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Factors Affecting the Prevalence of Malaria among Under-Five in Rumuigbo Town, Obio-Akpor L.G.A, Rivers State, Nigeria

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Abstract:
Aims The three objectives that guided the study include; determining if parents socio-demographic and economic variables (Monthly income, mothers literacy level and occupation) affect the prevalence of malaria in Rumuigbo, to determine if the use of insecticide treated nets is a determinant factor in the sustenance of malaria among under-five in the area and to ascertain if environmental factors (living close to stagnant water, blocked drains and water retaining plants) are determinants in the prevalence of malaria among under-five in Rumuigbo town.
Study Design: A descriptive survey research design was used.
Place and Duration of Study: Rumuigbo town, Obio-Akpor L.G.A, Rivers State,
Nigeria. The study was for a period of 3months (October to December 2015).
Methodology: A Structured, standardized and reliable (r = 0.8) questionnaire was administered to 480 care givers of under-fives systematically sampled from 3 hospitals in Rumuigbo town with a population of 4,796 patients.
Results: The result indicated that 202(42%) were males while 278 (58%) were females. The prevalence of malaria was 62% in Rumuigbo. In regards to the care givers literacy level, the highest 29% had primary education and P>0.05, thus educational level of care givers was not statistically significant in malaria occurrence among the under-five in this study. Chi-square result revealed that mothers' occupation (P < 0.05), average monthly income of parents (P < 0.05) and the non-use of ITNs (P< 0.05) were statistically significant and as such were associated with the sustenance or prevalence of malaria in the area. There is also association between some environmental factors and prevalence of malaria such as living close to blocked drainages (P < 0.05) and water retaining plants (P< 0.05) while living close to stagnant water (P>0.05) was not statistically significant to malaria prevalence in Rumuigbo town.
Conclusion: Mothers should be enlightened on the risk factors of malaria. There should also be enlightenment campaign on the use of ITNs to reduce the prevalence of malaria among under-five.

1. Introduction

Malaria is one of the commonest tropical diseases plaguing the African continent and the ruler areas of the continent in particular (WHO, 2008). Among the major diseases that are common in Africa, malaria is one of the greatest threats facing development in Africa today (Alaba, 2002). Malaria is characterized by cycle of chills, fever, pain and sweating. According to World Health Organization (2000), malaria affects 3.3 billion people, or half of the world's population, in 106 countries and territories. It estimates that 216 million cases of malaria occurred in 2010, 81% in the African region and that there were 655,000 malaria deaths in 2010, 91% in the African Region, and 86% were children under 5 years of age (WHO, 2010). Malaria is the third leading cause of death for children under five years worldwide, after pneumonia and diarrheal disease and the 2nd leading cause of death from infectious diseases in Africa, after HIV/AIDS (WHO, 2015). Thirty countries in Sub-Saharan Africa account for 90% of global malaria deaths. Nigeria, Democratic Republic of Congo (DRC), Ethiopia, and Uganda account for nearly 50% of the global malaria deaths (Whitty and Rowland, 2002).

Almost one out of five deaths of children under 5 in Africa is due to malaria (WHO, 2008). There are four main types of malaria parasite which are the Plasmodium vivax, Plasmodium malariae, Plasmodium ovale, and Plasmodium falciparum while Wang et al, (2008), observed that there are five plasmodium species that infect human beings (P. Falciparum, P. Vivax, P. Malariae, P. ovale and

P. knowlesi). P. Falciparum and p. vivax cause the significant majority of malaria infections. P. falciparum, which causes most of the severe cases of deaths, is generally found in tropical regions, such as sub-Saharan Africa and southeast Asia, as well as in the western pacific and in countries sharing the amazon rainforest. P. vivax is common in most of Asia (especially southeast Asia) and the eastern Mediterranean, and in most endemic countries of the Americas (Wang et al, 2008).

Several factors determine both the importance of each specie as a vector of malaria (or other diseases) and the options for control. A good understanding of the biology and ecology of the principal vectors is essential to the development of an integrated vector control approach. These factors include the following, time of biting (evening, dawn, night), flight range of the vector (usually 3 kilometers [km]), feeding preferences of adult female mosquitoes (humans or animals), adult behavior—particularly, preference for biting and resting indoors (endophagic, endophilic) or outdoors (exophagic, exophilic), Larval habitat preferences (e.g., pools vs. containers, brackish vs. fresh water, full sun vs. shade) and Resistance to insecticides.

The malaria parasite enters the human host when an infected Anopheles mosquito takes a blood meal. First, sporozoites enter the blood stream and migrate to the liver. They infect liver cells called hepatocytes, where they multiply into merozoites, rupture deliver cells and escape back into the blood stream (World Malaria Report, 2011). Then the merozoites infect red blood cells where they develop into ring forms, trophozoites and schizonts which in turn produce further merozoites. Sexual forms (gametocytes) are also produced which if taken up by a mosquito will infect the insect and continue the life cycle (World Malaria Report, 2008). Household level factors associated with adult malaria risk are low vegetation level in compound, distance to the vector-breeding site, income, education, pregnancy and occupation also Poverty sustains the conditions where malaria thrives, and malaria impedes economic growth and keeps communities in poverty. With a potential dual relationship between malaria and poverty, where poor household experience high malaria prevalence that maintains them in poverty, these household are trapped in reinforcing cycles (Poland et al., 2002).

Despite progress in fighting malaria worldwide, the parasitic disease kills close to 800,000 persons annually (WHO, 2002). Children less than five years of age living in sub-Saharan Africa are mainly affected. Malaria exerts a significant health and economic burden on Nigeria. According to the statistics of the Nigerian National Malaria Control Program, it is responsible for 60% of out-patient visits to health facilities, 30% of childhood deaths, 25% of infant deaths and 11% of maternal deaths; and an estimated loss of 132 billion Naira in the form of treatment and prevention cost, and loss of man-hour, amongst others (RBM, 2005).

The high rate of hospital visits by mothers of under-five due to cases of malaria has prompted the researcher to investigate the factors that are affecting the prevalence of malaria among under-five in the area.

2. Methodology

A Descriptive survey design was adopted for the study. The population for the study consisted of all the care givers of the under-five children in the 8 hospitals in Rumuigbo town, Obio-Akpor L.G.A., Rivers State, Nigeria. Through the register, a total of 4, 796 caregivers visited the hospitals with their under-five children during the study period. The sample size was determined from the general population using Nwana's formula 1981. Nwana (1981) in his educational research observed that if the population is a few hundred, a 40% or more sample will do; if many hundreds 20% sample will do; if few thousands a 10% sample will do; and if several thousand a 5% or less sample will do. The population of four thousand, seven hundred and ninety-six (4,796) was in few thousands and as such 10 % of the sample was drawn giving a total of 479.6 which was approximated to 480. The sample size was 480 care givers of under five children. Out of the 8 hospitals in Rumuigbo, 3 hospitals were randomly selected for the study. The systematic sampling technique was used to select the 480 mothers for the study from each hospital. The first mother was selected at random after which every eighth mother that was visiting the paediatric department of the hospitals was sampled till the required sample size was reached. A validated and reliable questionnaire (r=0.83) was used for data collection.

Data analysis was done using percentages, charts and chi-square (X^2) at 0.05 level of significance.

3. Results

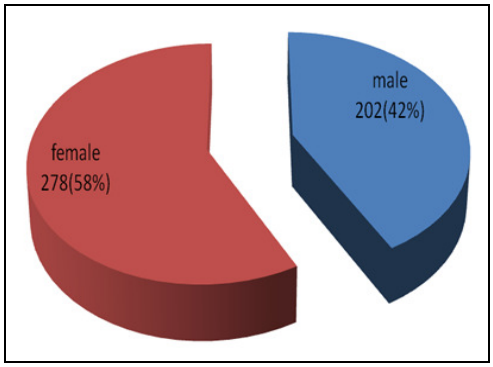

Figure 1: Frequency distribution of under-five babies by gender

The result in figure 1 showed that 202 (42%) Children under five years of age were males while 278 (58%) were females.

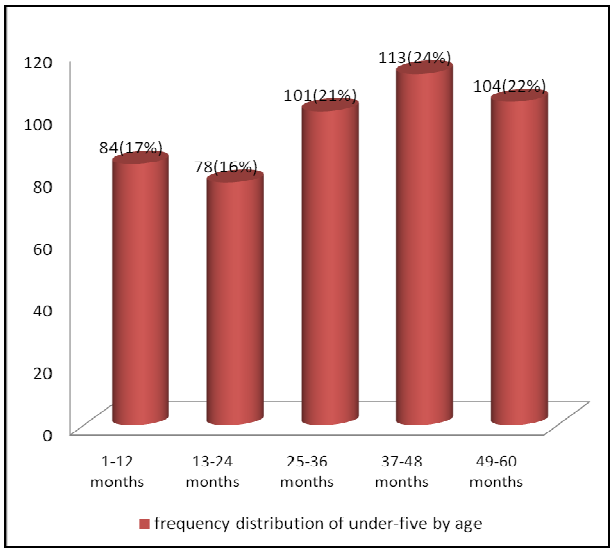

Figure 2: frequency distribution of under-five by age

Age distribution revealed that 84 (17%) of the children were aged between 1 and 12months old. 78(16%), 101 (21%), 113 (24%) and 104 (22%) are between the ages of 13-24 months, 25-36 months, 37-48 months and 49-60 months respectively.

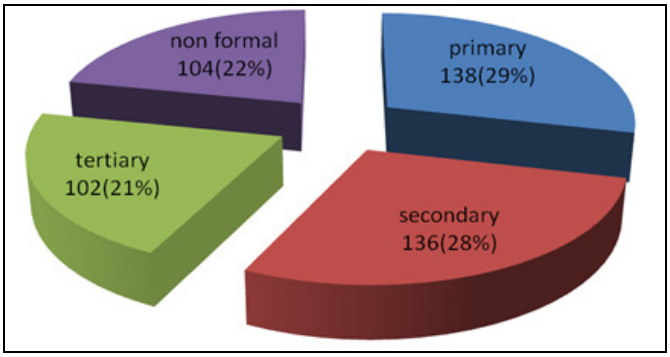

Figure 3; frequency distribution of mothers' literacy level

The result reveals that 138 (29%) of the mothers had primary education, 136 (28%) had secondary education, 102 (21%) had tertiary education and 104 (22%) had no formal education.

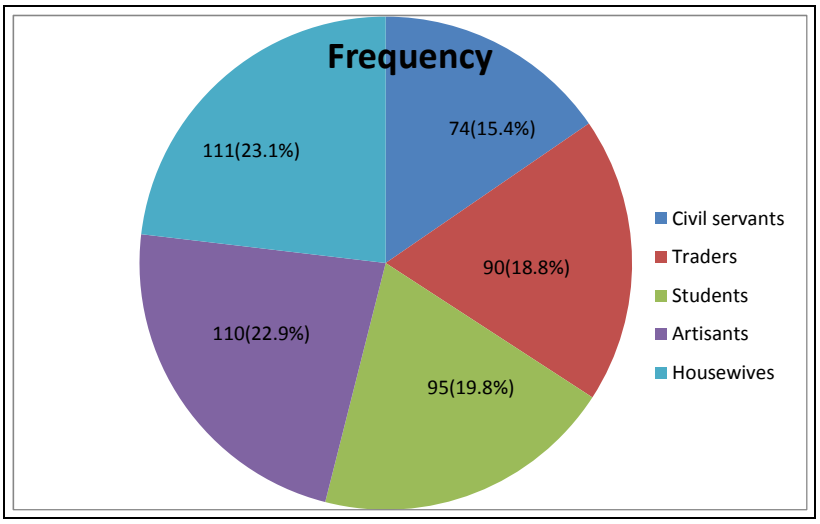

Figure 4: frequency distribution of mothers' occupation

The result revealed that 74 (15.4%) of the care givers were civil servants, 90 (18.8%) were traders, 95 (19.8%) were students, 110 (22.9%) were artisans while 111 (23.1%) were housewives.

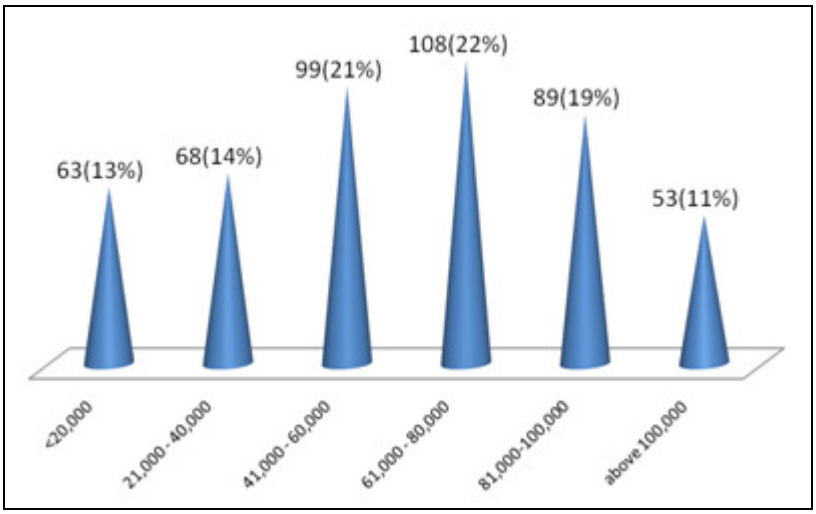

Figure 5: frequency distribution of average monthly income of parents

The result revealed that 63 (13%) of the mothers agreed that their average monthly income is below 20,000 naira, 68 (14%) accepted that they earn between 21,000 and 40,000 naira. 99 (21%), 108 (22%), 89 (19%) and 53 (11%) accepted that their average monthly income is between 41,000-60,000, 61,000-80,000, 81,000-100,000 and above 100,000 Naira respectively.

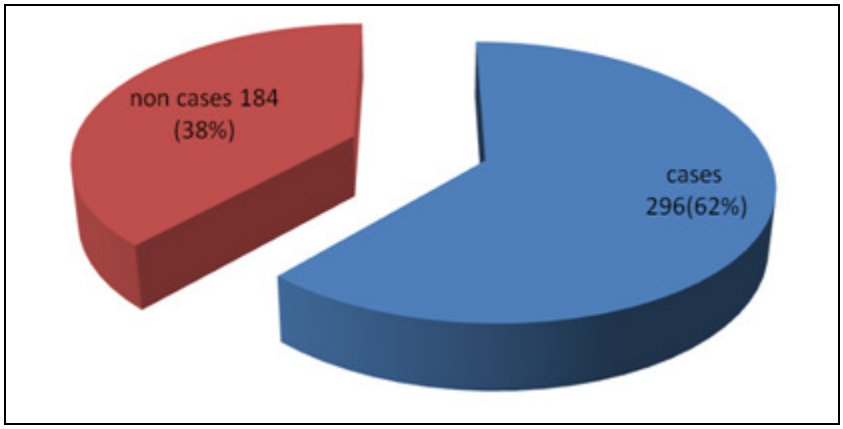

Figure 6: frequency distribution of malaria cases and non-malaria cases

The result revealed that 296 (62%) under five children were diagnosed of malaria within the period of this research, while 184 (38%) of the children were non-cases of malaria.

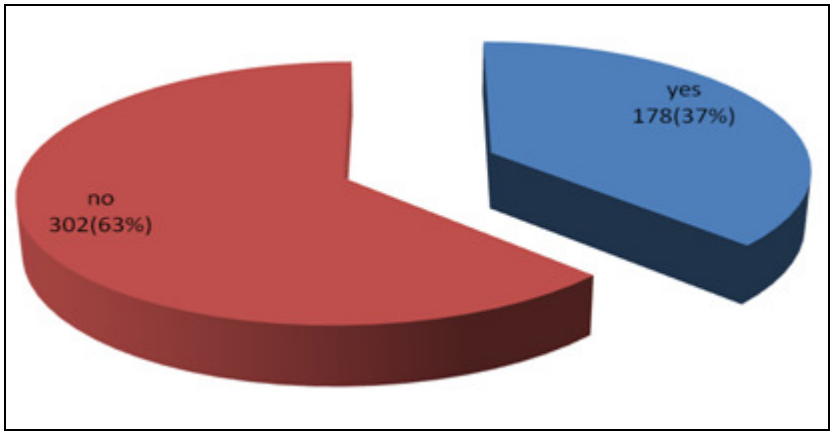

Figure 7: Frequency distribution of families that use ITNs

Insecticide Treated Net Use among the respondents showed that 178 (37%) mothers accepted that their children sleep under ITNs, while 302 (63%) said that their children do not sleep under ITNs.

Mother's educational level	Malaria		Chi- square value	P-value
	Cases (%)	Non-cases (%)		
Primary	78 (26.4)	60 (32.6)		
Secondary	82 (27.7)	54 (29.3)		
Tertiary	62 (20.9)	40 (21.7)		
No formal	74 (25.0)	30 (16.3)	5.647	0.130
Total	**296**	**184**		
Occupation of mothers				
Civil servants	42 (14.2)	32 (17.4)		
Traders	62 (20.9)	28 (15.2)		
Students	60 (20.3)	35 (19.0)	25.086	< 0.001*
Artisans	68 (23.0)	42 (22.8)		
Housewives	64 (21.6)	47 (25.5)		
Total	**296**	**184**		
Average monthly income of care givers (Naira)				
< 20,000	61 (20.6)	2 (1.1)		
21,000 – 40,000	47 (15.9)	21 (11.4)		
41,000 – 60,000	53 (17.9)	46 (25.0)		
61,000 – 80,000	56 (18.9)	52 (28.3)	27.822	< 0.001*
81,000 – 100,000	48 (16.2)	41 (22.3)		
Above 100,000	31 (10.5)	22 (12.0)		
Total	**296**	**184**		

Table 1: Association between socio-demographic/economic characteristics and malaria occurrence among under-five in Rumuigbo
*Key: * means statistically significant*

The result in table 1 showed 296 cases of malaria and 184 non-cases of malaria. 78 (26.4%) care givers or mothers of under-five cases of malaria had primary education, 82(27.7%) had secondary education, 62 (20.9%) had tertiary education while 74(25.0%) had no formal education. Among the non-cases of malaria, 60 (32.6%) had primary education, 54(29.3%) had secondary education, 40 (21.7%) had tertiary education and 30 (16.3%) had no formal education. In terms of occupation and cases of malaria, 42 (14.2%) care givers of under-five cases of malaria were civil servants, 62 (20.9%) were traders, 60 (20.3%) were students, 68 (23.0%) were artisans and 64 (21.6%) were house wives. Among non-cases of malaria, civil servants were 32(17.4%), traders were 28(11.4%), students were 35(19%), artisans were 42(22.8%) and housewives were 47(25.5%). Among caregivers of the under-five cases of malaria and their monthly income, those with less than 20,000 naira a month were 56 (18.9%), 21,000 to 40,000 naira were 47 (15.9%), 41,000 to 60,000 naira were 53(17.9%), 61,000 to 80,000 naira were 61(20.6%), 81,000 to 100,000 naira were 48(16.2%) and above 100,000 naira were 31(10.5%) while care givers of non malaria cases income were less than 20,000 naira a month 7 (3.8%), 21,000 to 40,000 naira were 21 (11.4%), 41,000 to 60,000 naira were 46(25.0%), 61,000 to 80,000 naira were 47(25.5%), 81,000 to 100,000 naira were 41(22.3%) and above 100,000 naira were 22(12.0%).
The Chi-square statistic test revealed that the association between mothers' occupation and average monthly income of the family were statistically significant at 0.05 level, while that of mothers' literacy level was not statistically significant at 0.05 level.

	Malaria		Chi-square value	P-value
	Cases (%)	Non-cases (%)		
Use of ITN				
Yes	83(28.0)	95 (51.6)	27.063	< 0.001*
No	213 (72.0)	89 (48.4)		
Living around stagnant water				
Yes	163 (55.1)	114 (62.0)		
No	133 (44.9)	70 (38.0)	2.206	0.137
Living close to blocked drainage				
Yes	189 (63.9)	80 (43.5)	19.117	< 0.001*
No	107 (36.1)	104 (56.5)		
Water retaining plants around the household				
Yes	119 (40.2)	104 (56.5)	12.148	< 0.001*
No	177 (59.8)	80 (43.5)		

Table 2: Association between environmental factors and malaria occurrence
*Key: * means statistically significant*

The result in table 2 showed that out of 296 cases of malaria, 83 (28%) used insecticide treated bed net (ITN) while 213(72.0%) did not while 95 (51.6%) out of 184 non-cases of malaria used ITN and 89 (48.8%) did not use ITN. 163 (55.1%) cases of malaria live

around stagnant water and 133(44.9%) cases of malaria do not live around stagnant water, while 114(62 %) non-cases of malaria live around stagnant water and 70(38.0%) do not live around stagnant water. 189 (63.9%) cases of malaria live close to blocked drainage while 107 (36.1%) cases do not live close to blocked drainage. Among 184 non-cases of malaria 80 (43.5%) live close to the drainage while 104 do not. 119 (40.2%) cases of malaria had water retaining plants around the house while 177(59.8%) had no water retaining plants close to their house. Also 104(56.5%) non-cases of malaria had water retaining plants close to their house while 80(43.5%) had none around their houses.

The Chi-square statistic revealed that the association between use of ITNs, living close to blocked drainages and water- retaining plants were significantly associated with malaria occurrence at 0.05 level, while that of living close to stagnant water or pools was not significant at 0.05 level.

4. Discussion

The result showed that the male under-five children were 202 (42%) while the female were 278 (58%). Among the 480, 296 (62%) were diagnosed of malaria while 184 (38%) were not diagnosed of malaria. In regards to frequency distribution of the mothers' literacy level, the highest 29% had primary education. When put to test, it was observed not to be statistically significant P> 0.05, thus the literacy level of mothers or care givers in Rumuigbo was not statistically associated with malaria prevalence in under-five children. This is not in line with the study of Snyman et al. (2015), Dike et al. (2006) and Kaona et al. (2000) which are of the view that malaria is easily perceived among mothers that have higher educational level. Positive association between level of education and improved perceptions of malaria was also reported in Southeast Nigeria and Zambia. There was also a similar result where the highest proportion of malaria among under-five children was reported among children whose mothers had primary school education while mothers with higher education reported the lowest malaria cases among children (Samuel & Anastasia, 2014).

Mothers occupation was statistically associated with malaria prevalence P<0.05. This is in line with the study of Mills (1998) which observed that certain occupation place individuals at greater risk for malaria infection than others. Agricultural laborers, for instance, may not only place themselves at risk through increased contact with the malaria vector but also, through their migration, place others at greater risk by contributing to the spread of the disease (Okorosobo, 2000). Consequently, occupation may reflect both socio-economic status and differential risk of exposure through occupational attribute. Similar results for occupation related malaria prevalence has been reported in similar studies Ukpai and Ajoku (2001) and Martin and Lefebvre (1995). The high rates of infection among farmers in the two areas could be attributed to the nature of their job which exposes them to the bites of exophagous malaria vectors while in their farms in addition to their contacts with endophagous nocturnal vector bites while asleep after farm work. The farmers are usually fatigued at nights resulting in deep sleep which encourages the uninterrupted blood sucking tendency of the nocturnal and endophagous vectors of malaria.

Care givers with low income per month had the highest cases of malaria among under-five children (20.6%) and least non-cases (1.1%) of malaria. The test statistics revealed significant association between care givers (Mothers) monthly income and occurrence of malaria among the under five children. This is in line with the study of Samuel and Anastasia (2014) which showed that the highest proportion of children who contracted malaria was among mothers from poor households (16.9%) and the lowest was reported among rich households (16.9%). Worrall et al. (2003) in a study in Nigeria also found that malaria was highest among children from homes with low income. Besides, malaria in Africa has been described as a disease of rural population and communities which are homes of the poorest of the poor (Malaney, 2004). That is to say, malaria cases among under-five children increase with the decrease in household income level.

The frequency analyses revealed that that 178 (37%) mothers accepted that their children sleep under ITNs, while 302 (63%) said that their children do not sleep under ITNs. The test statistic showed that none use of ITNs was significantly associated with malaria prevalence P<0.05 This was supported by the study conducted by Wang et al (2008) which showed that childhood mortality due to malaria reduced significantly in areas where high percentage of children slept under bed nets and that the low rate of the possession of bed nets (which might be as a result of inability to afford them) might have accounted for the high prevalence of fever especially in rural areas in particular, and in villages where poverty is more pronounced.

In this study, environmental factors such as living close to stagnant water was not statistically significant to the prevalence of malaria in the area, P>0.005 while living close to blocked drains and water retaining plants were statistically significant P<0.05. This was supported by Poland et al., (2002), who suggested that permanent natural bodies of water, such as swamps, serve as unique breeding grounds. In the tropic, as mentioned, mosquito breeding sites have emerged due to construction of dams and canals. Many of these sites develop into zones of transmission due to the concomitant increase of human populations moving to these areas. The number of possible breeding site is extensive, and describing a few more of them will help to illustrate the difficulty in finding a common solution to control of malaria transmission by limiting mosquito populations. The study also agrees with the work of Adefemi and Awo (2015) on social and environmental determinants of malaria among under-five children in Nigeria.

5. Conclusion

The study revealed that average monthly income of parents, mothers' occupation and the use of ITNs are some of the factors affecting the prevalence of malaria among under-five children in Rumuigbo town, Obio Akpor L.G.A., Rivers State. Environmental factors such as blocked drains and water-retaining plants are other factors. Mothers' literacy level and living close to stagnant water were seen to have no association with malaria prevalence in the area.

6. Ethical Considerations and Informed Consent

An approval was given by research ethical committee of Federal University of Technology Owerri and informed consent given by head of the hospitals and the participants.

7. Acknowledgements

The authors will like to express their heart felt gratitude to the heads of the hospitals used, and the participants for their cooperation.

8. Competing Interests

Authors hereby declare that there is no competing interest.

9. References

i. Adefemi, K and Awo, O (2015). Social and Environmental determinants of malaria in Under-Five Children in Nigeria: A Review. International Journal of Community Medicine and Public Health, 2(4), 345-350.
ii. Alaba, O.A and Alaba, O.B. (2002). Malaria in children: Implications for the productivity of female caregivers in Nigeria". Proceeding of Annual Conference of the Nigeria Economic Society (NES), 395-413.
iii. Dike N, Onwujekwe O, Ojukwu J, Ikeme A, Uzochukwu B, Shu E. (2006). Influence of education and knowledge on perceptions and practices to control malaria in Southeast Nigeria. Soc Sc Med, 63,103-6.
iv. Kaona F; Siajunza M. T; Manyando C; Khondowe S & Ngoma G. (2000). Utilisation of malaria drugs at a household level: Results from KAP study in Choma, southern province and Mporokoso, Northern Province of Zambia. Central African Journal Medicine, 46, 268-270.
v. Malaney, P; Sielman, A and Sachs, J. (2004). The malaria gap. The American Journal of Tropical Medicine and Hygiene, 71(2), 141–146.
vi. Martin P. H and Lefebvre M.G. (1995). Malaria and Climate: Sensitivity of malaria potential transmission to climate. Ambio, 24(4), 200-207.
vii. Mills, A. (1998). Operational Research on the Economics of Insecticide Treated mosquito nets: Lesson of Experience. Annals of Tropical Medicine and Parasitology 92(4).
viii. Okorosobo T. (2000). "The Economic Burden of Malaria in Africa", Paper prepared for the Abuja Submit of Head of State and Government, Abuja, Nigeria, April.
ix. Poland G. A & Murray D, (2002). "Science, medicine, and the future New Vaccine development" British Medical Journal, 324,1315-1319.
x. Samuel H. N. and Anastasia C. (2014). Sociodemographic Determinants of Malaria among Under-Five Children in Ghana. Malaria Research and Treatment, vol 2014, 6 pages.
xi. Snyman K, Mwangwa F, Bigira V, Kapisi J, Clark T.D et al. (2015). Poor housing construction associated with increased malaria incidence in a cohort of young Ugandan children. American Journal of Tropical Medicine Hygiene.92, 1207–1213.
xii. Ukpai O. M. and Ajoku E.I. (2001). The prevalence of malaria in Okigwe and Owerri areas of Imo State, Nigeria. Journal of Parasitology 22, 43-48.
xiii. World Health Organization (2005). Roll Back Malaria Partnership: WHO World Malaria Report, Geneva.
xiv. Wang R & Doolan D. L. (2008). Indication of antigen-specific cytotoxic T lymphocytes in humans by a malaria DNA vaccine science. 282, 476-480
xv. Whitty C.J.M & Rowland M, (2002). Science, medicine and the future: malaria" British Medical Journal, 325, 1221-1224.
xvi. World Health Organization (2008). Global Malaria Control and Elimination: Report of Technical Review, 17-18 January 2008, Geneva 1-47.
xvii. World Health Organization (2008) World Malaria Report 2008. Geneva Switzerland.
xviii. World Health Organization (2000). Malaria Desk Situation Analysis−Nigeria. 120.
xix. World Health Organization (2010). Global Report on Antimalaria Drug efficiency and Drug Resistance, 2000-2010, WHO, Geneva, Switzerland.
xx. World Health Organization (2011). World Malaria Report. Geneva Switzerland. WHO, http://www.who.int/
xxi. World Health Organization (2015). World Malaria Report. Geneva Switzerland, WHO.
xxii. Worrall, E. S; Basu, X.X; and Hanson, K. (2003). The relationship between socio-economic status and malaria: A review of the literature, in Proceedings of the Conference on Ensuring that Malaria Control Interventions Reach the Poor, London, UK, September 2003.