Global Scientific JOURNALS

GSJ: Volume 8, Issue 10, October 2020, Online: ISSN 2320-9186
www.globalscientificjournal.com

THE HEALTH EFFECTS OF FLOOD INCIDENCE ON THE INHABITANTS OF NMIATA-ANAM IN ANAMBRA WEST L.G.A. OF ANAMBRA STATE, NIGERIA

By

Duluora, Joseph Oluchukwu[1*], Uchegbu, Smart U.[2], Nwabueze, Simeon Achunam.[3] and Duluora, Nneka Chidimma[4]

1: Department of Environmental Management, Nnamdi Azikiwe University, Awka, Anambra State.
*Corresponding Author : Email: dazdjcardinal@yahoo.com, Jo.duluora@unizik.edu.ng
2: Department of Urban and Regional Planning, University of Nigeria, Nsukka.
3: Department of Community Medicine, Nnamdi Azikiwe University, Awka, Anambra State.
4: Medical Unit, Nnamdi Azikiwe University, Awka, Anambra State

Abstract

This work looked at the health impacts of flood on the inhabitants of Nmiata – Anam. The work is hinged on the Systems Theory. Hospital data was collected from the hospital in the locality and analysed using the trend analysis. The analysed data showed that the trend of both malaria and typhoid was on the increase. The work recommend that the Government should intensify the campaign on the fight against malaria, provide mobile hospitals to the locals, build more hospitals and primary health centers and post more doctors and nurses to the areas.

Keywords: ***flood, malaria, rainfall, typhoid, environment,***

1.0 Introduction

Background to the Paper:

Since after the industrial revolution, man has continued to modify the environment with impunity and reckless abandon. This recklessness has had its own consequences on man and his environment. Resource exploitation, increase in population, ozone layer depletion, flooding, loss of biodiversity,

environmental pollution, problem of waste are some of the consequences of the activities of man on his environment which he is suffering from today. The health, social, economic and environmental impacts of flooding can be significant and have a wide community impact.

Populations in developing countries are thought to be particularly at risk of adverse health consequences from floods, given unregulated land use in flood-prone areas, limited public-health infrastructure, and inadequate emergency response capability (Haines , Kovats , Campbell-Lendrum and Corvalan (2006). Paranjothy et al. (2011) observed that the prevalence of all mental health symptoms was two to five-fold higher among individuals affected by flood water in the home. Risks are apparent in agriculture, fisheries and many other components that constitute the livelihood of rural populations in developing countries. According to World Health Organization (WHO,2020) flooding is associated with an increased risk of infection, however this risk is low unless there is significant population displacement and/or water sources are compromised.

The potential consequences of climate change, according to Kolawole, Olayemi and Ajayi (2011), are profound, particularly on people in the less developed countries. Accordind to Haines, Kovats , Campbell-Lendrum and Corvalan (2006) it is now widely accepted that climate change is occurring as a result of the accumulation of greenhouse gases in the atmosphere arising from the

combustion of fossil fuels. Climate change may affect health through a range of pathways--eg, as a result of increased frequency and intensity of heat waves, reduction in cold-related deaths, increased floods and droughts, changes in the distribution of vector-borne diseases, and effects on the risk of disasters and malnutrition

2.0 Statement of the Problem

Climate change has exposed the nation (Nigeria) to the dangers of extreme weather with frequent and more severe consequences to lives and the environment (Suleiman, 2011). From May to September, Nigeria has a rainy season and suffers from seasonal flash floods. These flash foods are sometimes lethal, especially in the rural areas or overcrowded slums, where drainage is poor or does not exist at all. Many Nigerian coastal and inland cities experience heavy rains, and flooding. Nmiata-Anam experiences flood every now and then. This flood water in some cases carries some bacteria and parasites to these areas. The flood water, in other cases, does not leave the flooded areas for a very long time and as such provide breeding areas for mosquitoes. Based on these problems, this work is carried out.

3.0 Methodology

Medical records for thirty months were accessed from the available hospital in the study area and the collected data were subjected to trend analysis to determine the trend of malaria and typhoid in the study area.

4.0 Study Area

This work was carried out in Nmiata –Anam of Anambra West Local Government Area in Anambra State of Nigeria. Nmiata-Anam is a rural area and most of the inhabitants engage in primary activities. Anambra West is bounded in the north east by Ayamelum L.G.A., in the south east by Anambra East L.G.A., while in the north east it has a boundary with Kogi State. Anambra State is located within latitudes 6^0 15^1N and 7^0 00^1N and longitudes 6^0 45^1E and 7^0 15^1E. The study area is drained by Anambra River and its tributaries. The natural flow pattern of the river and its tributaries is of dendritic pattern (Onwuka, 2010)

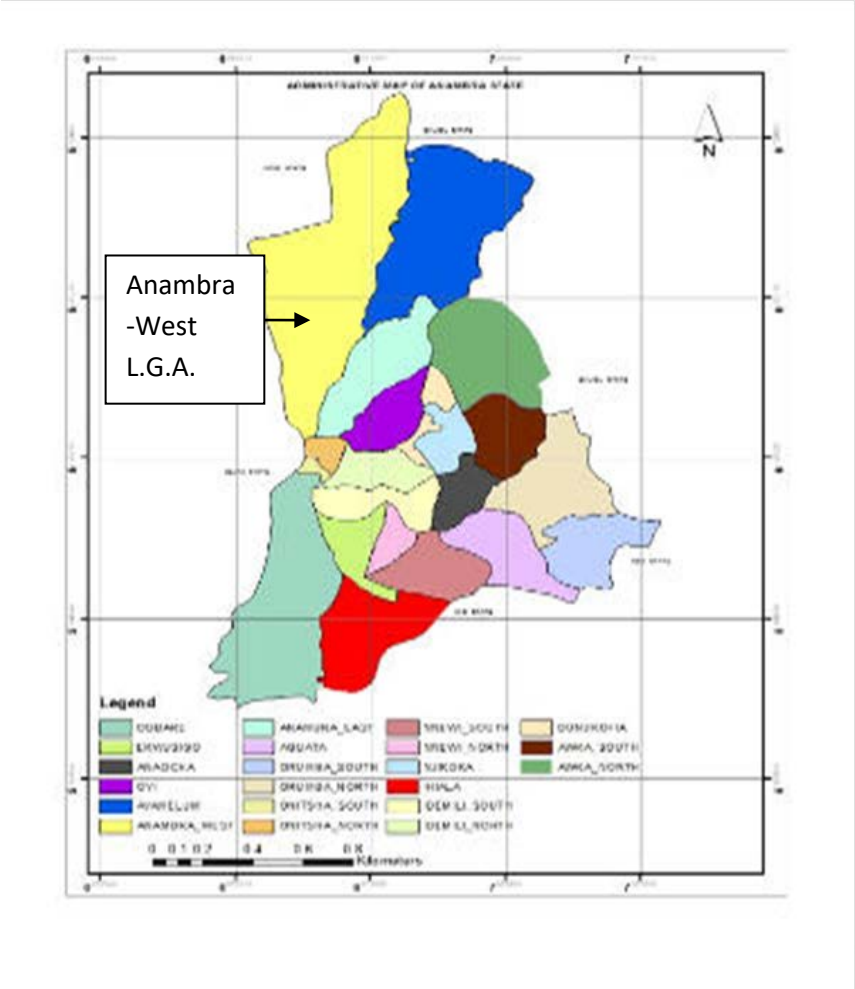

Fig 1: Map of Anambra State Showing Anambra West L.G.A.

5.0 Aim and Objective

The aim of this work is to determine the trend of the health challenges (such as malaria and typhoid) associated with flood occurrence in the study area by analyzing thirty months medical records from the study area.

6.0 Theoretical framework

This work is hinged on the Systems Theory. With this in view, a system becomes whatever the observer defines it to be as long as it contains the attributes of a system which include the **inputs**, **trough flow** and the **output**.

The input to the system has to do with rainfall amount, seasonality, duration and susceptibility of the area to flood. The throughput has to do with the inundation of areas such as playgrounds, farmlands, churches and other religious centres, educational areas, business areas and transportation routes. The output sources from the system theory include destruction of properties, environmental pollution, forced migration, diseases/ ailments, psychological effects and trauma. This is depicted in figure 2

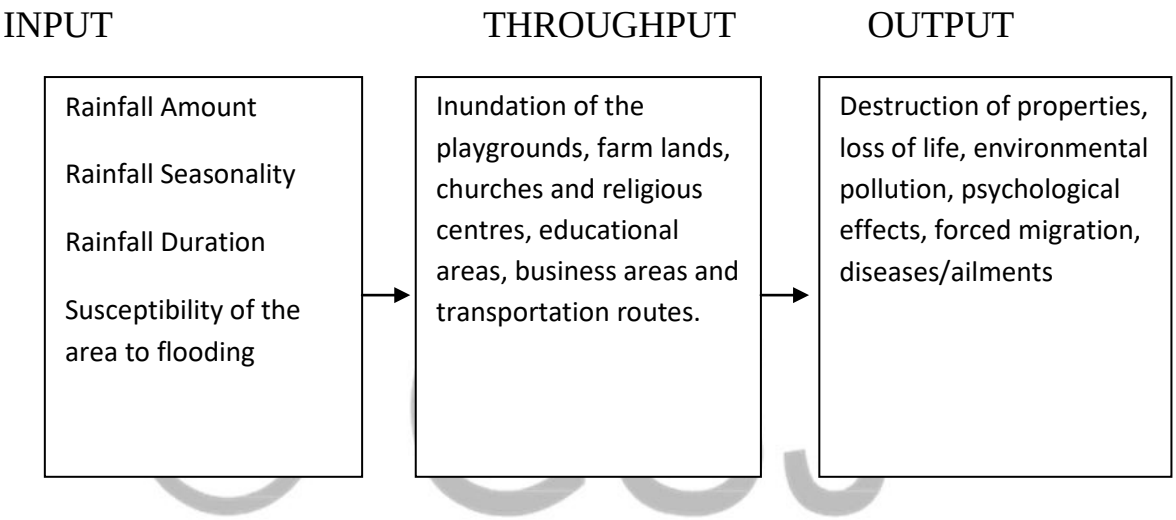

Fig 2 Modified systems input /output of flood on humans/environment

7.0 Results and Discussion

Table 1 Data on Monthly Record of Flood Related Ailments

Month/year	**Plasmodiasis Malaria**	**Salmonellosis typhoid**
Jan, 2014	9	4
Feb, 2014	17	10
March, 2014	20	13
April, 2014	12	7
May, 2014	12	5
June, 2014	16	8
July, 2014	11	7
Aug, 2014	13	5

Sept, 2014	11	3
Oct, 2014	6	3
Nov, 2014	14	7
Dec, 2014	14	10
Jan, 2015	18	13
Feb, 2015	16	10
March, 2015	20	7
April, 2015	33	10
May, 2015	26	9
June, 2015	37	5
July, 2015	60	7
Aug, 2015	32	6
Sept, 2015	29	3
Oct, 2015	26	7
Nov, 2015	27	6
Dec, 2015	38	11
Jan, 2016	27	8
Feb, 2016	27	6
March, 2016	21	6
April, 2016	29	10
May, 2016	43	13
June, 2016	36	8

Source: Researcher's field analysis of Hospital Records, 2016

Table 1 shows the monthly record of flood related ailments as recorded by the hospital in the study area. The record spans over a thirty month period. Two major ailments were reported and/ or recorded. The recorded ailments are projected in the figure 3 below.

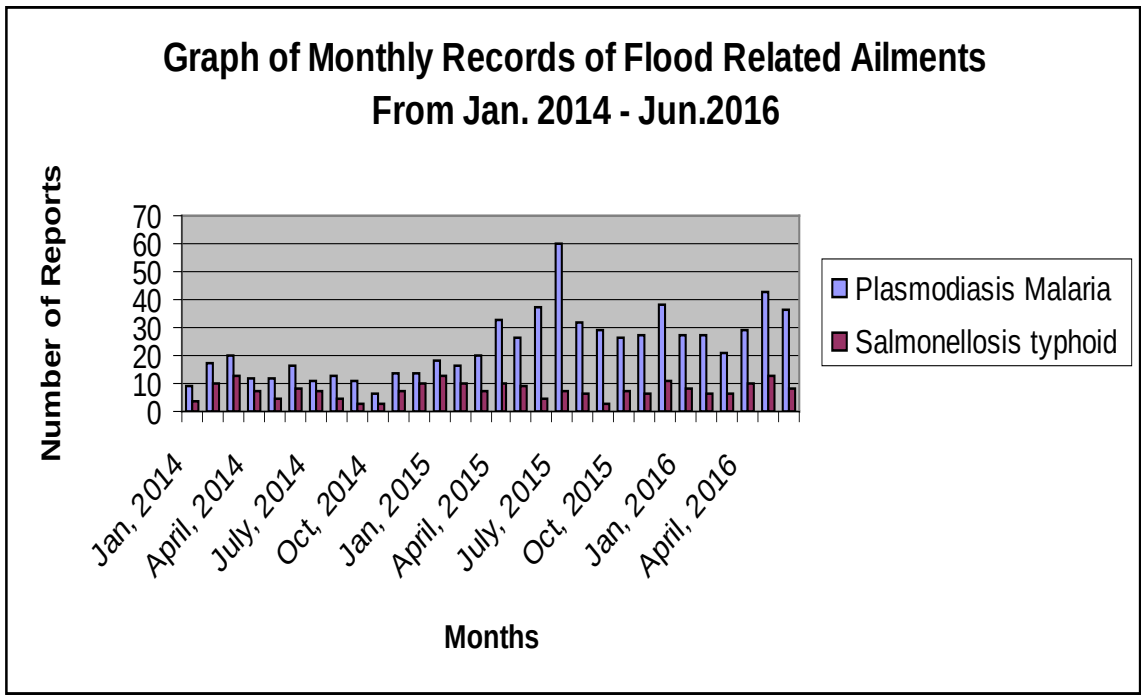

Fig 3 Monthly records of Flood Related Ailments

From Table 2, it will be noticed that for the month of Jan, 2014, the medical records show that nine people suffered from Malaria (Plasmodiasis) while four people suffered from Typhoid (Salmonellosis). In Feb, 2014 17 (seventeen) people were afflicted with plasmodiasis while ten people had salmonellosis. In March, 2014, the number of people who were afflicted with plasmodiasis increased to twenty while that of salmonellosis increased to thirteen. The month of April, 2014 saw twelve people suffering from malaria and seven people reporting of Typhoid. In May 2014, the hospital data showed that twelve people suffered from Malaria, while only five people suffered from Typhoid. In June 2014, the number of people who suffered from malaria rose to sixteen while that of Typhoid was eight. In July 2014, there were eleven and seven cases for Malaria and Typhoid respectively. In August 2014, thirteen

cases of Malaria were recorded while five cases of Typhoid were recorded. The month of September 2014, recorded eleven Malaria cases and three Typhoid cases. In October 2014, the ailment cases reported were six Malaria cases and three cases of Typhoid. November 2014 had a record of four Malaria cases and seven Typhoid cases. The month of December 2014, recorded fourteen Malaria cases and ten Typhoid cases.

In January 2015, eighteen malaria cases were recorded while thirteen typhoid cases were recorded. In February 2015, the number dropped to sixteen malaria cases and ten typhoid cases. March 2015 saw an increase in malaria from sixteen to twenty while salmonellosis continued to drop to seven. In April 2015, the cases of plasmodiasis increased by more than half from twenty to thirty three while salmonellosis increased to ten from seven. In May 2015, plasmodiasis recorded twenty six cases while salmonellosis recorded nine cases. In June 2015, thirty seven cases of malaria were recorded while only five cases of typhoid were also recorded. July 2015 saw a record of the highest malaria cases with a total of sixty cases while typhoid cases recorded was seven. For the month of August 2015, the recorded cases of malaria dropped to thirty two while that of typhoid was six. In September 2015, twenty nine cases of malaria were recorded while only three cases of typhoid were reported. The month of October 2015 had a record of twenty six malaria cases and seven typhoid cases while November 2015 recorded twenty seven malaria cases and six typhoid cases. In December 2015, the reported malaria and typhoid cases increased to

thirty eight and eleven respectively while in January 2016, the reported cases dropped to twenty seven and eight respectively.

February 2016 had twenty seven cases of malaria while six cases of typhoid were reported. In March 2016, the malaria cases dropped to twenty one while typhoid maintained six cases in April 2016, malaria cases increased to twenty nine and typhoid cases were ten. In May 2016, the incidence of malaria rose to forty three while typhoid rose to thirteen and in June 2016, malaria cases dropped to thirty six and typhoid eight.

Table 2 Table of incidence of Malaria in the Study Area

Month/year	**Plasmodiasis (Malaria)**
Jan, 2014	9
Feb, 2014	17
March, 2014	20
April, 2014	12
May, 2014	12
June, 2014	16
July, 2014	11
Aug, 2014	13
Sept, 2014	11
Oct, 2014	6
Nov, 2014	14
Dec, 2014	14
Jan, 2015	18
Feb, 2015	16
March, 2015	20
April, 2015	33
May, 2015	26
June, 2015	37
July, 2015	60
Aug, 2015	32
Sept, 2015	29

Oct, 2015	26
Nov, 2015	27
Dec, 2015	38
Jan, 2016	27
Feb, 2016	27
March, 2016	21
April, 2016	29
May, 2016	43
June, 2016	36

Source: Researcher's field analysis of Hospital Records, 2016

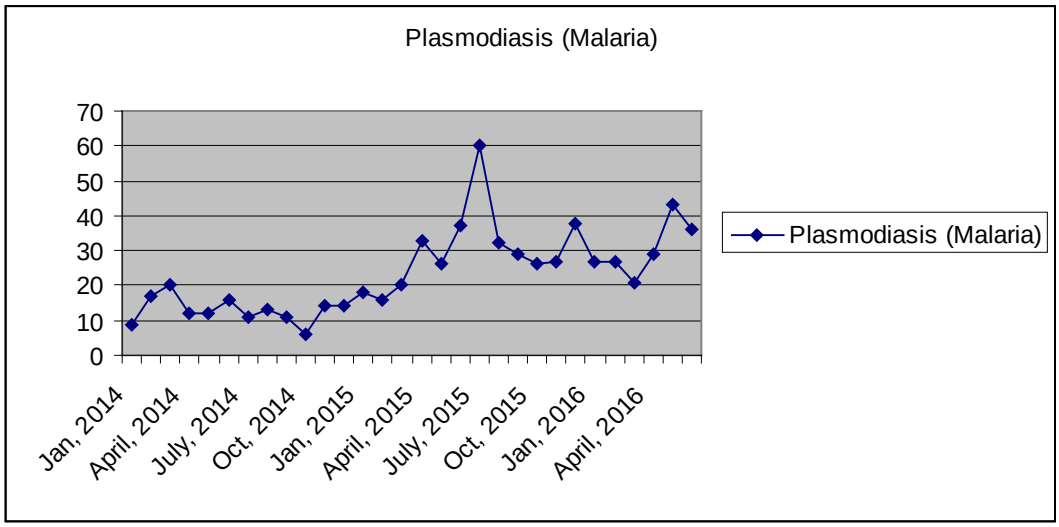

Fig.4 Graph of Malaria prevalence over the study period.

Table 3 Table of incidence of Typhoid in the Study Area

Month/year	Salmonellosis (typhoid)
Jan, 2014	4
Feb, 2014	10
March, 2014	13
April, 2014	7
May, 2014	5
June, 2014	8
July, 2014	7
Aug, 2014	5
Sept, 2014	3
Oct, 2014	3
Nov, 2014	7

Dec, 2014	10
Jan, 2015	13
Feb, 2015	10
March, 2015	7
April, 2015	10
May, 2015	9
June, 2015	5
July, 2015	7
Aug, 2015	6
Sept, 2015	3
Oct, 2015	7
Nov, 2015	6
Dec, 2015	11
Jan, 2016	8
Feb, 2016	6
March, 2016	6
April, 2016	10
May, 2016	13
June, 2016	8

Source: Researcher's computation from Hospital Records, 2016

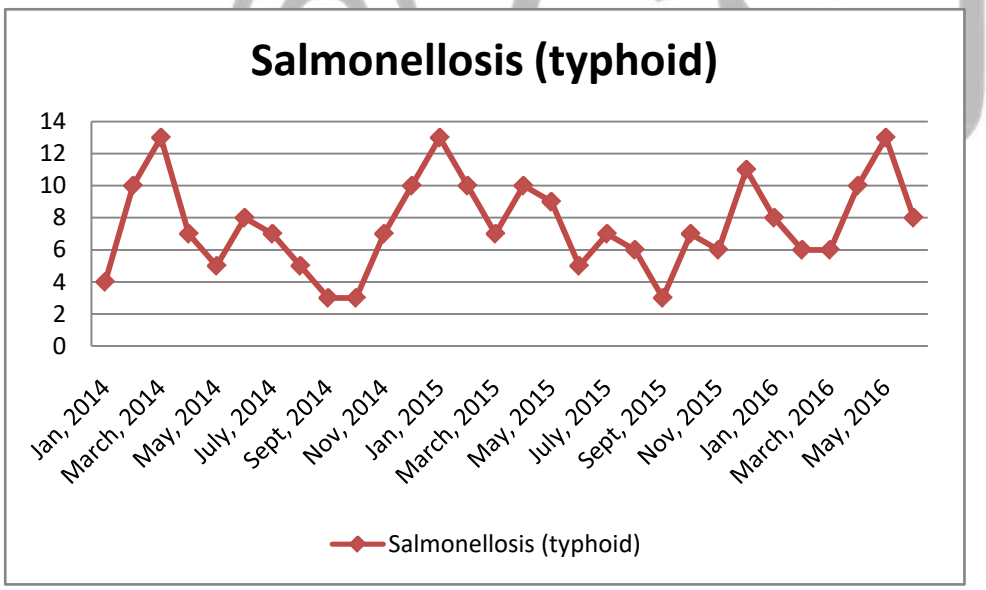

Fig.5 Graph of Typhoid prevalence over the study period.

Trend Analysis of Occurrence of Diseases

For Malaria

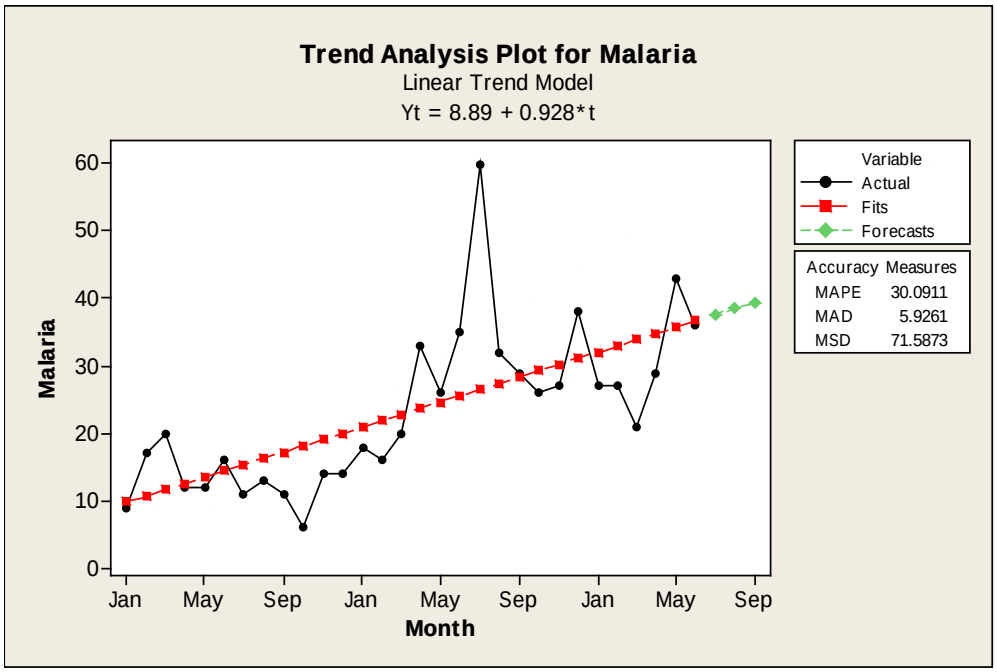

Fig.6 Trend Analysis For Malaria Over A Thirty Month Period,
Source: Researcher Computer analysis, 2016

```
Data      Malaria
Length    30
NMissing  0


Fitted Trend Equation
Yt = 8.89 + 0.928*t

Accuracy Measures
MAPE  30.0911
MAD    5.9261
MSD   71.5873
```

Time	Malaria	Trend	Detrend
Jan	9	9.8151	-0.8151
Feb	17	10.7428	6.2572
Mar	20	11.6704	8.3296
Apr	12	12.5981	-0.5981
May	12	13.5258	-1.5258
Jun	16	14.4535	1.5465
Jul	11	15.3812	-4.3812
Aug	13	16.3089	-3.3089
Sep	11	17.2366	-6.2366
Oct	6	18.1643	-12.1643
Nov	14	19.0920	-5.0920
Dec	14	20.0197	-6.0197
Jan	18	20.9474	-2.9474
Feb	16	21.8751	-5.8751
Mar	20	22.8028	-2.8028
Apr	33	23.7305	9.2695
May	26	24.6582	1.3418
Jun	35	25.5859	9.4141

Jul	60	26.5136	33.4864
Aug	32	27.4413	4.5587
Sep	29	28.3690	0.6310
Oct	26	29.2967	-3.2967
Nov	27	30.2244	-3.2244
Dec	38	31.1521	6.8479
Jan	27	32.0798	-5.0798
Feb	27	33.0075	-6.0075
Mar	21	33.9352	-12.9352
Apr	29	34.8629	-5.8629
May	43	35.7906	7.2094
Jun	36	36.7183	-0.7183

Forecasts

Period	Forecast
Jul	37.6460
Aug	38.5737
Sep	39.5014

From the trend analysis of malaria over the thirty months period, as shown in Figure 5.5, it will be noticed that October, 2014 has the least incidence of malaria while July, 2015 has the highest prevalence value. The trend analysis shows that the occurrence of malaria is increasing steadily even though the plot of the records shows a fluctuation in monthly occurrence. After the highest incidence in the month of July, 2015, the incidence dropped but did not drop to below the initial month of January, 2014.

Conclusion: The analysis shows increase in the trend of malaria in the region.

TREND ANALYSIS FOR TYPHOID

For Typhoid

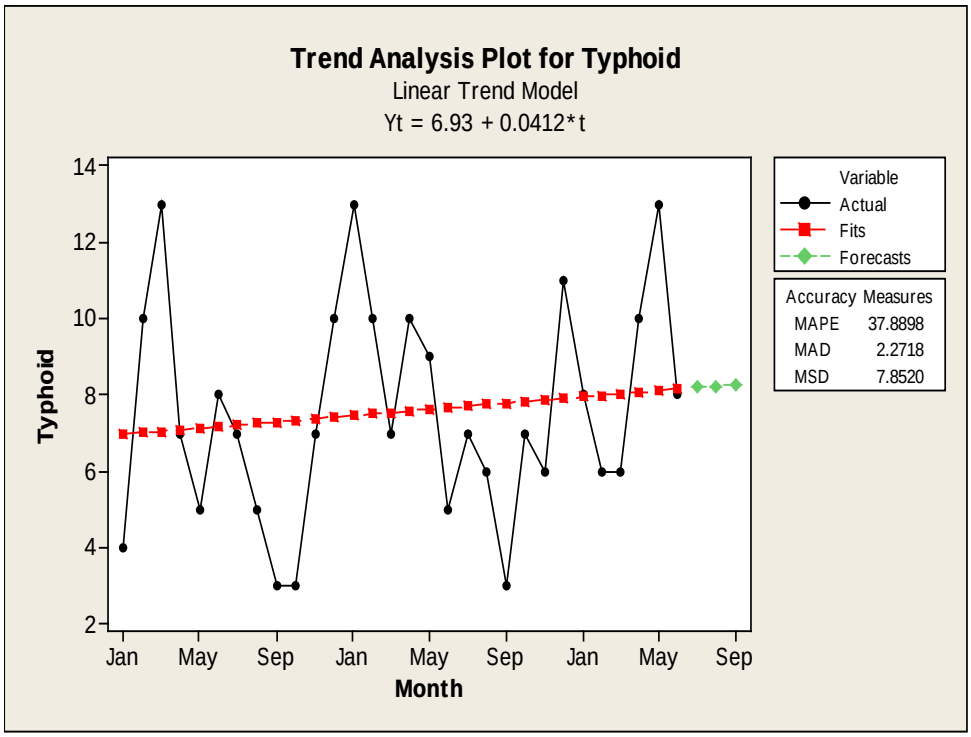

Fig.7 **Trend Analysis For Typhoid Over A Thirty Month Period**

Source: Researcher Computer analysis, 2016

Trend Analysis for Typhoid

Data Typhoid
Length 30
NMissing 0

Fitted Trend Equation
Yt = 6.93 + 0.0412*t

Accuracy Measures
MAPE 37.8898
MAD 2.2718
MSD 7.8520

Time	Typhoid	Trend	Detrend
Jan	4	6.96989	-2.96989
Feb	10	7.01105	2.98895
Mar	13	7.05221	5.94779
Apr	7	7.09336	-0.09336
May	5	7.13452	-2.13452
Jun	8	7.17568	0.82432
Jul	7	7.21683	-0.21683
Aug	5	7.25799	-2.25799
Sep	3	7.29915	-4.29915
Oct	3	7.34030	-4.34030
Nov	7	7.38146	-0.38146
Dec	10	7.42262	2.57738
Jan	13	7.46377	5.53623

Feb	10	7.50493	2.49507
Mar	7	7.54609	-0.54609
Apr	10	7.58725	2.41275
May	9	7.62840	1.37160
Jun	5	7.66956	-2.66956
Jul	7	7.71072	-0.71072
Aug	6	7.75187	-1.75187
Sep	3	7.79303	-4.79303
Oct	7	7.83419	-0.83419
Nov	6	7.87534	-1.87534
Dec	11	7.91650	3.08350
Jan	8	7.95766	0.04234
Feb	6	7.99881	-1.99881
Mar	6	8.03997	-2.03997
Apr	10	8.08113	1.91887
May	13	8.12228	4.87772
Jun	8	8.16344	-0.16344

Forecasts

Period	Forecast
Jul	8.20460
Aug	8.24575
Sep	8.28691

From the trend analysis of typhoid, it will be noticed that the months of March, 2014, January, 2015 and May, 2016, have the highest cases of occurrence of Typhoid in the study area while the the months with the least occurrence are the months of September,2014, October, 2014 and September,2015. In the first year (2014), there is a wide variation in the degree of prevalence while in the 2015, the degree of prevalence does not show much variation. It will equally be noticed that there is always an increase in occurrence in the months considered to be dry with each year (that is the months of January, February, November and December).

Conclusion: The trend of malaria in the region is higher than that of typhoid. This implies malaria is more common than typhoid despite the flooding. But it should be noted that typhoid also has a very slight upward trend.

Conclusion

- The trend analysis shows an increase in the trend of malaria in the region
- The trend analysis of typhoid also showed an increase but the trend of malaria in the region is higher than that of typhoid.

The findings supports WHO (2020) that Floods can potentially increase the transmission of the following communicable diseases: water-borne diseases, such as typhoid fever, cholera, leptospirosis and hepatitis A and Vector-borne diseases, such as malaria, dengue and dengue haemorrhagic fever, yellow fever, and West Nile Fever and Elsanousi, Elmahi, Pereira, and Debacker, (2018) that a marked increase of new malaria cases and incidence rate was observed in the 13 sentinel malaria notification sites

8.0 Recommendation

Based on the result of this study which showed an increase in the cases of malaria and also a slight increase in the prevalence of typhoid, it is recommended that the Government should intensify the campaign on the fight against malaria and also provide mobile hospitals to the locals. More hospitals and primary health centers should be built and doctors and nurses posted to the areas.

Appreciation: We wish to thank REX Hospital, Nmiata- Anam for providing us with their available data even though they lost some during the flood incidence that occurred before this study.

References

Elsanousi, Y.E.A., Elmahi, A.S., Pereira, I. and Debacker, M. (2018) Impact of the 2013 Floods on the Incidence of Malaria in Almanagil Locality, Gezira State, Sudan. *PLOS Currents Disasters* Edition 1. doi: 10.1371/currents.dis.8267b8917b47bc12ff3a712fe4589fe1 http://currents.plos.org/disasters/index.html%3Fp=37568.html

Haines A., Kovats R.S., Campbell-Lendrum D. and Corvalan C.,(2006) Climate Change And Human Health: Impacts, Vulnerability, and Mitigation. Lancet ; 367:2101–9. Pub Med https://www.ncbi.nlm.nih.gov/pubmed/16798393

Kolawole, O.M, Olayemi, A.B and Ajaymi, K.T. (2011), Managing Flood in Nigerian Cities: Risk Analysis and Adaptation Options – Ilorin City as a Case Study. Scholars Research Library. Archives of *Applied Science Research*, 2011, 3 (1):17-24 http://scholarsresearchlibrary.com/archive.html

Onwuka, S.U. (2010), Vertical Velocity of Pollutants through Porous Rocks: Implications for Water Resource Management in Anambra State, Nigeria. **A Ph.D. Dissertation submitted to the Department of Environmental Management, Nnamdi Azikiwe University, Awka.**

Paranjothy S, et al. (2011), Psychosocial impact of the summer 2007 floods in England https://www.ncbi.nlm.nih.gov/m/pubmed/21371296/?i=4&from=/20391225/related PMID: 21371296 [PubMed - indexed for MEDLINE] PMCID: PMC3062606 BMC Public Health.

Suleiman, A. (2011) Climate Change Exposes Nigeria To Natural Disasters. **The Nation** http://www.thenationonlineng.net/2011/index.php

WHO (2020) Flooding and Communicable Diseases Fact Sheet: Risk assessment and preventive measures https://www.who.int/hac/techguidance/ems/flood_cds/en/