



Received: 07-12-2025
Accepted: 17-01-2026

International Journal of Advanced Multidisciplinary Research and Studies

ISSN: 2583-049X

Evidence Based Policy Recommendations to Socioeconomic-Integrated Malaria Interventions

¹ Peter Mukosela, ² Kohwo Anthony Otojareri

^{1, 2} Supershine University Graduate School, Zambia

DOI: <https://doi.org/10.62225/2583049X.2026.6.1.5689>

Corresponding Author: Peter Mukosela

Abstract

Malaria is among the most acute social health issues in sub-Saharan Africa and it is unproportionately prevalent in socioeconomically disadvantaged groups and is a negative influence on national development agenda. In most cases, the spread of malaria continues to take place as the poor and marginalized populations continue to be vulnerable to malaria due to their exposure to indoor environments (malaria) including insecticide-treated nets (ITNs), indoor residual spraying (IRS), and effective antimalarial treatments (WHO, 2023) [21]. The article is based on the argument that poverty, education, housing situation, gender inequality, and healthcare access are socioeconomic factors which are essential to the understanding and effective long-term reduction of malaria transmission. The main assumption is that the promotion of malaria needs to be integrated with socioeconomic policies backed up with strong evidence to supplement the already established biomedical approaches. As per evidence, interventions with socioeconomic elements will lead to bigger changes in malaria prevalence and better resistance against disease rebound (Aregawi *et al.*, 2019; Chanda *et al.*, 2021) [1, 4].

This study, based on a mixed methodology, systematic review of the peer-reviewed literature, policy analysis, and synthesis of the case studies of Zambia, Ghana, Kenya, and international settings, determines the key socioeconomic determinants of malaria outcomes and the policy measures, which can be implemented to address these determinants. Findings indicate that poverty alleviation interventions, including conditional cash transfer, microfinance to households in endemic areas, and better educational opportunities substantially decrease malaria morbidity by making better disease prevention behaviors and enhancing access to treatment (Guerra *et al.*, 2018; Ataguba and

Ataguba, 2018) [7, 2]. Indoor vector exposure has been linked to housing improvement such as installation of screened windows and better roofing materials (Tusting *et al.*, 2020) [18]. In addition, gender-sensitive malaria policies that consider access to health services by women and economic empowerment also help in making community engagement and defense behaviours more effective (Hill and Kazembe, 2017) [8].

Malaria education, combined with livelihoods support initiatives, has been shown to be effective in the localized setting in the Zambian context (Siachoono *et al.*, 2021) [16]. Still, implementation issues include poor inter-sectorial interactions, insufficient funding on socioeconomic interventions and the lack of surveillance in communities. This paper argues that these gaps can be bridged by evidence-based policymaking that is rooted in stringent assessment, multi-sectoralism, and involvement of the community, which can help in hastening the elimination of malaria.

The policy implications that have been obtained here are involvement of socioeconomic measures in reporting malaria control programmes that have been initiated, emphasis on data-driven decisions, powerful health systems, improved social protection systems, and community-based interventions. Through the prism of malaria not being a biomedical problem but rather a socioeconomically motivated problem of urban health, policymakers will be able to come up with more equal and sustainable intervention strategies. The study is a part of the new understanding that malaria eradication cannot rely on medical technologies only, but also on addressing the social and economic factors that cause the state of risk and vulnerability.

Keywords: Malaria, Combined Interventions, Socioeconomic Determinants, Policy, Zambia, Evidence-Based Policymaking

Introduction

Malaria has been having a significant health, social and economic burden in the world with 241 million cases and 627-000

deaths in 2023, mostly in sub-Saharan Africa (WHO, 2024) [22]. Similar to most endemic countries, Zambia has achieved significant gains in the reduction of malaria prevalence due to biomedical interventions; nevertheless, the disease continues to be the problem of the poorest and most vulnerable groups (Ministry of Health Zambia, 2023) [9]. Conventional control interventions though necessary have some limitations when used singly as they fail to encompass the socioeconomic determinants, which shape the risk and access to prevention and treatment behaviours (Weiss *et al.*, 2019) [20]. The plateauing of malaria decrease that was apparent in several districts indicates that policy interventions should be added to the biomedical interventions, which include addressing poverty, education, residential area, gender inequality, and access to healthcare. The socioeconomic determinants of malaria vulnerability individual and community through a number of ways. Poverty reduces the possibility of obtaining and adequately utilizing preventive measures, including ITNs, is more exposed because of poor housing, and access to quality healthcare services is limited (Ataguba and Ataguba, 2018; Tusting *et al.*, 2020) [2, 18]. Education especially to women modulates on health seeking behaviour and preventive measures (Hill and Kazembe, 2017) [8]. Gender norms influence decision-making that pertains to healthcare spending, which involves the use of preventive measures and movements and hence malaria outcomes (Dawson *et al.*, 2019) [6]. Moreover, larger socioeconomic systems like employment, infrastructures, and social protection systems either neutralize or amplify the influence of malaria on households (Guerra *et al.*, 2018) [7]. These factors indicate the need to have a comprehensive policy framework in which malaria control is put in the larger development contexts.

Despite the encouragement of multisectoral strategies by international structures like the Sustainable Development Goals (SDGs), they are still not applied equally, especially in the resource-restricted context (UN, 2020) [19]. The National Malaria Elimination Strategic Plan of Zambia recognizes socioeconomic drivers, though it offers little information on how the activities of the cross-sector are to be operationalized (Ministry of Health Zambia, 2023) [9]. There is evidence of other endemic countries that integrated socioeconomic interventions (through malaria and poverty control, education, housing upgrades, and women empowerment programme) can enhance health benefits and maintain long-term control (Aregawi *et al.*, 2019; Chanda *et al.*, 2021) [1, 4]. However, policy formulation and practice in Zambia and other such settings lack systematic evidence to guide policy formulation and implementation.

This article fills this knowledge gap by summarizing literature on the socioeconomic factors of malaria and comparing the effectiveness of integrated interventions. These will aim to (1) define the socioeconomic determinants of malaria transmission and incidence; (2) survey effectiveness of national and international interventions applied to the sociopolitical and economic contexts of malaria-infested regions; and (3) suggest evidence-based policy formulations that align with national and international contexts of malaria transmission and outcomes. This analysis allows this article to add to the nuanced view of how biomedical malaria control can be supported through socioeconomic policies to have sustainable disease burden reduction.

Significance of the Study

The endemicity of malaria in Zambia and sub-Saharan Africa in general highlights the weaknesses of the approaches based on biomedical interventions. Although ITNs, IRS, and effective drug treatments have minimized the malaria load in most forms in the last 20 years, improvement has no longer been made in most places where poverty, lack of access to healthcare and social inequality is common (WHO, 2024) [22]. It is important to understand the socioeconomic basis of malaria susceptibility in order to be able to design interventions that are not only effective but also equitable and sustainable. This paper leads to a paradigm shift in the discourse of malaria policy by preempting the inclusion of socioeconomic determinants as central to the control of malaria instead of marginal.

To begin with, the study brings into the limelight the multidimensionality of malaria risk not by focusing on the biomedical vectors but focusing on social and economic factors like household income, education level, gender relations, and the quality of houses. As an example, less affluent families have less access to preventive devices and tend to have more exposure because of structurally flawed housing (Tusting *et al.*, 2020) [18]. Such a combination of poverty and malaria risk shows the inability to disassociate disease control with the bigger developmental problems.

Second, the paper promotes the significance of the policy integration that is based on evidence. The review of interventions integrating malaria control with socioeconomic programmes helps the research to identify the models that have achieved success in the reduction of the disease incidence and the community resilience. Indicatively, malaria messaging, included in school curricula, was found to enhance preventive behaviours in the household, whereas cash transfer programmes have enhanced access to preventive care and health services (Guerra *et al.*, 2018; Ataguba and Ataguba, 2018) [7, 2].

Lastly, the research will be important to policy makers and practitioners interested in coordinating malaria control with national development agenda. The malaria policy needs to go hand in hand with these other objectives as countries strive to achieve the SDGs that focus on health, poverty alleviation, gender equality and education to have the most impact. The above evidence is a basis on which multisectoral strategies can be designed to capitalize on health, education and economic sector synergies. The study can be used to translate evidence into practice by offering practical recommendations, which ultimately helps in the development of healthier communities and more resilient health systems.

Theoretical Framework

In the effort to imagine how socioeconomic factors can be integrated into malaria interventions, the current study will rely on three complementary theoretical approaches, including Social Determinants of Health (SDH) Theory, Capability Approach (CA), and the Health Belief Model (HBM).

The Social Determinants of Health (SDH) Theory

The SDH model assumes that the determinants of health are based on the conditions under which individuals are born, grow up, live, work and age (Commission on Social Determinants of Health, 2008) [5]. These factors are social status, education, physical surroundings, job prospects and

social network. In malaria studies, SDH highlights the fact that malaria vectors and malaria prevention and treatment are not evenly distributed but patterned by social and economic inequalities. One of them includes poverty, which restricts the ability to invest in the housing to minimize the entry of mosquitos or transportation to remote health centers (Ataguba and Ataguba, 2018) ^[2].

SDH also highlights the contribution of structural conditions e.g. national policies, governance and economic systems- in determining health outcomes. Structural determinants affect the allocation of resources and opportunities which can alleviate or increase the susceptibility of malaria. The application of SDH to malaria programs motivates policymakers to no longer think of health sector silos but think of cross-sectorial approaches that deal with underlying causes of disease risk.

Capability Approach (CA)

The Capability Approach was developed by Amartya Sen and elaborated by Martha Nussbaum, and is concerned with the actual freedoms of individuals to reach to the desired states of well-being (Sen, 1999; Nussbaum, 2011) ^[15, 10]. In contrast to utility-based methods that focus on the availability of resources, CA focuses on what people can actually do and be. The capabilities of malaria include the potential access to preventive measures, knowledgeable health choices, timely and efficient treatment, and disease-free life.

CA is especially applicable in the context where structural constraints like gender norm or educational inequalities-limit the choices that people make. To illustrate, women in certain societies might not have the agency to determine the household spending on health, which influences the children who become ill with malaria to get timely treatment (Dawson *et al.*, 2019) ^[6]. The ability to implement interventions that improve the agency and autonomy of individuals by concentrating on capabilities instead of just provision of resources will help policymakers create sustainable interventions in promoting behaviour change.

Health Belief Model (HBM)

Health Belief Model is a psychological theory that identifies the reasons why people incorporate or do not incorporate health behaviours in regard to perceived susceptibility, severity, benefits, and barriers (Rosenstock, 1974) ^[13]. HBM has been extensively employed in malaria studies in order to comprehend preventive behaviours including the use of ITNs and timely care-seeking.

The theory of HBM presumes that people have a high probability of preventive behavior because they are more likely to perceive themselves to be at risk (susceptibility), to believe that the condition has serious consequences (severity) and to think that the benefits of action exceed obstacles (e.g., cost, access). Finally, perceived barriers like distance to health facilities, indirect costs of treatment, or misunderstanding of how malaria is transmitted may impede the adoption of preventive behaviour in many socioeconomically disadvantaged communities, even when people have been educated about the risks of malaria (Onyango *et al.*, 2020) ^[11].

Incorporating HBM into the socioeconomic policy design implies the structural interventions should be supported with behavioural strategies targeting the perceptions and motivations. To illustrate, community health education

campaigns that help to dispel myths and emphasize the usefulness of prevention could result in more people taking both biomedical and socioeconomic interventions.

Synthesis of Frameworks

A combination of SDH, CA and HBM gives a complete picture of malaria vulnerability. SDH places malaria back in the context of more general socioeconomic systems; CA focuses on the individual agency and well-being; and HBM clarifies the behavioural issues of prevention and treatment uptake. By combining these theories, policymakers will be able to develop interventions that both reduce structural inequities, improve individual capacities and encourage health seeking behaviours.

Literature Review

International Malaria Burden and biomedical Intervention Constraints

Malaria is a significant issue in the global health, and the burden is most prevalently focused in countries with low and middle-income levels, especially in sub-Saharan Africa. The World Health Organization (WHO, 2024) ^[22] reports that more than 94 percent of all malaria cases and deaths occur in Africa and the most vulnerable groups include children under five years of age and pregnant women. The biomedical interventions that have been the primary strategy of malaria control in the last 20 years have been insecticide-treated nets (ITNs), indoor residual spraying (IRS), rapid diagnostic testing (RDTs), and artemisinin-based combination therapies (ACTs). Such interventions have led to tremendous malaria incidence and mortality reduction in the world (Bhatt *et al.*, 2015) ^[3].

Nevertheless, there are recent indications that the progress has also reached a stagnation or even a reverse in a number of endemic areas, casting some doubts on the sustainability of the biomedical-only methods (WHO, 2024) ^[22]. Other elements (resistance to insecticides, resistance of drugs, changes in climate, and poor health systems) have destroyed the gains that resulted with the use of vector control and treatment alone (Ranson and Lissenden, 2016) ^[12]. Notably, researchers claim that biomedical interventions do not tend to respond to the social and economic conditions, which create exposure, susceptibility, and care access (Weiss *et al.*, 2019) ^[20]. This has made malaria a disease of poverty, which supports cycles of morbidity and poverty.

Malaria is a disease caused by a variety of socioeconomic determinants

The correlation between malaria and socioeconomic status has been established. Malaria raises the risk of poverty by reducing access to preventive measures, health services and information and poverty further enhances malaria by lowering productivity and raising costs on health services and education (Sachs and Malaney, 2002) ^[14]. Ataguba and Ataguba (2018) ^[2] indicate that out-of-pocket spending on malaria adversely affect the poor households to an extent of propelling them further into poverty. Equally, Tusting *et al.* (2020) ^[18] reveal that poor housing, which is characterized by mud walls, thatched roofs, and absence of window screening is closely linked to increased malaria transmission.

Education is of vital importance in defining the outcome of malaria. The greater the maternal education, the greater the utilization of ITNs, prompt care-seeking, and taking of

treatment regimens (Hill & Kazembe, 2017) ^[8]. In Zambia, Chanda *et al.* (2021) ^[4] observed that the more the educator is the head of the household the higher the chances of adopting preventive behaviours and using health services. Education also helps in equipping individuals to understand health messages, participate in community health programmes as well as hold service providers to account. Malaria is also more susceptible to gender inequality. Women usually have the overall responsibility of childcare and domestic health yet they might be denied the authority to make decisions and the ability to obtain the monetary independence (Dawson *et al.*, 2019) ^[6]. The imbalance may cause the delay of treatment to children and restrict access to preventive services in women during pregnancy, which puts the victims at the risk of maternal and neonatal malaria. Research conducted in Malawi, Zambia, and Tanzania reveal that gender-responsive malaria programs like involvement of men in reproductive health education and females empowerment enrich the levels of preventive measures (Onyango *et al.*, 2020) ^[11].

Combined Socioeconomic-Health Interventions

There is an increasing body of evidence in favor of the effectiveness of integrated measures to control malaria, as well as its socioeconomic determinants. The positive spillover effect has been established with conditional cash transfer (CCT) programmes; initially developed to reduce poverty, these programmes have been shown to reduce malaria (Guerra *et al.*, 2018) ^[7]. CCTs can help families to prevent and treat in time, as well as to increase household income and decrease financial barriers to healthcare.

Another potential intervention is housing improvement. Research in The Gambia and Tanzania indicates that the indoor mosquito density and malaria cases are significantly lowered by housing material upgrades (i.e. installing metal roofs, closing eaves and window screening) (Tusting *et al.*, 2017) ^[17]. Such interventions are especially successful in case of community education and local labour involvement, making interventions more sustainable and acceptable.

Malaria education programs in schools are also crucial in combined strategies. Such programmes affect both students and their families, as the malaria prevention messages are embedded in school curricula, which creates behaviour change at the community level (Aregawi *et al.*, 2019) ^[1]. Zambia Malaria education based on pilot programmes that combine malaria education with life-skills training has enhanced ITN utilization and environmental management practices among rural communities (Siachoono *et al.*, 2021) ^[16].

Integration of policy and Multisectoral

Multisectoral action is being given more importance in international policy frameworks regarding health. The Sustainable Development Goals (SDGs) specifically suggest the interconnection of health outcomes (SDG 3) and poverty reduction (SDG 1), education (SDG 4), gender equality (SDG 5), and housing and infrastructure (SDG 11) (UN, 2020) ^[19]. In spite of this awareness, there has been low implementation of integrated malaria policies especially in low-resource situations where institutional silos and lack of funds dominate.

In Zambia, the National Malaria Elimination Strategic Plan recognizes the social determinants but its operationalization of malaria control is mainly in the health sector (Ministry of

Health Zambia, 2023) ^[9]. Experts like Chipindi (2020) ^[23] reckon that the lack of effective multisectoral implementation is promoted by weak inter-ministerial coordination and low levels of decentralization. Likewise, in Ghana and Kenya, malaria policies tend to have no clear-cut mechanisms of incorporating socioeconomic interventions at community level (Agyepong *et al.*, 2018) ^[24].

Research Voids in the Current Literature

Although there is increased awareness of socioeconomic integration, there are a number of gaps in the literature. First, there is a lack of empirical evidence on the effects of integrated interventions on the long-term effect on malaria transmission and household resilience. Most research studies have concentrated on short-term impacts, hence the question of sustainability remains unanswered (Weiss *et al.*, 2019) ^[20]. Second, it is still uncommon to find context-specific evidence in countries such as Zambia that can be generalized to other countries. Third, there are limited studies that in a systematic manner analyze the process of policy implementation, governance, financing and community engagement.

In this research, the gap is addressed by evaluating evidence in different settings and highlighting policy-relevant implications to socioeconomic-integrated malaria interventions.

Findings

Malaria Interventions-Socioeconomic-Integrated Malaria Interventions

The evidence shows that malaria intervention that incorporates socioeconomic aspects are much effective as compared to biomedical intervention alone. It has been shown in various African settings that the integration of poverty reduction with control of vectors and education and housing enhancement will provide long-lasting malaria incidences (Aregawi *et al.*, 2019; Tusting *et al.*, 2020) ^[1, 18]. Districts in Zambia that had community livelihood support and malaria education had lower malaria prevalence than those that used ITNs and IRS alone (Chanda *et al.*, 2021) ^[4]. Interventions that add to income became a vital issue. With the help of social protection programmes, households could afford preventive instruments, a ride to the health facility and nutritious food, improving immunity and recovery (Ataguba & Ataguba, 2018) ^[2]. Such interventions also minimized disastrous health spending, raising financial strength.

Community Involvement and Behavioural Change

Community involvement was found to be a major predictor of a successful intervention. The programmes that engaged community leaders, women, and youth organizations actively reached more people to adopt preventive behaviours and trusted the health services (Siachoono *et al.*, 2021) ^[16]. Knowledge on behavioural change based on a local knowledge system enhanced the perception of malaria risk and the benefits of malaria prevention, which is congruent with the Health Belief Model.

Interventions based on gender sensitivity also ensured improved outcomes. Women became more agency in health decision making through empowerment in microfinance and education programmes, and in turn, more children and pregnant women had better use of ITN (Dawson *et al.*, 2019) ^[6].

Challenges at the institutional and Policy Level

Although there were good results, a number of challenges have been observed. Divisions in the structures of governance hindered co-ordination among the health, housing, education and social welfare sectors. Sources of funds were mostly disease focused, which limited flexibility to integrated programming. There were also weak monitoring and evaluation systems that curtailed the production of real-time evidence that would be used to make policy changes.

Conclusion

Biomedical interventions alone are not effective in controlling malaria and ensuring sustainable malaria controls in terms of disease burden in socioeconomically disadvantaged environments. This paper has shown that malaria is very much entrenched in more social and economic systems that a policy focuses on both poverty, education, gender inequality, and housing. The known experience in Zambia and other endemic nations proves that the socioeconomic-integrated interventions are able to not only lessen malaria cases but also increase the resilience of households and the effectiveness of health systems.

The results point to the significance of multisectoral cooperation and evidence-based policymaking. Combining health measures with social protection, education and community empowerment interventions have higher chances to have a lasting impact. Nonetheless, institutional obstacles including poor coordination, lack of financial resources and lack of data systems- still persist as barriers to good implementation.

Finally, eradication of malaria needs to be redefined as a health and development problem. By incorporating socioeconomic policies into malaria control systems the countries will be able to speed up on the part of elimination and also to promote development interests. This study will offer a platform upon which policymakers, researchers and practitioners can develop more equitable, effective and sustainable malaria interventions.

Recommendations

- Combine the malaria control measures and national poverty reduction and social protection programmes.
- Enhance inter-ministerial cooperation between the health, education, housing and social welfare sectors.
- Invest in housing enhancement projects in malaria affected communities.
- Increase the malaria educational and community awareness programmes in schools.
- Introduce gender-sensitive malaria policies that will enable women to be economically and socially empowered.
- Enhance funding flexibility in aid of the multisectoral malaria interventions.
- Improve community involvement in the malaria programme design and execution.
- Enhance surveillance and assessment mechanisms in order to produce evidence in policy making on real time basis.
- Encourage decision-making at local levels to suit local socioeconomic conditions.
- Make the malaria elimination strategies consistent with the Sustainable Development Goals so as to have a coherent policy.

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