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Research Article

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Barriers to Effective Insecticide-Treated Nets (ITN) Usage in Rural Northern Nigeria: Behavioural and Gender Perspectives

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Abstract

Malaria remains a significant public health challenge in Nigeria, accounting for approximately 27% of malaria cases and 32% of malaria deaths worldwide. Insecticide-treated nets (ITNs) are among the most effective and cost-efficient interventions for malaria prevention. They reduce the disease's prevalence and mortality by offering a physical barrier and insecticidal protection against mosquitoes. Despite distributing Insecticide-Treated Nets (ITNs) as part of Nigeria's malaria control strategies, utilization remains low in rural areas. This study focuses on rural populations and examines the behavioral factors influencing ITN usage in Sokoto, Kebbi, and Zamfara States. Using a mixed-methods approach, quantitative data were collected from 600 households (200 per state) via structured surveys, while qualitative insights were gathered through focus group discussions.

Findings indicate that 72% of households own at least one ITN, but only 45% reported consistent usage. Key barriers to ITN adoption include misconceptions about malaria transmission (32%), discomfort due to heat (28%), and cultural beliefs (24%). Socioeconomic factors such as low income and limited education levels further hinder consistent ITN use. Qualitative findings reveal that women's decision-making power significantly influences ITN utilization, while myths, such as ITNs causing infertility, discourage their use.

The study concludes that improving ITN utilization in rural Nigeria requires addressing behavioral barriers through targeted community education, gender-sensitive interventions, and ensuring access to user-friendly nets.

Keywords: Insecticide-Treated Nets (ITNs), Malaria Prevention, Behavioral Barriers, Gender Dynamics, Cultural Beliefs, Health Education, Rural Nigeria, Socioeconomic Factors

Abbreviations

ITNs: Insecticide-Treated Nets
PHCs: Primary Health Care Centers
FGDs: Focus Group Discussions
LGAs: Local Government Areas
SPSS: Statistical Package for the Social Sciences
WHO: World Health Organization
NMEP: National Malaria Elimination Programme

1. Introduction

Malaria continues to pose a major public health challenge globally, with Nigeria bearing a disproportionately high burden, accounting for an estimated 27% of global malaria cases and 32% of malaria-related deaths [1,2]. Among the strategies to combat malaria, insecticide-treated nets (ITNs) have emerged as one of the most effective and cost-efficient interventions. ITNs provide dual benefits: they act as a physical barrier against mosquitoes and deliver insecticidal protection, significantly reducing malaria transmission rates [3,4]. Despite their proven efficacy and widespread distribution as part of Nigeria's malaria control programs, ITN utilization remains suboptimal, particularly in rural and socioeconomically disadvantaged areas [5].

In northern Nigeria, states like Sokoto, Kebbi, and Zamfara face persistent challenges to achieving effective ITN usage. These challenges are multifaceted, spanning behavioural, cultural, and socioeconomic dimen-sions. Misconceptions about malaria transmission, discomfort associated with ITN use, and deeply rooted cultural beliefs contribute significantly to low adoption rates [3,5]. For instance, myths suggesting that ITNs cause infertility or reduce masculinity have deterred their acceptance in some communities [3]. Furthermore, gender dynamics often limit women's autonomy in making health-related decisions, including the use of ITNs within households [4].

The low utilization rates in these rural regions, despite substantial investment in ITN distribution, highlight the need for a deeper understanding of the behavioural and gender-related barriers

that impede their adoption. Addressing these barriers is crucial not only for improving ITN usage rates but also for achieving broader malaria control objectives in Nigeria [4,5].

This study aims to examine the underlying behavioural and gender-specific factors affecting ITN utilization in Sokoto, Kebbi, and Zamfara states. By employing a mixed-methods approach, this research integrates quantitative insights from household surveys and qualitative findings from focus group discussions to identify key barriers and enablers of ITN use [3]. The findings from this study will provide actionable recommendations to policymakers and health practitioners, enabling them to design targeted interventions that address behavioural, cultural, and gender-specific barriers. Ultimately, this research contributes to the global fight against malaria by improving the uptake of life-saving malaria prevention tools in hard-to-reach and underserved communities.

Variable	Sokoto (n=200)	Kebbi (n=200)	Zamfara (n=200)	Total (n=600)
Average Household Size	7.5	8.2	7.8	7.8
Literacy Rate (%)	42%	48%	38%	43%
Primary Occupation (%)	Farming (68%)	Farming (72%)	Farming (70%)	Farming (70%)
Mean Age (years)	36 ± 14	34 ± 12	37 ± 13	36 ± 13

Table 1: Demographics of Participants

Indicator	Sokoto (%)	Kebbi (%)	Zamfara (%)	Total (%)
Households owning ITNs	74%	70%	72%	72%
Regular ITN usage	50%	42%	43%	45%
Non-usage due to heat	27%	30%	28%	28%
Misconceptions as a barrier	35%	30%	32%	32%

Table 2: ITN Ownership and Usage

Schemes

Schemes follow the same formatting as Figures.

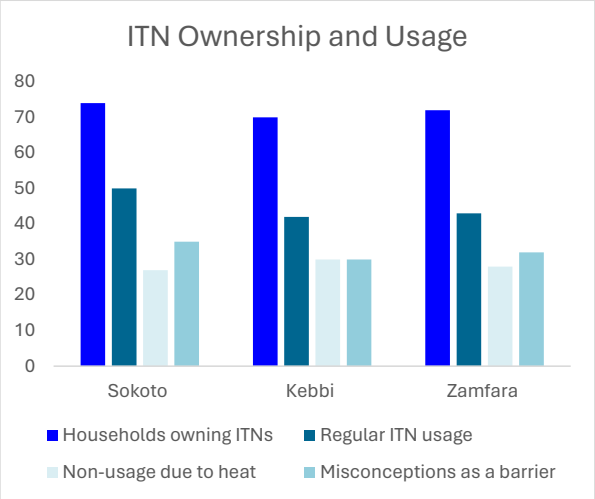
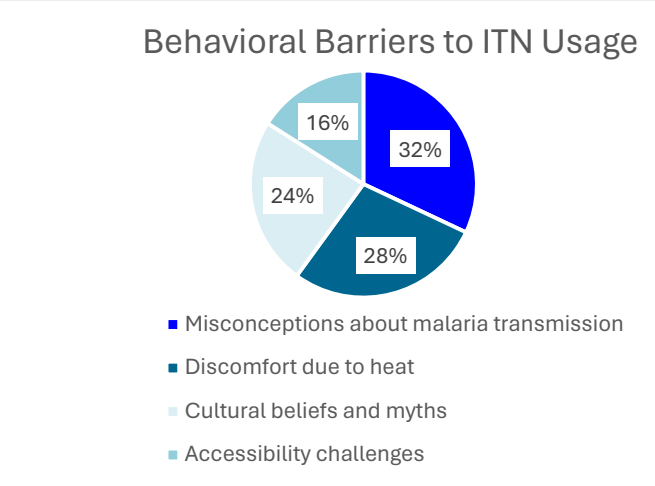


Figure 1: ITN Ownership and Usage



2. Methodology

2.1 Study Area

The study was conducted in the rural areas of Sokoto, Kebbi, and Zamfara States in northern Nigeria. These regions are predominantly agrarian, characterized by high malaria prevalence and limited access to healthcare and education. The study targeted communities with endemic malaria transmission throughout the year.

2.2 Study Design

A cross-sectional, mixed-methods approach was utilized to capture both quantitative and qualitative insights on the barriers to ITN usage:

Quantitative Surveys: Administered to 600 households (200 per state) to collect demographic data, ITN ownership and usage patterns, and factors influencing utilization.

Focus Group Discussions (FGDs): Conducted in six communities (two per state) to explore cultural beliefs, gender dynamics, and practical challenges related to ITN usage.

2.3 Sampling

A multistage sampling technique was employed:
Stage 1: Selection of two Local Government Areas (LGAs) per state based on malaria burden and rural accessibility.
Stage 2: Random selection of villages within the selected LGAs.
Stage 3: Random sampling of households from each village for survey participation.

2.4 Data Collection Tools

A structured questionnaire was developed to capture quantitative data on ITN ownership, usage, and barriers.
An FGD guide was prepared to facilitate discussions on behavioral and cultural factors.

2.5 Data Analysis

Quantitative Data: Analyzed using SPSS software for descriptive statistics, chi-square tests to identify associations, and logistic regression to determine predictors of ITN usage.
Qualitative Data: Thematic analysis was conducted to identify recurring patterns in responses and cultural narratives.

3. Results

3.1. Behavioural and Cultural Barriers

• Knowledge Gaps: 40% of respondents believed malaria was caused by supernatural forces rather than mosquito bites.
• Gender Dynamics: Women in 60% of households lacked autonomy in deciding to use ITNs.
• Cultural Practices: Sleeping outdoors during the heat seasons was cited by 35% of respondents as a reason for not using ITNs.

3.2 Predictors of Regular ITN Use

Education Level: Literate individuals were 1.8 times more likely to use ITNs ($p < 0.05$).
Female Decision-Making Power: Households where women decided on ITN usage had higher adoption rates ($p < 0.01$).

3.3 Qualitative Insights

Key Themes Emerged From FGDs:
Cultural Beliefs: ITNs were perceived as causing infertility or reducing masculinity.
Gender Dynamics: Women often lacked decision-making power regarding household health interventions.
Practical Challenges: Complaints about the discomfort of sleeping under nets in hot weather.

4. Discussion

The findings reveal a complex interplay of behavioural, cultural, and socioeconomic factors affecting ITN utilization in rural northern Nigeria. Despite high ownership rates (72% of households), consistent usage was reported by only 45% of respondents. Key barriers include misconceptions about malaria transmission (32%), discomfort due to heat (28%), and cultural beliefs such as ITNs causing infertility or reduced masculinity (24%). These findings underscore the importance of addressing deeply rooted myths and improving public understanding of malaria prevention. Gender dynamics emerged as a critical determinant of ITN usage. Households where women had greater decision-making power demonstrated higher adoption rates. However, in 60% of surveyed households, women lacked autonomy over health-related decisions, limiting the impact of ITNs. The role of cultural practices, such as sleeping outdoors during hot seasons, further exacerbates the challenges, as 35% of respondents cited this as a reason for non-use. Interventions such as community-centered education campaigns and gender-sensitive strategies are essential to overcoming these barriers. Involving local leaders and leveraging existing community structures could facilitate behaviour change and enhance ITN adoption. Economic factors, such as low income and limited education, also played a role, highlighting the need for subsidies and tailored health education programs.

5. Conclusions

This study concludes that improving ITN utilization in Sokoto, Kebbi, and Zamfara States requires a ho-listic approach that addresses behavioural, cultural, and socioeconomic barriers. Key recommendations include Targeted Health Education: Implementing community-centred campaigns to dispel misconcep-tions about malaria transmission and the benefits of ITNs.Gender-Inclusive Interventions: Empowering women through sensitization programs and involving them in ITN distribution and decision-making pro-cesses.

Community Engagement: Collaborating with local leaders to align malaria prevention efforts with cultural practices.Economic Support: Providing subsidies and improving access to user-friendly ITNs for low-income households.By adopting these strategies, stakeholders can significantly enhance ITN usage in security-compromised and underserved areas, contributing to malaria control and prevention in northern Nigeria.

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Author Contributions

The Author Contributions section is mandatory for all articles. SciencePG has adopted the CRediT Taxonomy to describe each author's specific contributions to the research work.
For example:
[Michael Audu]: Conceptualization, Methodology, Resources, Writing – original draft.
[Osuolale Oludayo Adekunle]: Supervision, Project administration.
[Caroline Uchenwoke]: Data curation, Formal Analysis, Investigation, Validation, Visualization, Writing
– review & editing.

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Data Availability Statement

The data supporting the outcome of this research work has been reported in this manuscript.

Conflicts of Interest

The authors declare no conflicts of interest.

Appendix

Appendix should be placed at the end of the paper, numbered in Arabic numerals, and cited in the text. If the Appendix includes one or more figures, please continue the consecutive numbering from the main text.

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