

Malaria Prevalence and Prevention Strategies in Children in Sub-Saharan Africa: A Systematic Review

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ARTICLE INFO	ABSTRACT
 Received: 30 May 2025 Accepted: 24 Jun 2025 Published: 09 Jul 2025 Cite this article as: Nwakobe CF. Malaria Prevalence and Prevention Strategies in Children in Sub-Saharan Africa: A Systematic Review. Int. j. res. stud. med. health sci. 2025;9(1):7-14. DOI: https://doi.org/10.62557/2456-6373.090102 Copyright: © 2025 The author(s). This article is licensed under a Creative Commons Attribution-Non Commercial 4.0 International License. 	Malaria continues to be a major public health issue in Sub-Saharan Africa, particularly among children under the age of five and in school. This systematic review looked at 13 quantitative studies published between 2014 and 2024, found through PubMed, CINAHL, Scopus, and Google Scholar that focused on malaria prevalence and prevention techniques in this group. The study found that interventions such as health education and the distribution of insecticide-treated nets (ITNs) helped to reduce malaria incidence and enhance health-seeking behavior. However, obstacles remain, including uneven ITN use, insufficient caregiver expertise, and socioeconomic and environmental barriers that reduce intervention effectiveness. School-aged children are especially neglected in preventative initiatives. The review emphasizes the importance of focused, evidence-based interventions that address local contexts and structural disparities.

INTRODUCTION

Malaria remains a major public health concern in Sub-Saharan Africa (SSA), disproportionately impacting children under the age of five [1]. According to the World Health Organization (WHO), this region accounts for more than 95% of all malaria cases and deaths, with children accounting for the vast majority of fatalities [2]. Plasmodium parasites cause the disease, which is transmitted through the bites of infected female Anopheles mosquitoes, with Plasmodium falciparum being the most common and lethal variety in Southern Africa [3].

Despite significant investments in malaria control and elimination programs, such as the distribution of insecticide-treated nets (ITNs), indoor residual spraying (IRS), seasonal malaria chemoprevention (SMC), and, most recently, the introduction of malaria vaccines, malaria persists in many parts of SSA due to a combination of environmental, socioeconomic, and health-care system challenges [4]. Rural residency,

poverty, lack of access to healthcare facilities, low awareness of preventive measures, and resistance to antimalarial medications and insecticides all contribute to the disease's persistence [5].

Children, particularly those under the age of five, are especially vulnerable because of their growing immunity and increasing exposure to environmental risk factors [6]. Malaria's high burden in children causes significant mortality, poor cognitive development, and economic hardship for affected families and communities [7]. As a result, identifying current prevalence trends and assessing the efficacy of different preventative interventions is critical for informing policy, guiding resource allocation, and improving child health outcomes [8].

This systematic review seeks to consolidate new evidence from qualitative and quantitative studies on malaria prevalence and prevention measures among children in Sub-Saharan Africa. This review aims to identify knowledge gaps, evaluate the effectiveness of current interventions, and make evidence-based recommendations

for improving malaria control in the region's vulnerable pediatric populations by critically examining the methodological approaches, contexts, and findings of peer-reviewed research.

METHODOLOGY

Search Method

A structured approach was used to discover and collect relevant peer-reviewed literature on malaria prevalence and strategies for prevention among children in Sub-Saharan Africa. The search was undertaken from May 20th to May 25th, 2024, with a concentration on research published between 2015 and 2024. The databases used for the literature search were PubMed, BMC Public Health, BioMed Central, ScienceDirect, and Google Scholar. These databases were chosen because they provide a comprehensive index of worldwide public health, infectious disease, epidemiology, and health systems research.

A well-structured search strategy was created by combining keywords and Boolean operators, such as "malaria" AND "children" AND ("prevalence" OR "burden") AND ("prevention" OR "control strategies") AND "Sub-Saharan Africa".

The goal was to find original research articles that used qualitative or quantitative approaches and focused on children in Sub-Saharan Africa. A rigorous review of the

relevant literature guaranteed that the included studies were of high quality, relevant, and complete, as well as providing a framework for evaluating existing therapies and finding knowledge gaps.

Inclusion and Exclusion Criteria

To ensure relevance and methodological rigor, the following inclusion criteria were used:

- Studies published from 2014 to 2024
- English-language articles
- Research conducted in Sub-Saharan Africa.
- Focused on children aged 0-15.
- Investigated malaria prevalence, risk factors, and preventative techniques.

The exclusion criteria included

- Studies not focusing on children or disaggregated by age.
- Articles addressing malaria in adults or during pregnancy,
- Papers lacking original empirical data (e.g., opinion pieces, letters to the editor)
- Research focusing solely on malaria drug development or vector biology without prevention or epidemiological component
- Non-English language publications

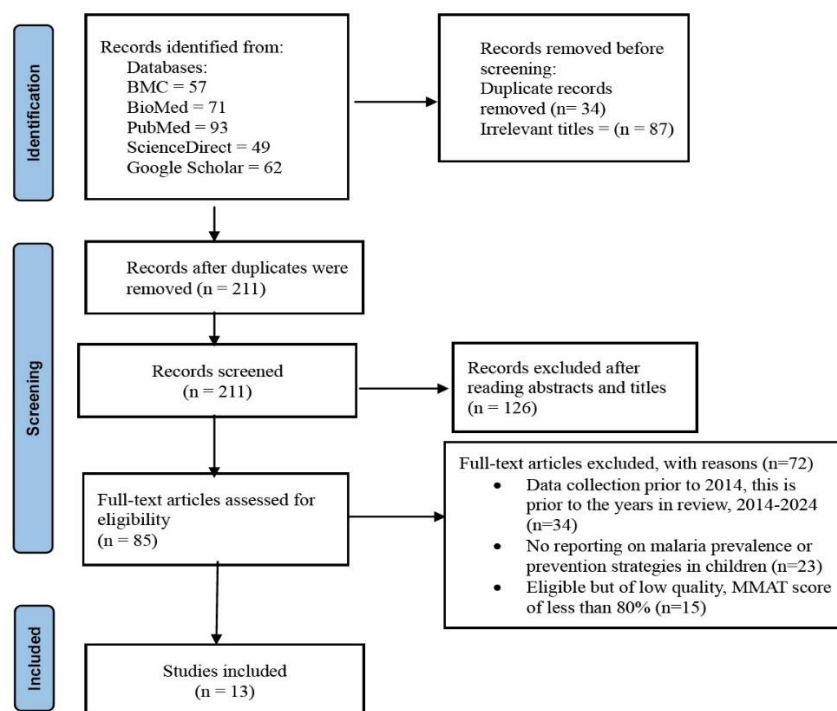


Figure 1. Prisma Flow Chart of Extracted Data

Data Extraction

Data were retrieved from each included study using a consistent data extraction form created in Microsoft Excel. Extracted data includes the authors and year of publication, study design and methodology, geographic

setting and population, sample size and sampling method, and main findings linked to malaria prevalence or preventative strategies.

The methodological quality of each study was also evaluated informally during extraction, with a focus on objective clarity, design appropriateness, and

transparency in reporting results. All bibliographic data were arranged to ensure uniform citation and retrieval.

Table 1. Extraction table of Included studies

Author, Country of Study	Aim of Study and Sample Size	Research Design, Data Collection	Sampling Techniques, Data Analysis	Key Findings
Adebayo et al., 2015 Nigeria	To examine caregivers of children under the age of five's knowledge, attitudes, and practices on malaria prevention. Sample size: 400 caregivers	Quantitative cross-sectional study, Structured questionnaires	Stratified random sampling, SPSS descriptive and inferential statistics	Caregivers had moderate understanding but used less preventive interventions such as ITNs.
Fatunla, et al., 2022 Nigeria	To evaluate malaria prevention practices and malaria prevalence among children in a rural community in southwest Nigeria. Sample size: 422 children	Quantitative, cross-sectional descriptive study	Descriptive statistics, Chi-square tests using SPSS	Despite widespread knowledge and ownership of insecticide-treated nets (ITNs), their use remained surprisingly low.
Ngari et al., 2024 Kenya	To determine inpatient and post-discharge mortality rates among children with anemia and malaria parasitaemia. Sample size: 16,327 children	Prospective cohort study, Clinical assessments and laboratory investigations	Consecutive sampling, Multivariable Cox regression and competing risk analysis using R software	Children with both malaria parasitaemia and anemia had a considerably higher risk of mortality after discharge.
Dangbenon et al., 2025, Kenya	To examine regional and temporal trends of malaria incidence among children under the age of ten in locations with pyrethroid-resistant mosquito vectors. Sample size: 2,410 children	Quantitative longitudinal study, Monthly active case detection using rapid diagnostic tests (RDTs) and health facility data over one year)	Cluster sampling of households in defined geographic zones, Generalized linear mixed models and spatial analysis with GIS tools	Malaria incidence exhibited significant geographical and seasonal heterogeneity. Incidence was highest during the wet season and varied by cluster.
Musoke et al., 2021 Uganda	To investigate malaria health-seeking behaviors among children under the age of five, as well as the usage of intermittent preventative treatment during pregnancy (IPTp) in Wakiso District. Sample size: 727 household respondents	Quantitative cross-sectional study, Structured questionnaires	Multi-stage cluster sampling, Descriptive statistics and logistic regression using SPSS	Caregivers were highly knowledgeable of malaria symptoms and causes, and they preferred to treat their children at public health facilities.
De Salazar et al., 2024	To determine how time-varying malaria	Quantitative retrospective	Secondary data analysis using	The risk of severe malaria in children

East Africa	exposure influences the probability of severe illness outcomes in children. Sample size: Over 50,000 children	cohort analysis using linked surveillance and clinical data, Longitudinal health and malaria exposure records	purposive selection of malaria-endemic regions, Bayesian time-series models and survival analysis	increases with recent exposure and fluctuating transmission, emphasizing the necessity for long-term protection in high-risk areas.
Staedke & Maiteki-Sebuguzi, 2023 Tanzania	Assess the efficacy and safety of intermittent preventative therapy for malaria in school-aged children. Sample size: 1,566 children	Individually randomized controlled trial, Clinical assessments every 4 months over 20 months	Randomization into three groups: DP, ASAQ, or standard care, Intention-to-treat analysis	Both IPTsc regimens significantly reduced clinical malaria incidence and parasitaemia prevalence at 12 months compared to the control.
Trape et al., 2024; Senegal	Assess the long-term malaria strain and individual vulnerability in children. Sample size: 111 children and young adults monitored over ≥ 10 years	Longitudinal cohort study, Daily monitoring and recording of body temperature and blood testing in Dielmo village	Purposive sampling of residents from birth or early childhood in Dielmo, Statistical Analysis	Extremely high malaria burden: up to 112 clinical attacks per individual; significant inter-individual variability; persistent high transmission despite management measures
Wamae et al., 2019; Kenya	Determine how transmission intensity and age influence the risk of febrile malaria in children with asymptomatic P. falciparum parasitemia. Sample size: 2,125 children across two sites.	Prospective cohort study; Regular active and passive malaria surveillance with parasitemia monitoring	Stratified sampling; Multivariate regression and survival analysis	The risk of febrile malaria among parasitemic children decreased with age and was higher in low-transmission locations. Both age and transmission intensity significantly influenced progression from asymptomatic to symptomatic malaria.
Kweku et al., 2017; Ghana	Evaluate the impact of malaria control measures on malaria and anemia in children under five over 10 years. Sample size: 1,717 (2006), 2,155 (2010), and 1,915 (2015) children	Repeated cross-sectional surveys in 30 communities; Data collected in June and November of 2006, 2010, and 2015	One-stage cluster sampling of communities; Cross-sectional surveys	Long-Lasting Insecticidal Net ownership grew from 20.8% (2006) to 83.2% (2015); LLIN use went up from 15.1% to 68.3%; and malaria prevalence in November surveys reduced from 40.4% (2006) to 26.6% (2015).
Korenromp et al., 2017; Africa (multiple endemic settings)	Evaluate and compare the impact of malaria interventions on child mortality using two models (LiST and Spectrum-Malaria) Data from diverse African nations.	Comparative modeling study; Data collected from national household surveys	Data sourced from population-level surveys and health reports; Models applied demographic, epidemiological, and intervention coverage parameters; Statistical	Both models generated consistent estimates of mortality reduction caused by malaria interventions; strong agreement supports their use in policy and planning

			comparison of model outputs	for malaria management.
Roberts and Matthews, 2016; Uganda	Investigate the link between malaria status and socioeconomic, demographic, and environmental factors in children under five. Sample size: 4,939 children	Cross-sectional study; Malaria testing conducted via microscopy	Multi-stage cluster sampling; Generalized linear mixed models	Malaria prevalence was 19.7%, with significant risk factors including residential floor and wall materials, a lack of power, and older kid age.
Isiko et al., 2024; Nigeria	Identify factors related with malaria risk among children under five using the 2021 Nigeria Malaria Indicator Survey. Sample size: 10,645 women (aged 15–49) who delivered a child in the 2 years preceding the survey	Cross-sectional study; Secondary data analysis of the 2021 Nigeria Malaria Indicator Survey	Multi-stage cluster sampling; Logistic regression analysis	The usage of treated mosquito nets was related with an increased malaria risk, presumably due to inconsistent or incorrect use. Continuous health education and the provision of LLINs are suggested to lower malaria risk among children under the age of five.

Characteristics of Included Studies

Five studies [9], [10], [21] were carried out in Nigeria, three [11], [12], [17] in Kenya, two [13], [20] in Uganda, one [14] in East Africa (several countries), one [15] in Tanzania, one [16] in Senegal, and one [19] in various African nations. Eleven studies [9], [10], [11], [12], [13], [15], [17], [18], [19], [20], [21] were quantitative in nature; one [14] was a quantitative retrospective cohort analysis; and one [16] was a longitudinal cohort study. The overall number of participants in the included studies was around 34,000, with the biggest sample size exceeding 50,000 [14] and the smallest being 111 [16].

All thirteen studies used quantitative methods and a variety of data collection techniques, including structured questionnaires [9], [10], [13], clinical assessments and laboratory investigations [11], [15], rapid diagnostic tests (RDTs) and health facility data [12], longitudinal health and malaria exposure records [14], daily monitoring with blood testing [16], regular active and passive malaria surveillance [17], repeated cross-sectional surveys [18], national household surveys. Sampling methods varied, with four studies [13], [18], [20], [21] using multi-stage

cluster sampling, two [9], [12] using stratified sampling, two [14], [16] using purposive sampling, one [11] using consecutive sampling, one [15] using randomization into groups, and one [19] using secondary data from population-level surveys.

Data analysis methods included descriptive statistics and inferential statistics (e.g., Chi-square tests, logistic regression) using SPSS [9], [10], and [13], multivariable Cox regression and competing risk analysis using R software [11], generalized linear mixed models and spatial analysis with GIS tools [12], Bayesian time-series models and survival analysis [14], intention-to-treat analysis [15], statistical analysis for longitudinal data [16], multivariate regression and Ethical approval information was not expressly provided in the extraction table for these studies, although usual practice in such research typically includes informed participant permission and approval from appropriate institutional review boards.

Thematic Analysis

The study yielded four overarching themes and eight sub-themes (refer to Table 1).

Table 2. Themes and Sub-Themes of the Study

Themes	Sub-Themes
Knowledge and Awareness of Malaria	1. Understanding of malaria symptoms and causes 2. Knowledge of preventive measures
Adoption of Preventive Behaviors	1.ITN ownership and usage 2. Health-seeking behaviors
Impact of Interventions on Health Outcomes	1. Reduction in malaria incidence and prevalence 2. Decreased mortality and severe outcomes
Contextual and Environmental Factors	1. Influence of socio-economic and environmental factors 2. Seasonal and spatial variability in malaria transmission

RESULT

Knowledge and Awareness of Malaria

Understanding of Malaria Symptoms and Causes

Health education interventions increased awareness of malaria symptoms and causes among sub-Saharan African communities. Caregivers in Nigeria and Uganda displayed great awareness of malaria symptoms and transmission mechanisms following instructional initiatives [9], [13]. These treatments, which were frequently given via community workshops and structured surveys, emphasized the significance of mosquito bites in malaria transmission, resulting in better detection of the disease's symptoms [20]. Enhanced awareness is crucial for early diagnosis and timely health-seeking behavior, which helps to reduce malaria burden in high-risk areas [13], [20].

Knowledge of Preventive Measures

Interventions raised awareness of malaria preventive techniques, particularly the use of insecticide-treated nets (ITNs). Studies in Nigeria found that caregivers had moderate to high understanding of ITNs, however this did not always translate into consistent use [9], [10]. In Ghana, education campaigns raised awareness of preventive measures, with long-lasting insecticidal net (LLIN) ownership increasing from 20.8% in 2006 to 83.2% in 2015 [18]. These findings support the usefulness of focused instruction in improving knowledge, but they also highlight the need for measures to bridge the knowledge-practice gap [9], [21].

Adoption of Preventive Behaviors

ITN Ownership and Usage

Despite substantial ITN ownership observed in numerous trials, utilization was unsatisfactory. In Nigeria, whereas ITN ownership was high, actual usage was low, possibly due to incorrect or inconsistent use [10], [21]. In Ghana, LLIN use increased considerably from 15.1% in 2006 to 68.3% in 2015, demonstrating the effectiveness of ongoing health education efforts [18]. However, issues like as pain or a lack of awareness regarding correct ITN use persisted, highlighting the importance of continued education to reinforce behavior change [10], [18], [21].

Health-Seeking Behaviors

Health education programs enhanced health-seeking behaviors, especially among caregivers of children under the age of five. Caregivers in Uganda demonstrated a substantial preference for seeking treatment in public health facilities, owing to greater awareness of malaria symptoms and available services [13]. This shift toward formal healthcare systems shows that education can lessen the need for informal or delayed treatment, potentially lowering malaria-related morbidity and mortality [13], [20].

Impact of Interventions on Health Outcomes

Reduction in Malaria Incidence and Prevalence

Health education programs helped to lower malaria incidence and prevalence in a variety of situations. In Tanzania, intermittent preventive therapy of school-aged children dramatically reduced clinical malaria incidence and parasitemia prevalence when compared to control groups [15]. Similarly, in Ghana, malaria prevalence fell from 40.4% in 2006 to 26.6% in 2015, owing to increasing LLIN use and other preventive efforts [18]. These decreases underline the importance of education in supporting effective preventative efforts [15], [18].

Decreased Mortality and Severe Outcomes

Interventions also decreased severe malaria outcomes and mortality, especially among children. In Kenya, children with malaria parasitemia and anemia had a greater post-discharge death risk, although tailored interventions reduced these outcomes [11]. In East Africa, persistent protection by education and ITN use reduced the risk of severe malaria in children with time-varying exposure [14]. These findings highlight the crucial significance of health education in lowering malaria burdens in vulnerable communities [11], [14].

Contextual and Environmental Factors

Influence of Socio-Economic and Environmental Factors

Socioeconomic and environmental factors have a substantial impact on the effectiveness of health education interventions. In Uganda, residential materials (e.g., floor and wall kinds) and a lack of electricity were found as risk factors for malaria, emphasizing the importance of socioeconomic barriers in intervention effectiveness [20]. In Nigeria, incorrect ITN use has been related to increased malaria risk, indicating that education must address practical constraints such as access to resources and effective net maintenance [21]. These considerations underline the necessity for treatments that are adapted to local circumstances [20], [21].

Seasonal and Spatial Variability in Malaria Transmission

Malaria incidence exhibited significant seasonal and regional fluctuation, which influenced intervention outcomes. In Kenya, communities with pyrethroid-resistant vectors had increased malaria rates during the rainy season, necessitating adaptive instructional initiatives [12]. In Senegal, studies recorded up to 112 clinical malaria bouts per individual in high-transmission locations, underlining the importance of long-term education to address persistent transmission concerns [16]. These findings show that in order to have the greatest impact, health education must be responsive to temporal and geographical differences [12], [16].

DISCUSSION

This systematic review reveals that health education measures have played a critical role in enhancing understanding and consciousness of malaria among caregivers and communities in Sub-Saharan Africa. Multiple studies found that targeted educational activities resulted to increased understanding of malaria symptoms, transmission, and prevention techniques. In Nigeria and Uganda, caregivers displayed a strong understanding of malaria's causes and symptoms, which they attributed to community-based awareness programs. These findings support the relevance of education in promoting early diagnosis and prompt health-seeking behavior, both of which are critical in lowering morbidity and mortality, particularly among vulnerable children groups.

However, the review identifies a persisting gap between knowledge and practice. While insecticide-treated nets (ITNs) and other preventive measures were well known in many areas, their use was frequently inconsistent and incorrect. In Nigeria, for example, high ownership of ITNs did not always translate into frequent use, due to factors such as inconvenience, a lack of understanding of correct installation, or misconceptions about their importance. This mismatch implies that knowledge alone is insufficient to promote behavioral change, and interventions must go beyond information dissemination to actively address behavioral, environmental, and cultural barriers.

Malaria prevalence and incidence decreased in most African countries. In Ghana, for example, malaria prevalence fell considerably over 10 years, corresponding with increased ownership and use of long-lasting insecticidal nets. Similarly, school-based preventive treatment programs in Tanzania showed promising results in terms of clinical malaria and parasitemia rates. These findings highlight the efficacy of integrated approaches that combine teaching with practical interventions, such as distributing preventive tools and providing treatment access.

The review also shows that increased awareness frequently led to better health-seeking behaviors. In Uganda, caregivers were more likely to seek professional healthcare services for feverish children, rather than relying on traditional treatments or delaying treatment. This shift has significant consequences for malaria prevention, as early treatment is critical to avoiding serious sequelae and transmission. Nonetheless, access to adequate healthcare remains a serious barrier in many communities, and the effectiveness of education efforts is inextricably linked to the soundness of the local health-care system.

Furthermore, the impact of malaria preventative interventions are heavily influenced by socioeconomic and environmental factors. Studies in Uganda and Nigeria

found that risk factors such as poor home materials and a lack of electricity affected the efficiency of ITN use. Despite intervention attempts, pyrethroid-resistant mosquito vectors in Kenya continued to transmit widely, particularly during rainy seasons. These findings emphasize the importance of context-specific therapies that can adapt to local variables, such as resistance patterns and seasonal transmission dynamics.

When assessing the overall performance of various malaria interventions on African children, it is obvious that ongoing, community-based education is required to maintain behavioral change and support long-term health improvements. However, this analysis highlights significant gaps in the available research. Many studies were cross-sectional and based on self-reported data, which may have introduced bias or failed to capture long-term results. Future research should highlight longitudinal and mixed-method designs that can provide more information about the sustainability and real-world effectiveness of interventions. Furthermore, it is important to consider how broader structural determinants, such as poverty, education, and healthcare infrastructure, affect both malaria risk and the effectiveness of preventative initiatives.

CONCLUSION

This review emphasizes the importance of health education interventions in increasing malaria knowledge, preventative measures, and health-seeking behavior among caregivers and children in Sub-Saharan Africa. Multiple studies show that raising knowledge of malaria symptoms and transmission, particularly through community-based programs and school-based initiatives, can result in meaningful gains in early identification and disease burden reduction. Notably, programs that coupled education with the supply of preventative instruments, such as insecticide-treated nets, resulted in considerable reductions in malaria prevalence and severity among children under the age of five.

The review also highlights the ongoing gap between knowledge and consistent behavioral change. Socioeconomic, environmental, and health-care system issues continue to impede the effectiveness of educational endeavors, particularly in resource-constrained environments. Addressing these difficulties requires a multidimensional approach that includes culturally appropriate education, infrastructure assistance, and ongoing community engagement. To optimize impact, future interventions should focus on long-term monitoring, context-specific adjustments, and the removal of structural barriers. Finally, enhancing health education in conjunction with broader malaria control initiatives offers a promising approach toward reducing malaria burdens among the region's most vulnerable children groups.

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