

Pediatric Malaria in Africa

OVERVIEW

Malaria is an infectious disease passed to humans through mosquitos infected by Plasmodium genus parasites (Government of Canada (GOC), 2022). The disease causes many health issues; the most fatal being the destruction of the body's red blood cells needed to transport oxygen to vital organs (GOC, 2022). Early on, the disease presents with flu-like symptoms including fever, chills, muscle aches and fatigue, and if left untreated, can cause anemia, jaundice, mental confusion, seizures, and even death (Centers of Disease Control and Prevention [CDC], 2022). Children are the most vulnerable population due to their undeveloped immune systems in conjunction with other social determinants of health (SDOH) (CDC, 2022). Although for years there have been medications and vaccines developed that prevent and treat malaria, there continues to be high morbidity and mortality related to malaria, hence the need for continued malaria education, prevention and treatment worldwide.

There were 247 million cases of malaria in 2021 and 619 000 deaths (World Health Organization [WHO], 2022a). These statistics prove that malaria is still a global health issue despite global efforts at reduction (United Nations [UN], 2022). Regions in Sub-Saharan Africa account for 95% of all malaria cases globally and 80% of malaria deaths were below the age of 5 (WHO, 2022). 10% of all deaths of children under the age of 5 in Sub-Saharan Africa were a direct result of malaria (Roberts & Matthews, 2016). A lack of SDOHs—health accessibility and quality, education, social support and community, food security and housing— influence these statistics (Roberts & Matthews, 2016).



MEASUREMENT METHODS

The Bayesian model conducts household surveys and interviews every few years to measure the prevalence of malaria since there is poor tracking of the cases and deaths (Mfueni, 2018). Surveys collect information on the history of fever in the last 14 days, estimating the prevalence of febrile illness (Mfueni, 2018).

RELATION TO SUSTAINABLE DEVELOPMENT GOALS (SDGs)

The issue of acquiring and spreading malaria relates to Sustainable Development Goal (SDG) 3 (healthy lives for all ages); target 3.3 specifically strives to end the epidemics of many communicable and water-borne diseases, including malaria (United Nations, 2022). Millions of children have died from preventable and treatable causes like malaria (WHO, 2020). Achieving this SDG will reduce the rate of child mortality in Africa where malaria is one of the leading causes of death (Mbacham et al., 2019).

REFERENCES

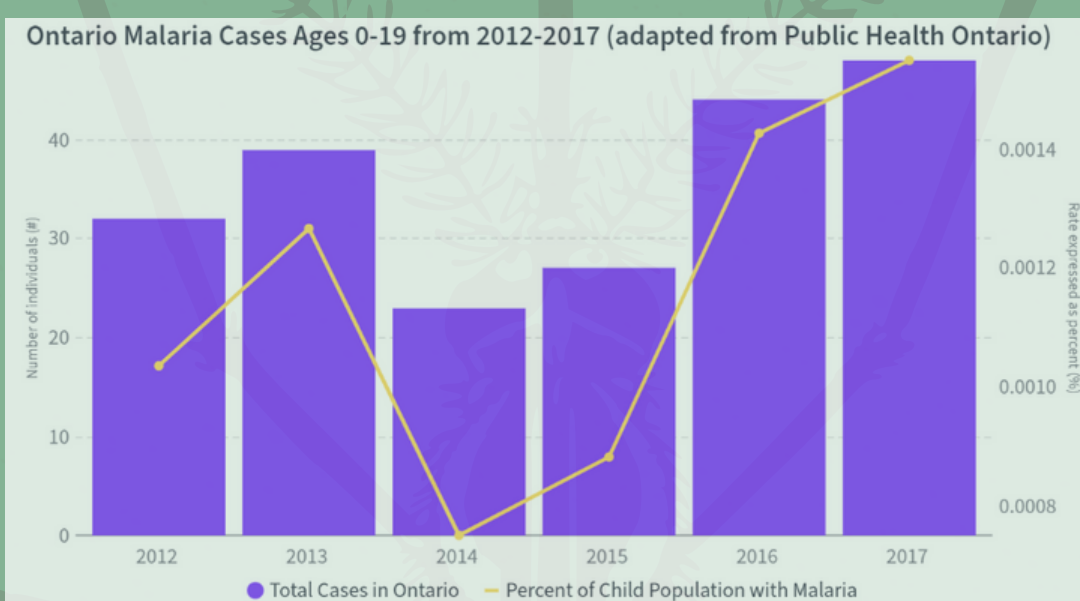
- Canadian Charter of Rights and Freedoms, Part 1 of the Constitution Act, 1982, being Schedule B to the Canada Act 1982 (UK), 1982, c 11.
- Centers for Disease Control and Prevention. (2021, December 16). *Malaria's impact worldwide*. <https://www.cdc.gov/parasites/malaria/index.html>
- Centers for Disease Control and Prevention. (2022, August 19). *Malaria*. <https://www.cdc.gov/parasites/malaria/index.html>
- College of Nurses of Ontario. (2022). *Achieving our purpose*. <https://www.cno.org/en/what-is-cno/mision-vision/>
- Day, N., & Dondorp, A. (2007). The management of patients with severe malaria. *The American Society of Tropical Medicine and Hygiene*, 77(6), 29-35. https://www.ncbi.nlm.nih.gov/books/NBK1704/pdf/Bookshelf_NBK1704.pdf
- Glouberman, S., & Millar, J. (2003). Evolution of the determinants of health, health policy, and health information systems in Canada. *American Journal of Public Health*, 93(3), 388-392. doi:10.2105/ajph.93.3.388
- Government of Canada. (2016, November 17). *Surveillance of malaria*. <https://www.canada.ca/en/public-health/services/diseases/malaria/surveillance-malaria.html>
- Government of Canada. (2022, September 14). *Malaria in developing countries*. https://www.international.gc.ca/world-monde/issues_developpement-enjeux_developpement/global_health-sante_monddiale/malaria-paludisme.aspx?lang=eng
- Maidland, K. (2016). Severe malaria in African children – The need for continuing investment. *The New England Journal of Medicine*, 375(25), 2416-2417. <https://doi.org/10.1056/NEJMp1613528>
- Mbacham, W.F., Ayong, L., Guewo-Fokeng, M., Makoge, V. (2019). Current situation of Malaria in Africa. In Ariey, F., Gay, F., Ménard, R. (Eds.), *Malaria Control and Elimination* (Vol. 2013, pp. 29-44). Methods in Molecular Biology. https://doi.org/10.1007/978-1-4939-9550-9_2
- Mfueni, E., Devleeschauwer, B., Rosas-Aguirre, A., Van Malderen, C., Brandt, P. T., Ogutu, B., Snow, R. W., Tshilolo, L., Zurovac, D., Vanderelst, D., & Speybroeck, N. (2018, February 5). True malaria prevalence in children under five: Bayesian estimation using data of malaria household surveys from three sub-Saharan countries. *Malaria journal*. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5800038/>
- Olsson, S., & Oskarsson, M. (2010). *How nurses support self-care in patients diagnosed with malaria: A field-study at a district hospital in Kenya* [Unpublished bachelor's dissertation]. University of Borås.
- Public Health Agency of Canada. (2020, January 16). *Canadian recommendations for the prevention and treatment of malaria*. <https://www.canada.ca/en/public-health/services/catmat/canadian-recommendations-prevention-treatment-malaria.html>
- Public Health Agency of Canada. (2021, March 10). *Treatment of malaria: Canadian recommendations for the prevention and treatment of malaria*. <https://www.canada.ca/en/public-health/services/catmat/canadian-recommendations-prevention-treatment-malaria/chapter-7-treatment.html>
- Public Health Ontario. (2019, October 22). *Malaria*. <https://www.publichealthontario.ca/en/diseases-and-conditions/infectious-diseases/vector-borne-zoonotic-diseases/malaria>
- Public Health Ontario. (2022). *Infectious disease trends in Ontario*. <https://www.publichealthontario.ca/en/Data-and-Analysis/Infectious-Disease/Reportable-Disease-Trends-Annually/#53>
- Registered Nurses' Association of Ontario. (n.d.). *Mission and values*. <https://rnao.ca/about/mission>
- Roberts, D., & Matthews, G. (2016). Risk factors of malaria in children under the age of five years old in Uganda. *Malaria Journal*, 15(1). <https://doi.org/10.1186/s12936-016-1290-x>
- Sarfo, J., Amoadu, M., Kordorwu, P., Adams, A., Gyan, T., Osman, A., Asiedu, I., & Anshah, E. (2023). Malaria amongst children under five in sub-Saharan Africa: A scoping review of prevalence, risk factors and preventive interventions. *European Journal of Medical Research*, 28. <https://doi.org/10.1186/s40001-023-01046-1>
- Snow, R., & Marsh, K. (1998). The epidemiology of clinical malaria among African children. *Bulletin de L'Institut Pasteur*, 96(1), 15-23. [https://doi.org/10.1016/S0020-2452\(98\)80025-0](https://doi.org/10.1016/S0020-2452(98)80025-0)
- Tsegaye, A., Ayele, A., & Birhanu, S. (2021). Prevalence and associated factors of malaria in children under the age of five years in Wogera district, northwest Ethiopia: A cross-sectional study. *PLOS ONE*, 16(10), e0257944. <https://doi.org/10.1371/journal.pone.0257944>
- UNICEF (n.d.). *About us*. <https://www.unicef.org/en/about-unicef>
- UNICEF (2023). *Malaria*. <https://data.unicef.org/topic/child-health/malaria/>
- United Nations. (2022). *Goal 3: Ensure healthy lives and promote well-being for all at all ages*. <https://www.un.org/sustainabledevelopment/health/>
- Windsor Essex County Health Unit. (2022, August 17). *Mosquito safety: Fight the bite!* <https://www.wechu.org/healthy-homes/mosquito-safety>
- World Health Organization. (2020, September 8). *Children: Improving survival and well-being*. <https://www.who.int/en/news-room/fact-sheets/detail/children-reducing-mortality>
- World Health Organization. (2022a, December 8). *Malaria*. <https://www.who.int/news-room/fact-sheets/detail/malaria>
- World Health Organization. (2022b, November 25). *WHO guidelines for malaria*. <https://app.magicapp.org/#/guideline/LwRMXj/section/LpRqL5>
- World Health Organization. (2023). *What we do*. <https://www.who.int/about/what-we-do>
- Zimmer, R. (2018, August 27). A forgotten vulnerable group: Canadian children visiting relatives in the developing world. *Canadian Medical Association*, 190(34) <https://doi.org/10.1503/cmaj.70191>

LOCAL CONTEXT

Malaria in Canada is related to immigrants or travelers to affected areas including Africa (Public Health Ontario [PHO], 2019). Nationwide, there are 488 cases and zero deaths per year on average (GOC, 2016; PHO, 2022). Compared to the global context, pediatric malaria in Canada is not a concern as supported by the statistics in Figure 1. Because children are at greater risk for complications, like reduced feeding, hospital admission should be considered for close monitoring and malaria management. Treatment is facilitated by organizations like the Canadian Malaria Network (CMN) who provide anti-malaria IV medications (PHAC, 2021).

Figure 1

Ontario Malaria Cases (2012-2017) in ages 0-19, both sexes



Note. Adapted from PHO's (2022) *Infectious Disease Trends in Ontario* database to combine three age ranges within ages 0-19.

WHY DOES THIS GLOBAL HEALTH ISSUE OCCUR?

Malaria remains an issue in African nations because of their tropical weather conditions, native mosquito species, and lack of effective malaria control programs (CDC, 2021). These countries are too poor to initiate modifiable activities, including chemoprophylaxis or mosquito eradication, so individuals have to educate themselves on the risk factors, symptoms, and prevention methods (CDC, 2021; WHO, 2022b). Children are extremely vulnerable because they rely on their guardians to take these measures on their behalf.

NURSING IMPLICATIONS

Nurses care for patients experiencing malaria complications, such as shock (Day & Dondorp, 2007). Providing atraumatic care that is developmentally appropriate for the child, while also providing emotional/mental support, education, and allowing autonomy for parents is essential (Olsson & Oskarsson, 2010).

Canadian public health units provide summarized fact sheets about the prevention of malaria and other zoonotic diseases, accessible in multiple languages (Windsor Essex County Health Unit, 2022). RNAO are responsible for outlining nurses' standards of practice and advocating for public health (RNAO, n.d.). The College of Nurses of Ontario's (CNO) involvement is crucial because they ensure the safety of the public and advocate for patients (CNO, 2022). PHAC and the Committee to Advice on Tropical medicine and Travel work together to create Canadian malaria guidelines (PHAC, 2020). Internationally, UNICEF and WHO are responsible for health coverage and equitable access to health care for all (WHO, 2023; UNICEF, n.d.).

ONTARIO'S LINK TO PRETRAVEL CLINICAL PREVENTION

Although research shows that Canadian malaria cases are related to immigration and travel, the federal and provincial governments of Canada avoid action due to constitutional confusion over their responsibility in this matter (Zimmer, 2018). Many provincial governments have removed pretravel medical prevention from public insurance plans. Consequently, individuals bargain on insured treatment/cure if they acquire the disease over prevention. Due to this, low/middle class immigrants and children, residing in Canada, choose not to travel to avoid the out-of-pocket expenses needed to visit their home countries safely (Zimmer, 2018). However, the Canadian Charter of Rights and Freedoms views travelling outside of Canada as a mobility right, not just a choice (Canadian Charter of Rights and Freedoms, 1982).



SOCIAL AND ENVIRONMENTAL DETERMINANTS OF HEALTH

- Income and social status:** low-income families cannot afford malaria prevention measures like insecticide-treated mosquito nets (UNICEF, 2023).
- Employment and working conditions:** child mortality is correlated to paternal occupational level; different social classes results in varying mortality rates as shown in the Whitehall study (Glouberman & Millar, 2003).
- Education and literacy:** with increased knowledge and understanding of hygiene and basic health care, the level of mortality and morbidity can decrease (Snow & Marsh, 1998). While low to no formal education along with low income and living in poverty, risk for malaria increases (Sarfo et al., 2023).
- Childhood experiences:** the Whitehall study argued that early childhood development correlates to children's further health development, school, and employment (Glouberman & Millar, 2003).
- Physical environments:** seasonal rain and collection of water create a favorable breeding ground for mosquito breeding, increasing the risk for malaria (Maitland, 2016). Families who live near bodies of water or those who sleep outside, are at higher risk (Tsegaye et al., 2021).