

MALARIA INFECTION AND ASSOCIATED RISK FACTORS IN PATIENTS ATTENDING FEDERAL POLYTECHNIC CLINIC IN NASARAWA LOCAL GOVERNMENT, NASARAWA STATE OF NIGERIA

¹HUSSAINI, F. A., ¹ALIYU, A. A., AND ²JIBRIN, M. S.

¹Department of Zoology, Faculty of Natural and Applied Sciences, Nasarawa State University, PMB 1022, Keffi, Nasarawa State, Nigeria. ²Department of Applied Biology and Microbiology, Federal Polytechnic Nasarawa, Nasarawa State, Nigeria.

Corresponding Author: fatimahasheadzi@nsuk.edu.ng

DOI Link: <https://doi.org/10.70382/bejhmns.v7i3.006>

Abstract

Malaria is a life-threatening mosquito-borne blood disease caused by a *Plasmodium species*. The burden of malaria is greatest among the developing countries with only 0.2% of global malaria deaths found in the developed countries. This study determined the status of malaria parasite infection and associated risk factors among patients attending the Clinic of Federal Polytechnic in Nasarawa Local Government of Nasarawa State. Thin and thick blood films were examined microscopically using x100 objectives. A

Introduction

Malaria is a life-threatening mosquito-borne blood disease caused by a *Plasmodium species*. The parasite transmitted to humans through the bite of the *Anopheles* mosquito, which carry infective sporozoite stage of *Plasmodium* parasite in their salivary glands. It is one of the biggest impediments to progress in

total of 400 consenting patients consisting of 180 male and 220 female were enrolled and the overall prevalence was 48.7% (195/100). The study revealed that malaria parasite infection was more prevalent in female (51.3.0%) than in their male counterparts (48.7%). The ages of 11-20 years had the highest prevalence 24.1% (47/85) of the infection when compared with the other age groups < 5 (21.5%), 5-10 (16.9%), 21-30 (17.9%) and 31-40 years (19.4%) prevalence rate. Based on their occupation, Farmers had the highest prevalence rate (24.6%), others (housewives and unemployed patients) had 23.5% then traders (21.5%), students had 16.4%, civil servants were the least infected occupational group (13.8%). Based on the risk factors, patients who sleep under the mosquito treated nets were less infected (46.6%) than those who did not (53.3%). Those who use insecticide spray (17.5%) were less infected than those did not (82.4%). Patients who cover their body were less infected (38.9%) than those who did not (62.0%). The uneducated patients were more infected (78.4%) than the educated ones (21.6%), Overall, there was a significant difference between the socio-demographic and risk factors ($p < 0.05$). There is need for vector control and strengthening healthcare infrastructure and increasing community awareness about malaria prevention which are crucial steps to reduce the burden of the study in the area.

Corresponding Author: Malaria, Nasarawa, Polytechnic, Risk factors.

Africa and is the biggest killer in Africa, with 90% of the global malaria deaths occurring on this continent (Das *et al*, 2024). There are 5 parasite species that cause malaria in humans: *Plasmodium vivax*, *P. malariae*, *P. ovale*, *P. falciparum* and *P. knowlensi* (WHO [World Health Organization], 2022). Two of these species *P. falciparum* and *P. vivax* pose the greatest threat. *P. falciparum* is the most prevalent malaria parasite on the African continent. It is responsible for the mortality and morbidity of all malaria-related disease around the globe. However, *P. vivax* is the most widely

distributed *Plasmodium species* in non-sub-Saharan Africa. Malaria is transmitted through the bites of infected female *Anopheles* mosquitoes. When this mosquito bites, the parasite is released into the blood stream. Once the parasites are inside the body, they travel to the liver, where they mature. After several days, the mature parasites enter the bloodstream and begin to infect red blood cells. Within 48 to 72 hours, the parasite multiplies inside the red blood cells, causing the infected cells to burst. In a non-immune individual, symptoms usually appear 10-15 days after the infective mosquito bite. The symptom which appear at the initial stage of malaria disease, include fever, headache, and chills, although this may be mild and will not be consider as malaria at the early stage. If not treated within 24 hours, *P. falciparum* malaria can progress to severe illness, often leading to death (WHO, 2023). Chronic malaria infection in children exhibit one or more symptoms which include: severe anaemia, respiratory distress in relation to metabolic acidosis, or cerebral malaria. In adults, multi-organ involvement is also frequent. In malaria endemic areas, people may develop partial immunity, allowing asymptomatic infections to occur. The estimated number of malaria deaths stood at 445 000 in 2016, a similar number to the previous year (446 000) in 2015 (WHO, 2019). New data from the WHO reveal that an estimated 2.2 billion cases of malaria and 12.7 million deaths have been averted since 2000, but the disease remains a serious global health threat, particularly in the WHO African Region. According to WHO's latest World malaria report, there were an estimated 263 million cases and 597 000 malaria deaths worldwide in 2023. This represents about 11 million more cases in 2023 compared to 2022, and nearly the same number of deaths. Approximately 95% of the deaths occurred in the WHO African Region, where many at risk still lack access to the services they need to prevent, detect and treat the disease (WHO, 2024). In areas with high transmission of malaria, the majority of the cases (65%) occur in children under 15 years old (WHO, 2024). The burden of malaria is greatest among the developing countries with only 0.2% of global malaria deaths found in the developed countries (WHO, 2024).

In malaria-endemic regions where *Plasmodium vivax* and *Plasmodium falciparum* coexist, *P. vivax* continues to be the main cause of malaria because existing interventions are primarily focused on *P. falciparum*. *Plasmodium vivax* causes severe and fatal outcomes that have reversed the historical notion of benign *P. vivax* infections (Howard *et al.*, 2023). However, despite this burden, *P. vivax* does not draw as much attention as *P. falciparum*, particularly in sub-Saharan Africa (WHO, 2024).

Malaria control and elimination strategies heavily depend on timely, accurate diagnosis and effective treatment. Microscopy is a gold standard and common malaria diagnostic test in several African In malaria-endemic regions where *Plasmodium vivax* and *Plasmodium falciparum* co-exist, *P. vivax* continues to be the main cause of malaria because existing interventions are primarily focused on *P. falciparum*.

Statement of the Problem

Malaria remains a significant public health challenge in Nasarawa State, Nigeria, contributing to high morbidity and mortality rates. Despite various efforts to combat the disease, the prevalence of malaria parasite infection among subjects in Nasarawa State continues to be alarmingly high. This persistent health issue poses severe implications for individual health, economic productivity, and overall community well-being.

The problem is multifaceted, involving factors such as inadequate healthcare infrastructure, limited access to effective diagnostic tools, and insufficient public awareness and education about malaria prevention and treatment. Moreover, the rise of drug-resistant malaria strains and the inconsistent use of preventive measures, such as insecticide-treated nets and indoor residual spraying, exacerbate the situation.

In Nasarawa State, there is a noticeable gap in comprehensive data on the prevalence of malaria parasite infection, which hampers effective planning and implementation of targeted interventions. This study seeks to address this gap by investigating the current prevalence rates, identifying the key

factors contributing to the high infection rates, and assessing the effectiveness of existing control measures.

Understanding the prevalence and the associated challenges is crucial for developing effective strategies to reduce malaria transmission and improve patient outcomes. The findings from this study will provide valuable insights for healthcare providers, policymakers, and public health officials to enhance malaria control programs, allocate resources more efficiently, and ultimately reduce the burden of malaria in Nasarawa State.

Materials and Methods

Study Area

The study was conducted in Federal Polytechnic Clinic Nasarawa Local Government Area of Nasarawa state in Nigeria. Nasarawa is a Local Government Area in Nasarawa State, Nigeria. Its headquarters are in the town of Nasarawa, located at 8°32'N 7°42'E, with a population of 30,949 (as of 2016). The local government area has an area of 5,704 km² and a population of 189,835 at the 2006 census. The postal code of the area is 962 (Nipost, 2009).

Duration of Study

The Study was conducted within the period of one year (January to December 2024).

Sample Size Determination

The sample size was determined by employing the formula by Bartlett *et al.*, (2001) for calculating appropriate sample size in a prevalence study.

$$n = \frac{p(100 - p)z^2}{E^2}$$

n is the required sample size

P is the percentage occurrence of a state or condition

E is the percentage maximum error required

Z is the value corresponding to level of confidence required

Therefore, the total number of subjects screened in this study was four hundred (400) after substituting the variables.

Sampling Technique

Safety procedures were adopted in the collection of finger-prick blood samples by swabbing the area with 70% alcohol and allow to air dry before the collection begins. The criteria for inclusion in the study are fever or a history of fever in the 24 to 48 hours preceding presentation.

Thick and thin films of the blood samples were prepared. Thin blood films were fixed with methanol and all the blood films were stained with 3% Giemsa stain of pH 7.0 for 30 min as reported by Cheesbrough, 2017. Blood films were examined microscopically using x100 (oil immersion) objectives as described by Cheesbrough 2017 and WHO 2023. The thick films were used to determine the parasite densities while thin films were used to identify the parasite species and infective stages. A slide was declared negative after examining 200 high power fields without parasites. Each slide was read independently and blindly by two certified laboratory microscopists.

Ethical approval and clearance

The aim and objectives of the study were discussed with the Health Research Ethics Committee, Nasarawa State Ministry of Health, Nasarawa State and ethical clearance obtained. Permission to carry out the study is obtained from these stakeholders. The written consent forms and participant information forms are kept separately from the data collection tools.

Data Analysis

Statistical analyses were carried out using SPSS (version 20.0) software. Comparisons between populations were made using Pearson's Chi-Square analysis. A probability of < 0.05 denoted a statistically significant difference.

Results

A total of 400 consenting patients consisting of 180 male and 220 female were enrolled and the overall prevalence was 48.7% (195/100). The study revealed that malaria parasite infection was more prevalent in female (51.3.0%) than in their male counterparts (48.7%). The ages of 11-20 years had the highest prevalence 24.1% (47/85) of the infection when compared with the other age groups < 5 (21.5%), 5-10 (16.9%), 21-30 (17.9%) and 31-40 years (19.4%) prevalence rate. Based on their occupation, Farmers had the highest prevalence rate (24.6%) followed by others which includes housewives and unemployed patients (23.5%) then traders (21.5%), students had 16.4%, civil servants were the least infected occupational group with the prevalence rate of 13.8% (Table 1). Based on the risk factors (Table 2), patients who sleep under the mosquito treated nets were less infected (46.6%) than those who did not (53.3%). Those who use insecticide spray (17.5%) were less infected than those did not (82.4%). Patients who cover their body were less infected (38.9%) than those who did not (62.0%). The uneducated patients were more infected (78.4%) than the educated ones (21.6%), Overall, there was a significant difference between the socio-demographic and risk factors ($p < 0.05$).

Table 1: Demographic-Related Prevalence of malaria parasite infection among Patients attending Federal Polytechnic Nasarawa Clinic Nasarawa.

Demographics	No. Examined (%)	No. Positive (%)	p-value
Gender			
Male	180 (45)	95 (48.7)	0.000
Female	220 (55)	100 (51.3)	
Age			
<5	70 (17.5)	42 (21.5)	0.000
5-10	100 (25)	33 (16.9)	
11-20	85 (21.2)	47 (24.1)	
21-30	55 (13.7)	35 (17.9)	
31 and above	90 (22.5)	38 (19.4)	
Occupation			
Farmers	104 (26)	48 (24.6)	0.000
Traders	45 (11.2)	42 (21.5)	
Civil servants	62 (15.5)	27 (13.8)	
Students	106 (26.5)	32 (16.4)	
Others	83 (20.7)	46 (23.5)	
Total	400 (100)	195 (48.7%)	

Table 2: Risk Factors Associated with Parasitic Infections among patient attending Federal

Risk Factors	No. Examined (%)	No. Positive (%)	p-value	χ^2 value
Use of ITNs				
Yes	216 (54)	91 (46.6)	0.006	
No	184 (46)	104 (53.3)		
Use of Insecticide sprays				
Yes	202 (50.5)	34 (17.4)	0.000	
No	198 (49.5)	161 (82.5)		
Covering of body				
Yes	204 (51)	76 (38.9)		
No	196 (49)	121 (62.0)		
Level of Education				
Educated	220 (55)	42 (21.6)	0.000	
Non-educated	180 (45)	153 (78.4)		
Total	400 (100)	195 (48.7)		

Polytechnic Nasarawa.

Discussion

The finding revealed that only *Plasmodium falciparum* was detected which is the most prevalent tropical disease with high morbidity and mortality (Isa *et al.*, 2023); Alemu *et al.*, (2024); WHO, (2024). This study was carried out during the late dry season (January-March) through the late rainy season (September-December 2024). The mosquitoes are more vicious throughout the season as they get ample breeding grounds near homesteads. The prevalence of 48.7% obtained in this study is similar to the 44.4% reported by Mandai *et al.*, (2024) whose study was a community-based survey in five villages in Kyerwa district of north-western Tanzania. The findings in this study is higher than the 39.4% prevalence rate by Alemu *et al.*, (2024), the 27.8% prevalence rate by Aliyo *et al.*, (2024), the 21% overall prevalence rate by 10.6% overall prevalence rate detected by Bardoe *et al.*, (2024) and Lower

than the 57.6% prevalence rate by Li *et al.* (2024) from Abia State of Nigeria and 80.5% prevalence rate by Olasehinde *et al.* (2010) from Ogun, Nigeria. In this study, it was observed that patient between the ages of 10-20 years had the highest prevalence rate. This may be due to the fact that their immunity to parasitic infection has not been fully developed Bardoe *et al.*, (2024); Oluwafemi *et al.*, (2024) and Ain *et al.*, (2024). Although it has been established that residual immunity derived from this age group are less strong compare to fully adult, but environmental conditions and inability of patient of this age to overcome the mosquito attacks made them vulnerable to the malaria parasite infection. The prevalence of the infection has been found to reduce with other age group (21-30 and 31 - 40 years) this could be attributed to the fact that patient of this age have developed immunity against *Plasmodium* parasites (Ain *et al.*, (2024). The present study as shown in table one revealed that *Plasmodium* infection were more common in the females (51.3%) than in the male patients (48.7%). The result is in accordance to the work of Oluwafemi *et al.*, (2024); Mandai *et al.*, (2024) and Zakari *et al.*, (2024) and in conformity with the work of Nmadu *et al.*, (2022) and Hassan *et al.*, (2024) who reported higher values in male than in female. However studies have shown that females have better immunity to parasitic diseases and this was attributed to genetic and hormonal factors (WHO, 2023). In this study, higher infection rate (53.3%), was observed among patients do not use insecticide treated nets as the means of prevention a higher prevalence rate was also observed among patients who do not use Insecticide spray (82.5%), patients who exposed their body (62.0) were more infected than those who do not. Infection was also higher among the non-educated patients (78.4%) which is similar to the work of Enyi *et al.*, (2023); Benjamin *et al.*, (2019); Ombugadu *et al.*, 2021 and Tatteh *et al.*, (2023). Vector control is the main way to prevent and reduce malaria transmission. If coverage of vector control interventions within a specific area is high enough, then a measure of protection will be conferred across the community.

World Health Organization recommended protection for all people at risk of malaria with effective malaria vector control. Several studies in malaria endemic regions of the world have documented average reduction of 20% in

all causes of mortality in younger ones under five years old within two years of increasing insecticide treated nets (ITN) use from 0 to 50-70%. In this study, lower prevalence of the infection was obtained among younger age group whom were educated up to tertiary levels. Maternal education has an enormous effect, it has been found that the higher a mother's education, the lesser the chance of infected

Conclusion

The study on the prevalence of malaria parasite infection among patients attending the Federal Polytechnic Clinic in Nasarawa Local Government Area reveals a significant rate of infection within the population. Factors such as environmental conditions, Negligence, and limited access to healthcare may contribute to the high transmission rate. Additionally, demographic variables like age, gender, and risk factors were found to influence susceptibility to malaria infection.

Recommendation

The findings underscore the urgent need for intensified malaria control efforts, including public health education, improved access to preventive measures like insecticide-treated nets, and timely treatment with effective antimalarial drugs. Strengthening healthcare infrastructure and increasing community awareness about malaria prevention are crucial steps to reduce the burden of the disease in the area. Future research should focus on evaluating the effectiveness of ongoing interventions and exploring more targeted strategies to mitigate malaria infection rates.

Acknowledgment

We are grateful to all of the patients who participated in this study, Medical Laboratory Scientists of the clinic of Federal Polytechnic Nasarawa for their guidance and tolerance throughout the study period.

Conflict of Interest

The authors declare no competing interest.

References

- Ain, Q. T., Saleem, N., Munawar, N., Nawaz, R., Naseer, F., Ahmed, S. (2024). Quest for malaria management using natural remedies. *Frontiers in Pharmacology*, 2024 Jun 26;15:1359890. doi: 10.3389/fphar.2024.1359890. PMID: 39011507; PMCID: PMC11247327.
- Alemu, A., Lemma, B., Bekele, (2024). Malaria burden and associated risk factors among malaria suspected patients attending health facilities in Kaffa zone, Southwest Ethiopia. *Malaria Journal*, 23, 397 (2024). <https://doi.org/10.1186/s12936-024-05228-y>.
- Aliyo, A., Golicha, W., Anteneh, F. (2024). Malaria and associated factors among under-five children in Borena pastoral communities, southern Ethiopia. *Frontiers in Parasitology*, 01 August 2024 Sec. *Epidemiology and Ecology*, Volume 3 - 2024 | <https://doi.org/10.3389/fpara.2024.1438218>.
- Bardoe, D., Bio, R. B., Yar, D. D. (2024). Assessing the prevalence, risk factors, and socio-demographic predictors of malaria among pregnant women in the Bono East Region of Ghana: a multicentre hospital-based mixed-method cross-sectional study. *Malaria Journal*, 23, 302 (2024). <https://doi.org/10.1186/s12936-024-05120-9>.
- Barlett J. E., Kotrlik, J. W. & Higgins, C. C. (2001). Organizational Research: Determining Appropriate Sample Size in Survey Research. *Information Technology, Learning and Performance Journal*, 19, 43-50.
- Benjamin, Y. G., Bartholomew, B., Abdullahi, J., & Labaran M. L. (2019). Assessment of Demographic Factors Associated with *falciparum* Malaria among Hospital Patients in Zaria, Kaduna State, Nigeria. *South Asian Journal of Research in Microbiology*, 5 (3), 1-7. ISSN: 2582-1989.
- Brooke, B. D., Raman, J., Frean, J., Rundle, K., Maartens, F., Misiani, A., Mabuza, A., Barnes, K. I., Moonasar, D. P., Dlamini, Q., Charles, S., Blumberg, L. & SAM, J. (2020). Implementing malaria control in South Africa, Eswatini and southern Mozambique during the COVID-19 pandemic. *South African Medical Journal* On-line version ISSN 2078-5135. vol.110 n.11 <https://doi.org/10.7196/samj.2020.v110i11.15286>.
- Cheesbrough, M. (2017). *District Laboratory Practice Manual in Tropical Countries*. Part 2. Cambridge University Press. Pp.178-179.
- Das, J. K., Lakhani, S., Rahman, A. R., Siddiqui, F., Ali, Z., Rashid, Z., Mahmud, O., Naqvi, S., K., Amir, H., Jehanzeb, H., Kumar, S. & Beg, M. A. (2024). Malaria in pregnancy: Meta-analyses of prevalence and associated complications. *Epidemiology and Infection*, 152, e39, 1-36. <https://doi.org/10.1017/S0950268824000177>. DOI: 10.32604/cmc.2022.025629
- Enyi, E. O., Ikegbunam, N. M., Iroha, I. R., Udeagbala, T. N. & Esimone, O. C. (2023). Effect of Formal Education on Malaria Knowledge among People attending Federal Medical Center, Owerri, Imo State Nigeria. *GSC Biological and Pharmaceutical Sciences*, eISSN: 2581-3250. Cross Ref. DOI: 10.30574/gscbps. <https://gsconlinepress.com/journals/gscbps/>.
- Hassan, E., Mahmoud, Y. S., Noha, A. H. & Samir, A. (2024). A Novel Convolutional Neural Network Model for Malaria Cell Images Classification. *Computers, Materials & Continua*, Vol. 72, no. 3. DOI: 10.32604/cmc.2022.024529.
- Howard, C., Joof, F., Hu, R., Smith, J. D. (2023). Probing cerebral malaria inflammation in 3D human brain microvessels Received April 4, 2023; Revised September 8, 2023; Accepted September 8, 2023; Published online October 10, 2023. DOI: 10.1016/j.celrep.2023.113253.
- Isa, M. H., Mukhtar, I. M. & Sadiq, H. A. (2023). Malaria and Typhoid Fever: Prevalence, Co-Infection and Socio-Demographic Determinants Among Pregnant Women Attending Antenatal Care at a Primary Healthcare Facility in Central Nigeria. *International Journal of Pathogen Research* 5 (4):17-24. <https://doi.org/10.9734/ijpr/2020/v5i430140>.
- Li, J., Docile, H. J., Fisher, D., Pronyuk, K., Zhao, L. (2024). Current Status of Malaria Control and Elimination in Africa: Epidemiology, Diagnosis, Treatment, Progress and Challenges. *Journal of*

- Epidemiology and Global Health*, 14(3):561-579. doi: 10.1007/s44197-024-00228-2. Epub 2024 Apr 24. PMID: 38656731; PMCID: PMC11442732
- Mandai, S. S., Francis, F., Challe, D. P. (2024). High prevalence and risk of malaria among asymptomatic individuals from villages with high prevalence of artemisinin partial resistance in Kyerwa district of Kagera region, north-western Tanzania. *Malaria Journal*, 23, 197 (2024). <https://doi.org/10.1186/s12936-024-05019-5>
- Nipost (2009). Post Offices- with map of LGA". NIPOST. Archived from the original on 2009-10-07. Retrieved 2009-10-20.
- Nmadu, P. M., Peter, E., Alexander, P., Koggie, A. Z., Maikenti, J. I. (2024). The prevalence of malaria in children between the ages 2-15. Visiting Gwarinpa General Hospital Life Camp Abuja Nigeria. *Journal of Health Science*, 2015;5:47-51.
- Olasheinde, G., Olugbenga, T., Oluwaseyi, A., Adegboyega, A. (2010). Prevalence and management of Falciparum malaria among infants and children in Ota, Ogun state, Southwestern Nigeria. *African Journal of Clinical and Experimental Microbiology*, 11(3). DOI: 10.4314/ajcem.v11i3.57773.
- Oluwafemi, R. O., Afolabi, O. J. & Oniy, M. O. (2024). Prevalence of Malaria among Under-5 Children in a Secondary Care Level, Ondo State, Nigeria. *European Journal of Clinical Medicine*, Home Archives Vol. 5 No. 2.
- Ombugadu, A., Jibril, A. B., Dawam, N. N., Ahmed, H. O., Ayim, J. O., Benson, R. F., Pam, V. A., Aimankhu, O. P., Uzoigwe, N. R., Micah, E. M., Maikanti, J. I., Mafuyai, M. J., Aliyu, A. A., Ayuba, S. O., Anyebe, G. E., Adejoh, V. A., Attah, S. A., Samuel, M. D., Polycarp, I. A., Dogo, K. S.,..... & Mwansat, G. S. (2021). Nocturnal Activities and Strategies for Self-Protection Against Human-Vectors Contact in a Peri-Urban Community in Lafia, Nasarawa State, Nigeria. *Biomedical Journal of Scientific & Technical Research*, 37(2), 2021. BJSTR. MS.ID.005975. DOI: 10.26717/BJSTR.2021.37.005975.
- Tatteh, J. A., Djissem, P. E., & Manyeh, A. K. (2023). Prevalence, trends, and associated factors of malaria in the Shai-Osudoku District Hospital, Ghana. *Malaria Journal*, 22, 131. <https://doi.org/10.1186/s12936-023-04561-y>.
- WHO (2019). The World Malaria Report <http://www.who.int/malaria/publications/world-malaria-report-2019/report/en/> ISBN 978 92 4 1565158.
- World Health Organization (2022). *World malaria report*. Geneva. ISBN: 978-92-4-006489-8 (electronic version), ISBN: 978-92-4-006490-4 (print version). Licence: CC BY-NC-SA 3.0 IGO. <https://apps.who.int/iris>.
- World Health Organization (2023). *World malaria report 2023*. Geneva. ISBN: 978-92-4008617-3 (electronic version), ISBN: 978-92-4-008618-0 (print version). Licence: CC BY-NC-SA 3.0 IGO. <https://apps.who.int/iris>. Pp. 8-12.
- World Health Organization (2024). *World malaria report 2024: Addressing inequity in the global malaria response*. Geneva. ISBN: 978-92-4-010444-0 (electronic version), ISBN: 978-92-4-010447-7 (print version). Licence: CC BY-NC-SA 3.0 IGO. <https://apps.who.int/iris>. Pp. 8-12.
- Zakari, H., Bawa, S., Ijimbili, S., Eze, C., Agboola, O. (2024). A Cross Sectional Study of Malaria Burden among Febrile Patients Attending a Healthcare Facility in Nassarawa State, Nigeria. *Translational Biomedicine*, 15(01):1.