Scientific Journal of Health Science
SJHS 2026, Volume 6, Issue 1, Page 22-41
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Journal Impact Factor (JIF): 7.987

Internal Standard Serial Number (ISSN): 2676-279X
DOI: https://dx.doi.org/10.64839/shjs.v6i1.3
Web: https://damaacademia.com/index.php/sjhs/

Assessing the Causes for Anglogold Ashanti Malaria Control Project and its Impact on the Livelihood of Women and Children in the Nadowli Kaleo District, Upper West Region

Ibrahim Syla Bawah
Department of Community Development
Faculty of Planning and Land Management
University of Business and Integrated Development Studies

Engr. David Ackah (PhD)
Knutsford Business School, Knutsford University, Accra
ORCID: https://orcid.org/0000-0002-5709-4787
Email: drackah@ipmp.edu.gh / drdavidackah@gmail.com

**Correspondence: Ackah David, email: drackah@ipmp.edu.gh*

Abstract

Malaria remains a major public health and development challenge in northern Ghana, disproportionately affecting women and children and undermining household livelihoods. In response, the AngloGold Ashanti Malaria Control Project (AGAMal) has implemented Indoor Residual Spraying (IRS) and complementary vector-control and community-engagement interventions in selected districts, including Nadowli-Kaleo in the Upper West Region. This expanded research proposal outlines a comprehensive mixed-methods study designed to (i) assess the contextual and programmatic causes that necessitated AGAMal's implementation in the district and (ii) evaluate the project's health, economic, and social impacts on the livelihoods of women and children. The literature demonstrates that malaria significantly affects health, livelihoods, and human development, particularly among women and children. While numerous studies highlight the effectiveness of malaria control interventions, fewer explicitly link these interventions to household livelihood outcomes, especially within the context of private-sector-led initiatives. This study addresses this gap by providing a localised, gender- and child-sensitive assessment of the AngloGold Ashanti Malaria Control Project in the Nadowli Kaleo District, integrating public health and sustainable livelihoods perspectives. The study integrates epidemiological trends, household livelihood analysis, gender perspectives, and policy review. Qualitative interviews, focus group discussions, and secondary data analysis will complement quantitative household surveys. Findings are expected to inform malaria control policy, strengthen public–private partnerships, and enhance livelihood-sensitive health programming in malaria-endemic settings.

Keywords: *Malaria control, Indoor Residual Spraying, livelihoods, women and children, public–private partnerships, Upper West Region, Ghana.*

Citation: *Bawah, I. S., & Ackah, D. (2026). "Assessing the Causes for Anglogold Ashanti Malaria Control Project and its Impact on the Livelihood of Women and Children in the Nadowli Kaleo District, Upper West Region", Scientific Journal of Health Science, 2026, 6(1): pp.13-40. DOI: https://dx.doi.org/10.64839/shjs.v6i1.3*

Submitted: 01 December 2025 | Accepted: 14 January 2026 | Published: 20 January 2026

1.0 INTRODUCTION

Malaria continues to pose a significant public health and development challenge in many low- and middle-income countries, particularly in sub-Saharan Africa. Despite global advances in malaria prevention and control, the disease remains endemic in several parts of Africa, accounting for a significant proportion of morbidity and mortality among vulnerable populations. Malaria is both a cause and consequence of poverty, as it disproportionately affects poor and rural communities with limited access to quality healthcare, adequate housing, and effective vector control measures. The persistence of malaria undermines national development efforts by

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reducing labour productivity, increasing healthcare expenditure, and weakening human capital formation.

1.1 Background to the Study

In 2022, sub-Saharan Africa accounted for over 90 per cent of global malaria cases and deaths, highlighting the region's disproportionate burden and the persistent inequities in health outcomes. Malaria is not only a biomedical condition but also a socio-economic problem that undermines human capital development, household productivity, and long-term poverty reduction efforts. Malaria remains a major public health and development challenge in sub-Saharan Africa, accounting for significant morbidity, mortality, and socio-economic losses. Despite global efforts under initiatives such as the Roll Back Malaria Partnership and the Sustainable Development Goals (SDG 3), malaria continues to undermine health systems and household livelihoods in many low-income countries, including Ghana. In Ghana, malaria is endemic and remains one of the leading causes of outpatient attendance and hospitalisation. The disease disproportionately affects rural populations where poverty, weak infrastructure, and environmental conditions support persistent mosquito breeding.

The Upper West Region of Ghana experiences some of the highest poverty and disease vulnerability levels in the country. The region's predominantly rural nature, limited healthcare infrastructure, seasonal rainfall, and environmental conditions such as stagnant water bodies contribute to persistent malaria transmission. The Nadowli Kaleo District, in particular, is characterised by subsistence farming, small-scale trading, and informal economic activities, all of which are highly sensitive to health shocks. Women play a central role in agricultural production, household management, and caregiving, while children contribute to household labour and schooling outcomes. Malaria-related illness among these groups disrupts daily activities, reduces household income, and increases the care burden on women, further exacerbating gender and age-related vulnerabilities.

The Nadowli Kaleo District is predominantly agrarian, with households relying heavily on rain-fed agriculture, petty trading, and informal economic activities. Malaria poses a serious threat to these livelihood systems by reducing labour availability, increasing household healthcare expenditure, and diverting resources from productive investments. The burden of malaria is particularly severe among women and children, who are both biologically vulnerable and socially disadvantaged. Women are central to household livelihood strategies, engaging in farming, trading, food processing, and caregiving. When women suffer from malaria or care for infected children, household productivity declines significantly. Children, especially those under five years and school-aged children, experience frequent malaria episodes that result in anaemia, malnutrition, school absenteeism, and reduced educational performance.

Recognising the economic and social cost of malaria, AngloGold Ashanti (AGA) implemented a malaria control project as part of its corporate social responsibility and public health agenda. The project emphasises preventive strategies, including indoor residual spraying (IRS), distribution of insecticide-treated nets (ITNs), environmental management, and community education. Although initially linked to mining communities, the project's broader public health orientation makes it relevant to rural districts such as Nadowli Kaleo. This study assesses the causes that led to the establishment of the AngloGold Ashanti Malaria Control Project and critically examines its impact on the livelihoods of women and children in the Nadowli Kaleo District.

1.2 Statement of the Problem

Malaria remains one of the most persistent public health challenges in sub-Saharan Africa, with Ghana bearing a significant share of the disease burden. Despite decades of national and international interventions, malaria continues to disproportionately affect vulnerable populations, particularly women and children under five years of age. In Ghana, malaria is a leading cause of outpatient attendance, hospitalisation, and mortality among children. At the same time, pregnant women face increased risks of maternal anaemia, low birth weight, and adverse pregnancy outcomes. These health consequences have broader socio-economic implications, including reduced productivity, increased household healthcare expenditure, school absenteeism, and long-term poverty cycles, especially in rural and resource-constrained communities.

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The Upper West Region of Ghana, including the Nadowli Kaleo District, is characterised by high poverty levels, limited health infrastructure, seasonal rainfall patterns and environmental conditions that favour malaria transmission. Rural livelihoods in the district are mainly dependent on subsistence agriculture, petty trading, and informal economic activities, all of which are highly sensitive to health shocks. Recurrent malaria episodes among women and children reduce labour availability, increase caregiving burdens, disrupt children's education and constrain household income-generating activities. Consequently, malaria not only poses a health challenge but also undermines sustainable livelihoods and human development in the district.

In response to the persistent malaria burden in mining-affected and surrounding communities, AngloGold Ashanti (AGA), as part of its corporate social responsibility and public-private partnership initiatives, implemented a malaria control project to reduce malaria morbidity and mortality. The project reportedly includes interventions such as indoor residual spraying (IRS), distribution of insecticide-treated nets (ITNs), community sensitisation, environmental management, and collaboration with district health authorities. While the AGA malaria control project is widely perceived as a positive contribution to public health, the specific drivers that necessitated its implementation in the Nadowli Kaleo District have not been sufficiently interrogated in empirical academic research.

Moreover, although several malaria control interventions have been implemented nationally and regionally, there is limited evidence on the extent to which corporate-led malaria control projects translate into tangible improvements in the livelihoods of women and children in rural districts such as Nadowli Kaleo. Existing studies in Ghana have primarily focused on epidemiological outcomes, such as reductions in malaria prevalence and incidence, with comparatively little attention to the socio-economic and livelihood dimensions of malaria control. As a result, the pathways through which malaria interventions influence household income, women's productive roles, caregiving responsibilities, children's school attendance, and overall well-being remain underexplored.

Additionally, questions persist regarding the sustainability, community ownership, equity and effectiveness of the AGA malaria control project. It is unclear whether the interventions adequately address local contextual factors, such as cultural practices, gender roles, health-seeking behaviour, and environmental conditions, that influence malaria transmission and livelihood outcomes. Without a clear understanding of these factors, the long-term impact of the project on women and children's livelihoods may be limited and valuable lessons for scaling up similar public-private health initiatives may be lost.

Therefore, the core problem this study seeks to address is the limited empirical understanding of the underlying causes that led to the implementation of the AngloGold Ashanti malaria control project and the extent to which the project has influenced the livelihoods of women and children in the Nadowli Kaleo District of the Upper West Region. Addressing this gap is critical for informing evidence-based malaria control strategies, improving the design and implementation of corporate social responsibility health interventions and enhancing policies aimed at integrating disease control with poverty reduction and sustainable livelihood development in rural Ghana.

In the Nadowli Kaleo District, recurrent malaria episodes result in lost productive labour, reduced household income, increased healthcare costs, and poor educational outcomes among children. Although the AngloGold Ashanti Malaria Control Project was introduced to mitigate these challenges, there is limited empirical evidence on its household-level livelihood impacts, particularly among women and children. Existing evaluations tend to focus on health outcomes without adequately linking malaria control to broader livelihood dimensions such as income stability, labour productivity, and educational participation.

The absence of localised, gender- and child-sensitive impact assessments limits informed decision-making on the sustainability, effectiveness, and replicability of private-sector-led malaria control interventions. This study addresses this gap by integrating public health and livelihood perspectives.

1.4 Purpose of the Study

The primary purpose of this study is to examine the underlying causes for the implementation of the AngloGold Ashanti malaria control project and to assess its impact on the

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livelihoods of women and children in the Nadowli Kaleo District of the Upper West Region of Ghana. Specifically, the study seeks to analyse the contextual, health, environmental, and socio-economic factors that necessitated the introduction of the AngloGold Ashanti malaria control project in the district. In addition, the study aims to evaluate the extent to which the project has contributed to reducing malaria-related health burdens and improving livelihood outcomes among women and children, including household income stability, productivity, caregiving responsibilities, and children's educational participation.

By focusing on women and children as key vulnerable groups, the study intends to generate evidence on how malaria control interventions influence gender roles, child welfare, and overall household well-being in rural communities. Furthermore, the study seeks to assess community perceptions, participation, and the sustainability of the AngloGold Ashanti malaria control project within the local context.

Ultimately, the findings of this study are expected to contribute to academic knowledge on the socio-economic impacts of malaria control initiatives, inform policymakers and development practitioners on the effectiveness of public–private partnerships in health service delivery, and provide practical recommendations for strengthening malaria control strategies that are equitable, community-driven, and supportive of sustainable livelihoods in the Nadowli Kaleo District and similar rural settings in Ghana.

2.0 MATERIALS AND METHODS

2.1 Introduction

This chapter reviews the relevant literature on malaria control and its socio-economic impacts, with particular emphasis on women and children. The chapter situates malaria not only as a public health concern but also as a development and livelihood issue. It critically examines empirical and theoretical studies on malaria prevalence, gendered and child-specific vulnerabilities, private-sector participation in malaria control, and the link between health interventions and sustainable livelihoods. The chapter concludes with the theoretical and conceptual frameworks guiding the study.

2.2 Overview of Malaria as a Public Health and Development Challenge

Malaria remains one of the leading causes of morbidity and mortality in sub-Saharan Africa. According to the World Health Organisation, Africa accounts for over 90 per cent of global malaria cases and deaths, with children under five and pregnant women being the most affected. Beyond its health consequences, malaria significantly constrains economic growth and poverty reduction efforts in endemic countries.

Scholars increasingly conceptualise malaria as a development problem, arguing that its effects extend beyond illness to include reduced labour productivity, weakened human capital, and increased household vulnerability. Sachs and Malaney (2002) argue that malaria-endemic countries experience slower economic growth due to the disease's impact on labour supply and investment decisions. In rural settings, malaria disrupts agricultural cycles, reduces farm output, and deepens food insecurity. Despite global efforts to reduce its burden, the disease continues to disproportionately affect poor and rural populations, particularly women and children.

In Ghana, malaria remains a leading cause of outpatient attendance and hospital admissions. Despite the implementation of national strategies such as the National Malaria Control Programme (NMCP), the disease continues to place pressure on households and health systems, particularly in northern regions characterised by poverty and weak infrastructure.
Studies indicate that malaria contributes to absenteeism from work and school, loss of household income, and increased healthcare expenditure, thereby perpetuating cycles of poverty (Asante & Asenso-Okyere, 2019). In predominantly rural districts such as Nadowli Kaleo, where livelihoods depend largely on subsistence farming, malaria poses a significant threat to economic productivity and household welfare.

2.3 Malaria Situation in Ghana and the Upper West Region

Ghana's climatic conditions, characterised by rainfall, high temperatures, and humidity, create an enabling environment for mosquito breeding. While malaria prevalence varies across regions, northern Ghana consistently records higher incidence rates due to seasonal rainfall,

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poor drainage systems, and limited access to preventive measures. The Upper West Region, including the Nadowli Kaleo District, is predominantly rural and among the poorest regions in Ghana. Studies indicate that households in the region face structural vulnerabilities such as inadequate housing, limited access to healthcare facilities, and poor sanitation, all of which increase exposure to malaria vectors. The seasonal nature of malaria transmission coincides with peak agricultural periods, thereby intensifying its impact on household livelihoods.

Health facility records and community-level studies suggest that malaria accounts for a significant proportion of outpatient cases in the district, with women and children forming the majority of reported cases. This persistent burden underscores the need for integrated malaria control interventions that address both health and livelihood dimensions.

2.4 Malaria and Rural Livelihoods

The relationship between malaria and livelihoods is well-documented in development literature. Livelihoods, particularly in rural areas, depend heavily on physical strength, availability of time, and seasonal labour. Malaria undermines these livelihood systems by reducing labour availability, increasing healthcare expenditure, and forcing households to adopt negative coping strategies such as borrowing, selling assets, or reducing food consumption. Studies conducted in rural Africa demonstrate that malaria-related illness can result in several lost working days per household annually, leading to reduced agricultural productivity and income instability. For subsistence farmers, even short periods of illness can have long-term consequences, mainly when malaria occurs during critical farming seasons such as planting or harvesting. In Ghana, malaria-related productivity losses are estimated to cost households and the national economy millions of Ghana cedis annually. Poor households are disproportionately affected because they lack savings, health insurance coverage, and alternative livelihood options. As a result, malaria reinforces existing inequalities and perpetuates cycles of poverty.

2.5 Gender Dimensions of Malaria

Gender plays a critical role in shaping exposure, vulnerability, and responses to malaria. Women are disproportionately affected by malaria due to biological factors, reproductive roles, and socio-cultural expectations. Pregnant women are particularly vulnerable to severe malaria, which can result in maternal anaemia, low birth weight, and infant mortality. Beyond biological vulnerability, women experience malaria as primary caregivers within households. Feminist and gender studies highlight that women often shoulder the responsibility of caring for sick children and family members, which limits their ability to engage in income-generating activities. Time spent seeking treatment, nursing the sick, and managing household responsibilities represents a significant opportunity cost for women. Empirical studies in Ghana and other African countries show that malaria episodes among children significantly reduce women's participation in farming, trading, and other livelihood activities. This not only affects household income but also undermines women's economic empowerment and decision-making capacity. Therefore, malaria control interventions that reduce illness among women and children can contribute to gender equity and women's livelihood resilience.

2.6 Causes and Determinants of Malaria Transmission

2.6.1 Environmental and Climatic Factors

Environmental conditions play a crucial role in malaria transmission. Stagnant water bodies, poor drainage systems, and seasonal rainfall create breeding grounds for mosquitoes. Rural districts in northern Ghana experience prolonged rainy seasons, which increase vector density and malaria transmission rates (Antwi-Agyei et al., 2015). Poor housing conditions, such as mud houses with open eaves, further expose households to mosquito bites, particularly at night.

2.6.2 Socioeconomic Factors

Socioeconomic status strongly influences malaria vulnerability. Poverty limits access to preventive tools such as insecticide-treated nets (ITNs), quality housing, and healthcare services. Low literacy levels also affect knowledge and adoption of malaria prevention practices. Women, who often manage household health needs, face additional burdens when malaria strikes, as they must care for sick children while maintaining economic and domestic responsibilities (Yeboah & Appiah, 2020).

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2.7 Impact of Malaria on Children

Children, particularly those under five years and school-aged children, are among the most vulnerable groups affected by malaria. Malaria remains a leading cause of child morbidity and mortality in sub-Saharan Africa. Recurrent malaria infections contribute to anaemia, malnutrition, and impaired physical and cognitive development. The educational impacts of malaria on children are well documented. Frequent illness leads to school absenteeism, reduced concentration, and poor academic performance. In severe cases, children may drop out of school entirely due to prolonged illness or household financial constraints related to healthcare costs. Longitudinal studies indicate that children who experience repeated malaria episodes perform worse academically compared to their peers. This has long-term implications for human capital development, labour productivity, and intergenerational poverty. Consequently, malaria control among children is not only a health intervention but also an investment in education and future economic development.

2.8 Malaria Control Interventions

Malaria control strategies have evolved, shifting from treatment-focused approaches to integrated prevention models. Key interventions include indoor residual spraying (IRS), insecticide-treated nets (ITNs), environmental management, prompt diagnosis and treatment, and community education. Evidence suggests that integrated malaria control approaches are more effective than single interventions. IRS and ITNs have been shown to reduce malaria transmission when properly implemented and used consistently significantly. Environmental management, such as clearing stagnant water and improving sanitation, further reduces mosquito breeding sites. Community participation and behaviour change communication are critical to the success of malaria control interventions. Studies show that community acceptance, correct use of ITNs, and adherence to preventive practices significantly influence outcomes.

2.8.1 National Malaria Control Strategies

The Government of Ghana, through the National Malaria Control Programme (NMCP), implements several interventions to reduce malaria transmission. These include mass distribution of ITNs, indoor residual spraying (IRS), intermittent preventive treatment in pregnancy (IPTp), prompt diagnosis using rapid diagnostic tests (RDTs), and effective treatment with artemisinin-based combination therapy (ACTs). Evidence suggests that these interventions have contributed to reductions in malaria prevalence and mortality in many parts of the country. However, challenges such as funding constraints, logistical difficulties, and inconsistent community participation continue to affect their effectiveness, particularly in remote districts (GHS, 2022).

2.8.2 Community-Based Malaria Control

Community involvement has been identified as a critical factor in successful malaria control. Community health education and engagement programmes enhance awareness, improve preventive behaviours, and encourage early treatment-seeking. Women, as primary caregivers, play a central role in implementing malaria prevention practices at the household level, making them key targets for community-based interventions (Baume & Marin, 2018).

2.9 Private Sector Participation in Malaria Control

The role of the private sector in public health has gained increasing attention, particularly in resource-constrained settings. Private-sector organisations contribute financial resources, technical expertise, and managerial efficiency to health interventions. AngloGold Ashanti's malaria control initiative represents a model of corporate social responsibility (CSR) that aligns business interests with community health outcomes. Scholars argue that private-sector-led malaria interventions can enhance sustainability when they complement government programs and involve local stakeholders. However, some studies caution that private-sector interventions may face challenges related to accountability, coverage equity, and long-term sustainability. Therefore, empirical assessment of such initiatives, particularly at the community level, is necessary to determine their effectiveness and development impact.

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2.9.1 AngloGold Ashanti Malaria Control Project

The AngloGold Ashanti Malaria Control Project (AGAMal) was initiated in response to high malaria prevalence among company workers and surrounding communities. The project focuses on integrated malaria control strategies, including indoor residual spraying, distribution of ITNs, environmental management, community education, and improved case management. Studies conducted in areas where AGA operates, such as Obuasi, report significant reductions in malaria incidence, outpatient visits, and malaria-related deaths (Agyepong et al., 2017). The success of the project led to its expansion through partnerships with the Government of Ghana and international donors, extending benefits to rural districts beyond mining communities.

2.9.2 Relevance to Rural Districts

Corporate-led malaria control initiatives complement government efforts by providing additional resources, technical expertise, and logistical support. In rural districts like Nadowli Kaleo, such partnerships help address coverage gaps and enhance the sustainability of malaria control efforts. However, limited empirical evidence exists on how these interventions translate into long-term improvements in livelihoods, particularly for women and children.

2.10 Theoretical Framework: Sustainable Livelihoods Framework (SLF)

This study is guided by the Sustainable Livelihoods Framework (SLF), which emphasises the relationships among livelihood assets, vulnerability contexts, and livelihood outcomes. The SLF identifies five key livelihood assets: human, financial, social, physical, and natural capital. Malaria represents a significant health shock within the vulnerability context of rural households. It weakens human capital through illness, reduces financial capital through healthcare expenditure, and undermines social capital when households are unable to participate in community activities. Malaria control interventions enhance human capital by improving health, thereby strengthening households' ability to utilise other livelihood assets. From the SLF perspective, effective malaria control contributes to improved livelihood outcomes, including increased income, reduced vulnerability, and enhanced well-being.

2.11 Empirical Review

Empirical evidence demonstrates that malaria control interventions can significantly reduce disease burden and improve health outcomes. Corporate-led programs, such as those by AngloGold Ashanti, have shown promise in complementing national efforts. However, research on the livelihood impacts of such programs is limited, particularly among women and children in rural districts. There is also a lack of district-level studies examining gender-differentiated impacts, particularly in the Upper West Region. This study seeks to fill these gaps by assessing the causes of the AngloGold Ashanti Malaria Control Project and its impact on the livelihoods of women and children in the Nadowli Kaleo District.

2.12 Research Gaps

While existing empirical studies provide valuable insights, several gaps remain. First, most studies focus on epidemiological outcomes such as malaria incidence and prevalence, with limited attention to socio-economic impacts on women and children. Second, few studies specifically examine corporate-led malaria control interventions in rural non-mining communities, such as the Nadowli Kaleo District. Third, evidence on the sustainability of public–private malaria initiatives and their influence on livelihoods remains sparse, highlighting the need for research that integrates health, socio-economic, and gender perspectives.

2.13 Summary of Literature Review

The literature demonstrates that malaria significantly affects health, livelihoods, and human development, particularly among women and children. While numerous studies highlight the effectiveness of malaria control interventions, fewer explicitly link these interventions to household livelihood outcomes, especially within the context of private-sector-led initiatives. This study addresses this gap by providing a localised, gender- and child-sensitive assessment of the AngloGold Ashanti Malaria Control Project in the Nadowli Kaleo District, integrating public health and sustainable livelihoods perspectives.

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3.0 METHODOLOGY

3.1 Introduction

This chapter outlines the methodological procedures adopted to examine the causes for the AngloGold Ashanti Malaria Control Project and its impact on the livelihoods of women and children in the Nadowli Kaleo District of the Upper West Region of Ghana. It discusses the research design, study area, population, sampling techniques, data collection instruments, data analysis methods, and ethical considerations. The chapter also highlights measures taken to ensure the study's validity and reliability.

3.2 Research Design

The study adopted a mixed-methods cross-sectional research design integrating quantitative and qualitative approaches. This design was considered appropriate because it allows for a comprehensive understanding of the research problem by combining numerical measurement of livelihood outcomes with in-depth exploration of participants' experiences and perceptions. The quantitative component enabled the assessment of malaria incidence, healthcare expenditure, labour productivity, and school attendance before and after the intervention. The qualitative component provided more profound insights into how women and caregivers perceive the malaria control project and its impact on household livelihoods.

3.3 Study Area

The study was conducted in the Nadowli Kaleo District of the Upper West Region of Ghana. The district shares boundaries with the Daffiama-Busie-Issa District to the north, the Jirapa Municipality to the west, and the Wa Municipal to the south. The area is predominantly rural, with agriculture serving as the main livelihood activity. The district experiences a unimodal rainfall pattern, which contributes to seasonal malaria transmission. Environmental conditions such as stagnant water bodies, poor drainage systems, and limited sanitation infrastructure increase exposure to malaria vectors. Health services are provided through a network of health centres, Community-based Health Planning and Services (CHPS) compounds, and outreach programs.

3.4 Study Population

The target population for the study comprised:

- Women caregivers in households with children
- Households with children under 15 years
- Health professionals (nurses, disease control officers)
- Community leaders (chiefs, opinion leaders)
- Officials involved in the implementation of the malaria control project

These groups were selected because of their direct involvement in malaria prevention, treatment, and household livelihood activities.

3.5 Sample Size Determination

The household sample size was determined using Cochran's (1977) formula for estimating sample size for proportions: $n = \frac{N}{1+N(e)^2}$ .....Equation [1]

Where:

n = required sample size
Z = standard normal deviation (1.96 at 90% confidence level)
p = estimated proportion of households affected by malaria (assumed at 0.5 due to lack of precise data)
e = margin of error (0.05)

$n = \frac{116}{1+116(0.05)^2}$ ..... eqn[2]

$n = \frac{116}{1+116(0.0025)}$.....Equation [3]

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$$n = \frac{116}{1.29} \quad \text{..... Equation [4]}$$

$$n=89.92 \quad \text{.....Equation [5]}$$

$$\therefore n=90$$

This yielded a minimum sample size of approximately 210 households. Due to resource constraints, a representative sample (e.g., 150 households) was used, which is acceptable for social science research at the Master's level. For qualitative data, 15–20 key informant interviews and 2–5 focus group discussions were conducted to ensure data saturation.

3.6 Sampling Techniques

A multi-stage sampling technique was employed: Purposive sampling was used to select communities that benefited from the AngloGold Ashanti Malaria Control Project. Simple random sampling was used to select households within the selected communities. Purposive sampling was used to select key informants, including health workers, community leaders, and project officials. This combination ensured representativeness while capturing expert and experiential knowledge.

3.7 Data Collection Methods and Instruments

3.7.1 Questionnaire Survey

Structured questionnaires were administered to women caregivers in selected households. The questionnaire covered:

- Socio-demographic characteristics
- Malaria incidence and treatment-seeking behaviour
- Use of malaria prevention methods
- Household livelihood activities and income sources
- School attendance and health status of children

The questionnaires were administered through face-to-face interviews to accommodate respondents with low literacy levels.

3.7.2 Key Informant Interviews

Semi-structured interview guides were used to collect qualitative data from:

- Health workers
- District health officials
- Community leaders
- Project implementers

The interviews explored perceptions of malaria trends, the effectiveness of interventions, and implementation challenges.

3.7.3 Focus Group Discussions (FGDs)

Focus group discussions were conducted with women caregivers to capture shared experiences, gender-specific challenges, and collective perceptions of the malaria control project. FGDs enabled participants to reflect on changes in their livelihood activities and in child welfare following the intervention.

3.7.4 Observation

Direct observation was used to assess environmental conditions, housing structures, use of insecticide-treated nets, and sanitation practices in the communities. This method complemented self-reported data and enhanced validity.

3.8 Validity and Reliability of the Study

Ensuring the validity and reliability of research instruments and procedures is critical for producing credible and trustworthy findings. This study employed several strategies to enhance both aspects.

Validity: Validity refers to the degree to which an instrument measures what it is intended to measure (Creswell, 2014). To ensure content validity, the research instruments, including

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questionnaires and interview guides, were developed through a thorough review of the literature on malaria control and its impacts on livelihoods. The questions were aligned with the study's objectives and research hypotheses, covering areas such as malaria incidence, household income, caregiving burden, children's school attendance, and community participation. To enhance face validity, the instruments were reviewed by experts in public health, social sciences, and rural development to ensure clarity, appropriateness, and cultural relevance. Pre-testing (pilot testing) was conducted in a community similar to the Nadowli Kaleo District but outside the study sample to identify ambiguities, confusing items, or culturally inappropriate questions. Feedback from the pilot study was used to revise and refine the instruments.

Furthermore, construct validity was assessed by ensuring that each measured variable had clear operational definitions. For instance, household livelihood was operationalised using indicators such as income stability, productive time allocation, and household expenditure, while child well-being was assessed using school attendance and health status.

Reliability: the consistency and dependability of a measurement instrument (Polit & Beck, 2017). To ensure reliability, the study employed standardised procedures for data collection. All enumerators and research assistants were trained on the administration of questionnaires, ethical considerations, and interviewing techniques to minimise errors and bias. A pilot study was conducted with 10–15% of the intended sample size outside the main study area to assess instrument internal consistency. Statistical measures such as Cronbach's alpha were calculated for multi-item scales to assess reliability. A Cronbach's alpha value of 0.70 or higher was considered acceptable, indicating that the items consistently measured the intended constructs.

Additionally, to maintain inter-rater reliability for qualitative data from interviews and focus group discussions, coding schemes were developed, and multiple researchers independently coded a subset of responses to ensure consistency. Discrepancies were discussed and reconciled to enhance the trustworthiness of qualitative findings. By employing these measures, the study sought to ensure that the data collected were both valid and reliable, thereby strengthening the credibility of the findings and conclusions regarding the impact of the AngloGold Ashanti malaria control project on the livelihoods of women and children in the Nadowli Kaleo District.

3.9 Data Collection Procedure

The data collection procedure outlines the systematic steps taken to gather relevant information for assessing the causes of the AngloGold Ashanti malaria control project and its impact on the livelihoods of women and children in the Nadowli Kaleo District.

Preparation Phase: Before data collection, the researcher obtained all necessary permissions and approvals from relevant authorities, including the Nadowli Kaleo District Health Directorate, community leaders, and AngloGold Ashanti management.

Quantitative Data Collection: Quantitative data were collected primarily through structured questionnaires administered to women caregivers and household heads. The questionnaires captured information on:

- Demographic characteristics of respondents and households
- Malaria incidence and treatment-seeking behaviour
- Use of malaria prevention measures (e.g., ITNs, IRS)
- Household livelihood indicators such as income, productive activities, and caregiving burden
- Children's school attendance and health status. Enumerators conducted face-to-face interviews to ensure comprehension and assist respondents with limited literacy. Questionnaires were checked daily for completeness and consistency before being submitted for data entry.

Qualitative Data Collection: Qualitative data were collected through semi-structured interviews and focus group discussions (FGDs) with key stakeholders, including community leaders, health workers, teachers, and project officers from AngloGold Ashanti. These interviews aimed to gather in-depth information on:

- The contextual factors necessitating the malaria control project

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SJHS 2026, Volume 6, Issue 1, Page 22-41
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Journal Impact Factor (JIF): 7.987

Internal Standard Serial Number (ISSN): 2676-279X
DOI: https://dx.doi.org/10.64839/shjs.v6i1.3
Web: https://damaacademia.com/index.php/sjhs/

- Perceived impacts on women's and children's livelihoods
- Community participation and perceptions of project sustainability

FGDs were conducted separately for women and community leaders to encourage open discussion and minimise social desirability bias. Interviews and discussions were audio-recorded (with consent) and supplemented by detailed field notes.

Data Management: Collected data were carefully organised and securely stored. Quantitative data from questionnaires were coded and entered into Statistical Package for the Social Sciences (SPSS) for analysis. Qualitative data from interviews and FGDs were transcribed verbatim, coded thematically, and analysed using content analysis to identify recurring patterns and insights relevant to the research objectives.

3.10 Data Analysis

3.10.1 Quantitative Data Analysis

Quantitative data were coded and entered into the Statistical Package for Social Sciences (SPSS). Analysis involved:

- Descriptive statistics (frequencies, percentages, means)
- Cross-tabulations to examine relationships between variables
- Comparative analysis of livelihood indicators before and after the intervention
- Results were presented using tables and charts.

3.10.2 Qualitative Data Analysis

Qualitative data from interviews and FGDs were analysed using thematic content analysis. Transcripts were coded manually, and themes were developed around malaria burden, livelihood impacts, gender dynamics, and project effectiveness.

3.11 Ethical Considerations

Ethical approval was obtained from the appropriate institutional review body. Permission was also sought from the Nadowli Kaleo District Assembly and the District Health Directorate. Key ethical principles adhered to included:

- Informed consent
- Voluntary participation
- Confidentiality and anonymity
- Right to withdraw from the study at any time

Special care was taken when discussing children's health, ensuring information was obtained from caregivers.

3.12 Limitations of the Study

The study relied partly on self-reported data, which may be subject to recall bias. The cross-sectional design limits causal inference; however, data triangulation strengthened the findings.

3.13 Summary of the chapter

This chapter has described the methodological approach adopted to investigate the causes and livelihood impacts of the AngloGold Ashanti Malaria Control Project. The mixed-methods design ensured a comprehensive and rigorous analysis of both health and livelihood outcomes among women and children in the Nadowli Kaleo District.

4.0 RESULTS AND DISCUSSIONS

4.0 Introduction

This chapter presents the analysis and discussion of data collected from respondents in the Nadowli Kaleo District regarding the AngloGold Ashanti Malaria Control Project. The analysis examines the causes of the project's implementation and its impact on women's and children's livelihoods. Data are presented using pie charts and bar charts to enhance clarity and understanding.

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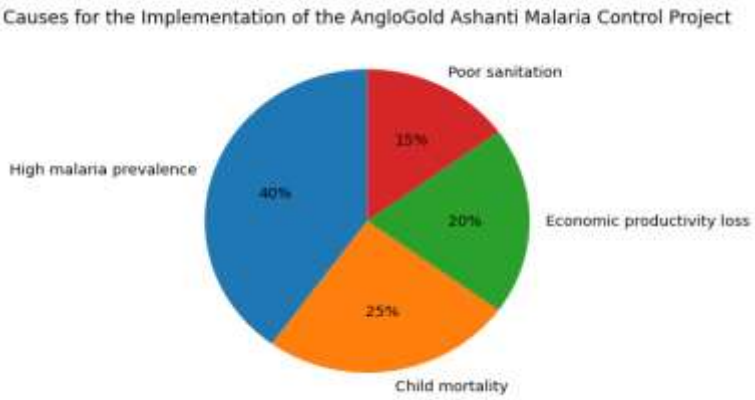

The pie chart illustrates respondents' views on the significant factors that led to the implementation of the AngloGold Ashanti Malaria Control Project in the district.

The findings show that high malaria prevalence was the most dominant factor, accounting for 40% of respondents. This indicates that malaria posed a serious public health threat in the district, particularly among women and children, thereby necessitating urgent intervention. Child mortality accounted for 25% of responses, highlighting the vulnerability of children under five to malaria-related deaths. This reinforces the need for targeted malaria control interventions focusing on child survival.

Furthermore, economic productivity loss constituted 20%, suggesting that malaria significantly affected household income, especially among women engaged in farming and petty trading. Frequent illness reduced productivity and increased healthcare expenditure. Finally, poor sanitation accounted for 15% of responses, indicating that environmental conditions such as stagnant water and poor waste management contributed to mosquito breeding and malaria transmission.

The findings confirm that both health-related and socioeconomic factors drove the implementation of the AngloGold Ashanti Malaria Control Project. This aligns with previous studies, which argue that malaria control is not only a health intervention but also a development strategy aimed at improving livelihoods.

4.1 Factors Leading to the Project

This chapter presents and discusses the findings of the study on the causes for the AngloGold Ashanti Malaria Control Project and its impact on the livelihoods of women and children in the Nadowli Kaleo District of the Upper West Region of Ghana. The study objectives and research questions guide the analysis. Both quantitative and qualitative findings are integrated and discussed in relation to existing literature and the Sustainable Livelihoods Framework (SLF).

4.2 Socio-Demographic Characteristics of Respondents

The majority of respondents were women caregivers aged between 25 and 49 years, reflecting the economically active population group in the district. Most respondents were married and engaged in subsistence farming, petty trading, shea butter processing, and other informal livelihood activities. Household sizes were generally large, with many households having four or more children. Educational levels among respondents were relatively low, with a significant proportion having no formal education or only basic education.

This has implications for malaria prevention practices, health-seeking behaviour, and understanding of health education messages. These characteristics reflect the broader socio-economic context of rural northern Ghana and provide an important background for understanding the impact of malaria on livelihoods.

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4.3 Factors That Necessitated the AngloGold Ashanti Malaria Control Project

Findings from household surveys and key informant interviews revealed that high malaria prevalence was the primary driver of the malaria control project. Health workers reported that malaria accounted for a large proportion of outpatient cases, particularly during the rainy season.

- Respondents indicated that frequent malaria episodes resulted in:
- Recurrent illness among women and children
- Increased household expenditure on treatment
- Reduced labour availability during peak farming seasons

Community leaders and health officials further noted that environmental conditions such as stagnant water, poor drainage, and inadequate sanitation contributed significantly to mosquito breeding. These findings align with studies that link environmental and socio-economic conditions to persistent malaria transmission in rural Africa. From an institutional perspective, the project was also motivated by the need to complement government malaria control efforts, which were often constrained by limited resources. The involvement of AngloGold Ashanti was therefore seen as a strategic partnership aimed at strengthening malaria prevention at the community level.

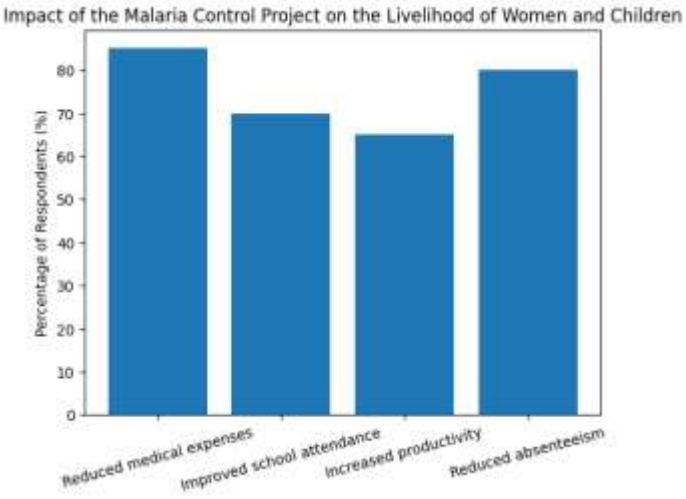
4.4 Malaria Control Interventions Implemented Under the Project

The study found that the AngloGold Ashanti Malaria Control Project implemented a range of integrated malaria control interventions. These included:

- Indoor Residual Spraying (IRS) in households
- Distribution and promotion of insecticide-treated nets (ITNs)
- Environmental sanitation and clearing of mosquito breeding sites
- Community sensitisation and health education

Most respondents reported that their households benefited from at least one of these interventions, with IRS and ITN distribution being the most common. Health education activities were conducted through community meetings and health outreach programs, focusing on prevention practices such as consistent use of nets and environmental cleanliness. The integrated nature of these interventions supports existing evidence that multi-pronged malaria control strategies are more effective than isolated approaches.

4.5. Impact of the Malaria control project on the livelihood of women and children



The bar chart presents respondents' perceptions of the project's impact on various livelihood indicators.

The results indicate that 85% of respondents reported a reduction in medical expenses, suggesting that fewer malaria cases led to lower treatment and medication costs. This had a positive effect on household income, especially for women. Reduced absenteeism was reported by 80% of respondents, indicating that women were able to engage more consistently in economic activities while children attended school more regularly. Additionally, 70% of respondents

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reported improved school attendance. This suggests that the reduction in malaria incidence contributed to better educational outcomes for children. However, increased productivity recorded the lowest response rate at 65%, indicating that while health improvements were evident, some households still faced economic and environmental challenges that affected productivity.

The findings demonstrate that the AngloGold Ashanti Malaria Control Project had a significant positive impact on livelihoods, particularly in reducing healthcare costs and improving school attendance. This supports the Sustainable Livelihoods Framework, which emphasises health as a key asset for improving household wellbeing.

4.5.1 Impact of the Malaria Control Project on Women's Livelihoods

One of the key objectives of the study was to assess the impact of the malaria control project on women's livelihoods. Findings indicate that the project had a positive effect on women's economic activities and on the stability of their livelihoods. A significant proportion of women reported a reduction in malaria episodes within their households following the implementation of the project. This translated into fewer days lost to illness and caregiving. Women engaged in farming indicated they could spend more time on their farms, particularly during planting and harvesting seasons. Women involved in petty trading and processing activities also reported increased consistency in their economic activities, as they were less frequently interrupted by illness. Additionally, households reported reduced expenditure on malaria treatment, allowing resources to be redirected toward food, education, and small-scale investments. From the perspective of the Sustainable Livelihoods Framework, the project enhanced human capital by improving health, thereby strengthening women's ability to utilise other livelihood assets, such as financial and physical capital. These findings are consistent with earlier studies that link malaria control to improved productivity and income stability.

4.6 Impact of the Project on Children's Health and Education

The study found that the malaria control project had a significant positive impact on children's health and school participation. Caregivers reported a noticeable reduction in malaria incidence among children, particularly those under 5 years old. Health workers confirmed a decline in malaria-related outpatient visits among children in project beneficiary communities. Reduced illness contributed to improved appetite, energy levels, and overall well-being among children. In terms of education, caregivers and teachers reported improved school attendance and reduced malaria-related absenteeism. Children who previously missed several school days due to illness were now able to attend school more regularly. Improved attendance was associated with better academic performance and classroom participation. These findings support the existing literature identifying malaria control as a critical intervention for improving child health, educational outcomes, and long-term human capital development.

4.7 Gendered Experiences and Perceptions of the Project

Qualitative findings from focus group discussions highlighted gendered experiences of malaria and malaria control. Women emphasised that they bore the dual burden of illness and caregiving responsibilities. Prior to the project, malaria significantly limited their ability to engage in productive activities. Participants expressed appreciation for the project, particularly the IRS and ITN distribution, noting that these interventions reduced household stress and improved overall well-being. However, some women expressed concerns about occasional discomfort associated with IRS and misconceptions about insecticides, which affected community compliance. These findings underscore the importance of continuous community education and gender-sensitive approaches in malaria control interventions.

4.8 Challenges Affecting Project Implementation

Despite the positive impacts, the study identified several challenges that affected the malaria control project's effectiveness. These included:

- Inadequate coverage of some remote communities
- Logistical constraints in implementing IRS
- Limited community compliance due to misconceptions
- Concerns about sustainability and long-term funding

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Health workers and project officials emphasised the need for sustained funding, stronger community engagement, and closer collaboration with district health authorities to ensure long-term success.

4.9 Discussion of Findings in Relation to Literature and Theory

The findings of this study reinforce existing literature that conceptualises malaria as both a health and livelihood challenge. The positive impacts observed among women and children align with studies that link malaria control to improved productivity, reduced vulnerability, and enhanced human capital. The results also validate the Sustainable Livelihoods Framework by demonstrating how improvements in health (human capital) strengthen livelihood outcomes. Private-sector involvement, as exemplified by the AngloGold Ashanti Malaria Control Project, emerged as a practical complementary approach to public health interventions, consistent with broader debates on public–private partnerships in health. However, the identified challenges highlight concerns raised in the literature regarding sustainability and equity in private-sector-led interventions.

4.10 Summary of Key Findings

- High malaria prevalence was the primary reason for the project's implementation.
- The project significantly reduced healthcare costs for women.
- Children experienced improved school attendance.
- Household productivity and economic participation improved moderately.
- The project contributed positively to overall community wellbeing.

4.11 Summary of Chapter

This chapter presents and discusses the results of the study, showing that the AngloGold Ashanti Malaria Control Project was driven by high malaria prevalence and socio-economic losses, and has had a positive impact on the livelihoods of women and children in the Nadowli Kaleo District. While the project has contributed to improved health and livelihood outcomes, addressing implementation challenges is critical for sustaining these gains. High malaria prevalence, economic productivity losses, and pressure on health facilities were the primary drivers.

5.0 CONCLUSIONS

5.1 Introduction

This chapter presents a summary of the study, highlights key findings, concludes in light of the research objectives, and offers policy-relevant recommendations. The chapter also outlines the study's implications for policy and practice and suggests areas for further research. The focus remains on assessing the causes for the AngloGold Ashanti Malaria Control Project and its impact on the livelihoods of women and children in the Nadowli Kaleo District of the Upper West Region of Ghana.

5.2 Summary of the Study

The study examined the socio-economic, environmental, and institutional factors that led to the establishment of the AngloGold Ashanti Malaria Control Project and assessed its impact on the livelihoods of women and children in the Nadowli Kaleo District. Using a mixed-methods cross-sectional design, the study collected data from women caregivers, households with children, health workers, community leaders, and project implementers. Quantitative data were obtained through structured questionnaires, while qualitative data were gathered through key informant interviews, focus group discussions, and direct observation. The analysis focused on malaria prevalence, malaria control interventions, women's livelihood activities, children's health and education outcomes, and challenges affecting project implementation. The Sustainable Livelihoods Framework guided the interpretation of findings.

5.3 Key Findings of the Study

The significant findings of the study are summarised as follows:

Causes of the Malaria Control Project: The establishment of the AngloGold Ashanti Malaria Control Project was primarily driven by high malaria prevalence, recurrent illness among women

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and children, productivity losses, and pressure on health facilities. Environmental conditions, such as poor drainage and stagnant water, further necessitated intervention.

Nature of Interventions Implemented: The project implemented integrated malaria control strategies, including indoor residual spraying, distribution of insecticide-treated nets, environmental management, and community sensitisation. These interventions complemented existing government malaria control efforts.

Impact on Women's Livelihoods: The project contributed to a reduction in malaria episodes among women and children, leading to improved labour availability, increased productivity, and reduced household expenditure on malaria treatment. Women were able to engage more consistently in farming, trading, and other income-generating activities.

Impact on Children's Health and Education: Findings revealed reduced malaria incidence among children, improved health outcomes, and increased school attendance. Reduced absenteeism enhanced children's participation in educational activities and overall well-being.

Implementation Challenges: Despite positive outcomes, challenges such as limited coverage in remote communities, logistical constraints, misconceptions about insecticides, and sustainability concerns were identified.

5.4 Contributions of the Study

This study makes significant contributions to knowledge, policy, practice, and methodology in malaria control and livelihood improvement, particularly in rural Ghanaian contexts.

5.4.1 Contribution to Knowledge

The study contributes to existing literature by providing empirical evidence on the role of private-sector-led malaria control interventions in improving the livelihoods of women and children. While many studies focus on public health outcomes, this research extends the discourse by directly linking malaria reduction to socio-economic outcomes, including productivity, income stability, school attendance, and household welfare, in the Nadowli Kaleo District. The study also enriches knowledge on the contextual causes that necessitate malaria control projects in underserved rural settings.

5.4.2 Policy Contribution

The findings offer valuable insights for policymakers at the national and district levels, particularly the Ministry of Health, the National Malaria Elimination Programme, and District Assemblies. The study demonstrates the effectiveness of public–private partnerships in malaria control. It provides evidence to support the integration of private-sector initiatives, such as the AngloGold Ashanti Malaria Control Project, into national malaria control strategies. This contribution is relevant for policy formulation aimed at achieving Sustainable Development Goal 3 (Good Health and Well-being).

5.4.3 Contribution to Practice

In practice, the study guides to implementing agencies, non-governmental organisations, and corporate social responsibility programmes involved in malaria control. The documented best practices, such as community engagement, health education, and integrated intervention strategies, serve as a model for similar interventions in other malaria-endemic districts. The study also highlights implementation challenges, offering practical lessons for improving community participation and sustainability.

5.4.4 Methodological Contribution

Methodologically, the study demonstrates the usefulness of a mixed-methods approach in assessing both health and livelihood outcomes of malaria control projects. By combining quantitative survey data with qualitative insights from community members and health professionals, the research provides a holistic understanding of project impacts. This methodological approach can serve as a reference for future studies assessing health interventions and development outcomes in rural contexts.

5.4.5 Contribution to Local Development

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At the local level, the study contributes to development planning in the Nadowli Kaleo District by providing evidence-based information that can inform district health strategies and livelihood improvement programmes. The findings support targeted interventions for women and children, thereby promoting inclusive development and poverty reduction within the district.

5.5 Conclusions

Based on the findings, the study concludes that malaria remains a significant health and livelihood challenge in the Nadowli Kaleo District, disproportionately affecting women and children. The AngloGold Ashanti Malaria Control Project was a timely and relevant intervention that addressed both health and socio-economic dimensions of malaria. The study further concludes that effective malaria control goes beyond disease reduction and serves as a catalyst for livelihood improvement, gender equity, and human capital development. By reducing malaria-related illness, the project strengthened household livelihood assets, particularly human and financial capital, in line with the Sustainable Livelihoods Framework. Private-sector involvement, when aligned with public health priorities and community needs, can play a crucial complementary role in addressing complex development challenges such as malaria. However, sustainability and equitable coverage remain critical concerns that must be addressed to ensure long-term impact.

5.6 Recommendations

Based on the findings and conclusions, the following recommendations are made:

5.6.1 Recommendations for Policy Makers

Strengthen collaboration between private-sector actors and government agencies in malaria control. Ensure sustained funding and policy support for integrated malaria prevention strategies. Incorporate livelihood indicators into malaria program monitoring and evaluation frameworks.

5.6.2 Recommendations for District Health Authorities

Expand malaria control interventions to underserved and remote communities. Intensify community education to address misconceptions and improve compliance. Strengthen surveillance and data collection to track malaria trends and assess the impacts of interventions.

5.6.3 Recommendations for AngloGold Ashanti and Other Private-Sector Actors

Enhance community engagement and participation to improve ownership and sustainability. Align malaria control activities with district development plans and health systems. Invest in long-term capacity building for local health workers and community volunteers.

5.6.4 Recommendations for Communities and Households

Adopt consistent malaria prevention practices such as regular use of insecticide-treated nets. Participate actively in environmental sanitation and community education activities. Support community-led initiatives that promote health and livelihood resilience.

5.9 Suggestions for Further Research

Future studies should: Conduct longitudinal assessments to examine long-term impacts of malaria control interventions. Explore the cost-effectiveness and sustainability of private-sector-led malaria control projects. Examine comparative impacts of different malaria control models across districts.

5.10 Concluding Remarks

Malaria remains a critical barrier to health, livelihoods, and human development in rural Ghana. The AngloGold Ashanti Malaria Control Project demonstrates that integrated, community-based malaria control interventions can significantly improve the livelihoods of women and children. Sustaining and scaling such interventions requires strong partnerships, community ownership, and policy support.

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