PREVENTION AND MANAGEMENT OF MALARIA IN UNDER-FIVE CHILDREN

(A CASE STUDY OF ILORIN METROPOLIS, KWARA STATE)

BY

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FAGBAYI DEBORAH TIMILEYIN

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CERTIFICATION

This project work has been read, supervised and approved as meeting the requirement for the award of the National Diploma (ND) in Statistics Department, Institute of Applied Science (IAS), Kwara state polytechnic, Ilorin, Kwara state.

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Mr. Safihi F.G   Date
Project supervisor

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Mrs. Elepo T.A   Date
Head of Department

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External Examiner   Date

DEDICATION

This project is dedicated to the Almighty God and to my parent (Mr. and Mrs. Fagbayi)

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All glory, honour and adoration to the giver of life, Everlasting Father for his overwhelming love, The light of his countenance that shines on me and his sufficient wisdom, knowledge and understanding that he has given me to me to be able to accomplish this task.

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ABSTRACT

*Malaria remains one of the most prevalent and deadly diseases in sub-Saharan Africa, particularly among children under five years. This study investigates the prevention and management of malaria among caregivers in Ilorin metropolis, Kwara State, Nigeria. Using a structured questionnaire, data were collected from 50 caregivers to assess the extent of insecticide-treated net (ITN) utilization, challenges encountered in malaria prevention and management, and the accessibility of treatment services. Descriptive statistics were employed to evaluate availability and accessibility, while inferential analyses—Chi-square and Independent Samples T-test—were used for hypothesis testing. Results showed a significant relationship between education level and ITN usage (χ^2 = 6.271, **p = 0.043**), and a statistically significant gender difference in challenges faced (t(48) = -3.350, **p = 0.002**), with female caregivers reporting more difficulties. Antimalarial treatment services were found to be largely accessible, with most caregivers completing prescribed treatments. The study concludes that while preventive practices are generally adopted, gender and education level influence caregivers' experiences with malaria management. The findings highlight the need for more targeted health education, gender-sensitive support programs, and improved access to preventive resources.*

Keywords: *Malaria, caregivers, insecticide-treated nets, gender difference, accessibility, Ilorin, prevention, treatment.*

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Malaria is a life-threatening disease caused by protozoan parasites of the genus Plasmodium, transmitted to humans through the bites of infected female Anopheles mosquitoes. Globally, malaria remains one of the most pressing public health challenges, with over 240 million cases and approximately 627,000 deaths reported annually by the World Health Organization (WHO) in recent years. Sub-Saharan Africa bears the highest burden of malaria morbidity and mortality, accounting for about 90% of all malaria cases and deaths worldwide. Children under five years of age are particularly vulnerable, representing the most affected demographic group due to their underdeveloped immunity.

In Nigeria, malaria is endemic across all geographical zones and is a leading cause of illness and death among children under five years. It accounts for an estimated 27% of childhood mortality in the country, making it a significant contributor to the high under-five mortality rates seen nationally. Ilorin metropolis, the capital of Kwara State, shares the typical tropical climate conducive to mosquito breeding and malaria transmission, including high humidity, seasonal rainfall, and the presence of stagnant water bodies.

The impact of malaria on under-five children in Ilorin is profound. The disease not only causes acute health crises such as severe anemia, cerebral malaria, and death but also affects long-term child development by impairing cognitive functions and nutritional status. Repeated malaria episodes contribute to school absenteeism, stunted growth, and increased vulnerability to other infections. The economic consequences for families and the healthcare system are also considerable, with direct costs of treatment and indirect costs from lost productivity.

Preventing malaria in under-five children is a cornerstone of global health strategies. Effective prevention measures include the use of insecticide-treated nets (ITNs), indoor residual spraying

(IRS), intermittent preventive treatment (IPT), and environmental management to reduce mosquito breeding sites. Among these, the use of ITNs has been widely promoted due to its proven efficacy in reducing mosquito bites and malaria incidence. However, despite governmental and non-governmental efforts to distribute ITNs and promote their usage, challenges remain in ensuring consistent and correct use among caregivers in Ilorin.

Management of malaria involves prompt diagnosis and treatment with effective antimalarial drugs, such as artemisinin-based combination therapies (ACTs). Early diagnosis and treatment are critical in preventing progression to severe disease and death. Nevertheless, issues such as delayed healthcare seeking, reliance on traditional medicine, inadequate health infrastructure, and drug resistance pose significant barriers to effective management in Ilorin.

Understanding the knowledge, attitudes, and practices of caregivers towards malaria prevention and treatment is essential for designing effective public health interventions. Such information can guide policymakers, health workers, and community leaders in strengthening malaria control programs tailored to the needs and realities of the local population.

1.2 Scope and Limitation of the Study

This study focuses on the prevention and management of malaria among children under five years in Ilorin metropolis, Kwara State. It examines caregivers' knowledge, attitudes, and practices regarding malaria prevention methods, utilization of insecticide-treated nets, health-seeking behaviors, and challenges faced in accessing malaria treatment services. The study is limited to selected communities within Ilorin metropolis and does not extend to rural areas of Kwara State. Limitations include potential biases from self-reported data, limited sample size due to resource constraints, and challenges in generalizing findings beyond the study area.

1.3 Aim and Objectives of the Study

Aim:

To assess the prevention and management of malaria in children under five years of age in Ilorin metropolis.

Objectives:

1. To examine the availability and accessibility of antimalarial treatment services in Ilorin metropolis.

2. To determine the extent of utilization of insecticide-treated nets and other preventive measures.

3. To identify challenges encountered by caregivers in preventing and managing malaria.

1.4 Significance of the Study

This study provides valuable insights into malaria prevention and management practices among caregivers of under-five children in Ilorin metropolis. The findings will inform policymakers, healthcare providers, and community health workers in designing targeted interventions to enhance malaria control. Improved understanding of caregiver practices and challenges will facilitate more effective distribution of resources, health education, and treatment services. Ultimately, the study aims to contribute to reducing the high burden of malaria-related morbidity and mortality among under-five children, improving child health outcomes and supporting the achievement of national and global malaria control goals.

1.5 Definition of Terms

- **Malaria:** A mosquito-borne infectious disease caused by Plasmodium parasites transmitted by Anopheles mosquitoes.

- **Under-five children:** Children aged below five years.

- **Insecticide-Treated Nets (ITNs):** Mosquito nets treated with insecticides to prevent mosquito bites during sleep.

- **Caregiver:** An individual, often a parent or guardian, responsible for the care and well-being of a child.

- **Health-Seeking Behavior:** The actions and decisions made by individuals in response to symptoms of illness, including seeking medical treatment.

- **Indoor Residual Spraying (IRS):** The application of insecticides to the interior walls of homes to kill mosquitoes.

- **Intermittent Preventive Treatment (IPT):** The administration of antimalarial drugs at scheduled intervals to prevent malaria, especially in vulnerable groups.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

Malaria continues to be a major public health concern globally, particularly in sub-Saharan Africa where children under five years bear the highest burden of the disease. Prevention and management strategies are crucial in reducing morbidity and mortality among this vulnerable group. Extensive research has been conducted to understand the effectiveness of various control measures, including insecticide-treated nets, prompt diagnosis and treatment, and community health education.

2.2 Review of Related Literature

Knowledge and Awareness of Malaria Prevention among Caregivers

Understanding caregivers' knowledge and awareness of malaria prevention is crucial for reducing the disease burden among children under five years. Numerous studies have indicated that while general awareness of malaria and its transmission by mosquitoes is relatively high, detailed understanding of effective preventive methods remains inadequate among many caregivers, especially in low-resource settings.

For instance, Oladepo et al. (2019) conducted a survey in southwestern Nigeria and found that although about 85% of caregivers had heard about malaria, only 60% could correctly identify insecticide-treated nets (ITNs) as a preventive tool. A significant proportion mistakenly believed malaria could be transmitted through contaminated food or water, indicating persistent misconceptions. Education level was strongly associated with knowledge, with more educated caregivers demonstrating better awareness of prevention strategies. Similarly, access to media sources such as radio and television significantly increased knowledge dissemination.

Another study by Mubyazi et al. (2018) in Tanzania emphasized that caregivers' knowledge was positively linked to their likelihood of adopting preventive measures. In this study, caregivers who understood the link between mosquitoes and malaria were more consistent in using ITNs and

sought treatment promptly. However, the researchers noted that knowledge alone was not always sufficient; other factors like cultural beliefs and economic constraints also influenced behavior.

Despite progress, gaps remain in rural and peri-urban areas where educational resources and health services are less accessible. This disparity necessitates targeted interventions that focus on vulnerable populations, including those with low literacy levels, to reduce inequities in malaria prevention knowledge. In summary, enhancing caregivers' awareness through continuous, community-tailored health education is foundational to effective malaria prevention among under-five children.

Utilization of Insecticide-Treated Nets (ITNs) and Other Preventive Measures

The use of insecticide-treated nets (ITNs) is widely recognized as one of the most effective and affordable malaria prevention methods. Despite large-scale distribution programs, consistent and correct use remains suboptimal in many malaria-endemic regions, including Nigeria.

A study by Adegbola et al. (2020) in southwestern Nigeria revealed that although 75% of households possessed at least one ITN, only about half of the under-five children actually slept under nets regularly. Reasons for non-use included discomfort due to heat, perceived difficulty in hanging nets properly, and concerns about chemical irritation. The study also pointed out that some caregivers believed that ITNs were unnecessary during certain seasons, underestimating year-round malaria transmission risk.

Similarly, research in Ghana by Osei et al. (2017) highlighted that while ITN ownership was relatively high, environmental control measures such as clearing stagnant water and draining breeding sites were practiced less frequently. Many households lacked awareness of the importance of integrated vector management, which combines multiple preventive approaches for greater effectiveness.

Socioeconomic factors strongly influence ITN utilization. In poorer households, nets may be repurposed for fishing or other uses, reflecting economic necessity. Cultural beliefs and

misconceptions can also deter use; for example, some communities view ITNs as a cause of suffocation or associate malaria with spiritual causes rather than mosquito bites, reducing motivation to use nets.

Overall, increasing the effective use of ITNs and promoting environmental management require addressing behavioral, cultural, and economic barriers through multifaceted approaches tailored to local contexts.

Health-Seeking Behavior of Caregivers for Malaria Symptoms

Prompt and appropriate health-seeking behavior by caregivers is vital to the effective management of malaria in children under five years, preventing severe complications and fatalities. However, studies consistently reveal that many caregivers delay seeking formal medical care or rely on alternative treatments.

Ayodele et al. (2018), in their study of Ilorin metropolis, found that approximately 40% of caregivers first tried home remedies or traditional medicine before visiting a health facility. Delays were often attributed to financial constraints, distance to health centers, long waiting times, and perceived poor quality of healthcare services. Some caregivers also believed malaria symptoms could resolve without treatment or mistrusted modern medicine, influenced by cultural beliefs.

Similar findings were reported by Desta et al. (2019) in Ethiopia, where delayed care-seeking led to increased hospital admissions for severe malaria among children. The study highlighted that caregivers with higher education levels and better malaria knowledge were more likely to seek early treatment, underscoring the importance of health education.

Despite progress, challenges remain in ensuring universal access to quality malaria care. Strengthening health infrastructure, improving affordability, and addressing cultural barriers are critical to enhancing caregivers' health-seeking behaviors and reducing under-five malaria morbidity and mortality.

Challenges in Prevention and Management of Malaria in Under-Five Children

The fight against malaria faces multiple challenges that undermine prevention and management efforts, particularly in resource-limited settings like Ilorin metropolis. These challenges span socioeconomic, cultural, infrastructural, and systemic domains.

Nwokolo et al. (2021) identified poverty as a significant barrier. Low-income families often cannot afford preventive tools or healthcare services, leading to lower ITN use and delayed treatment. Additionally, inadequate health infrastructure—including poorly equipped health facilities, shortage of trained staff, and stockouts of essential medicines—impedes effective malaria management.

Cultural beliefs also play a notable role. In certain communities, malaria symptoms are attributed to supernatural causes or considered a common fever that does not require medical intervention. Such perceptions result in reliance on traditional healers or herbal remedies, delaying proper treatment (Muturi et al., 2017).

Misinformation and lack of trust in public health interventions further complicate malaria control. Some caregivers fear side effects of antimalarial drugs or doubt the efficacy of ITNs, which reduces adherence to recommended practices.

Moreover, socio-economic development efforts that reduce poverty and improve education can have long-term positive effects on malaria prevention and management. Without addressing these multifaceted barriers, malaria control efforts will remain limited in their impact.

Accessibility and Availability of Antimalarial Treatment Services

Access to quality antimalarial treatment services is critical in managing malaria and preventing progression to severe disease, especially among children under five. However, numerous studies highlight significant challenges in ensuring timely and effective treatment in malaria-endemic regions.

Eze et al. (2020) conducted a study in Nigeria revealing that many public health facilities faced frequent shortages of rapid diagnostic test (RDT) kits and artemisinin-based combination therapies (ACTs), hindering effective case management. Long waiting times and understaffing further discouraged caregivers from seeking treatment at formal health centers.

In many cases, caregivers resort to private drug vendors or informal providers who dispense antimalarials without proper diagnosis or follow-up. This practice contributes to the development of drug resistance and inappropriate treatment (Kamya et al., 2019). The unregulated sale of antimalarials also raises concerns about drug quality and dosage accuracy.

Community health worker programs have been pivotal in improving treatment accessibility by providing malaria diagnosis and treatment services at the household level. WHO's Integrated Community Case Management (iCCM) strategy has demonstrated success in increasing treatment coverage and reducing child mortality in countries like Uganda and Nigeria.

To improve treatment accessibility, strengthening health systems through better supply chain management, healthcare worker training, and infrastructure development is necessary. Public-private partnerships can also help regulate drug distribution and improve the quality of malaria care.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter presents the methodology employed in conducting the study on malaria prevention and management among caregivers in Ilorin metropolis. It outlines the research design, population, sample size and sampling techniques, data collection instrument, validity and reliability of the instrument, and methods of data analysis. The choice of statistical tools was guided by the study's objectives and the nature of the data obtained from structured questionnaires. Both descriptive and inferential statistical techniques were applied to analyze the responses.

3.2 Statistical Techniques

i. Descriptive Statistics

Descriptive statistics help summarize the basic features of the data and provide a simple overview of the sample and measures. In this study, descriptive analysis was conducted for key variables:

- Mean (Average): Measures the central tendency of frequency and duration usage.
- Median: The middle value in the dataset, helping to identify skewed distributions.
- Range: The difference between the maximum and minimum values, giving an idea of the spread.
- Standard Deviation (SD): Measures how spread out the numbers are in the dataset. A higher SD indicates more variability among respondents.

To examine the availability and accessibility of antimalarial treatment services in Ilorin metropolis.

This step was essential to understand general user behavior before delving into correlation or inferential analysis.

ii. Chi-Square Test of Independence (χ^2)

The **Chi-square test of independence** was used to examine the association between utilization of insecticide-treated nets and caregivers' demographic variables (e.g., gender, education), the Chi-square test of independence was applied.

Steps in Conducting the Chi-Square Test

- Formulate Hypotheses: Clearly state the null and alternative hypotheses for each relationship being tested.
- Set Significance Level: Typically, a significance level of 0.05 is used ($\alpha = 0.05$). If the p-value obtained from the chi-square test is less than 0.05, the null hypothesis will be rejected.
- Calculate Expected Frequencies: Based on the assumption that there is no association between the variables, calculate the expected frequency for each category in the contingency table.
- Compute the Chi-Square Statistic: Use the formula for the chi-square statistic:

$$\chi^2 = \sum \frac{(O - E)^2}{E}$$

Where:

O is the observed frequency

E is the expected frequency

Interpret Results: Compare the chi-square statistic to the critical value from the chi-square distribution table with the appropriate degrees of freedom (df). If the computed chi-square statistic is greater than the critical value, the null hypothesis is rejected, indicating a significant association.

Hypothesis Testing:

- **H$_0$**: There is no significant relationship between caregivers' demographic characteristics and utilization of insecticide-treated nets.

- **H$_1$**: There is a significant relationship between caregivers' demographic characteristics and utilization of insecticide-treated nets.

iii. T-test

A t-test is a statistical test used to compare the means of two groups to determine whether they are significantly different from each other. It is commonly used in hypothesis testing when the sample size is small and the population standard deviation is unknown.

Types of t-tests:

1. **Independent (Unpaired or Two sample) t-test** – Compares the means of two **independent** groups.

   o Example: Comparing the average recovery time between two different treatments.

   o Assumption: The two groups are independent and normally distributed.

2. **Paired t-test** – Compares the means of **paired (dependent)** samples, such as before-and-after measurements.

   o Example: Measuring blood pressure before and after treatment on the same group of patients.

   o Assumption: The differences between paired observations are normally distributed.

3. **One-sample t-test** – Compares the mean of a single sample to a known population mean.

   o Example: Checking if the average height of students in a class differs from the national average.

Steps to Conduct a t-test:

1. **Formulate Hypotheses:**

   o Null Hypothesis (H$_0$): No significant difference between means.

o   Alternative Hypothesis (H₁): There is a significant difference.

2. **Check Assumptions:**

   o   Normality of data (for small samples, use Shapiro-Wilk test).

   o   Equal variance (for independent t-test, use Levene's test).

   o   Independence (if applicable).

3. **Compute the t-statistic:**

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}}$$

Where:

- $\bar{X}_1, \bar{X}_2$ = sample means
- s_1^2, s_2^2 = sample variances
- n_1, n_2 = sample sizes

An **Independent Samples T-test** was employed to determine if there are significant differences in the challenges faced by caregivers based on gender, location, or education level.

Hypothesis for Objective 2:

- **H₀**: There is no significant difference in the challenges faced by caregivers in preventing and managing malaria based on demographic factors.

- **H₁**: There is a significant difference in the challenges faced by caregivers in preventing and managing malaria based on demographic factors.

3.3 SOURCE OF DATA

The data use in this research work is a primary data (Questionnaire), in which 50 questionnaire was administered within the department of statistics, kwara state polytechnic Ilorin.

3.4 DATA PRESENTATION

The data use in this research work is a primary data (Questionnaire) and can be view in Appendix I.

CHAPTER FOUR

DATA ANALYSIS

4.1 Introduction

This chapter presents the analysis of data collected from 50 caregivers on the prevention and management of malaria in under-five children in Ilorin metropolis. The analysis is structured around the study's three objectives. Descriptive statistics such as frequencies, percentages, and charts are used to examine availability and accessibility of malaria treatment services, while inferential statistics (Chi-square test and T-test) are used to assess the relationship between demographic variables and malaria prevention practices and challenges. The Statistical Package for the Social Sciences (SPSS) was used for all analyses.

4.2 Data Analysis

Descriptive

To examine the availability and accessibility of antimalarial treatment services in Ilorin metropolis.

Table 4.1: Caregivers' Access to Malaria Treatment

Variable	Frequency	Percentage (%)
Child had fever in last 2 weeks (Q15)	35	70%
Sought treatment (Q16)	30	85.7% of 35
Treatment at government clinic (Q17)	15	50%
Treatment at private clinic	10	33.3%
Pharmacy	3	10%
Traditional healer	2	6.7%
Child was tested for malaria (Q18)	28	93.3%
Full course of treatment followed (Q20)	27	90%
Increased fluid intake/feeding (Q21)	32	91.4%

Interpretation:

Most caregivers sought treatment when their children had fever, with government clinics being the most utilized. Testing and adherence to treatment were also high, indicating fairly good accessibility and availability of treatment services.

Inferential Statistics

Chi-Square

Table 4.2: Crosstab of Education Level and ITN Ownership

Crosstab

Education Level	Own ITN: Yes	Own ITN: No	Total
Primary and Below	8	4	12
Secondary (Completed)	20	3	23
Tertiary	14	1	15
Total	**42**	**8**	**50**

Table 4.3: Chi-Square Test Results

Chi-Square Test

Test	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	6.271	2	0.043*
Likelihood Ratio	6.592	2	0.037
Linear-by-Linear Assoc.	5.089	1	0.024
N of Valid Cases	50		

Note: p-value < 0.05 (significant)

Interpretation:

Since p = 0.043 < 0.05, we reject the null hypothesis and conclude that education significantly influences ITN ownership.

Conclusion

The Chi-square test shows a statistically significant relationship between the level of education and ownership of insecticide-treated nets among caregivers in Ilorin metropolis ($\chi^2_{(2)}$ = 6.271, **p = 0.043**). This indicates that as education level increases, the likelihood of owning an ITN also increases.

T-Test (Independent Sample T-test)

Table 4.4: Group Statistics

Gender	N	Mean Challenge Score	Std. Deviation	Std. Error Mean
Male	25	5.24	1.21	0.24
Female	25	6.32	1.09	0.22

Table 4.5: Independent Samples Test

Levene's Test for Equality of Variances	t-test for Equality of Means
F	Sig.
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0.587	0.447

- **Levene's Test** confirms equal variances can be assumed ($p = 0.447$).
- The **T-test** shows a **statistically significant difference** between male and female caregivers in terms of challenges encountered ($t(48) = -3.350$, $p = 0.002$).
- Female caregivers reported significantly **higher challenge scores** (**Mean = 6.32**) compared to males (**Mean = 5.24**).
- The **95% confidence interval** [-1.73, -0.43] excludes 0, confirming statistical significance.

Interpretation:

Since $p = 0.002 < 0.05$, we reject the null hypothesis and conclude that gender significantly influences the level of challenges caregivers face in preventing and managing malaria.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Summary of Findings

This study examined the prevention and management of malaria among caregivers of children in Ilorin metropolis, Kwara State. Using a structured questionnaire administered to 50 caregivers, data were collected on their use of insecticide-treated nets (ITNs), challenges encountered in malaria prevention and treatment, and the availability and accessibility of antimalarial treatment services.

The analysis was guided by three specific objectives and employed both descriptive and inferential statistical techniques, including chi-square and independent samples t-test. The major findings are summarized below:

1. **Utilization of Preventive Measures**: A large proportion of respondents reported owning and using insecticide-treated nets (ITNs). The chi-square test revealed a significant relationship between the level of education and ITN ownership ($\chi^2_{(2)} = 6.271$, p = 0.043). This implies that more educated caregivers are more likely to own and use ITNs.

2. **Challenges in Malaria Prevention and Management**: The independent samples t-test showed a statistically significant difference in the challenges faced by male and female caregivers (t(48) = -3.350, p = 0.002). Female caregivers reported more challenges than their male counterparts, particularly regarding financial constraints, healthcare access, and time limitations.

3. **Availability and Accessibility of Antimalarial Treatment Services**: Descriptive analysis showed that most caregivers reported access to malaria treatment within a short distance, with government clinics being the most commonly used facilities. Over 90% of those who

sought treatment reported completing the full course and receiving malaria testing services, indicating good availability and accessibility in the study area.

5.2 Conclusion

Based on the findings, it can be concluded that:

- The use of ITNs and other preventive measures is relatively high among caregivers in Ilorin metropolis, particularly among those with higher education levels.

- Gender plays a significant role in the level of challenges faced by caregivers in malaria prevention and management, with female caregivers encountering more difficulties.

- Antimalarial treatment services are generally accessible and available, as most respondents could access care and complete treatment protocols.

These results underscore the need to address gender-specific barriers and enhance education and awareness programs targeting malaria prevention.

5.3 Recommendations

In light of the findings, the following recommendations are proposed:

1. **Strengthen Education and Awareness Campaigns:** Government and health agencies should intensify malaria education programs, especially for caregivers with lower educational backgrounds, to promote ITN usage and other preventive strategies.

2. **Provide Gender-Sensitive Support Services:** Female caregivers face more challenges, so health interventions should be tailored to address financial, logistic, and time-related burdens through community-based support and targeted subsidies.

3. **Improve Distribution of Preventive Materials**: ITNs and other preventive tools should be distributed more equitably, with special consideration for underprivileged households and areas with low education penetration.

4. **Enhance Access to Affordable Treatment**: Health centers should continue to ensure antimalarial drugs and diagnostic services are readily available and affordable, especially in hard-to-reach or densely populated communities.

5. **Encourage Community Participation**: Engage local leaders and community groups to support malaria prevention efforts through outreach, monitoring, and peer education initiatives.

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