

**ASSESSMENT OF THE EFFECTIVENESS OF
ENVIRONMENTAL SANITATION IN THE CONTROL OF
MALARIA IN EKOSODIN COMMUNITY IN OVIA NORTH
EAST LOCAL GOVERNMENT AREA OF EDO STATE**

**UGBO Beauty
EDU1603427**

**DEPARTMENT OF HEALTH, SAFETY AND ENVIROMENTAL
EDUCATION
FACULTY OF EDUCATION
UNIVERSITY OF BENIN
BENIN CITY**

JULY, 2021

**ASSESSMENT OF THE EFFECTIVENESS OF
ENVIRONMENTAL SANITATION IN THE CONTROL OF
MALARIA IN EKOSODIN COMMUNITY AT OVIA NORTH
EAST LOCAL GOVERNMENT AREA OF EDO STATE**

**UGBO Beauty
EDU1603427**

**A RESEARCH PROJECT SUBMITTED TO THE
DEPARTMENT OF HEALTH, SAFETY AND ENVIROMENTAL
EDUCATION, FACULTY OF EDUCATION, UNIVERSITY OF
BENIN, BENIN CITY. IN PARTIAL FULFILMENT OF THE
REQUIREMENTS FOR THE AWARD OF BACHELOR OF
SCIENCE B.SC (ED) DEGREE IN ENVIRONMENTAL
EDUCATION, UNIVERSITY OF BENIN, BENIN CITY,
NIGERIA.**

JULY, 2021

CERTIFICATION

We, the undersigned certified that **UGBO Beauty** with the matriculation number **EDU1603427** of the Department of Health Safety and Environmental Education carried out this work in partial fulfillment of the requirement for the award of bachelors of Science Degree (Bsc./Ed) in Environmental Education

Mrs. J.U Don

Project Supervisor

Date: _____

Dr. S.O.Olikiabor

Project coordinator

Date: _____

Prof. E.O.S. Iyamu

Dean, Faculty of Education

Date: _____

DEDICATION

This research work is dedicated to GOD ALMIGHTY for His unending grace, love and mercy all through the course of this programme

ACKNOWLEDGEMENTS

The successful completion of this research project goes to numerous persons whom the researcher owes profound gratitude.

Most importantly, the researcher is particularly grateful to God for his unfailing love towards the researcher and for enabling her to complete her degree programme.

She also wishes to express her sincere gratitude to her supervisor Mrs. J.U. Don for her guidance, assistance, words of encouragement and profitable suggestions which has led to the completion of this research work. Indeed I pray that God will grant her heart desires.

She is also grateful to all the lecturers in the Department of Health, Safety and Environmental Education for their useful contributions and suggestions.

To the Head of Department of Health Safety and Environmental Education Dr. E.I. Igudia and other lecturers as follows Dr. (Mrs.). A.J. Agbonifoh, Dr. T.O. Akingbade, Dr. H.O. Obasuyi, Mrs. O.O. Egbochukwu, Mrs. M. Onobumeh, Mrs. Timbiri Elizabeth B. in the Department, for impacting her throughout her course of study.

The researcher also must of necessity express her unreserved and unflinching profound appreciation to her parents Mr Felix and Mrs Patient Ugbo for their support financially, morally and spiritually. Her Profound Gratitude also goes to her siblings, Mr and Mrs Jerry and to all my friends Monies, Faith, Praise, Victory, Fidelis, Festus. I love you all. To as many whose names as have not been mentioned, God bless you all.

TABLE OF CONTENTS

	PAGE
TITLE	
CERTIFICATION	iii
DEDICATION	iv
ACKNOWLEDGEMENTS	v
ABSTRACT	ix
CHAPTER ONE: INTRODUCTION	
Background of the Study	1
Statement of the Problem	5
Research Questions	6
Purpose of the Study	7
Significance of the Study	8
Scope/Delimitation of the Study	8
Limitation of the Study	9
CHAPTER TWO: REVIEW OF RELATED LITERATURE	
Concept of Malaria	10
Environmental management and Malaria	17
Malaria Control Measures	18
Vector Abatement	19
Progress in Malaria Control	20
Malaria and other mosquito- borne diseases	27
Environmental Sanitation Practice	30
CHAPTER THREE: METHOD OF THE STUDY	
Research Design	31
Population of the Study	32
Sample and Sampling Technique	32
Research Instrument	32

Validity of Instrument	33
Reliability of the Instrument	33
Method of Data Collection	33
Method of Data Analysis	34

CHAPTER FOUR: PRESENTATION OF RESULTS AND DISCUSSION OF FINDINGS

Presentation of Results	35
Discussion of Findings	45

CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATIONS

Summary	49
Findings	49
Conclusion	50
Recommendations	51
Suggestions for Further Study	52
References	52
Appendix	55

ABSTRACT

This study was carried out to determine the effectiveness of environmental sanitation in the control of malaria. The study is to assess the effectiveness of environmental sanitation in the control of malaria in the Ekosodin community, to examine different measures adopted by the residents of Ekosodin dwellers in the control of malaria, to examine how well the residents practice environmental sanitation in Ekosodin community and to assess the level of effectiveness of environmental sanitation in the control of malaria in Ekosodin community.

Descriptive Survey research design was adopted for the study and a purposive sampling technique was used in selecting the sample population in the rural community. A representative sample of eighty (80) rural dwellers of the Ekosodin community was chosen for the study. A questionnaire containing twenty (20) items was constructed and administered to the respondents. The results obtained from the data collected from the respondents was analyzed using frequency and mean.

The Result of the study revealed that most Ekosodin residents community have a good knowledge about malaria, they also have low level of practice measures to control mosquito in their surroundings as poor drainage construction, lack of adequate bush clearing were identified to be prevalent. It is therefore recommended that Health education programmers should be organized to enlighten the community members on importance of environmental sanitation practice in the prevention and control of malaria. Community leaders should ensure community participation in environmental sanitation practice in Ekosodin Community.

CHAPTER ONE

INTRODUCTION

Background to the Study

Malaria also called plasmodium infection is a disease caused by a plasmodium parasite, transmitted by the bite of infected mosquitoes. The severity of malaria varies based on the species of plasmodium. It is a life-threatening disease caused by parasites that are transmitted to people through the bites of infected female Anopheles mosquitoes. It is preventable and curable.

In 2019, there were an estimated 229 million cases of malaria worldwide, the estimated number of malaria deaths stood at 409 000 in 2019, also children aged under 5 years are the most vulnerable group affected by malaria; in 2019, they accounted for 67% (274 000) of all malaria deaths worldwide (World Health Organization, 2020). The African Region of the World Health Organization has a proportionately high share of the global malaria burden. In 2019, the region was home to 94% of malaria cases and deaths (WHO, 2020).

According to an excerpt from WikiEducator (2014), it was stated that malaria is the most common disease in Africa. It is also the number one

cause of death among young children and a significant cause of miscarriages among pregnant mothers. About 95% of children brought to health facilities with fever suffer from Malaria. A significant amount of suffering, complications and death due to malaria can be prevented through prompt and correct treatment and prevention measures.

Malaria has symptoms which could be mild or severe, a malaria infection is generally characterized by the following signs and symptoms; fever, chills, headache, nausea and vomiting, muscle pain and fatigue. Other signs and symptoms may include; sweating, chest or abdominal pain, cough (Mayo Clinic, 2020).

Malaria which is a serious public health problem in many parts of the world especially in sub-Saharan Africa where over 90% of the illness which occur can be prevented or controlled successful such that the morbidity and mortality rate will be reduce to the least. Experts in the field of health have recommended various effective ways it can be controlled; an integrative approach has been recommended to mitigate the spread of malaria parasites. One of such strategy or approach is the Integrated Vector Management (IVM) through a combination of biological and chemical methods (WHO, 2021). IVM is aimed at

improving ecological soundness and sustainability for the control of vector-borne diseases, improve efficacy and cost effectiveness (Zachaeus & Amadi, 2012). Components of IVM include the use of preventive measures (such as use of mosquito repellents, long lasting insecticide-treated nets (LLINs) and wearing of protective clothing) and chemical control methods (e.g. Environmental and biological control measures, outdoor spraying, larviciding and indoor residual spraying). Other malaria control strategies recommended by WHO for the control of malaria include; Insecticidal Treated Nets (ITNs) use, Indoor Residual Spraying (IRS) and prompt management of malaria cases with Artemisinin-based Combination Therapies (ACTs) (WHO, 2008).

Following the above, it is pertinent to consider an alternative means of control of malaria, one of such means is environmental sanitation as mosquito which is the vector of malaria breeds well in a dirty and unkempt environment. The Merriam Webster Dictionary (2020) defined environment as the complex of physical, chemical, and biotic factors (such as climate, soil, and living things) that act upon an organism or an ecological community and ultimately determine its form and survival, it is

the circumstances, objects, or conditions by which one is surrounded. Environment from the foregoing is simply every component that makes up our surrounding; the need to keep our environment clean cannot be overemphasized. According to Nunn and Dracup, (2016) the environment has a huge potential to increase the risk of cross infection, therefore a clean and safe environment is essential. In 2012, an estimated 12.6 million deaths globally were attributable to the environment. The air we breathe, the food we eat, the water we drink, and the ecosystems which sustain us are estimated to be responsible for 23 per cent of all deaths worldwide (United Nations Environment Programm, 2010), the information above reveals that the environment is a contributive factor to human health. With regards to the control of malaria environmental sanitation is a sine qua none

In its modern concept, environment includes not only water, air and soil but also the social and economic conditions under which we live (Park, 2011). The key to man's health lies largely in his environment. In fact, much of man's ill-health can be traced to adverse environmental factors such as water, soil and air pollution, poor housing conditions, presence of animal reservoir and insect vectors of diseases which pose threats to

man's health.

From a triad perspective which includes the agent, host and environment, researchers and scholars have encouraged the source reduction, elimination and eradication of mosquitoes breeding sites by concentrating on the environment. These tend to be essential because, the proliferation of mosquitoes continually perpetuate the transmission of malaria. So, it can be postulated that if the sources of mosquitoes breeding sites is eradicated or eliminated, malaria would be drastically reduced. This implies that good environmental sanitation practices could help mitigate malaria transmission, promote healthiness and improve quality of life of the populace.

Statement of the Problem

Malaria is indeed one of the world's most deadly and life threatening parasitic diseases. Dougnon (2015) reported that it is one of the world's deadliest diseases affecting people particularly in tropical and subtropical regions of the world.

In areas of endemicity such as Nigeria, it poses a major problem to both human capital, economic development among others factors. It has been

estimated to cause death of two million children globally per annum. Malaria is a common disease with public health challenges. Globally, nearly 50% of the world's population (3.28 - 3.4 billion people) live in areas at risk of malaria infections (Tyndall, 2012; Orok, 2016), which are distributed in 106 nations.

A disease with such a ravaging power as provided by statistics need to be curtail to the minimal as male, female, children, economy of the nation is being threatened by it. One of the ways however to curtail this disease is through environmental sanitation - by ensuring there's no breeding place for the vector to thrive in. It is in line with this, that this study is carried out to assess the effectiveness of environmental sanitation in the control of malaria in Ekosodin Community.

Research Questions

The study sought to answer the following questions.

1. What level of knowledge do the residents of Ekosodin Community have about malaria?
2. What are the various measures adopted by the residents of Ekosodin Community in the control of malaria?

3. How well does the residents of Ekosodin Community practice environmental sanitation?
4. What level of effectiveness does environmental sanitation have in the control of malaria in Ekosodin Community?

Purpose of the Study

The purpose of the study is to assess the effectiveness of environmental sanitation in the control of malaria in Ekosodin Community at Ovia North East Local Government Area of Edo State. Specifically, the study will find out;

- What the residents of Ekosodin Community know about malaria
- Examine different measures adopted by the residents of Ekosodin Community in the control of malaria
- How well the residents practice environmental sanitation in Ekosodin Community.
- Assess the level of effectiveness of environmental sanitation in the control of malaria in Ekosodin Community.

Significance of the Study

The study will assess the effectiveness of environmental sanitation in the control of malaria in Ekosodin Community is significant in that the result of this study will elicit information that would educate the public within Edo State on the importance of environmental sanitation. It will heighten the need for Ekosodin residents and beyond to adhere strictly to various methods of control of malaria.

Also the Ministry of Environment will find more reasons to carry out their duties judiciously, the Ministry of Information is not left out as the need for sensitization of the public on the causes, effects and control of malaria will be exposed.

Scope/Delimitation of the Study

The study was delimited to; assess the effectiveness of environmental sanitation in the control of malaria in Ekosodin Community. Only the residents of Ekosodin Community are captured in this research study.

Limitation of the Study

The limitation of this study is the inability of some of the residents to read and comprehend as Ekosodin Community is a rural Community with a majority of less educated individuals.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

- **Concept of Malaria**
- **Environmental Management and Malaria**
- **Malaria Control Measures**
- **Vector Abatement**
- **Progress in Malaria Control**
- **Malaria and other Mosquito-Borne Diseases**
- **Environmental Sanitation Practice**
- **Summary of Related Literature Review**

Concept Framework

All over the world, poor environmental quality is increasingly recognized as a major threat to social and economic development and even to human survival (Acheampong, 2010). The impacts of environmental deterioration are severe on developing countries thus hindering and undermining their development (Bello, 2007). The world Health Organization (WHO, 2008) defined environmental sanitation as the control of all those factors in man's physical environment, which exercise

or may exercise a deleterious effect on his physical development, health and survival. According to Tecer (2007), environmental deterioration, extinction, or pollution in many vital earth systems such as air, water, soil, forest and biological diversity have required countries to develop policies for protecting and developing the earth and promoting global cooperation on these issues. Atasoy (2005) stated that environmental problems have become globalized and have reached the stage where they present a threat to life on earth.

Malaria continues to be a serious public health problem in sub-Saharan Africa (Bhatt & Weiss, 2015) and affects the health and wealth of nations and individuals alike (Weil, 2015). Children aged less than five years and pregnant women are the people most vulnerable to dying of malaria or suffering serious consequences of the disease, especially in regions where transmission is intense (Gonzalez, 2016). Children are most vulnerable because they have not yet acquired immunity to the disease, while maternal susceptibility to malaria infection during pregnancy may be related to the physiological immunosuppression that occurs during gestation. In children under five, the adverse effects include convulsions, anaemia, coma, and death. In Ghana, preventing malaria is of prime

importance in reducing the rates of morbidity and mortality (Kimbi, 2014). Malaria is actually responsible for about 31% of consultations, 44% of hospitalizations, and 18% of deaths occurring in health facilities in the country (Kimbi et al., 2014). In children less than 5 years, 41% of deaths are due to malaria (Kimbi et al., 2014). If malaria is appropriately prevented, the individual, family, and the state will save lots of resources that will improve the standards of living of the general population (Kimbi, 2014).

Malaria is unique among diseases because its roots lie so deep within human communities (Heggenhougen & Vivek, 2003). Beliefs and practices related to malaria are often associated with culture and can influence the effectiveness of control practices (Adera, 2003). Similarly, Kimbi et al., (2014) note that the practice of malaria preventive is related to the level of knowledge and belief of people. The understanding of the possible causes, modes of transmission, and decision about adoption of preventive and control measures vary from community to community and among individual households. Nkuo-Akenji et al. Akenji et al, (2005) reported that an adequate knowledge of mothers of under-fives about malaria has a great correlation with reduced morbidity and mortality

among children less than five years. However, a lot of misconceptions concerning malaria still exist. Thus, local knowledge and practices related to malaria are important for the implementation of culturally appropriate, sustainable, and effective interventions (Vijayakumar, 2009). Malaria cannot be controlled by the health sector alone; therefore, multiple strategies must be pursued with other health related sectors. In view of this, Ghana implemented interventions to help in the control of the deadly disease. Some of the interventions applied included residual insecticide application against adult mosquitoes, mass chemoprophylaxis with Pyrimethamine medicated salt, and improvement of drainage system. But malaria continued to be the leading cause of morbidity (illness) in the country [9]. Overall, the Ghana Roll Back Malaria programme emphasizes the strengthening of health services through multi- and intersectoral partnerships and making treatment and prevention strategies more widely available [Ghana Health Service (GHS), National Control Programme, 2017.]

Government has taken several initiatives in the prevention of malaria and these include the free distribution of Long Lasting Insecticide Treated Nets (LLITNs) to pregnant women and children five (5) years and below,

the subsidizing of the cost of LLITNs to the rest of the population, the subsidizing of the cost of artemisinin-based combination therapy used as first line treatment for uncomplicated malaria cases, and training in the community of local health assistance capable of managing uncomplicated malaria cases and providing adequate advices [Ghana Health Service (GHS), National Control Programme, 2017.]

Despite the measures put in place by the government and its partners, malaria still remains a public health concern, a major cause of mortality and morbidity especially in pregnant women, nursing mothers, and children under five years in Ghana (Awine et al., 2017). In the Volta region of Ghana, malaria topped the morbidity indicators recording 617,191 cases representing 40.96% of the total Outpatient Department (OPD) attendance (GSS, 2010). Ho municipality recorded 70,567 cases in 2014 (Ho Municipal Health Directorate, 2016). From Ho Polyclinic annual review (2016), 70% of the malaria cases reported come from Godokpe community. Significant numbers of such cases were recorded in both pregnant women and nursing mothers. With the above figures showing devastating rate of malaria infection in Ho municipality, this study seeks to investigate the awareness of malaria prevention among

people living in Godokpe community.

In 2010, the UN General Assembly recognized access to safe and clean drinking water and sanitation as a human right, and called for international efforts to help countries to provide safe, clean, accessible and affordable drinking water and sanitation. World Health Organization (WHO, 2021) recently reported that Some 827 000 people in low- and middle-income countries die as a result of inadequate water, sanitation, and hygiene each year, representing 60% of total diarrheal deaths. Poor sanitation is believed to be the main cause in some 432 000 of these deaths. Malaria transmission is endemic in the majority of the country, as sustained transmission of the disease occurs either throughout the year or seasonally (MARA/ARMA 2002). Numerous factors interact to influence transmission levels in a given area including macro- and micro-environmental conditions, socioeconomic factors, vector abundance and parasite loads, and level of compliance with malaria control policies. Environmental conditions play an important role in the transmission of malaria, as the amount of stagnant or slow-moving water in an area is a strong determinant of abundance of the Anopheles mosquito vector. The presence and amount of water in an area is

dependent on both macro-environmental factors such as climatic conditions (temperature and rainfall), and micro-environmental factors such as local topography, and human land use and management (for example irrigation systems). Environmental management is a promising technique for vector control, as it alters these micro-environmental conditions in order to decrease the available breeding habitat for mosquitoes by removing stagnant or slow-moving water sources. It is estimated that 42% of the malaria burden in Sub-Saharan Africa could be prevented by environmental management (Pruss-Ustun & Corvalan, 2006).

Human activities play an important role in influencing the transmission of infectious diseases, including malaria (Patz et al 2004; Sattenspiel 2000; Weiss & McMichael 2004). Human-induced micro-environmental changes, such as the construction of irrigation schemes and dams, have been shown to dramatically increase mosquito populations in an area by creating new breeding habitat (Ijumba et al 2002; Mutero et al 2004). Malaria is thus a particular problem in agricultural areas, as land use changes implemented to improve crop yields often result in an increased presence of surface water. Environmental management is an important

component of malaria control, as it can be used to regulate these micro-environmental conditions, reducing the amount of slow-moving water present in an area, and thus creating land less suitable for sustaining mosquito populations. This method has been successful in reducing the malaria burden in many different ecological, socioeconomic, and epidemiological conditions (Utzinger et al 2001).

Environmental Management and Malaria

Environmental management consists of installing and maintaining drains, removing pools of stagnant water, managing vegetation, irrigating intermittently, and altering rivers to create faster flowing water (Keiser et al 2005). In Ethiopia, reduction of mosquito breeding grounds through environmental management has been shown to significantly reduce mosquito abundance in surrounding areas (Yohannes et al 2005). A study in a rice-growing area of Sri Lanka found that after the implementation of a community-based ecosystem management program to control mosquitoes, the abundance of adult *Anopheles* was significantly lowered during the rainy season (Yasuoka et al 2006a). Additionally, in Zambia it has been shown that shortly after the implementation of a large-scale environmental management program, annual incidence of

malaria was halved among the affected community. This form of malaria control is relatively inexpensive, is simple for local communities to implement and maintain, and is not harmful to the local environment or human (Keiser et al 2005). Additionally, community approval and involvement has been seen as a necessary component of malaria control in today's more democratic Africa (Mukabana et al 2006).

Community-implemented environmental management programs are therefore an important bottom-up component to the largely top-down system of disease control, acting as a beneficial addition to methods such as insecticide-treated net (ITN) use and indoor residual spraying (IRS). Adah (2013) asserts that the issue of environmental sanitation is nationwide, but the degree of attitude varies.

Malaria Control Measures

Vector abatement

Vector control measures aim to reduce the transmission of disease by reducing the number of animals and insects that act as vectors for disease transmission, or by reducing interactions between animal and disease vectors, and people. Vector-borne diseases, such as malaria, are preventable and curable, and yet malaria caused more than 580 000 deaths

in 2013, mostly among African children WHO, (2016). This section focuses on mosquito and rodent control, although region-specific health threats may also require attention to vectors such as cockroaches, or sand and tsetse flies.

Despite its effectiveness in malaria control, some countries may face pressure to reduce IRS in order to eliminate the use of DDT. DDT is a closely regulated and cost-effective insecticide that has been controversial in malarial control efforts. The Stockholm Convention on Persistent Organic Pollutants expressly allows the use of DDT for disease control purposes

Progress in malaria control

Stockholm Convention on Persistent Organic Pollutants, (2004) reported that, in some countries, the replacement of DDT with other insecticides has compromised malaria control programs. Following a risk assessment, WHO (2011) published an updated position statement that confirms the necessity of the use of DDT, in accordance with the requirements of the (subject to reporting to the Secretariat).

In 2015 there were an estimated 214 million new cases of malaria, and

438 000 deaths. WHO (2016), asserts that although the estimated malaria mortality rate has fallen by 60% since 2000, a child still dies from malaria every two minutes.³⁴ In recent years, a number of countries have been certified as malaria-free. These include the United Arab Emirates (2007), Morocco (2010), Turkmenistan (2010) and Armenia (2012). Nevertheless, in 2015, 95 countries and territories had cases of malaria transmission. (World Malaria Report, 2015) In the WHO African Region, between 2000 and 2015, malaria mortality declined by 48%.

Nevertheless, in 2015, most cases of malaria (88%), and most deaths (90%) still occurred in this region. The longer lifespan and stronger tendency of African mosquito species to bite humans explains why around 90% of malaria deaths occur in this region (WHO, 2015).

Malaria and other mosquito-borne diseases

WHO's Global Technical Strategy for Malaria 2016–2030 encourages countries to move towards malaria-free status by adopting a strategy based on three pillars (WHO, 2015).

The first pillar involves universal access to measures for the prevention, diagnosis and treatment of malaria. This means universal coverage of malaria control interventions for all populations at risk, including indoor

residual spraying (IRS), and the distribution of long-lasting insecticide-treated nets (LLINs) in high-burden areas. IRS and LLINs are the “two core, broadly-applicable vector control interventions” for effective malaria control (WHO, 2015). Better outcomes have been achieved when LLINs are distributed for free or at subsidized cost. In areas with seasonal transmission patterns, distribution of LLINs should be focused on areas at highest risk due to climatic conditions or lack of access to health services.

Public education on LLINs is critical to reduce improper and sporadic use (or no use at all), re-selling, improper washing practices, and/or failure to replace damaged nets. IRS is also an effective means of vector control in areas where the majority of the population sleeps and rests indoors and where a high percentage of homes have spray-able surfaces. In areas where this is not the case, other strategies include larviciding (where vectors breed in permanent or semi-permanent bodies of water), environmental management, window screens and area spraying during peak vector activity time. Effective vector control should be complemented by preventive courses of antimalarial medication for the most vulnerable groups (including pregnant women and infants),

universal diagnostic testing for all suspected cases, and quality-assured treatment of all confirmed cases. In order to prevent drug resistance, the World Health Assembly has urged Member States to cease progressively the provision in both the public and private sectors of oral, artemisinin-based monotherapies and to promote the use of artemisinin-based combination therapy. The WHO strategy urges regulatory authorities to ensure that artemisinin-based monotherapies are removed from health facilities, pharmacies and the private market.

The second pillar of WHO's malaria strategy involves accelerating efforts towards malaria-free status and elimination of malaria in low-transmission settings. This includes strengthening the epidemiological surveillance of malaria, with compulsory notification of all confirmed cases, and a ban on the sale of over-the-counter antimalarial medicines to prevent inappropriate use. The elimination of malaria requires a multisectoral approach, with renewed political commitment and enhanced regional collaboration. The third pillar involves upgrading malaria surveillance within all national and subnational malaria strategies, and investing in health information systems to support surveillance.

The Roll Back Malaria Partnership, hosted by WHO between 1998 and

2015, is made up of more than 500 partners including malaria-endemic countries, OECD donor countries, multilateral development partners, foundations, the private sector, nongovernmental organizations and researchers (Roll Back Malaria, 2016). Since 2013, these efforts have been strengthened by the Multisectoral Action Framework for Malaria, which recognizes that malaria is a symptom of low levels of human development, and aims to accelerate malaria control by integrating it within strategies for social and economic development. (New York, UNDP and Geneva, Roll Back Malaria, 2013) said that, financing plays an important role in the Multisectoral Action Framework, including the provision of financial support for the costs of malaria interventions incurred directly by households..

Also Public health law can support national programs to control mosquito-borne illnesses in several important ways. For example, legislation can mandate vector surveillance and the provision of public education programs, and give local health authorities a clear mandate to take all such actions as are necessary to fully implement national malaria control strategies. There may be benefits in incorporating environmental management strategies directly into public health regulations, and

including a requirement for provincial health officers to educate local populations about vector control requirements. Provincial health officers should have a duty to report annually in an independent manner, and to issue reports at other times as necessary.

Vector control remains the most generally effective measure to prevent malaria transmission and is therefore one of the four basic technical elements of the Global Malaria Control Strategy (GMCS). Which are;

- I. to provide early diagnosis and prompt treatment of malaria;
- II. to plan and implement selective and sustainable preventive measures, including vector control;
- III. to detect early, contain or prevent epidemics;
- IV. to strengthen local capabilities in basic and applied research to permit and promote the regular assessment of a country's malaria situation, in particular the ecological, social and economic determinants of the disease.

The current malaria control strategy calls for the selection of those control measures which are most appropriate to local circumstances and capabilities and malaria risk. Vector control measures vary considerably in the scope of their applicability. Table 2.1, adapted from Bruce-Chwatt

(1985), lists the currently available control measures according to their effect and indication for community or personal protection.

Table 2.1 Malaria vector control measures

Action	For individual and family protection	For community protection
Reduction of human-mosquito contact	Insecticides treated nets, repellants, protective clothing, screening of houses	Insecticides treated nets, zooprophylaxis
Destruction of adult mosquitoes		Insecticides treated nets, indoor residual spraying, space spraying, ultra-low volume sprays
Destruction of mosquito larvae	Peri-domestic sanitation	Larviciding of water surface, intermittent irrigation, sluicing, biological control

Source reduction	Small-scale drainage	Environmental sanitation, water management, drainage
Social participation	Motivation for personal and family protection	Health education, community participation

Vector control issues and challenges IRS remains the main method of vector control. WHO's position statement on the use of DDT in malaria control Indoor residual spraying (IRS) using DDT is an important intervention for malaria control. From 12 insecticides recommended by World Health Organization for IRS, DDT has the longest residual efficacy against malaria when sprayed on walls and ceilings (6–12 months). WHO's position statement concludes: DDT is still needed and used for disease vector control simply because there is no alternative of both equivalent efficacy and operational feasibility, especially for high-transmission areas. The reduction and ultimate elimination of the use of DDT for public health must be supported technically and financially. It is essential that adequate resources and technical support are rapidly allocated to countries so that they can adopt appropriate measures for

sound management of pesticides in general and of DDT in particular. There is also an urgent need to develop alternative products and methods, not only to reduce reliance on DDT and to achieve its ultimate elimination, but also to sustain effective malaria vector control.

Challenges for the appropriate use of IRS include refusal of spraying; replastering of sprayed surfaces; vector resistance, avoidance and exophily; poor planning; poor quality house coverage; rising cost of insecticides to replace DDT where there is DDT resistance; agricultural use of insecticides leading to a faster development of resistance to insecticides; mass destruction of houses in earthquakes etc., all of which may impede IRS. The use of ITNs is being scaled up and large-scale community-supported ITN programs. Vector control measures aim to reduce the transmission of disease by reducing the number of animals and insects that act as vectors for disease transmission, or by reducing interactions between animal and disease vectors, and people. Vector-borne diseases, such as malaria, are preventable and curable, and yet malaria caused more than 580 000 deaths in 2013, mostly among African children

Environmental Sanitation Practice

Environmental sanitation practices refer to residents' involvement in provision, utilization, and maintenance of environmental sanitation facilities and services and adherence to environmental legislation (Daramola, 2015). General access to environmental sanitation facilities and services by citizens remains very poor (Akpabio, 2012). The living environment is well polluted owing to social misdemeanor of indiscriminate littering, improper domestic wastewater discharge, and poor sewage disposal. These behaviors promote unsanitary living conditions which result in the breeding of communicable diseases (Adimekwe, 2013).

Poor environmental sanitation practices exhibited in the disposal of solid waste, wastewater and excreta, cleaning of drainage including personal, household and community hygiene significantly contribute to infant and child mortality (Amadi and Iwuala, 2005).

Environmental sanitation comprises the disposal and treatment of human excreta, solid waste and wastewater, control of disease vectors, and provision of washing facilities for personal and domestic hygiene which work together to form a hygienic environment (Schertenleib et al, 2005).

Improved environmental condition affects positively a wide range of development indicators. Thus, environmental sanitation is a channel to improved quality of life of the individuals and a contributor to their social, economic and physical development (Olowoporoku, 2013). Numerous studies have shown that the incidence of many diseases is reduced when people have access to, and make regular use of adequate sanitary installations (Aremu, 2012; Mohammed, 2011).

Nevertheless, most of these deaths are preventable through adequate environmental sanitation practices. Nigerian cities are characterized by rapid population growth which is not accompanied by a corresponding increase in the delivery of environmental sanitation facilities and services capable of enhancing environmental sanitation practices. The resultant effects of these are unsanitary and unhealthy environmental conditions that are prevalent in Nigerian urban centers (Daramola, 2012). In order to achieve proper environmental sanitation practices, good sanitation behaviour and availability of facilities and services must work in unison (Mmom and Mmom, 2011). As it is in other environmental management activities, environmental sanitation practices are influenced by various factors (Willuweit, 2009). These include social, economic and

demographic attributes, such as age, income, gender, education, household structure; situational conditions. Others include level of information, religious participation, enabling law and place of residence.

Summary Related Literature Review

Adequate environmental sanitation practices are more than just an inconvenience. It allows users knowledge and experience to the design and management of facilities and services and to increase the likelihood that the services will be used sustainably.

Large-scale environmental management programs helped reduce malaria

CHAPTER THREE

METHOD OF THE STUDY

This chapter describes the method and procedure used by the researcher in conducting the study. It is presented under the following Sub headings;

- ❖ Research Design
- ❖ Population of the study
- ❖ Sample and sampling Techniques
- ❖ Research Instrument
- ❖ Validity of the Instrument
- ❖ Reliability of the instrument
- ❖ Method of Data Collection
- ❖ Method of Data Analysis

Research Design

The research design that was employed in this research is a descriptive survey research design. According to Omorogiuwa (2012), this form of design allows a researcher to study a group of persons or items by

collecting and analyzing data from a few persons or items considered to be representative of the entire population.

Population of the Study

The population for the study was two thousands and sixty – four (2,064) residents in Ekosodin community, Ovia North East LGA. It was made up of the residents of Ekosodin Community (National Population Commission, 2021).

Sample and Sampling Technique

The sample for the study was eighty (80) respondents and this was drawn using the systematic sampling technique which was used to select the first and every other third street in Ekosodin Community.

The systematic sampling technique was also used to select the first house and every other third house on the street.

The purposive sampling technique was then use to select residents above 18 years of age as the respondents for the study

Research Instrument

The instrument for the study is a questionnaire of 20 items used to elicit information from respondents. The questionnaire will be divided into two sections. Section A, covers the demographic background of the

respondents while Section B, will consist of items related to the research questions.

Validity of the Instrument

The instrument was subjected to face validity by the researcher's supervisor and two other experts in the Department of Health, Safety, and Environmental Education. Their correction and criticism will be incorporated into the final draft of the instrument.

Reliability of the Instrument

To determine the reliability of the instrument, the test-retest method of estimating the reliability of an instrument will be used. Consequently, the constructed instrument was administered on a group of twenty (20) pregnant women who are not part of the study. The instruments will then be re-administered after two weeks. Correlation of the response will be determined using the Pearson's Product Moment Correlation Coefficient.

Method of Data Collection

The researcher will personally administer the instrument to the respondents with the aid of two (2) researches assistant. The questionnaires to be completed by the respondent will be retrieved immediately upon completion to ensure 100% recall.

Method of Data Analysis

The data gathered through the questionnaire will be analyzed using frequency counts, and percentage.

CHAPTER FOUR

PRESENTATION OF RESULTS AND DISCUSSION OF FINDINGS

The purpose of this chapter is to report, illustrate and discuss the result of the research. It involves the presentation and analysis of the data generated in the course of the research. This analysis was made using frequency count and simple percentage. The presentation and analysis were also made in line with the research questions raised in chapter one. The results of this finding are also discussed.

Presentation of Results

Section A: Demographic Information

Table 1: Gender

Gender	Frequency	Percentage {%}
Male	38	47.5
Female	42	52.5
Total	80	100

From the table 1 above it was found that 47.5% of the respondents are male while 52.5 % of the respondents are females

Table 2: Age

Age in Years	Frequency	Percentage {%
18 – 28	49	61.2
29 – 39	27	33.7
40 – 50	4	5
51 above	Nil	Nil
Total	80	100

Table 2 showed that 61.2% of the respondents are between 18 – 28 years of age, 33.7% of the respondents are between 29 – 39 years of age, while 5% of the respondents are between 40 – 50 years of age, finally there was no responses age bracket of 51 years and above.

Table 3: Highest Educational Level

Education	Frequency	Percentage {%
No Formal Education	11	13.7
Primary Education	Nil	Nil
Secondary Education	7	8.75
Tertiary Education	62	77.5

Total	80	100
--------------	----	-----

Table 3 showed that 13.7% of the respondents have no formal education, none of the respondents had primary school as their highest level of education, 8.75% of the respondents have SSCE as their highest level of education, while 77.5% of the respondents have tertiary education. It can therefore be discovered that majority of the population are educated to tertiary level of education.

Table 4: Highest Educational Level

Occupation	Frequency	Percentage {%}
Trader	36	45
Entrepreneur	31	38.7
Civil Servant	13	16.2
Total	80	100

Table 4 showed 45% of the respondent are traders, while 38.7% of the respondent are entrepreneurs and 16.2% of the respondents are civil servants

Table 5: Religion

Religion	Frequency	Percentage {%}
Christian	34	42.5
Muslim	32	40
Traditional Religion	4	5
Total	80	100

Table 5 showed that 42.5% of the respondents are Christians while 40% and 5% of the respondent are traditional worshippers.

SECTION B: ANALYSIS OF RESEARCH QUESTIONS

Research Question 1: What level of knowledge do the residents of Ekosodin Community have about malaria?

1. Malaria is a deadly (a) sickness (b) fever (c) headache
2. Malaria is caused by (a) bush burning (b) mosquitoes (c) animals
3. Dirty environments can increase the breeding of (a) fish (b) chicken (c) mosquitoes
4. Malaria cannot be(a) prevented (b) inherited (C) cured

S/N	ITEMS	A (%)	B (%)	C (%)
1.	Malaria is a deadly ...	72 (90)	8 (10)	Nil
2.	Malaria is caused by ...	2 (2.5)	77 (96.2)	3 (3.7)
3.	Dirty environments can increase the breeding of....	Nil	4(5)	77 (96.2)
4.	Malaria cannot be ...	16 (20),	47(58.7)	17(21.2)

To item 1 above 72 representing 90% of the respondents assented option A and 8 representing 10% of the assented option B, while there was no response to option C.

To item 2 above 2 representing 2.5% of the respondents assented that bush burning is a cause of malaria, 77 representing 96.2% of the respondents assented that mosquito is a cause of malaria while 3 representing 3.7% of the respondents assented that animals cause malaria

To item 3 above, option B had 4 responses representing 5% and 77 respondents representing 96.2% assented to option C while option A had no respondents.

To item 4 above, option A had 16 respondents representing 20%, while option B had 47 respondents representing 58.7% and option C while option B had 17 respondents representing 21.2% assented to it.

Table 6: What are the various measures adopted by the residents of Ekosodin Community in the control of malaria

S/N	ITEMS	AGREED (%)	DISAGREED (%)
1.	There is proper drainage system to ensure there is no stagnant water in the surroundings	15 (18.7%)	65 (81.2)
2.	We clear the bushes in our surroundings	36 (45%)	44 (55)
3.	We use mosquito treated nets to prevent malaria	40 (50%)	40 (50)
4.	I use spray insectides in my house to control mosquitoes	60 (75%)	20 (25)
5.	We organize health education programmers on the prevention and control of malaria	15 (18.7%)	65 (81.2)

On the various measures adopted by the residents of Ekosodin Community in the control of malaria, 15(18.7%) of the respondent agreed that there is proper drainage system to ensure there is no stagnant water in the surroundings while 65(81.2%) of the respondents disagreed showing that there is no proper drainage system at Ekosodin community. 36(45%) agreed while 44(65%) of the respondents disagreed and strongly disagreed to clearing bushes in the surrounding, this reveals that there is low practices of bush clearing at Ekosodin by the residents.

40(50%) of the respondents agreed respectively to the use of mosquito net to protect themselves from mosquito bite while 40(50%)of the respondents disagreed,

60(75%) of the respondents agreed to the use of insecticide to control mosquito while 20 (25%) of the respondents disagreed to the item raised. It was therefore seen from the item that there is prevalent use of insecticide and mosquito treated nets in the control of mosquitoes at Ekosodin community, also it was discovered that there is use of mosquito treated nets in the control of malaria

Item 5 showed that there is a very low level of health education programmes on the prevention and control of malaria at Ekosodin as

15(18.7%) agreed to item 5 while 65(82.2%) disagreed.

In conclusion it can be seen that the residents of Ekosodin community have low level of practice or measures to control mosquito in their surroundings

Research Question 3

Table 8: How well does the residents of Ekosodin Community practice environmental sanitation?

S/N	ITEMS	AGREED	DISAGREED
		F (%)	F (%)
1.	I keep my house and surroundings clean every day to prevent malaria	62 (77.5%)	18 (22.5%)
2.	I do environmental sanitation week	15 (18.7)	65 (81.2)
3.	I do not carry out environmental sanitation because of my age	25 (31.2%)	55 (68.7%)
4.	I do not carry out environmental sanitation because my neighbors leaves it for only me to do it	37 (46.2)	43 (53.7)

5.	I do not engage in environmental sanitation because I don't know when they usually do in this community	42 (52.5)	38 (47.5)
----	---	--------------	--------------

From responses to item 1 the table above, it was seen that residents of Ekosodin community keep their surrounding clean to prevent malaria as 62 (77.5%) of the respondents agreed while 18 (22.5%) disagreed. 15 (18.7) of the respondents agreed to doing environmental sanitation while 65 (81.2) of the respondents disagreed to the item indicating that they do not carry out environment sanitation practices.

25 (31.2%) of the respondents said they do not carry out environmental sanitation because of their age while 55 (68.7%) of the respondents disagreed. 37 (46.2) of the respondents do not carry out environmental sanitation because my neighbors leaves it for only me to do it while 43 (53.7) of the respondents disagreed. 42 (52.5) of the respondents agreed that thy do not engage in environmental sanitation because I don't know when they usually do in this community while 17.5% and 10% of the respondents disagreed,

Research Question 4

Table 9: The effectiveness of environmental sanitation in the control of malaria in Ekosodin Community

S/N	ITEMS	AGREED F (%)	DISAGREED F (%)
1.	The mosquitoes in this community are too much	52 (65)	28 (35%)
2.	I am suffering malaria now	12 (15)	68 (85)
3.	I suffered malaria in the last one month	68(77.5%)	18 (22.5)
4.	I suffered malaria in the last 3 months	60 (75)	20 (25)
5.	I know someone in this community who is currently treating malaria	37 (46.2)	23 (53.7)

From the table above, 52(65%) of the respondents assented that mosquitoes in this community are too much, while 28(35%) of the respondent disagreed. 12(15%) of the respondents were suffering malaria

and 68(85%) of the respondents were not were suffering malaria during the course of the study. 62(77.5%) of the respondents strongly agree and agreed respectively that they suffered malaria in the last one month while 18(6.2%) and 16.2% responded not to have suffered malaria in the last one month.

In the same vein, 23.7% and 52.2% of the respondents strongly agreed and agreed respectively that they suffered malaria in the last 3 months. 22.5 and 23.7% of the respondents strongly agreed and agree respectively that they know someone in this community who is currently treating malaria while 38 (47.5) of the respondents disagreed to the statement.

Discussion of Findings

Results tabulated above were quite helping in obtaining information which the study sought to achieve.

From research question one, it was seen that the residents of Ekosodin community have a good knowledge about malaria as an average of 81% of the respondents gave the correct answers to the multiple choice questions as majority 72 (90%) of the respondents assented that malaria is a deadly disease, 77 (96.2%) of the respondents assented that mosquito is a cause of malaria, this

is in consonance with the study of Adedotun, Morenikeji, and Odaibo (2010) who had similar findings on good level of knowledge among the study population. In contrast to the findings Deressa, Ali, and Enquoselassie (2003) found out that knowledge of malaria and its control were observed to be low among the study population. Similarly, Mazigo, and Obasy had related findings on low level of knowledge among their study population

About 180 (90.0%) of the respondents reported any bed nets as the most common known protective method against malaria, while 128 (64.0%) respondent had knowledge of insecticide treated bed net (ITNs). Second most common known preventive measure was use of mosquito coils by 79 (37.8%) respondent. The knowledge of ways to prevent mosquito breeding, by cleaning of house surroundings was reported by 97 (48.5%) and draining of stagnant water by 58 (29.0%)

Responses to research questions two it can be seen that the residents of Ekosodin community have low level of practice of measures to control mosquito in their surroundings as poor drainage construction, lack of adequate bush clearing were identified to be prevalent. The common methods adopted in the control of mosquitoes at Ekosodin community were the use of insecticidal

treated nets and the spraying of insecticides. According to Singh, Musa, and Ukatu (2014), it found that about 180 (90.0%) of the respondents reported any bed nets as the most common known protective method against malaria, while 128 (64.0%) respondent had knowledge of insecticide treated bed net (ITNs). Second most common known preventive measure was use of mosquito coils by 79 (37.8%) respondent. Similarly, Abate, Degarege, and Erko (2013) found the use of bed net as a preventive measure against mosquito bite to be high among the respondents (90%) in their study. On the other hand Iriemenam, Dosunmu, and Oyibo (2011) found that the awareness of ITNs was high among respondents, but only 31.9% of respondents were actually using it as a preventing method for malaria.

Responses obtained from research question three which sought to find out how well the residents of Ekosodin Community practice environmental sanitation reveals that their practice of environmental sanitation was negative as the results indicated that just a few numbers of residents engaged in environmental sanitation practices. This is consistent with the findings of Alain (2017) noted that while 188 (41.8%) respondents claimed that they had drainage system around their houses, it was discovered from observation that only 136 (30.2%)

had drainage system around their homes; out of which 41 (30.1%) drains were in sanitary condition. Hence, the poor sanitary condition of most drainage systems observed in most homes presents significant level of health risks to the people residing in such environments as exposure to malaria is inevitable.

In the same vein [Jimmy Ebi Eko](#) (2017) noted that more than half of the respondents in a study conducted admitted that there were bushes and overgrown weeds/grasses in their surroundings; out of which 128 (41.8%) clean their surrounding monthly, 100 (32.7%) clean weekly and 45 (14.7%) only clean the surrounding whenever they choose or expect visitors. This result clearly indicates poor environmental sanitation practice despite the fact that the respondents reported that they clear their surrounding bushes to prevent malaria.

Research question four which sought to find out the effectiveness of environmental sanitation in the control of malaria in Ekosodin Community. This study found out that there is low level of environmental sanitation practices. There is therefore prevalence of mosquitoes in the community. According to Inah, Uwadiogwu, and Eko (2017) poor environmental sanitation practice has been strongly linked to high malaria transmission, morbidity and mortality rates especially in low and middle income countries. Findings in the

current study showed that most respondents recorded poor environmental sanitation practices.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATION

Summary

The study was carried out to assess the effectiveness of environmental sanitation in the control of malaria in Ekosodin Community. The study was guided by four research questions. Responses were elicited from the respondents using a self-structured questionnaire made up of 20 items. The Descriptive survey research design was adopted for this study and the population covers all the rural area dwellers in the Ekosodin community in Ovia north east local government area of Edo state. The sample size of 80 was achieved using the simple random sampling technique. The collection of data was carried out through the administration of structured questionnaire on 80 respondents. The data were analyzed, tabulated, interpreted and then discussed. Percentage and frequency were adopted as a method of data analysis.

Findings

The findings of the study therefore clearly revealed that

1. Ekosodin community have a good knowledge about malaria,
2. They have low level of practice measures to control mosquito in their surroundings as poor drainage construction, lack of adequate bush clearing were identified to be prevalent.
3. The Community practice on environmental sanitation revealed that their practice of environmental sanitation was negative as the results indicated that just a few number of residents engaged in environmental sanitation practices.

Conclusion

Malaria has been known to be one of the most common sickness affecting Nigerians and Africans in general, it has been and still a cause of death to so many individuals. Malaria has its vector to be the female anopheles mosquito which breeds faster and better in a dirty and unkempt environment. One of the effective ways of preventing malaria is to stop their breeding places; this can be done through good environmental sanitation practices. This study was carried to examine the effectiveness of environmental sanitation practices on the control of malaria in Ekosodin Community. The study found out that the residents of Ekosodin

community have a good knowledge about malaria. It was also found out that the residents of Ekosodin community have low level of practice of measures to control mosquito in their surroundings. The common methods adopted in the control of mosquitoes at Ekosodin community were the use of insecticidal treated nets and the spraying of insecticides. Lastly, the results obtained from the study revealed that there is yet prevalent rate of malaria at Ekosodin community

Recommendations

Following the findings of the study, the researcher recommends below;

1. There should be increased sensitization about the negative effect of mosquitoes in the environment.
2. Health education programmers should be organized to enlighten the community members on importance of environmental sanitation practice in the prevention and control of malaria.
3. Community leaders should ensure community participation in environmental sanitation practice in Ekosodin Community.
4. The use of Mosquito nets should be encouraged as this can help prevent mosquito bites which causes malaria.

5. Measures that will improve the quality of the environment such as waste disposal practices, clearing of gutters, proper drainage system should be taken up by the Government and Environmental sanitation agencies.

Suggestion for Further Studies

The Following Studies Was Suggested

1. Attitudes of residents in Ekiadolor Community towards environmental sanitation Practices
2. An Assessment Of Environmental Sanitation Practices In Ovbiogie Community Of Edo State.
3. Evaluation of malaria spread in relation to poor sanitation practices

REFERENCES

- Adera, T.D. (2003). Beliefs and traditional treatment of malaria in Kishe settlement area, South West Ethiopia. *Ethiop Med J.* 2003;41:25–34.
- Adongo, P.B., Kirkwood, B., & Kendall, C. (2005). How local community knowledge about malaria affects insecticide treated net use in northern Ghana. *Trop Med Int Health.* 2005;10:366–78.]
- Ako-Nai, K.A., & Adesiyun, M. (2012). Unusually High prevalence of malaria in a tertiary institution setting in South western Nigeria. *Int J Med.* 2012;7:121–9.
- Alabi, J.O. (2010). Nigeria & Environmental Sanitation http://Nigerianmasterweb.com/.../indexphp/2010/10/05/title_10. [Accessed April 2013].
- Alain Inah, Zacchaeus Uwadiogwu, & Jimmy Ebi Eko, (2017). Environmental Sanitation Practices on Malaria Control and Prevention in Abi Local Government Area, Cross River State, Nigeria. *Asian Journal of Medicine and Health* 6(2):1-12 DOI:10.9734/AJMAH/2017/34870
- Anunonwu. (2009). Evaluation of Environmental Sanitation in Owerri Municipal Council of Imo State. 2009. *Research Journal of Medical Sciences.* 3(4):137-140.
- Campbell, T.H., McDaniel, S.H., Cole-Kelly, K. (2002). Family issues in

- Health care. In: Taylor RB, editor. *Family Medicine Principles and Practices*. 6th ed. New York: Springer-Verlag; 2002. p. 24.
- Deressa, W., & Ali, A. (2003). Enquoselassie F. Knowledge, attitude and practice about Malaria the mosquito and antimalarial drugs in a rural community. *Ethiop J Health Dev*. 2003;17:99–104.
- Heggenhougen, H.K., Hackethal, V., & Vivek. P. (2003). The behavioural and social aspects of malaria control: An introduction and annotated bibliography. *World Health Organization on behalf of the Special Programme for Research and Training in Tropical Diseases*. 2003 TDR/STR/SEB/VOL/031.
- Idowu, J.O. (2012). Build environmental delay and health situation of slum dwellers in residential core of Akure. *American Journal of Human Ecology*. 2012;19(3), 41-48.
- Iriemenam, N.C., Dosunmu, A.O., Oyibo, W.A., & Fagbenro-Beyioku, A.F. (2011). Knowledge, attitude, perception of malaria and evaluation of malaria parasitaemia among pregnant women attending antenatal care clinic in metropolitan Lagos, Nigeria. *J Vector Borne Dis*. 2011 Mar; 48(1):12-7.
- Isah, E.C., & Okojie, O.H. (2007). Environmental Sanitation in an urban community in Benin city, Edo State, Nigeria *Postgrad Med J*, Mar; 14(1): 12-5.
- Mazigo, H.D., Obasy, E., Mauka, W., Manyiri, P., Zinga, M., & Kweka, E.J. (2010). Knowledge, attitudes, and practices about malaria and its control in rural northwest Tanzania. *Malar Res Treat*. 2010;2010:794261.
- Munguti, K.J. (1998). Community perceptions and treatment seeking for malaria in Baringo District, Kenya: Implications for disease control. *East*

Afri Med J. 1998;75:687–91.

Nigeria Malaria Fact Sheet United States Embassy in Nigeria Economic Section, United States Embassy in Nigeria, Abuja, Nigeria. 2011. [Last accessed on 2013 Aug 07]. Available from: <http://www.nigeria.usembassy.gov> .

Park, J.E. (2011). *Textbook of Preventive and Social Medicine*, 21st Edition, Bhanot Publishers, India

Pauline Nunn & Adrian Dracup. (2016). Importance of a safe and clean environment, Department of Health retrieved from <http://mrsaactionuk.net/Improvement%20Foundation/How%20important%20is%20a%20safe%20and%20clean%20environment.pdf>

Reigart, J.R., Roberts, J.R.. (1999). *Recognition and management of pesticide poisoning.* Fifth edition. Washington, United States Environmental Protection Agency, 1999 (<http://www.epa.gov/oppfead1/safety/healthcare/handbook/Front.pdf>, accessed 8 January 2013).

Rodriguez, A.D., Penilla, R.P., Henry-Rodriguez, M., Hemingway, J., & Francisco Betanzos, A., (2003). Knowledge and beliefs about malaria transmission and practices for vector control in Southern Mexico. *Salud Pública Méx.* 2003;45:110–6.

Statistical Year Book. *Kebbi State of Nigeria, Birnin Kebbi, Kebbi State.* 2007

Tyagi, P., Roy, A., Malhotra, M.S. (2005). Knowledge, awareness and practices towards malaria in communities of Rural, semi-rural and bordering areas of east Delhi, India. *J Vector Borne Dis.* 2005;42:30–5.

UNICEF and World Health Organization. (2012). *Progress on Drinking Water and Sanitation: update*, WHO Geneva

- United Nations Environment Programme, High mountain glaciers and climate change - Challenges to human livelihoods and adaptation (2010).
- Vijayakumar KN, Gunasekaran K, Sahu SS, Jambulingam P. Knowledge, attitude and practice on malaria: A study in a tribal belt of Orissa state, India with reference to use of long lasting treated mosquito nets. *Acta Trop.* 2009;112:137–42. [PubMed] [Google Scholar]
- WHO. World Malaria Report. (2008). Geneva: World Health Organisation; 2008.
https://www.researchgate.net/publication/318923776_Environmental_Sanitation_Practices_on_Malaria_Control_and_Prevention_in_Abi_Local_Government_Area_Cross_River_State_Nigeria
- WHO. *World Malaria Report (2012.)* Geneva: World Health Organization; 2012. p. xiii.
- World Health Organization - WHO (2020). Malaria
<https://www.who.int/news-room/fact-sheets/detail/malaria>
- World Health Organization. Equipment for vector control – specification guidelines. Revised version. Geneva, 2010
[\(http://www.who.int/whopes/equipment/en/](http://www.who.int/whopes/equipment/en/), accessed 8 January 2013
- World Health Organization. (2013). Pesticides and their application: for the control of vectors and pests of public health importance. Sixth edition. Geneva, 2006
http://whqlibdoc.who.int/hq/2006/WHO_CDS_NTD_WHOPEP_GCDP_P_2006.1_eng.pdf, accessed 10 January 2013)
- World Health Organization. (2013). Safe use of pesticides. Third report of the WHO Expert Committee on Vector Biology and Control. Geneva, 1979. WHO technical report series, 634: 17–18

(http://whqlibdoc.who.int/trs/WHO_TRS_634.pdf, accessed 8 January 2013).

APPENDIX

**UNIVERSITY OF BENIN,
BENIN CITY, EDO STATE
FACULTY OF EDUCATION,
DEPARTMENT OF HEALTH, SAFETY AND ENVIRONMENTAL
STUDENTS' QUESTIONNAIRE**

Dear Respondents,

I am an undergraduate of the above named institution; I am currently carrying out a research on the Topic: *the effectiveness of environmental sanitation in the control of malaria in Ekosodin Community at Ovia Norh East Local Government Area of Edo State.*

I humbly crave your indulgence to fill the questionnaire sincerely as all information gathered shall be used purely for research purposes and shall be treated with utmost confidentiality.

SECTION A (Demographic Data)

Gender: Male () Female ()

Age: 18 – 28 () 29 – 39 () 40 – 50 () 51 and above ()

Highest Educational Level: No Formal Education () Primary Education ()
Secondary Education () Tertiary Education ()

Occupation: Trader () Entrepreneur () Civil Servant ()

Religion: Christian () Muslim () Traditional Religion ()

SECTION B

Instruction: Please answer all questions: indicate the answer(s) most appropriate to you by ticking (√) in the box provided. Thank you

A. Level of knowledge about malaria among residents of Ekosodin Community

1. Malaria is a deadly (a) sickness (b) fever (headache)
2. Malaria is caused by (a) bush burning (b) mosquitoes (c) animals
3. Dirty environments can increase the breeding of (a) fish (b) chicken (c) mosquitoes
4. Malaria cannot be(a) prevented (b) inherited () cured

S/N	ITEMS	SA	A	D	
B	What are the various measures adopted by the residents of Ekosodin Community in the control of malaria				
1.	There is proper drainage system to ensure there is no stagnant water in the surroundings				
2.	We clear the bushes in our surroundings				
3.	We use mosquito treated nets to prevent malaria				
4.	I use spray insecticides in my house to control mosquitoes				
5.	We organize health education programmes on the prevention and control of malaria				
C	How well does the residents of Ekosodin Community practice environmental sanitation?				
6.	I keep my house and surroundings clean every day to prevent malaria				
7.	I do environmental sanitation week				
8.	I do not carry out environmental sanitation because of my age				
9.	I do not carry out environmental sanitation because my neighbors leaves it for only me to do it				
10.	I do not engage in environmental sanitation because I don't know when they usually do in this community				
11.	I engage in environmental sanitation because I know it is good for human health				
D	The effectiveness of environmental sanitation in				

	the control of malaria in Ekosodin Community?			
12.	The mosquitoes in this community are too much			
13.	i am suffering malaria now			
14.	I suffered malaria in the last one month			
15.	I suffered malaria in the last 3 months			
16.	I know someone in this community who is currently treating malaria			

26

NATIONAL POPULATION COMMISSION
Final results of 1991 population census of Nigeria

State: EDO Lga: OVIA NORTH EAST

Locality	Males	Females	Both-Sexes	1996 Projection
IPOR	2,893	2,970	5,863	6,683
WAN	3,523	3,689	7,212	8,221
IBOGIOBO	470	536	1,006	1,147
ZALAMA	189	208	397	453
KO UGBOKO	83	104	187	213
NIARO	106	74	180	205
IBONEKA CAMP	20	29	49	56
IBONEKA	166	828	1,725	1,966
SIUKHUKHU & OTHERS	170	118	284	324
SUNGERE & OTHERS	238	140	310	353
CUANI CAMP & OTHERS	101	240	478	545
CHOU WATERSIDE	113	77	178	203
CASEA & OTHERS	326	67	180	205
UOWA & OTHERS	165	275	601	685
BIHIEHE & OTHERS	472	143	308	351
ARA ISOKO CAMP & OTHER	610	476	948	1,081
UIYE	69	626	1,236	1,409
HN HOLT FARM CAMP IGIU	90	39	108	123
HENEPIAFO CAMP & OTHER	256	70	160	182
ANOMON CAMP & OTHERS	185	259	515	587
URZE CAMP & OTHERS	177	197	382	435
BOKUN	177	201	378	431
BOKUN II	265	207	472	538
IUWA	239	196	435	496
JORIAKHI II	411	265	676	771
ASE CAMP & OTHERS	177	86	263	300
AYANTOR II	102	92	194	221
AYANTOR I	132	104	236	269
SONMOBA & OTHERS	271	238	509	580
KEZE VILLAGE & OTHERS	263	246	509	580
JOSIODUN NEBUDIN	154	161	315	359
OROSA CAMP & OTHERS	133	115	248	283
IBZ CAMP & OTHERS	192	192	384	438
OSAGIE & OTHERS	291	321	612	698
LE VILLAGE & OTHERS	184	159	343	391
BETU VILLAGE I	218	176	394	449
A CAMP & OTHERS	258	205	463	528
VILLAGE	719	672	1,391	1,586
ADOLOR	1,420	1,529	2,949	3,362
WA	296	288	584	666
ABETU	246	259	505	576
OR CAMP & OTHERS	175	191	366	417
KON	690	632	1,322	1,507
KE & OTHERS	123	78	201	248
CAMP & OTHERS	151	154	305	348
ODIN	945	866	1,811	2,064
T BARRACKS	433	339	772	880
URU	2,014	2,024	4,038	4,603
URU & OTHERS	137	154	291	332
OGIE	388	333	721	822
INMWUN	334	361	695	792
HUA	185	209	394	449
GHIE & OTHERS	169	138	307	350
DOLOR	240	275	515	587
SODIN NEBUDIN	372	288	657	749

STATE DIRECTOR
EDDO STATE NIGERIA