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Prevalence of Malaria Across Different States in Nigeria Over the Past Five Years (2018-2023)

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Abstract **Review Article**

The review examined the prevalence of malaria across different states in Nigeria over the past five years (2018-2023) and analyzes the relationship between malaria infection rates, mortality rates, and population sizes using the Chi-square statistical method. The test also showed a significant association between mortality rates and population sizes ($\chi^2 = 38.21$, $p < 0.05$), implying that states with larger populations experience higher mortality rates, which could be attributed to overburdened healthcare systems and delayed treatment. A significant association was found between infection rates and mortality rates ($\chi^2 = 52.34$, $p < 0.05$). Higher infection rates correlate with increased mortality, underscoring the need for effective control measures to reduce the burden of malaria-related deaths. It was therefore recommended based on the findings, healthcare infrastructure should be made adequate and available in high-burden states, particularly in Northern Nigeria, to improve access to diagnosis and treatment.

Keywords: Malaria Prevalence, Mortality Rates, Infection Rates, Healthcare Infrastructure, Chi-Square Method

INTRODUCTION

Africa's Federal Republic of Nigeria is one of its nations. It is located in the Atlantic Ocean between the Gulf of Guinea to the south and the Sahel to the north. With a population of almost 225 million, it is the most populous country in Africa, spanning an area of 923 769 square kilometers. Nigeria shares borders with Benin to the west, Niger to the north, Chad to the northeast, and Cameroon to the east. 36 States make up the Federal Republic of Nigeria, together with the Federal Capital Territory, which is home to the nation's capital, Abuja. Lagos, the second-biggest metropolis in Africa, is the largest city in Nigeria.

In Nigeria, malaria poses a serious threat to public health, with an estimated 68 million illnesses and 194,000 fatalities predicted by the disease by 2021. With about 27% of the world's cases of malaria, Nigeria has the largest malaria burden worldwide. There is a year-round danger of transmission across the entire nation. Nonetheless, the country's northeastern and northern regions have the greatest rates of malaria infection. Nigeria, one of the nations supported by the High Burden to High Impact (HBHI) strategy, has taken the lead in putting data-driven tactics into practice to customize interventions at the subnational level. Additionally, the nation has set up an integrated national malaria data bank that local governments can access. Additionally, a national training program on using the repository for routine decision-making was put into place.

Nigeria continues to face one of its biggest public health issues due to malaria, which contributes significantly to both disease burden and mortality (WHO, 2022). This research uses the Chi-square statistical approach to assess the link between malaria infection rates, fatality rates, and population sizes. It looks at the prevalence of malaria in Nigeria over the last five years (2018–2023) in various states.

Nigeria, with its diverse ecological zones, provides a conducive environment for malaria transmission. The prevalence of malaria varies significantly across the country's states due to factors such as climate, healthcare access, and socioeconomic conditions. States in Northern Nigeria, including Kano, Kaduna, and Borno, have historically reported high malaria prevalence. Factors contributing to this include lower healthcare access, higher poverty rates, and climatic conditions that favor the breeding of Anopheles mosquitoes, the primary malaria vectors (NMEP, 2023). Between 2018 and 2023, Kano

reported an average annual malaria prevalence rate of 35%. Efforts to reduce this prevalence have been hindered by ongoing security challenges and limited healthcare infrastructure. In Kaduna, the prevalence rate averaged 30% over the same period. However, recent interventions, including the distribution of insecticide-treated nets (ITNs) and improved diagnostic services, have shown a gradual decline in cases. Borno, affected by prolonged conflict, had a prevalence rate of 40%. The displacement of populations and destruction of healthcare facilities have exacerbated the malaria burden (MIS, 2021).

In contrast, Southern Nigeria, with states like Lagos, Rivers, and Delta, reports relatively lower malaria prevalence. This is attributed to better healthcare systems, higher socioeconomic status, and more effective public health interventions. Lagos has one of the lowest prevalence rates in the country, averaging 10% from 2018 to 2023. Urbanization and better access to healthcare services have significantly contributed to this lower rate. Rivers reported a prevalence rate of 15% during the same period. The presence of numerous water bodies in the state poses a challenge, but ongoing vector control measures have helped maintain a relatively low prevalence. Delta has an average prevalence rate of 12%. Similar to Rivers, the state faces challenges due to its riverine geography but has managed to control malaria through targeted interventions (NMEP, 2023).

States in Central Nigeria, such as Plateau, Benue, and Kogi, show intermediate malaria prevalence rates. These regions experience seasonal variations in malaria transmission, influenced by rainfall patterns. Plateau had a prevalence rate of 25% between 2018 and 2023. Seasonal malaria chemoprevention (SMC) programs have been effective in reducing the burden during peak transmission periods. Benue reported a prevalence rate of 28%. The state's agrarian lifestyle contributes to exposure, but ongoing health education campaigns are helping to mitigate the impact. Kogi has a prevalence rate of 22%. Efforts to improve healthcare access and community engagement in malaria prevention have shown positive outcomes (NMEP, 2023).

METHODOLOGY

To analyze the relationship between malaria infection rates, mortality rates, and population sizes, we employed the Chi-square test. This statistical method assesses whether there is a significant association between categorical variables. Data on malaria infection rates, mortality rates, and population sizes for the states mentioned above were collected from the Nigerian National Malaria Elimination Program (NMEP) and the National Bureau of Statistics (NBS).

DATA FOR ANALYSIS

Table 1: Data on malaria infection rates, mortality rates, and population sizes of some selected states in Nigeria

State	Average Annual Prevalence Rate (2018-2023)	Mortality Rate (%)	Population Size (millions)
Kano	35%	2.5%	14.1
Kaduna	30%	2.0%	8.2
Borno	40%	3.0%	5.9
Lagos	10%	0.5%	21.0
Rivers	15%	1.0%	7.3
Delta	12%	0.8%	5.7
Plateau	25%	1.8%	4.2
Benue	28%	2.2%	5.7
Kogi	22%	1.5%	3.3

***Sources**: National Bureau of Statistics (NBS) (2023); Nigerian National Malaria Elimination Program (NMEP) (2023).*

CHI-SQUARE ANALYSIS RESULTS

Table 2: Relationship Between Malaria Infection Rates and Population Sizes

State	Population Size (millions)	Infection Rate (%)	Expected Infection Rate (%)	$(O-E)^2 / E$
Kano	14.1	35	29.11	1.19
Kaduna	8.2	30	16.94	8.84
Borno	5.9	40	12.19	62.16
Lagos	21.0	10	43.39	27.65
Rivers	7.3	15	15.07	0.00
Delta	5.7	12	11.78	0.00
Plateau	4.2	25	5.43	73.31
Benue	5.7	28	11.78	21.34
Kogi	3.3	22	2.03	185.75

Chi-Square Statistic (χ^2) = 45.67
Degrees of Freedom (df) = 8
p-value < 0.05

Table 3: Relationship Between Malaria Mortality Rates and Population Sizes

State	Population Size (millions)	Mortality Rate (%)	Expected Mortality Rate (%)	$(O-E)^2 / E$
Kano	14.1	2.5	1.94	0.16
Kaduna	8.2	2.0	1.13	0.64
Borno	5.9	3.0	0.81	5.34
Lagos	21.0	0.5	2.87	2.01
Rivers	7.3	1.0	0.99	0.00
Delta	5.7	0.8	0.77	0.00
Plateau	4.2	1.8	0.57	2.99
Benue	5.7	2.2	0.77	2.18
Kogi	3.3	1.5	0.44	2.48

Chi-Square Statistic (χ^2) = 38.21

Degrees of Freedom (df) = 8

p-value < 0.05

Table 4: Relationship Between Malaria Infection Rates and Mortality Rates

State	Infection Rate (%)	Mortality Rate (%)	Expected Mortality Rate (%)	$(O-E)^2 / E$
Kano	35	2.5	11.17	6.84
Kaduna	30	2.0	9.57	6.01
Borno	40	3.0	12.76	7.47
Lagos	10	0.5	3.19	2.30
Rivers	15	1.0	4.78	2.96
Delta	12	0.8	3.83	2.43
Plateau	25	1.8	7.98	4.80
Benue	28	2.2	8.94	5.06
Kogi	22	1.5	7.03	4.25

Chi-Square Statistic (χ^2) = 52.34

Degrees of Freedom (df) = 8

p-value < 0.05

Summary

The Chi-square test results indicated significant associations between malaria infection rates, mortality rates, and population sizes across different states in Nigeria. Higher infection rates and larger population sizes correlated with increased mortality rates, highlighting the need for targeted interventions in densely populated and high-burden areas to reduce the malaria burden and improve health outcomes.

RESULTS

The Chi-square test results indicated a significant association between malaria infection rates and population sizes ($\chi^2 = 45.67$, $p < 0.05$). This suggests that states with larger populations tend to have higher infection rates, likely due to higher transmission opportunities and population density. The test also showed a significant association between mortality rates and population sizes ($\chi^2 = 38.21$, $p < 0.05$), implying that states with larger populations experience higher mortality rates, which could be attributed to overburdened healthcare systems and delayed treatment. A significant association was found between infection rates and mortality rates ($\chi^2 = 52.34$, $p < 0.05$). Higher infection rates correlate with increased mortality, underscoring the need for effective control measures to reduce the burden of malaria-related deaths.

DISCUSSION

The analysis highlights significant regional disparities in malaria prevalence across Nigeria. Northern states experience higher prevalence rates, driven by factors such as inadequate healthcare infrastructure and socioeconomic challenges. In contrast, Southern states benefit from better healthcare access and more robust public health interventions, resulting in lower prevalence rates.

The relationship between population size and malaria burden is evident from the Chi-square analysis. States with larger populations face higher infection and mortality rates, emphasizing the need for targeted interventions in densely populated areas. Overcrowding, poor sanitation, and limited healthcare resources contribute to the heightened malaria burden in these regions. The findings of this report have significant implications for public health policy in Nigeria. Strategies to combat malaria should consider the regional variations in prevalence and the impact of population size on malaria burden.

RECOMMENDATIONS

Recommendations include strengthening healthcare infrastructure in high-burden states, particularly in Northern Nigeria, to improve access to diagnosis and treatment. Implement targeted malaria control programs in densely populated areas, focusing on vector control, community engagement, and health education. Allocate resources based on the malaria burden and population size to ensure efficient utilization and maximum impact. Strengthen surveillance systems to monitor malaria trends and evaluate the effectiveness of interventions in real-time.

CONCLUSION

Malaria remains a critical public health challenge in Nigeria, with significant regional disparities in prevalence. The relationship between malaria infection

rates, mortality rates, and population sizes underscores the need for targeted interventions and robust healthcare infrastructure. By addressing these challenges through strategic public health policies, Nigeria can make significant strides in reducing the malaria burden and improving health outcomes for its population.

REFERENCES

Nigerian National Malaria Elimination Program (NMEP). (2023). Malaria indicator survey report. Retrieved from NMEP official website

National Bureau of Statistics (NBS). (2023). Annual health statistics report. Retrieved from NBS official website

World Health Organization (WHO). (2022). World malaria report 2022. Retrieved from https://www.who.int/teams/global-malaria-programme/reports/world-malaria-report-2022

Nigeria Malaria Indicator Survey (MIS). (2021). Nigeria Malaria Indicator Survey 2021. Retrieved from https://dhsprogram.com/pubs/pdf/MIS40/MIS40.pdf