



<https://doi.org/10.59298/ROJPHM/2024/335255>

Prevalence and Control of Malaria in Uganda: Epidemiological Trends and Public Health Interventions

Nyiramana Mukamurera P.

Faculty of Medicine Kampala International University Uganda

ABSTRACT

Malaria is a critical public health issue in Uganda, a country that bears one of the highest burdens of the disease globally. Despite significant advancements in medical treatments and preventive measures, malaria continues to pose a substantial threat to the health and economic well-being of Ugandans. This review provides a comprehensive analysis of the prevalence and control of malaria in Uganda, examining epidemiological trends and assessing the impact of public health interventions. Recent data indicate that while the overall incidence of malaria has declined due to intensified control efforts, pockets of high transmission persist, particularly in rural and hard-to-reach areas. Seasonal variations and demographic factors further influence malaria transmission, with children under five and pregnant women being particularly vulnerable. Public health interventions such as insecticide-treated nets (ITNs), indoor residual spraying (IRS), rapid diagnostic testing (RDT), and artemisinin-based combination therapies (ACTs) have been instrumental in reducing malaria prevalence, though challenges such as insecticide resistance and health system constraints remain. The methodology used in writing this paper involves a comprehensive review of existing literature on malaria prevalence and control strategies in Uganda. Future directions include integrated vector management, strengthening surveillance systems, and investing in research and innovation to develop new tools and strategies. Addressing these challenges through a multifaceted approach is essential for sustainable malaria control and ultimately eliminating the disease in Uganda.

Keywords: Malaria Control, Epidemiological Trends, Public Health Interventions, Insecticide Resistance, Integrated Vector Management (IVM).

INTRODUCTION

Malaria is a critical public health issue in Uganda, a country that bears one of the highest burdens of the disease globally. Despite significant advancements in medical treatments and preventive measures, malaria continues to pose a substantial threat to the health and economic well-being of Ugandans [1, 2]. The disease is endemic throughout the country, with almost the entire population at risk. Efforts to control malaria have led to notable successes, particularly with the widespread implementation of insecticide-treated nets (ITNs) and indoor residual spraying (IRS) [3, 4]. However, challenges such as insecticide resistance, health system constraints, and varying transmission dynamics complicate these efforts [5]. Understanding the epidemiological trends of malaria in Uganda is essential for designing effective interventions. These trends reveal variations in disease prevalence across different regions and demographics, influenced by factors such as climate, socioeconomic conditions, and healthcare access [6, 7]. The persistence of high transmission rates in certain areas, despite overall declines, underscores the need for targeted and sustained control measures. This review delves into the prevalence and control of malaria in Uganda, examining the epidemiological patterns and assessing the impact of various public

This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

health interventions. By exploring the successes and challenges of current strategies, we aim to provide insights into how malaria control efforts can be enhanced to ultimately reduce the burden of this devastating disease in Uganda.

EPIDEMIOLOGICAL TRENDS OF MALARIA IN UGANDA

Prevalence and Incidence: Malaria in Uganda is highly endemic, with nearly the entire population at risk. The prevalence of malaria varies across regions, influenced by factors such as altitude, climate, and socioeconomic conditions. Recent data indicate that while the overall incidence of malaria has declined due to intensified control efforts, pockets of high transmission persist, particularly in rural and hard-to-reach areas[8–10].

Seasonal Variations: Malaria transmission in Uganda exhibits significant seasonal variations, with peaks coinciding with the rainy seasons. These variations are crucial for planning and implementing control measures, as they help target interventions during periods of highest risk[11].

Demographic and Socioeconomic Factors: Malaria disproportionately affects certain demographic groups, particularly children under five years of age and pregnant women. Socioeconomic factors, including poverty, lack of access to healthcare, and educational disparities, further exacerbate the burden of malaria in Uganda. Understanding these demographic and socioeconomic dimensions is essential for designing targeted interventions[12].

PUBLIC HEALTH INTERVENTIONS FOR MALARIA CONTROL

Insecticide-Treated Nets (ITNs): The widespread distribution and use of insecticide-treated nets (ITNs) have been one of the cornerstones of malaria control in Uganda. ITNs have proven effective in reducing malaria transmission by providing a physical and chemical barrier against mosquitoes. However, challenges such as low usage rates, improper use, and insecticide resistance threaten the sustainability of this intervention[13, 14].

Indoor Residual Spraying (IRS): Indoor residual spraying (IRS) involves the application of long-lasting insecticides on the walls and ceilings of homes. This method has significantly reduced malaria prevalence in targeted areas. Despite its effectiveness, IRS faces challenges including logistical constraints, high costs, and community acceptance issues[15, 16].

Rapid Diagnostic Testing (RDT) and Case Management: Timely and accurate diagnosis of malaria is critical for effective case management. Rapid diagnostic tests (RDTs) have improved the ability to diagnose malaria quickly, facilitating prompt treatment. Ensuring the availability of RDTs and effective antimalarial drugs, particularly in remote areas, remains a critical component of malaria control efforts[17].

Artemisinin-Based Combination Therapies (ACTs): Artemisinin-based combination therapies (ACTs) are the frontline treatment for malaria in Uganda. These therapies have been instrumental in reducing malaria morbidity and mortality. However, the emergence of artemisinin resistance in other parts of the world underscores the need for continuous monitoring and the development of alternative treatment options.

CHALLENGES IN MALARIA CONTROL

Insecticide Resistance: The development of resistance to insecticides used in ITNs and IRS poses a significant threat to malaria control efforts. Monitoring resistance patterns and developing new insecticides with different modes of action are essential to maintain the efficacy of vector control strategies.[18, 19]

Health System Constraints: Uganda's health system faces numerous challenges, including inadequate infrastructure, limited healthcare workforce, and insufficient funding. Strengthening the health system is crucial for the effective implementation and sustainability of malaria control interventions.

Community Engagement and Behavior Change: Successful malaria control requires active participation and behavior change at the community level. Efforts to educate communities about the importance of using ITNs, seeking timely treatment, and adhering to preventive measures are vital. Culturally sensitive approaches and engagement with local leaders can enhance community buy-in and participation.[19, 20]

FUTURE DIRECTIONS

Integrated Vector Management (IVM): Integrated vector management (IVM) is a comprehensive approach that combines multiple vector control methods based on local epidemiological and ecological conditions. Implementing IVM in Uganda can optimize the use of resources and enhance the effectiveness of malaria control efforts.

Strengthening Surveillance and Monitoring: Robust surveillance and monitoring systems are essential for tracking malaria trends, evaluating intervention impacts, and detecting emerging threats such as drug and insecticide resistance. Leveraging technology and data analytics can improve the efficiency and accuracy of surveillance systems.

This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Research and Innovation: Investing in research and innovation is critical for developing new tools and strategies to combat malaria. This includes the development of new insecticides, vaccines, diagnostic tools, and treatments. Collaborative efforts between government, academia, and the private sector can drive progress in this area.

CONCLUSION

Malaria remains a formidable public health challenge in Uganda, with significant epidemiological and socioeconomic impacts. While progress has been made through various public health interventions, persistent challenges such as insecticide resistance, health system constraints, and community engagement hinder the achievement of malaria control goals. A multifaceted approach that integrates vector management, strengthens health systems, and fosters community participation is essential for sustainable malaria control. Continued investment in research and innovation will be crucial to developing new tools and strategies to ultimately eliminate malaria in Uganda.

REFERENCES

- Ekpono, E.U., Aja, P.M., Ibiama, U.A., Alum, E.U., Ekpono, U.E.: Ethanol Root-extract of *Sphenocentrum jollyanum* Restored Altered Haematological Markers in *Plasmodium berghei*-infected Mice. *Earthline Journal of Chemical Sciences*. 2, 189–203 (2019). <https://doi.org/10.34198/ejcs.2219.189203>
- Egwu, C.O., Aloke, C., Chukwu, J., Agwu, A., Alum, E., Tsamesidis, I., Aja, P.M., Offor, C.E., Obasi, N.A.: A world free of malaria: It is time for Africa to actively champion and take leadership of elimination and eradication strategies. *Afr Health Sci*. 22, 627–640 (2022). <https://doi.org/10.4314/ahs.v22i4.68>
- Egwu, C.O., Aloke, C., Chukwu, J., Nwankwo, J.C., Irem, C., Nwagu, K.E., Nwite, F., Agwu, A.O., Alum, E., Offor, C.E., Obasi, N.A.: Assessment of the Antimalarial Treatment Failure in Ebonyi State, Southeast Nigeria. *J Xenobiot*. 13, 16–26 (2023). <https://doi.org/10.3390/jox13010003>
- Erisa, K., Raphael, I., P.C., U., Alum, E.: Exploration of Medicinal Plants Used in the Management of Malaria in Uganda. (2023)
- Gumisiriza, H., Olet, E.A., Mukasa, P., Lejju, J.B., Omara, T.: Ethnomedicinal plants used for malaria treatment in Rukungiri District, Western Uganda. *Trop Med Health*. 51, 49 (2023). <https://doi.org/10.1186/s41182-023-00541-9>
- Emmaculate, K., Extension, K.P.: Effects of Antimalarial Drugs on the Motor and Behavioral Programs in *Drosophila melanogaster*. 3, 17–26 (2024)
- Obeagu, E., Alum, E., P.C., U.: Hepcidin: The Gatekeeper of Iron in Malaria Resistance. *NEWPORT INTERNATIONAL JOURNAL OF RESEARCH IN MEDICAL SCIENCES*. 4, 1–8 (2023). <https://doi.org/10.59298/NIJRMS/2023/10.1.1400>
- Ssempiira, J., Kissa, J., Nambuusi, B., Mukooyo, E., Opigo, J., Makumbi, F., Kasasa, S., Vounatsou, P.: Interactions between climatic changes and intervention effects on malaria spatio-temporal dynamics in Uganda. *Parasite Epidemiology and Control*. 3, e00070 (2018). <https://doi.org/10.1016/j.parepi.2018.e00070>
- Kigozi, S.P., Kigozi, R.N., Sebuguzi, C.M., Cano, J., Rutazaana, D., Opigo, J., Bousema, T., Yeka, A., Gasasira, A., Sartorius, B., Pullan, R.L.: Spatial-temporal patterns of malaria incidence in Uganda using HMIS data from 2015 to 2019. *BMC Public Health*. 20, 1913 (2020). <https://doi.org/10.1186/s12889-020-10007-w>
- Yeka, A., Gasasira, A., Mpimbaza, A., Achan, J., Nankabirwa, J., Nsohya, S., Staedke, S.G., Donnelly, M.J., Wabwire-Mangen, F., Talisuna, A., Dorsey, G., Kamya, M.R., Rosenthal, P.J.: Malaria in Uganda: Challenges to control on the long road to elimination. *Acta Tropica*. 121, 184–195 (2012). <https://doi.org/10.1016/j.actatropica.2011.03.004>
- Talisuna, A.O., Noor, A.M., Okui, A.P., Snow, R.W.: The past, present and future use of epidemiological intelligence to plan malaria vector control and parasite prevention in Uganda. *Malar J*. 14, 158 (2015). <https://doi.org/10.1186/s12936-015-0677-4>
- Roberts, D., Matthews, G.: Risk factors of malaria in children under the age of five years old in Uganda. *Malar J*. 15, 246 (2016). <https://doi.org/10.1186/s12936-016-1290-x>
- Akello, A.R., Byagamy, J.P., Etajak, S., Okadhi, C.S., Yeka, A.: Factors influencing consistent use of bed nets for the control of malaria among children under 5 years in Soroti District, North Eastern Uganda. *Malaria Journal*. 21, 363 (2022). <https://doi.org/10.1186/s12936-022-04396-z>

This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

14. Scott, J., Kanyangarara, M., Nhama, A., Macete, E., Moss, W.J., Saute, F.: Factors associated with use of insecticide-treated net for malaria prevention in Manica District, Mozambique: a community-based cross-sectional survey. *Malar J.* 20, 200 (2021). <https://doi.org/10.1186/s12936-021-03738-7>
15. Tangena, J.-A.A., Hendriks, C.M.J., Devine, M., Tamaro, M., Trett, A.E., Williams, I., DePina, A.J., Sisay, A., Herizo, R., Kafy, H.T., Chizema, E., Were, A., Rozier, J., Coleman, M., Moyes, C.L.: Indoor residual spraying for malaria control in sub-Saharan Africa 1997 to 2017: an adjusted retrospective analysis. *Malaria Journal.* 19, 150 (2020). <https://doi.org/10.1186/s12936-020-03216-6>
16. Opiyo, M., Sherrard-Smith, E., Malheia, A., Nhacolo, A., Sacoor, C., Nhacolo, A., Máquina, M., Jamu, L., Cuamba, N., Bassat, Q., Saúte, F., Paaijmans, K.: Household modifications after the indoor residual spraying (IRS) campaign in Mozambique reduce the actual spray coverage and efficacy. *PLOS Global Public Health.* 2, e0000227 (2022). <https://doi.org/10.1371/journal.pgph.0000227>
17. Allen, E.N., Wiyeh, A.B., McCaul, M.: Adding rapid diagnostic tests to community-based programmes for treating malaria. *Cochrane Database Syst Rev.* 2022, CD009527 (2022). <https://doi.org/10.1002/14651858.CD009527.pub3>
18. Quiñones, M.L., Norris, D.E., Conn, J.E., Moreno, M., Burkot, T.R., Bugoro, H., Keven, J.B., Cooper, R., Yan, G., Rosas, A., Palomino, M., Donnelly, M.J., Mawejje, H.D., Eapen, A., Montgomery, J., Coulibaly, M.B., Beier, J.C., Kumar, A.: Insecticide Resistance in Areas under Investigation by the International Centers of Excellence for Malaria Research: A Challenge for Malaria Control and Elimination. *Am J Trop Med Hyg.* 93, 69–78 (2015). <https://doi.org/10.4269/ajtmh.14-0844>
19. Li, J., Docile, H.J., Fisher, D., Pronyuk, K., Zhao, L.: Current Status of Malaria Control and Elimination in Africa: Epidemiology, Diagnosis, Treatment, Progress and Challenges. *J Epidemiol Glob Health.* (2024). <https://doi.org/10.1007/s44197-024-00228-2>
20. Tungu, P., Kabula, B., Nkya, T., Machafuko, P., Sambu, E., Batengana, B., Sudi, W., Derua, Y.A., Mwingira, V., Masue, D., Malima, R., Kitojo, C., Serbantez, N., Reaves, E.J., Mwalimu, C., Nhiga, S.L., Ally, M., Mkali, H.R., Joseph, J.J., Chan, A., Ngondi, J., Lalji, S., Nyinondi, S., Eckert, E., Reithinger, R., Magesa, S., Kisinza, W.N.: Trends of insecticide resistance monitoring in mainland Tanzania, 2004–2020. *Malaria Journal.* 22, 100 (2023). <https://doi.org/10.1186/s12936-023-04508-3>

CITE AS: Nyiramana Mukamurera P. (2024). Prevalence and Control of Malaria in Uganda: Epidemiological Trends and Public Health Interventions. *Research Output Journal of Public Health and Medicine* 3(3):52-55. <https://doi.org/10.59298/ROJPHM/2024/335255>