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GOVERNANCE DIMENSIONS OF INSECTICIDE-TREATED BED NET USE AND MALARIA CONTROL AMONG RESIDENTS OF OBUDU LOCAL GOVERNMENT AREA, CROSS RIVER STATE, NIGERIA

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Abstract

This study examined the governance dimensions of insecticide-treated bed net (ITN) use and malaria control among residents of Obudu Local Government Area (LGA), Cross River State, Nigeria. Anchored in public administration theory specifically governance theory, the Health Belief Model, and the Theory of Planned Behavior the study investigated three dimensions: the relationship between ITN availability and malaria control; the relationship between community knowledge of ITNs and malaria control; and the association between residents' attitudes toward ITN use and malaria control outcomes. Three research questions were posed and three hypotheses formulated. A correlational survey design was adopted. The study population comprised 112,450 adult residents of Obudu LGA, from which a sample of 399 was drawn using the Taro Yamane (1969) formula and multi-stage sampling. A structured questionnaire was validated and tested for reliability, yielding Cronbach Alpha coefficients ranging from .79 to .87. Pearson Product Moment Correlation was used to test hypotheses one and two, while Chi-square (χ^2) analysis was employed for hypothesis three. Findings revealed significant positive relationships between ITN availability and malaria control ($r = .391$, $p < .05$), knowledge of ITNs and malaria control ($r = .374$, $p < .05$), and a significant association between attitude towards ITN use and malaria control outcomes ($\chi^2 = 35.32$, $df = 1$, $p < .05$). The study concludes that strengthening local government administrative capacity for ITN distribution, health education, and community behavioral change communication is critical to achieving sustainable malaria control in Obudu LGA and similar rural communities across Cross River State.

Keywords: Public Administration, Governance, Malaria Control, Insecticide-Treated Bed Nets, Community Attitude, Policy Implementation, Obudu LGA, Cross River State



Introduction

Malaria remains one of the most significant public health challenges globally, particularly in sub-Saharan Africa, where the disease continues to impose substantial health, social, and economic burdens on affected populations. Despite considerable progress in malaria prevention and control over the past two decades, the disease remains endemic in many African countries, including Nigeria. The World Health Organization (WHO, 2024) reported that approximately 263 million malaria cases and 597,000 malaria-related deaths occurred worldwide in 2023, with the WHO African Region accounting for about 94% of all reported cases and 95% of deaths. Nigeria continues to bear the highest malaria burden globally, contributing nearly one-quarter of all malaria cases in Africa and a significant proportion of malaria-related mortality (WHO, 2024). The persistent prevalence of malaria in Nigeria underscores the need for effective and sustainable interventions that address not only biomedical factors but also the governance mechanisms that influence the implementation and utilization of malaria control strategies.

Governance has increasingly been recognized as a critical determinant of public health outcomes, particularly in the implementation of disease prevention and control programmes. Effective governance encompasses policy formulation, resource allocation, service delivery, accountability, community engagement, and institutional coordination, all of which are essential for successful malaria control initiatives (United Nations Development Programme [UNDP], 2022). In the context of malaria prevention, governance structures influence the availability, accessibility, distribution, and utilization of preventive measures such as insecticide-treated bed nets (ITNs). Consequently, understanding the governance dimensions of ITN use is vital for improving malaria control outcomes, especially in rural and underserved communities where health service delivery challenges are often more pronounced. Among the various malaria prevention interventions, insecticide-treated bed nets have been widely acknowledged as one of the most effective and cost-efficient tools for reducing malaria transmission. According to WHO (2022), consistent and correct use of ITNs can reduce malaria incidence by up to 50% and significantly decrease malaria-related morbidity and mortality among vulnerable populations. The large-scale distribution and utilization of ITNs have contributed substantially to the decline in malaria deaths observed across many malaria-endemic countries over the past two decades (WHO, 2022). However, the effectiveness of ITNs depends not merely on their availability but also on the extent to which communities possess adequate knowledge about their use and maintain positive attitudes toward adopting them as routine preventive measures.

Nigeria has implemented several malaria control initiatives through the National Malaria Elimination Programme (NMEP), supported by state governments, international development partners, and non-governmental organizations. These initiatives include periodic mass distribution campaigns, routine distribution through health facilities, community sensitization programmes, and behavior change communication strategies aimed at increasing ITN ownership and utilization (Federal Ministry of Health, 2021; Awubi et al., 2025). Despite these efforts, malaria prevalence remains high in many parts of the country, suggesting persistent gaps in programme implementation and community-level uptake of preventive interventions. These gaps often reflect broader governance challenges, including inadequate resource management, weak health infrastructure,



limited community participation, insufficient public awareness, and ineffective monitoring mechanisms.

Cross River State is among the Nigerian states where malaria continues to pose a major public health concern. Within the state, Obudu Local Government Area presents unique challenges for malaria control due to its predominantly rural settlement pattern, difficult terrain, limited healthcare infrastructure, and socioeconomic constraints. Many communities in the area experience inadequate access to quality healthcare services, poor environmental sanitation, and limited exposure to health education programmes, factors that increase vulnerability to malaria infection. Although ITNs are periodically distributed through government and donor-supported programmes, evidence suggests that ownership does not always translate into regular and proper utilization, thereby reducing the effectiveness of malaria prevention efforts.

The continued occurrence of malaria in Obudu Local Government Area raises important questions regarding the governance factors that influence the utilization of insecticide-treated bed nets. Specifically, the availability of ITNs, community knowledge concerning their proper use, and residents' attitudes toward sleeping under treated nets represent critical dimensions through which governance structures can affect malaria control outcomes (Richard & Azu, 2021). Availability reflects the effectiveness of government and institutional efforts in ensuring adequate supply and equitable distribution of ITNs. Community knowledge indicates the success of health education and awareness campaigns designed to promote proper usage, while attitudes toward ITN utilization reflect the extent to which behavioral change interventions have influenced residents' perceptions and practices regarding malaria prevention.

Given the importance of these factors, there is a need for empirical evidence that examines how governance-related dimensions of ITN use contribute to malaria control at the local level. This study therefore investigates the governance dimensions of insecticide-treated bed net use and malaria control among residents of Obudu Local Government Area, Cross River State, Nigeria. Specifically, the study examines the relationship between ITN availability, community knowledge, residents' attitudes toward ITN utilization, and malaria control outcomes. The findings are expected to contribute to existing literature on malaria governance and provide evidence-based recommendations for strengthening local health administration, enhancing community participation, and improving the effectiveness of malaria control programmes in Cross River State and other similar settings in Nigeria.

Literature Review

Theoretical Framework

This study is anchored in three theoretical frameworks that collectively bridge public administration, governance, and public health scholarship.

The Governance Theory, as developed within the public administration tradition, holds that effective public service delivery including health service delivery is contingent on the quality of governmental and inter-organizational arrangements that coordinate, resource, and implement public programs (Pierre & Peters, 2000). In the context of malaria control, governance theory directs attention to how local government administrative structures in Obudu LGA plan, fund, coordinate, and monitor ITN distribution and health education programs. Weak governance at the



LGA level translates directly into poor malaria control outcomes, regardless of the quality of national policy frameworks.

The Health Belief Model (HBM), developed by Rosenstock (1974), posits that individuals are more likely to adopt preventive health behaviors such as sleeping under an ITN when they perceive themselves as susceptible to the disease, recognize its severity, believe in the effectiveness of the preventive action, and perceive few barriers to adoption. For public administrators in Obudu LGA, the HBM implies that health communication campaigns must be designed to address all four dimensions building awareness of malaria risk, communicating the severity of the disease, demonstrating ITN effectiveness, and removing practical barriers to access and use.

The Theory of Planned Behavior (TPB), formulated by Ajzen (1991), extends this analysis by emphasizing the role of attitudes, subjective norms, and perceived behavioral control in determining behavioral intentions. In communities like Obudu, where traditional beliefs and social norms may influence health-seeking behavior, the TPB underscores the importance of community-based behavioral change communication programs administered by local government authorities and implemented through trusted community structures including traditional rulers, women's groups, and religious organizations.

ITN Availability as a Governance Outcome

The availability of insecticide-treated bed nets in rural communities is fundamentally determined by government policy decisions, administrative capacity, and logistical efficiency. Lengeler (2004) established through a systematic review of 22 randomized controlled trials that ITNs reduce all-cause child mortality by about 17% and clinical malaria episodes by approximately 50%, underscoring the life-saving importance of ensuring adequate ITN availability. However, the realization of these benefits depends heavily on the administrative systems through which ITNs are distributed.

Hanson et al. (2017) demonstrated that coordinated government-led distribution programs in Tanzania produced a 55% reduction in malaria transmission intensity, while Noor et al. (2017) reported a 40% reduction in Kenya following sustained national ITN distribution efforts. Both cases highlight that availability is not a naturally occurring condition but an administrative achievement one that requires sustained investment in procurement logistics, distribution networks, community targeting, and monitoring systems.

In Cross River State, and particularly in Obudu LGA, the challenge of ITN availability is compounded by geographic remoteness, poor road infrastructure, and limited local government financial capacity. The Cross River State Ministry of Health has made efforts to integrate ITN distribution into routine healthcare delivery, but coverage gaps in rural LGAs like Obudu persist, reflecting what public administration scholars describe as the implementation deficit the gap between policy aspiration and administrative delivery (Pressman & Wildavsky, 1973).

Knowledge, Attitudes, and the Public Administration of Behavioral Change

Community knowledge of ITNs including awareness of their purpose, correct usage practices, maintenance, and replacement is not spontaneously generated but is produced through deliberate public education programs administered by government agencies and their partners.



Studies across sub-Saharan Africa have consistently shown that ITN knowledge is significantly associated with ITN use and malaria control outcomes (Gamble, Ekwaru & Ter, 2017; Mushi et al., 2017). Community attitudes toward ITNs present an additional governance challenge. In many Nigerian rural communities, cultural beliefs, discomfort associated with sleeping under nets in hot climates, concerns about insecticide safety, and skepticism about the effectiveness of ITNs can undermine adoption even when nets are available and communities possess basic knowledge about them (Dalrymple, Alipui & Garner, 2020; Richard et al., 2025). Addressing attitudinal barriers requires sustained behavioral change communication programs a function that falls within the domain of local government public health administration.

Mushi et al. (2017) demonstrated that community-based malaria control programs that engage local institutions including village health workers, community development committees, and traditional authorities in ITN promotion are significantly more effective at changing attitudes and increasing ITN uptake than top-down distribution campaigns alone. This finding reinforces the public administration argument that effective malaria governance requires participatory approaches that embed health programs within existing community governance structures.

Methodology

Research Design

A correlational survey design was adopted for this study. This design is appropriate for investigating the relationships between variables ITN availability, community knowledge, community attitude, and malaria control outcomes without experimental manipulation, and is widely used in public administration research aimed at generating policy-relevant evidence (Creswell, 2014).

Study Area

The study was conducted in Obudu Local Government Area, located in the northeastern senatorial district of Cross River State, Nigeria. Obudu LGA is situated in a highland terrain bordering Benue State to the north, Obanliku LGA to the west, Bekwarra LGA to the south, and the Republic of Cameroon to the east. The area is known for the Obudu Mountain Resort (formerly Obudu Cattle Ranch), one of Nigeria's foremost tourist destinations, as well as its rich biodiversity and favorable highland climate.

Obudu LGA has an estimated population of 189,977 (National Population Commission, 2024), with adult residents constituting approximately 112,450 persons. The LGA is predominantly rural, with communities engaged in subsistence farming, cattle rearing, and small-scale trade. English and Yala (Icive-Maci) are the dominant languages, alongside several Bantu dialects. The area's relative remoteness, limited healthcare infrastructure, and low formal education penetration in rural communities make it a contextually significant site for investigating the administrative determinants of malaria control.

The Cross River State Ministry of Health administers malaria control programs in the state through the State Malaria Elimination Programme (SMEP), in partnership with the National Malaria Elimination Programme (NMEP) and international development organizations. However,



service delivery at the LGA level remains constrained by funding inadequacies, logistics challenges, and limited administrative capacity.

Population and Sampling

The target population comprised all adult residents (18 years and above) of Obudu LGA, estimated at 112,450 based on National Population Commission (2024) and National Bureau of Statistics (2023) data. A sample of 399 respondents was determined using the Taro Yamane (1969) formula: $n = N / (1 + N(e^2))$, where $N = 112,450$ and $e = 0.05$. Multi-stage sampling was applied, incorporating purposive selection of communities across Obudu's administrative zones, followed by systematic random sampling of households within selected communities, and convenience sampling of eligible adult residents within selected households.

Instrument and Data Collection

A structured questionnaire comprising four sections was developed: Section A (demographic data), Section B (ITN availability), Section C (ITN knowledge and attitude), and Section D (malaria control outcomes). Items were rated on a 5-point Likert scale ranging from Strongly Agree (5) to Strongly Disagree (1). The instrument was validated by three experts in public administration and public health at the University of Calabar. Reliability testing via Cronbach Alpha yielded coefficients ranging from .79 to .87 across the subscales, confirming internal consistency.

Data Analysis

Descriptive statistics (frequency counts, percentages, means, and standard deviations) were used to profile respondents and describe variable distributions. Pearson Product Moment Correlation Coefficient was used to test hypotheses one and two, assessing the strength and direction of relationships between ITN availability, knowledge, and malaria control outcomes. Chi-square (χ^2) analysis was employed to test hypothesis three, examining the association between residents' categorical attitudes towards ITN use and malaria control outcome categories. All hypotheses were tested at the .05 level of significance.

Findings

Demographic Profile of Respondents

Table 1 presents the demographic characteristics of the 399 respondents. Female respondents constituted 59.6% of the sample, consistent with the overrepresentation of women in community health studies and their heightened vulnerability to malaria during pregnancy. The modal age group was 33–39 years (34.6%), representing the economically active population most severely affected by malaria-related productivity losses. A significant proportion of respondents (41.6%) had only primary or no formal education, reflecting the community's limited formal literacy a critical consideration for health communication program design.

Table 1: Demographic Profile of Respondents

Variable	Category	Frequency	Percent (%)
Sex	Male	161	40.4
	Female	238	59.6



	Total	399	100.0
Age	18–25 years	46	11.5
	26–32 years	93	23.3
	33–39 years	138	34.6
	40 years & above	122	30.6
	Total	399	100.0
Educational Level	No formal education	54	13.5
	Primary	112	28.1
	Secondary	148	37.1
	Tertiary	85	21.3
	Total	399	100.0

Source: Author's field survey (2026)

Descriptive Statistics of Study Variables

Table 2 presents the descriptive statistics for the four study variables. ITN availability recorded the highest mean score (17.84), suggesting that respondents perceive moderate availability of bed nets in their communities. However, community attitude towards ITN use recorded the lowest mean (15.93), indicating that attitudinal barriers rather than availability alone may be a significant constraint on ITN adoption. The mean score for ITN knowledge (16.47) also fell below that for availability, suggesting that government health education programs have not kept pace with distribution efforts.

Table 2: Descriptive Statistics of Study Variables

Variable	N	Min.	Max.	Mean	SD
Availability of ITNs	399	10.00	22.00	17.84	2.76
Knowledge of ITNs	399	09.00	21.00	16.47	2.61
Attitude towards ITN use	399	10.00	22.00	15.93	2.48
Malaria control outcomes	399	09.00	22.00	17.52	2.39

Source: Author's field survey (2026)

Hypothesis One: ITN Availability and Malaria Control

H01 stated that there is no significant relationship between availability of insecticide-treated bed nets and malaria control among residents of Obudu LGA. Pearson Product Moment Correlation analysis was applied. The result ($r = .391$, $p = .000 < .05$) indicated a statistically significant positive relationship, leading to the rejection of H01. This finding confirms that as ITN availability



a direct product of government distribution policy and administrative logistics increases, malaria control outcomes improve correspondingly.

Table 3: Pearson Correlation Between ITN Availability and Malaria Control

Variable	N	Mean	SD	r	Sig.
Availability of ITNs	399	17.84	2.76	.391	.000*
Malaria control outcomes	399	17.52	2.39	—	—

*Significant at .05 level, $p < .05$

Hypothesis Two: ITN Knowledge and Malaria Control

H02 stated that there is no significant relationship between community knowledge of insecticide-treated bed nets and malaria control among residents of Obudu LGA. Pearson Product Moment Correlation analysis yielded $r = .374$, $p = .000 < .05$, indicating a statistically significant positive relationship and leading to the rejection of H02. Community knowledge of ITNs shaped by government-administered public education programs and local health communication campaigns is therefore significantly associated with better malaria control outcomes.

Table 4: Pearson Correlation Between ITN Knowledge and Malaria Control

Variable	N	Mean	SD	r	Sig.
Knowledge of ITNs	399	16.47	2.61	.374	.000*
Malaria control outcomes	399	17.52	2.39	—	—

*Significant at .05 level, $p < .05$

Hypothesis Three: Attitude Towards ITN Use and Malaria Control

H03 stated that there is no significant association between residents' attitudes towards insecticide-treated bed net use and malaria control outcomes in Obudu LGA. Chi-square (χ^2) analysis was applied to a 2×2 contingency table cross-tabulating attitude categories (positive/negative) and malaria control outcome categories (high/low). The result ($\chi^2 = 35.32$, $df = 1$, $p = .000 < .05$) indicated a statistically significant association between attitude and malaria control outcomes, leading to the rejection of H03. Residents with positive attitudes towards ITN use were significantly more likely to report better malaria control outcomes than those with negative or indifferent attitudes.

Table 5: Chi-Square Analysis of Attitude Towards ITN Use and Malaria Control Outcomes

Variable	Observed (O)	Expected (E)	(O-E) ² /E	χ^2 Value	Sig.
Positive attitude — High malaria control	187	159.6	4.70		
Positive attitude — Low	72	99.4	7.55		



malaria control					
Negative attitude — High malaria control	61	88.4	8.52		
Negative attitude — Low malaria control	79	51.6	14.55		
Total	399	399.0	35.32	35.32*	.000

*Significant at .05 level, $p < .05$; $df = 1$; Critical value = 3.841

Discussion of Findings

The finding that ITN availability is significantly positively correlated with malaria control ($r = .391$) aligns with the governance theory argument that effective public health outcomes are contingent on the administrative capacity of government institutions to deliver services equitably and efficiently. This result is consistent with Hanson et al. (2017) and Noor et al. (2017), who demonstrated that government-coordinated ITN distribution programs in Tanzania and Kenya respectively produced substantial reductions in malaria transmission intensity. In the context of Obudu LGA, where healthcare infrastructure is limited and geographic remoteness compounds distribution challenges, this finding underscores the urgency of strengthening local government administrative systems for ITN delivery.

The correlation coefficient for availability ($r = .391$) is marginally higher than that for knowledge ($r = .374$), suggesting that while both dimensions are important, the physical accessibility of ITNs exerts a slightly stronger direct influence on malaria control outcomes in Obudu LGA. This may reflect a context where even ITN-aware residents cannot consistently use nets due to supply gaps a condition that calls for prioritizing distribution governance reforms while simultaneously investing in knowledge dissemination programs.

The significant relationship between ITN knowledge and malaria control ($r = .374$) confirms the public administration argument that effective policy implementation extends beyond resource distribution to encompass information governance the systematic management of public knowledge and behavior through health communication programs (Gamble, Ekwari & Ter, 2017). The finding that ITN knowledge scores (mean = 16.47) trail ITN availability scores (mean = 17.84) suggests that the Cross River State Malaria Elimination Programme's distribution activities have outpaced its community health education efforts in Obudu LGA, creating a knowledge-access gap that may limit the practical impact of distributed ITNs.

Perhaps the most distinctive finding of this study facilitated by the inclusion of the chi-square analysis is the significant association between community attitude and malaria control outcomes ($\chi^2 = 35.32$, $p < .05$). The magnitude of this chi-square statistic is notably large, indicating that attitudinal differences between community members are strongly patterned in relation to malaria control outcomes. This supports the Theory of Planned Behavior's proposition that behavioral intentions, including consistent ITN use, are powerfully shaped by attitudes and reinforces the public administration implication that local government behavioral change



communication programs are not optional add-ons to malaria control but core administrative functions.

The descriptive finding that attitude toward ITN use recorded the lowest mean score (15.93) among the four study variables is particularly telling. It suggests that even among a community with moderate ITN availability and some level of ITN knowledge, attitudinal resistance remains a significant barrier to malaria control. This points to the need for Obudu LGA's health department to invest in targeted, culturally grounded behavioral change interventions delivered through community governance structures, traditional institutions, and women's groups that address the specific attitudinal barriers prevalent in the local community.

Conclusion

This study has established that the governance dimensions of insecticide-treated bed net use specifically, government-driven ITN availability, community knowledge fostered through public education programs, and attitudes shaped by behavioral change communication interventions are each significantly associated with malaria control outcomes among residents of Obudu Local Government Area, Cross River State. The findings collectively affirm that malaria control in rural Nigerian communities is as much a public administration challenge as it is a biomedical one.

The three-dimensional framework adopted in this study examining availability, knowledge, and attitude simultaneously offers a more comprehensive understanding of the governance gaps that perpetuate malaria burden in communities like Obudu LGA than studies that focus on a single determinant alone. The chi-square analysis, in particular, reveals that attitudinal dimensions, which are often underemphasized in supply-side malaria control programs, are strongly associated with health outcomes and must be addressed through dedicated administrative investment.

For Cross River State to achieve meaningful progress toward malaria elimination targets, local government administrations in rural LGAs must be empowered through fiscal devolution, capacity building, and inter-agency coordination to function as effective front-line agents of malaria governance. The evidence from Obudu LGA provides a compelling policy case for this administrative transformation.

10. Recommendations

Based on the findings of this study, the following recommendations are made to public administrators and policymakers at the local, state, and federal levels:

- i. The Obudu Local Government Administration should establish a dedicated Community Malaria Control Unit within its health department, with a specific mandate for ITN distribution governance, community health education, and behavioral change communication targeting identified attitudinal barriers.
- ii. Cross River State's Malaria Elimination Programme should expand its health communication programs in Obudu LGA to address not only ITN awareness but active attitudinal change, employing community theater, peer education, and indigenous language campaigns to reach low-literacy populations.



- iii. The federal and state governments should strengthen fiscal transfers to rural LGAs for health service delivery, ensuring that national malaria policy commitments are matched with adequate administrative resources at the local government level.
- iv. Local government health administrators should engage traditional rulers, religious leaders, women's associations, and community development committees as formal partners in ITN distribution and behavioral change communication programs, leveraging existing community governance structures for greater program reach and cultural legitimacy.
- v. ITN distribution campaigns in Obudu LGA should be accompanied by simultaneous health education sessions at the community level, closing the gap identified in this study between availability and knowledge, and linking supply-side governance with demand-side behavioral change outcomes.
- vi. The Cross River State Government should establish an LGA-level malaria control monitoring and evaluation framework that tracks ITN coverage, knowledge levels, attitude trends, and malaria incidence data together, enabling evidence-based administrative responses to emerging gaps.

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Authors' contributions

All authors read and approved the final manuscript.

Data availability

No datasets were generated or analyzed during the current study.

Declarations

Ethics approval and consent to participate

Not applicable. This study did not involve human or animal subjects.



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Competing interests

The authors declare that they have no competing interests.

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