

# Assessing The Utilization Of Insecticide Treated Nets Among Residents Of Kpakungu Community, Minna, Niger State, Nigeria

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## Abstract

*Malaria remains a leading cause of morbidity and mortality in Nigeria, which accounts for approximately 27% of the global malaria burden (World Health Organization [WHO], 2023). Insecticide-treated nets (ITNs) are among the most effective malaria prevention strategies, yet utilization often lags behind ownership. This study assessed household access to ITNs, utilization patterns, and the relationship between socio-demographic characteristics and ITN use among residents of Kpakungu community, Minna, Niger State. A descriptive cross-sectional study was conducted among 413 randomly selected respondents using a structured questionnaire. Data were analyzed using SPSS version 26. Descriptive statistics were presented as frequencies and percentages, while Chi-square tests examined associations between ITN utilization and socio-demographic variables at  $p < .05$ . Overall, 71.7% of households owned at least one ITN. Although 80.4% reported sleeping under an ITN the night before the survey, only 47.9% reported consistent nightly use. Significant associations were found between ITN utilization and gender ( $p < .001$ ), educational level ( $p < .001$ ), tribe ( $p < .001$ ), religion ( $p = .012$ ), and occupation ( $p < .001$ ). Age and marital status were not significant. Despite relatively high ownership, consistent utilization remains suboptimal. Targeted behavioral and educational interventions are required to improve sustained ITN use.*

**Keywords:** *Malaria, insecticide-treated nets, utilization, socio-demographic factors, Nigeria.*

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## I. Introduction

Malaria remains one of the most significant public health challenges globally, particularly in sub-Saharan Africa. According to the World Health Organization (WHO, 2023), an estimated 249 million malaria cases and 608,000 deaths occurred worldwide in 2022, with Africa accounting for over 94% of cases and deaths. Nigeria bears the highest burden globally, contributing approximately 27% of global cases and 31% of malaria deaths (WHO, 2023).

Insecticide-treated nets (ITNs) have been widely recognized as one of the most cost-effective malaria prevention interventions (Lengeler, 2004; WHO, 2022). Studies demonstrate that consistent ITN use can reduce malaria incidence by up to 50% and child mortality by about 20% (Eisele et al., 2012; Lengeler, 2004). In Nigeria, large-scale ITN distribution campaigns have been coordinated by the National Malaria Elimination Programme (NMEP, 2022), leading to increased household ownership. However, disparities persist between ownership and actual utilization (National Population Commission [NPC] & ICF, 2019).

Evidence from previous studies in Nigeria indicates that socio-demographic factors such as gender, education, income, and cultural beliefs significantly influence ITN use (Auta, 2012; Ezire et al., 2015; Onwujekwe et al., 2014). Despite improvements in access, consistent use remains affected by discomfort, misconceptions, and inadequate household coverage (Afolabi et al., 2020; Pulford et al., 2011).

Niger State continues to experience high malaria prevalence due to climatic and environmental factors (NPC & ICF, 2019). However, community-specific evidence regarding ITN utilization in Kpakungu is limited. This study therefore assessed ITN ownership, utilization, and socio-demographic determinants among residents of Kpakungu community, Minna, Niger State.

## II. Methods

### Study Design

A community-based descriptive cross-sectional study design.

### Study Area

The study was carried out in Kpakungu community, located along Bida-Minna Road in Chanchaga Local Government Area of Minna, Niger State, Nigeria.

### Study Population

The study population comprised heads of households and adult household members aged 18 years and above.

### Sample Size and Sampling Technique

A sample size of 413 respondents was obtained using the Lemeshow formula with 95% confidence level and 5% margin of error, including 20% attrition. using the Lemeshow formula (Lemeshow et al., 1990). A multi-stage sampling technique was applied with 95% confidence level and 5% margin of error, including 20% attrition. A multi-stage sampling technique was employed including random selection of enumeration areas, random selection of households and interview of eligible household members.

### Data Collection

Data were collected using a structured questionnaire divided into sections covering socio-demographics, ITN ownership, utilization, and associated factors.

### Ethical Consideration

Ethical approval was obtained from Newgate University Minna Ethics Committee. Participation was voluntary and confidentiality was maintained.

### Data Analysis

Data were analyzed using SPSS version 26. Descriptive statistics were presented as frequencies and percentages. Chi-square tests assessed associations between ITN utilization and socio-demographic variables at  $p < 0.05$ .

## III. Results

**Table 1: Socio-demographic characteristics of respondents (n = 413)**

Variable	Category	Frequency	Percentage
Age (years)	18-25	154	37.3
	26-35	149	36.1
	36-45	76	18.4
	46 and above	34	8.2
Gender	Male	189	45.8
	female	224	55.2
Marita status	Single	187	43.1
	Married	198	47.9
	Divorced	21	5.1
	widowed	16	3.9
Religion	Christianity	180	42.4
	Islam	217	52.5
	others	16	5.1
Educational level	No formal	55	33.3
	Primary	112	27.1
	Secondary	167	40.4

	Tertiary	79	19.1
Occupation	Civil servants	102	24.7
	Farmer	76	18.4
	Trader/buissnessmen	163	39.4
	Others	72	17.4

Table 1 shows the socio-demographic distribution of the 413 respondents. The majority of respondents were young adults aged 18–25 years (37.3%), followed closely by those aged 26–35 years (36.1%), indicating a predominantly youthful study population. Females constituted slightly more than half of the respondents (55.2%). Nearly half of the respondents were married (47.9%), while 43.1% were single. In terms of educational attainment, most respondents had secondary education (40.4%), and only 13.3% had no formal education. Traders and businesspersons formed the largest occupational group (39.4%), followed by civil servants (24.7%).

**Table 2: Household Ownership and Access to ITNs (n = 413)**

Variable	Category	Frequency	Percentage
<b>Household owns at least one ITN</b>	Yes	296	71.7
	No	117	28.3
<b>Number of ITNs in the household</b>	1	115	27.8
	2	109	26.4
	3	58	14.0
	More than 3	117	28.3
<b>Sources of ITNs</b>	NGO	96	23.2
	Health facility	89	21.5
	Government distribution	87	21.1
	Market	74	17.9
	Others	67	16.2
<b>Adequacy of ITNs</b>	Yes	198	47.9
	No	147	35.6
	Not sure	68	16.5

Table 2 shows that 71.7% of households owned at least one insecticide treated net (ITN), indicating relatively high household coverage. However, only 47.9% of respondents considered the number of ITNs in their household adequate, suggesting that ownership does not necessarily translate to sufficient access for all household members. Most ITNs were obtained through NGOs (23.2%), health facilities (21.5%), and government distribution programs (21.1%), demonstrating the important role of institutional and public health interventions in improving ITN coverage. A smaller proportion purchased nets from the market (17.9%).

**Table 3: ITNs utilization pattern (n = 413)**

Variable	Category	Frequency	Percentage
<b>Slept under ITN</b>	Every night	198	47.9
	Most nights	102	24.7
	Occasionally	78	18.9
	Never	35	8.5

<b>Slept under ITN last night</b>	Yes	332	80.4
	No	81	19.6
<b>Peroid of ITN use</b>	Year round	255	61.7
	Rainy season	73	17.7
	During high malaria period	60	14.5
	Others	25	6.1
<b>Household member who use ITN most</b>	Every one	173	41.9
	Children	141	34.1
	Preganant women	62	15.0
	No one	37	9.0
<b>Reasons for irregular use</b>	Skin irritation	28	6.8
	Heat disconfort	22	5.3
	Do not believe in its effectiveness	22	5.3
	No mosquito perceived	17	4.1
	Difficult to hang	10	3.4

Table 3 presents the utilization pattern of ITNs among respondents. Although 80.4% reported sleeping under an ITN the night before the survey, only 47.9% indicated that they use ITNs every night. This reveals a gap between occasional use and consistent nightly use. Most respondents (61.7%) reported using ITNs year-round, while others limited use to the rainy season (17.7%) or periods of high malaria prevalence (14.5%), suggesting seasonal behavior patterns in malaria prevention. Furthermore, 41.9% stated that everyone in the household sleeps under ITNs, while children (34.1%) and pregnant women (15.0%) were often prioritized.

**Table 4: Association between socio-demographic characteristics and ITNs Utilization**

Variable	Chi square value ( $\chi^2$ value)	P-value	Significance
Age	5.39	0.145	Not significant
Gender	69.09	0.001	significant
Marital status	4.12	0.249	Not significant
Tribe	35.15	0.001	significant
Religion	10.96	0.012	significant
Educational level	41.73	0.001	significant
occupation	37.62	0.001	significant

Table 4 presents the relationship between socio-demographic variables and ITN utilization using Chi-square analysis. Significant associations were found between ITN utilization and gender ( $p < 0.001$ ), educational level ( $p < 0.001$ ), tribe ( $p < 0.001$ ), religion ( $p = 0.012$ ), and occupation ( $p < 0.001$ ). This indicates that these socio-demographic factors significantly influence whether individuals consistently use ITNs. In contrast, age ( $p = 0.145$ ) and marital status ( $p = 0.249$ ) were not statistically significant predictors of ITN utilization

#### IV. Discussion

This study assessed the utilization of insecticide-treated nets (ITNs) among residents of Kpakungu community in Minna, Niger State, and revealed relatively high household ownership (71.7%) but suboptimal consistent utilization (47.9% night use). Although 80.4% reported sleeping under an ITN the night preceding the survey, regular sustained use remains inadequate. This ownership utilization gap has been consistently

reported across malaria endemic settings in sub-Saharan Africa (Pulford et al., 2011, World Health Organization [WHO], 2022). The finding aligns with the Nigeria Demographic and Health Survey, which documented improved ITN ownership following mass distribution campaigns but persistent disparities in consistent usage (National Population Commission [NPC] & ICF, 2019).

The relatively high ownership observed in this study may reflect the impact of large scale free distribution campaigns coordinated by the National Malaria Elimination Programme and supporting partners (National Malaria Elimination Programme, 2022; Federal Ministry of Health, 2014). Similar improvements in coverage following structured distribution strategies have been reported in other African countries (Grabowsky et al., 2007, Noor et al., 2009). However, consistent utilization remains influenced by behavioral, socio-cultural, and environmental factors. The seasonal pattern of ITN use identified in this study where some respondents reported using nets only during the rainy season or perceived high malaria periods suggests misconceptions regarding year round malaria transmission. Evidence indicates that malaria transmission can occur beyond peak rainy seasons, thereby necessitating continuous protection (WHO, 2023, Eisele et al., 2012).

Education emerged as a significant predictor of ITN utilization, corroborating findings from previous Nigerian studies demonstrating that higher educational attainment improves health literacy and adoption of preventive practices (Ezire et al., 2015, Yaya et al., 2018). Individuals with secondary or tertiary education are more likely to understand malaria transmission dynamics and the protective benefits of consistent ITN use. This supports broader evidence linking socio-economic empowerment and knowledge to improved malaria prevention behaviors (Onwujekwe et al., 2014, Ricotta et al., 2019).

Gender differences were also statistically significant. Women were more likely to report ITN utilization, possibly due to their greater exposure to maternal and child health programs where ITNs are routinely promoted (Auta, 2012; Oresanya et al., 2008). This finding is consistent with reports that pregnant women and caregivers of young children are often prioritized during distribution campaigns, increasing awareness and compliance within these groups (Eisele et al., 2012). However, this also suggests a need to intensify male targeted behavioral change communication strategies to ensure equitable usage across household members.

The significant associations observed with tribe and religion underscore the importance of cultural context in malaria prevention behaviors. Cultural norms, traditional beliefs, and trust in public health messaging may influence perceptions of malaria risk and the perceived effectiveness of ITNs (Afolabi et al., 2020, Onwujekwe et al., 2014). Engaging community gatekeepers, including religious and traditional leaders, may therefore enhance community acceptance and sustained behavioral change.

Reported barriers such as heat discomfort, skin irritation, and difficulty hanging nets mirror findings from other African settings (Pulford et al., 2011, Eze et al., 2021). Heat related discomfort is particularly relevant in northern Nigeria, where high ambient temperatures may discourage night use. These findings highlight the need for improved ITN design, enhanced ventilation strategies, and continuous community sensitization addressing misconceptions and practical challenges.

Overall, the findings of this study reinforce that improving malaria outcomes requires not only increasing ITN ownership but also strengthening behavioral interventions to promote consistent night use. Integrated strategies combining health education, culturally sensitive messaging, routine monitoring, and adequate household coverage are critical to achieving sustained malaria prevention and supporting Nigeria's malaria elimination goals (WHO, 2023, Federal Ministry of Health, 2014)

## V. Conclusion

Despite relatively high ITN ownership in Kpakungu community, consistent night utilization remains inadequate. Socio-demographic factors including gender, education, tribe, religion, and occupation significantly influence ITN use. Addressing behavioral and cultural barriers is essential for maximizing malaria prevention efforts.

## VI. Recommendations

- Targeted health education for men and less-educated groups.
- Community-based advocacy through religious and traditional leaders.
- Improved ITN distribution based on household size.
- Strengthened behavioral change communication programs.
- Routine monitoring and evaluation of ITN use

## References

- [1]. Afolabi, A. O., Olatunji, S. O., & Usman, H. B. (2020). Factors Affecting Utilization Of Insecticide-Treated Nets In Rural Nigeria. *African Journal Of Public Health*, 7(3), 102–110.
- [2]. Auta, A. (2012). Demographic Factors Associated With Insecticide-Treated Net Use Among Nigerian Women. *North American Journal Of Medical Sciences*, 4(1), 40–44.

- [3]. Eisele, T. P., Keating, J., Littrell, M., Larsen, D., & Macintyre, K. (2012). Assessment Of Insecticide-Treated Net Use Among Children And Pregnant Women. *American Journal Of Tropical Medicine And Hygiene*, 86(4), 557–565.
- [4]. Ezire, O., Adebayo, S. B., Bamgboye, E., Et Al. (2015). Determinants Of Insecticide-Treated Net Use In Nigeria. *Malaria Journal*, 14, 170.
- [5]. Lengeler, C. (2004). Insecticide-Treated Bed Nets And Curtains For Preventing Malaria. *Cochrane Database Of Systematic Reviews*, (2), CD000363.
- [6]. Lemeshow, S., Hosmer, D., Klar, J., & Lwanga, S. (1990). *Adequacy Of Sample Size In Health Studies*. WHO.
- [7]. National Malaria Elimination Programme. (2022). *Annual Malaria Report*. Federal Ministry Of Health, Nigeria.
- [8]. National Population Commission (NPC) [Nigeria] & ICF. (2019). *Nigeria Demographic And Health Survey 2018*. Abuja, Nigeria, And Rockville, MD.
- [9]. Onwujekwe, O., Hanson, K., & Uzochukwu, B. (2014). Socio-Economic Inequalities In Malaria Prevention. *Health Policy And Planning*, 29(5), 631–642.
- [10]. Pulford, J., Hetzel, M. W., Bryant, M., Siba, P. M., & Mueller, I. (2011). Reported Reasons For Not Using Mosquito Nets. *Malaria Journal*, 10, 83.
- [11]. Ricotta, E., Oppong, S., Yukich, J., Et Al. (2019). Determinants Of Bed Net Use Conditional On Access. *Malaria Journal*, 18, 63.
- [12]. World Health Organization. (2022). *World Malaria Report 2022*. Geneva: WHO.
- [13]. World Health Organization. (2023). *World Malaria Report 2023*. Geneva: WHO.
- [14]. Yaya, S., Bishwajit, G., & Ekholuenetale, M. (2018). Factors Associated With Insecticide-Treated Net Use In Nigeria. *BMJ Open*, 8(1), E018802.
- [15]. Grabowsky, M., Nobiya, T., & Selanikio, J. (2007). Sustained High Coverage Of Itns. *Tropical Medicine & International Health*, 12(7), 815–822.
- [16]. Noor, A. M., Amin, A. A., Akhwale, W. S., & Snow, R. W. (2009). Increasing Coverage Of Itns. *Plos Medicine*, 4(4), E255.
- [17]. Oresanya, O. B., Hoshen, M., & Sofola, O. T. (2008). Utilization Of Insecticide-Treated Nets In Nigeria. *Malaria Journal*, 7, 145.
- [18]. Eze, P., Nwankwo, C., & Uzochukwu, B. (2021). Utilization Of Itns In Nigeria: A Systematic Review. *Malaria Journal*, 20, 1–10.
- [19]. WHO. (2021). *World Malaria Report 2021*. Geneva: WHO.
- [20]. Federal Ministry Of Health. (2014). *National Malaria Strategic Plan 2014–2020*. Abuja, Nigeria.