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Gender Disparities in Malaria Outcomes amongst Residents of Edo South Senatorial District, Edo State, Nigeria

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ABSTRACT: The debate over which family members are most vulnerable to the malaria disease often highlights gender as a key factor in malaria outcomes. Physiological differences, work environments, and social roles all influence susceptibility. The aim of this research therefore was to ascertain the frequency of occurrence of malaria amongst male and female household members, in order to determine gender disparities as it relates to malaria outcomes in the study area, Questionnaires from household survey were administered to 630 respondents in the study area using the systematic random sampling technique. To ascertain if malaria is gender dependent, a cross tabulation and Pearson Chi-Square test analysis was carried out, with the stated hypothesis that there is no association between the sex of respondents and malaria occurrence. Results from the Chi-square analysis depicted that there was no significant association between the sex of respondents and the number of times they had fallen ill due to malaria in the last one year. With a p-value of 0.9855, which was much higher than the significance level of 0.05, the null hypothesis stating that there is no significant association between the sex of respondents and the number of times they have fallen ill due to malaria was accepted. In order words, sex does not appear to significantly influence the occurrence of malaria amongst respondents in Edo South Senatorial District.

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Malaria being one of the commonest diseases combated in Africa has led to its trivialization, which has given rise to high morbidity and mortality levels. Over time, there has been a lot of global concern and interest on ways of permanently eliminating malaria (Stratton *et al.*, 2008). This concern has been expressed in various ways as can be clearly seen from the efforts made by various governments and international organizations through the introduction of programmes such as the "Roll Back malaria initiative (RBM), and the Multilateral initiative on malaria (MIM), (Adefemi *et al.*, 2015). Malaria remains a major problem in Africa, in spite of the huge sums of money devoted to its eradication by different interests and agencies. In fact, malaria mortality is higher than it was half a century ago (World Health Organisation [WHO], 2010). Africa bears a higher malaria burden, with Nigeria having over 300,000 malaria associated deaths yearly (Adefemi *et al.*, 2015). In a study carried out by Wilke *et al.*, (2019), urban processes such as gardening, use of flower pots in and around the house, etc., have also been observed to promote indoor mosquito breeding sites and to create favourable habitats that promote mosquito spread. This was also affirmed in a study carried out in Slovakia by Cabanova *et al.*, (2018), which also revealed an increase in household mosquito borne infections being associated with urban habits and cultures. Malaria thus poses both a global and

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regional challenge which should be of concern to all, including geographers, Environmental health managers, etc. Studies carried out in the past have argued that women are more prone to malaria infection compared to men (Kakuru, 2020). In a study carried out by Quaresima *et al.,* (2021), in Ghana, it was observed that malaria was higher in women compared to men, as a result of biological and social factors. The study also suggested data which revealed women to have greater exposure to mosquito bites compared to men (Quaresima *et al.,* 2021). Research has shown that there are many ways in which gender can influence who gets malaria. Socio-cultural and economic factors seem to be very significant in determining malaria outcomes amongst males and females (UNDP, 2015, Finda, 2019).

Traditional household roles in which women play a key role, such as cooking outdoor at dusk and dawn when mosquitoes are more active, exposes women to more mosquito bites compared to men. This is especially true of households in rural areas who still utilize firewood for outdoor cooking. Studies have shown that, while the disease burden is greater for adult males, the economic effect is greater for female family members, who face increased pressures to provide food and medicines, as well as an increase in care-giving responsibilities (UNDP, 2015). Again, research carried out by McClelland and Smith, (2011) "suggests that there is an interaction between gender specific immune differences and the specific immune response to individual microbes". It therefore means that understanding sex-based differences is important for optimal disease management for both males and females (Fisher *et al*., 2015).

A study carried out by Verthelyi (2001), has also shown the impact of sex hormones on the immune system and affirms that "the greater immune responsiveness in females is evident in their increased susceptibility to autoimmune diseases". "An appreciation of gender difference in malaria burden would be important for improving the understanding of factors that may influence susceptibility to malaria, case management practices, and targeting control interventions" (Okiring *et al*., 2022). Hence the objective of this study is to ascertain the category of family members (male and female), most prone to malaria, in order to establish if sex is a significant determinant of malaria outcomes in the study area.

MATERIALS AND METHODS

Study Area: The research was carried out in Edo South senatorial district of Edo State, which is one the largest senatorial district in Edo State. It is bordered by Ondo state in the north and Delta State in the south as can be seen on Figure 1.

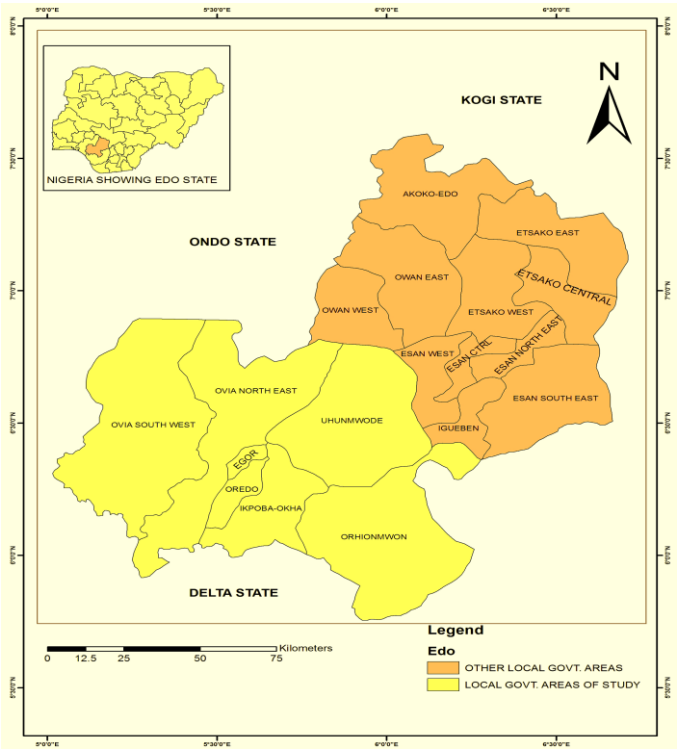

Fig. 1: Map of Edo State, showing Edo South Senatorial District
Source: Ministry of Lands and Survey

This study sets out to explore how often malaria affects male and female respondents in the study area and to identify the category most affected by malaria. In other words, it seeks to explore the role of gender in shaping malaria outcomes amongst respondents in the study area. Primary data on socio-economic and malaria statistics were retrieved from questionnaire survey. Various sampling techniques were utilized for the study. First a simple random technique was utilized through the lottery method to select communities for the survey, in order to ensure that each community has a known and equal chance of being picked (Yomere and Agbonifoh, 1999). A total of 21 communities were randomly selected from Edo South Senatorial District, while 630 questionnaires were then administered and retrieved from respondents living in the study area using the systematic random sampling technique, which was utilised in selecting households in the study area. Results from the study were presented using tables and charts, while the hypothesis stating that there is no significant relationship between sex and malaria outcomes in the study area was tested using the Pearson Chi-square test. Data was analysed using the version 24 of the IBM SPSS statistical software.

RESULTS AND DISCUSSION

Table 1 show a detailed representation of questionnaire distribution in the seven local government areas of Edo South Senatorial district, which amounted to 630 questionnaires.

The age of respondents is clearly depicted on Table 2. The proportion of respondents who are within the ages of 19–29 years is 15.2%, 43.0% are within the age range of 30–39 years, the proportion of respondents who are within the age range of 40–49 years is represented as 26.5%. While 15.2% of respondents fell within the age range of 50–69%. The age range with the highest representation of respondents fall within the ages of 30–39 years. This clearly shows that the study area is characterized by a youthful population which is typical of developing countries.

Table 3 illustrates the sex of respondents in the study area. The proportion of respondents who are male is represented as 33.0% while the proportion of females is represented as 67.0%. From Table 3, it can be observed that the population of female respondents is higher compared to that of men in the study area. The disparity in the proportion of males and females in the study area can be attributed to the fact that male respondents were perceived to be very impatient and could barely spare a few minutes to respond to the questionnaires being administered, with the excuse that they were working and were very busy.

Table 1: Place of Residence (Local Government Area)

	Frequency	Percent
Egor	85	13.5
Ikpoba-Okha	90	14.3
Oredo	64	10.2
Orhionmwon	114	18.1
Ovia North-East	135	21.4
Ovia South-West	73	11.6
Uhunmwonde	69	11.0
Total	630	100.0

Source: Field Analysis

Table 2: Age of Respondents

	Frequency	Percent
19 - 29	96	15.2
30 – 39	271	43.0
40 – 49	167	26.5
50 – 69	96	15.2
Total	630	100.0

Source: Field Analysis

Table 3: Sex of Respondents by Local Government Area

Place of Residence	Sex of Respondents		
	Male	Female	Total
Uhunmwonde	22	47	69
	31.9%	68.1%	100.0%
Orhionmwon	55	59	114
	48.2%	51.8%	100.0%
Oredo	30	34	64
	46.9%	53.1%	100.0%
Egor	26	59	85
	30.6%	69.4%	100.0%
Ovia North-East	26	109	135
	19.3%	80.7%	100.0%
Ikpoba-Okha	27	63	90
	30.0%	70.0%	100.0%
Ovia South-West	22	51	73
	30.1%	69.9%	100.0%
Total	208	422	630
	33.0%	67.0%	100.0%

Source: Field Analysis, 2021

The women were observed to be more sympathetic and some even mentioned that they also had children in school and hence were more understanding in sparing a few minutes to respond to the questionnaire.Table 4 shows the marital status of respondents. The proportion of respondents who are single is represented as 8.9%, the proportion who are married is represented as 86.0% while the proportion who are separated is given as 1.6%, with the widowed having a representation of 3.5%. The results reveal that married individuals make up the largest proportion of the sampled population. In contrast, separated individuals have the lowest representation.

Table 4: Marital Status of Respondents by Local Government Area

Place of Residence	Marital Status of Respondents				Total
	Single	Married	Separated	Widowed	
Uhunmwonde	9	58	1	1	69
	13.0%	84.1%	1.4%	1.4%	100.0%
Orhionmwon	9	101	1	3	114
	7.9%	88.6%	0.9%	2.6%	100.0%
Oredo	15	49	0	0	64
	23.4%	76.6%	0.0%	0.0%	100.0%
Egor	0	83	0	2	85
	0.0%	97.6%	0.0%	2.4%	100.0%
Ovia North-East	9	113	3	10	135
	6.7%	83.7%	2.2%	7.4%	100.0%
Ikpoba-Okha	9	75	3	3	90
	10.0%	83.3%	3.3%	3.3%	100.0%
Ovia South-West	5	63	2	3	73
	6.8%	86.3%	2.7%	4.1%	100.0%
Total	56	542	10	22	630
	8.9%	86.0%	1.6%	3.5%	100.0%

Source**:** Field Analysis, 2021

This minimal percentage may be attributed to traditional African and religious beliefs that emphasize the permanence of marriage. The high percentage of married individuals also highlights the significant responsibilities many mothers in the study area bear, particularly in rural areas, in providing for their families and preparing meals, which is often done outdoors to meet the nutritional needs of the family.

Sex of Respondents	Number of Times you have Fallen Ill due to Malaria in the Last One Year				
	Never	2	3	4 and Above	Total
Male	25	34	102	47	208
	12.0%	16.3%	49.0%	22.6%	100.0%
Female	54	69	201	98	422
	12.8%	16.4%	47.6%	23.2%	100.0%
Total	79	103	303	145	630
	12.5%	16.3%	48.1%	23.0%	100.0%

Table 5: Sex of Respondents and Malaria Occurrence
Source: Field Analysis, 2021

Table 5 illustrates the frequency of illness among male and female respondents over a one-year period and was analysed in order to provide insight into which group is more susceptible to malaria. A cross tabulation between sex and malaria occurrence was carried out as can be seen on Table 5, in order to ascertain if malaria occurrence was as a consequence of the sex of respondents in the last one year. A Pearson Chi-square analysis on sex and malaria occurrence between male and female respondents in the study area was also carried out, in order to ascertain the relationship between sex and malaria occurrence in the study area and to uncover any associations or links.

The data reveals the frequency of malaria cases among male and female respondents in the study area over the past year. Among men, 12.0% reported never contracting malaria, 16.3% experienced it twice, 49.0% fell ill three times, and 22.6% had four or more occurrences. Similarly, among women, 12.8% reported never falling ill, 16.4% had malaria twice, 47.6% suffered from it three times, and 23.2% experienced it four or more times. When comparing malaria outcomes between both sexes, the proportion of males and females experiencing multiple occurrences of malaria can be said to be similar, with about half of the respondents from both groups reporting 3 or more malaria incidences in the last one year. The Pearson chi-square test was carried out to test the hypothesis stating that there is no relationship between the sex of respondents in the study area and malaria outcomes. The analysis confirms that malaria is widespread among both men and women, with most experiencing multiple episodes. While gender differences were minimal, a slightly higher percentage of females reported four or more cases compared to males. With a p-value of 0.9855 which is well above the 0.05 significance level, the null hypothesis is accepted, indicating no significant link between respondents' sex and the frequency of malaria occurrences. This suggests that gender does not play a determining role in malaria prevalence within the study area. Since the data is categorical, a Chi-square test of independence was carried out to ascertain if there is a significant association between sex and malaria occurrence. The observed and

expected frequencies were observed to be very close. This close alignment between observed and expected frequencies further supported the conclusion that the two variables (sex and malaria occurrence) are statistically independent of each other in explaining malaria outcomes in the study area.

Conclusion: Conclusions from the study revealed that women are usually more exposed to mosquito bites as a result of the cultural roles they play as care givers. However, the cross-tabulation analysis showed no significant link between sex and malaria outcomes, thereby contradicting previous research that suggests gender-based differences in malaria susceptibility. There is great need to carry out further gender-based research on sex and malaria correlation in Edo South senatorial district, in order to uncover any linkages between gender and malaria outcomes, and to give room for a comparative analysis on sex and malaria outcomes between the southern and northern parts of Edo state. It is recommended that women (especially those in rural areas of the LGA, who often cook outdoors) be enlightened on the need to wear protective clothing and make use of insect repellent creams when cooking at dusk or dawn in order to reduce exposure to mosquito bites as mosquitoes are usually more active at such times.

*Declaration of conflict of Interest***:** The author declares no conflict of interest.

*Data Availability Statement***:** Data are available upon request from the author.

REFERENCES

Adefemi, K; Awolaran, O; Wuraola, C (2015). Social and environmental determinants of malaria in under-five children in Nigeria: a review. *Int J. of Comm. Med. and Pub Hlth. 2*(4), 345-350. DOI: http://dx.doi.org/10.18203/2394-6040.ijcmph20151026

Burn, K; Boyce, C (2015). Gender and Malaria. United Nations Development Programme.https://www.undp.org/sites/g/files/zskgke326/files/publications/Discussion%20Paper%20Gender_Malaria.pdf

Čabanová, V; Miterpáková, M; Valentová, D; Blažejová, H; Rudolf, I; Stloukal, E; Hurníková, Z; Dzidová, M. (2018). Urbanization impact on mosquito community and the transmission potential of filarial infection in central Europe. *Para. Vec. 11***(**261). https://doi.org/10.1186/s13071-018-2845-1

Finda MF; Moshi IR; Monroe A; Limwagu AJ; Nyoni AP; Swai JK; Ngwo, HS (2019) Linking human behaviours and malaria vector biting risk in south-eastern Tanzania. PLoS ONE 14(6): e0217414. https://doi.org/10.1371/journal.pone.0217414

Fischer, J; Jung, N; Robinson, N; Lehmann, C (2015). Sex differences in immune responses to infectious diseases. *Infection*, *43*(4), 399–403. https://doi.org/10.1007/s15010-015-0791-9

Kakuru, A; Roh, ME; Kajubi, R; Ochieng, T; Ategeka, J; Ochokoru, H; Nakalembe, M (2020). Infant sex modifies associations between placental malaria and risk of malaria in infancy. *Malar J.* 19:449. https://doi.org/10.1186/s12936-020-03522-z

McClelland, EE; Smith, JM. (2011). Gender specific differences in the immune response to infection. *Archivum immunologiae et therapiae experimentalis*, *59*(3), 203–213. https://doi.org/10.1007/s00005-011-0124-3

Okiring, J; Epstein, A; Namuganga, JF; Nabende, I; Nassali, M; Sserwanga, A; Gonahasa, S. (2022). Gender difference in the incidence of malaria diagnosed at public health facilities in Uganda. Malar J. 21, 22. https://doi.org/10.1186/s12936-022-04046-4

Quaresima, V; Agbenyega, T; Oppong, B; Awunyo, JADA; Adomah, PA; Enty, E; Francesco D; Castelli, F. (2021). Are malaria risk factors based on Gender? A mixed-methods survey in an urban setting in Ghana. *Trop. Med. Infect.*, 6, 161.https:// doi.org/10.3390/tropicalmed6030161

Stratton, L; O'Neill, MS; Kruk, ME; Bell, ML (2008). The persistent problem of malaria: Addressing the fundamental causes of a global killer. *Social Science & Medicine*. *67*(5):854-62. Doi: http://dx.doi.org/10.1016/j.socscimed.2008.05.013

United Nations Development Programme, (2015). Gender and Malaria. https://www.undp.org/sites/g/files/zskgke326/files/publications/Discussion%20Paper%20Gender_Malaria.pdf. Accessed January 3, 2025.

Verthelyi, D. (2001). Sex hormones as immunomodulators in health and disease. *Intnal Immunopharm*, *1*(6), 983–993. https://doi.org/10.1016/s1567-5769(01)00044-3

Wilke, AB; Chase, C; Vasquez, C; Carvajal, A; Medina, J; Beier, J. (2019). Urbanization creates diverse aquatic habitats for immature mosquitoes in urban areas. *Scientific Rep, 9*(15335). https://doi.org/10.1038/s41598-019-51787-5

World Health Organisation. [WHO], (2010). *World Malaria Report: Global Malaria Programme, Geneva, Switzerland*. Retrieved November 24, 2019, from https://www.who.int › malaria › worldmalariareport2010

World Health Organization., [WHO], (2015b). World malaria report. Author. Retrieved from www.who.int/malaria/media/ world-malaria-report-2015/en/, September, 2021.

Yomere, GO; Agbonifoh, BA (1999). *Research methodology in the Social Sciences and Education*, Edo state, Benin City, Uniben Press.