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Knowledge, Attitude, and Associated Factors Regarding Malaria among Caregivers of Under-Five Children in the Federal Capital Territory, Abuja, Nigeria

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Abstract

Background

Malaria remains a leading cause of morbidity and mortality among children under five years of age in Nigeria, which bears the highest global malaria burden. Caregiver knowledge and attitude are key determinants of appropriate care-seeking and home management behaviour, yet these remain poorly characterised among caregivers in the Federal Capital Territory (FCT), Abuja.

Objectives

To assess knowledge, attitude, and associated factors among caregivers of under-five children towards malaria in FCT.

Methods

A descriptive cross-sectional study was conducted among 308 caregivers of under-five children recruited from three area councils (AMAC, Bwari, Kuje) in the FCT using a multistage sampling technique. Data were collected using an interviewer-administered structured questionnaire deployed through KoboToolbox. Knowledge and attitude were scored and compared across sociodemographic characteristics using t-tests and one-way ANOVA.

Results

Most respondents were female (78.9%), aged 25–29 years (39.3%), married (78.2%), and earned less than ₦50,000 monthly (68.8%). Overall knowledge was poor, with a mean score of 3.38 ± 1.56 out of a maximum of 8; 58.4% of caregivers had poor knowledge and only 10.1% had good knowledge. Mean attitude score was 19.36 ± 4.12 out of a maximum of 30. In multiple linear regression, age, education, occupation, ethnicity, religion, awareness of treatment guidelines, and financial constraint were independent predictors of knowledge (model R^2=0.490, $p < 0.001$); education, income, ethnicity, religion, guideline awareness, and cost of treatment were independent predictors of attitude (model R^2=0.466, $p < 0.001$). Tertiary education showed the largest independent effect on attitude ($\beta = 0.440$, $p < 0.001$), and financial constraint the largest independent effect on knowledge ($\beta = -0.246$, $p < 0.001$). Sex and marital status were not significant independent predictors of either outcome.

Conclusion

Knowledge of malaria among caregivers of under-five children in the FCT is poor, and both knowledge and attitude are strongly patterned by socioeconomic status. Targeted health education addressing

caregivers with low educational attainment, informal employment, and low income is needed to close these gaps.

1. Introduction

Malaria remains a life-threatening disease transmitted through the bite of infected female *Anopheles* mosquitoes, and continues to be one of the leading causes of death among children under five years of age, accounting for approximately 76% of malaria-related deaths in this age group globally (WHO, 2024). Nigeria bears a disproportionate share of this burden, accounting for 30.9% of malaria deaths in the WHO African Region, which itself accounts for approximately 94% of all malaria cases and 95% of all malaria-related deaths worldwide (WHO, 2024).

Caregiver knowledge and attitude are widely recognised as key determinants of how promptly and appropriately a malaria episode in a child is managed. Poor knowledge of causes, symptoms, and recommended treatment, combined with unfavourable or ambivalent attitudes toward formal care, can delay effective treatment and increase the risk of progression to severe disease. Despite the existence of national and WHO guidelines recommending prompt diagnosis and artemisinin-based combination therapy (ACT), the extent to which caregivers in the FCT understand and endorse these recommendations, and the sociodemographic factors that shape this understanding, has not been well documented. This paper assesses the level of knowledge and attitude towards malaria among caregivers of under-five children in the FCT, Abuja, and identifies the sociodemographic factors associated with both.

2. Methods

2.1 Study area and design

This descriptive cross-sectional study was conducted in the Federal Capital Territory (FCT), Abuja, located in North-Central Nigeria. The FCT comprises six area councils spanning urban, peri-urban, and rural communities, with malaria transmission peaking during the rainy season (May–October). Three area councils, Abuja Municipal Area Council (AMAC), Bwari, and Kuje were selected by simple random sampling to represent this urban–rural gradient.

2.2 Study population and sample size

The study population comprised caregivers (mothers, fathers, or guardians) of children under five years of age who had resided in the selected communities for at least six months. Sample size was calculated using Fischer's formula for proportions, based on a previously reported HMM prevalence of 78.8% (Aruoture & Ademola, 2021), a precision of 0.05, and a 95% confidence level, yielding a minimum sample size of 257. A total of 308 caregivers were recruited after adjusting for a 20% non-response rate ().

2.3 Sampling technique

A multistage sampling method was used. Following random selection of the three area councils, wards were selected within each (four in AMAC, two in Bwari, one in Kuje), and communities within each ward were selected by simple random sampling. Households were then selected using systematic random sampling, with sampling intervals calculated separately for each area council based on the average number of households per ward.

2.4 Data collection

Data were collected using an interviewer-administered structured questionnaire deployed through KoboToolbox, covering sociodemographic characteristics, knowledge of malaria causes, transmission, symptoms, complications, and vulnerable groups, and attitude toward malaria treatment, prevention, and formal care.

2.5 Data analysis

Knowledge and attitude scores were computed and categorised, and mean scores were compared across sociodemographic variables (age, sex, marital status, educational status, employment status, religion, ethnicity, and monthly income) using independent-samples t-tests (for two-group comparisons) and one-way ANOVA (for comparisons across more than two groups). Statistical significance was set at $p < 0.05$.

2.6 Ethical considerations

Ethical approval

was obtained from the Federal Capital Territory Health Research Ethics Committee of the Federal Capital Territory Ministry of Health (approval number FHREC/2026/01/12/10-02-2016) and the Adeleke University Research Ethics Committee (approval number AUERC/2026/33PH/016). Approval from the Federal Capital Territory Health Research Ethics Committee was required as the regulatory ethics body with oversight of research conducted within FCT communities and health facilities, in addition to institutional approval from Adeleke University, the corresponding author's academic institution. All methods were carried out in accordance with the relevant guidelines and regulations, including the Declaration of Helsinki. Written informed consent was obtained from all respondents prior to interview, and confidentiality was maintained throughout.

3. Results

3.1 Sociodemographic characteristics

Of the 308 caregivers, the majority (39.3%) were aged 25–29 years, and females constituted 78.9% of respondents. Most caregivers were married (78.2%), and educational attainment was concentrated at the lower end, with 31.2% having no formal education and 31.5% having only secondary education; only 13.9% had tertiary education. Housewives were the largest occupational group (45.8%), followed by the unemployed (20.5%). The Hausa ethnic group was most represented (43.1%), and the majority of

caregivers (68.8%) earned less than ₦50,000 per month, confirming a predominantly low-income study population.

3.2 Knowledge of malaria among caregivers

Most caregivers (75.6%) correctly identified mosquito bites as a cause of malaria; however, substantial misconceptions persisted, with 43.2% citing a dirty environment and 42.9% citing sunlight or heat as causes. Regarding transmission, 49.7% of caregivers did not know any other mode of transmission, while 27.9% incorrectly believed malaria could be transmitted through sharing utensils.

Fever was the most widely recognised symptom (82.5%), followed by vomiting (42.5%), loss of appetite (41.9%), and headache (40.6%). Awareness of malaria complications was critically low: 90.0% of caregivers reported not knowing any complication of malaria. Most caregivers (62.1%) correctly identified children under five as the group most vulnerable to malaria.

Awareness of national treatment guidelines was very low: only 11.4% of caregivers were aware that national guidelines exist, only 11.4% correctly identified ACT as the recommended first-line treatment, and only 15.9% knew that treatment should begin within 24 hours of fever onset.

3.3 Attitude of caregivers towards malaria

Half of caregivers (50.3%) agreed that malaria is a serious problem among under-five children, while nearly as many (49.0%) disagreed. Three-quarters (75%) agreed that early treatment prevents complications, and 78.2% expressed trust in health facilities for malaria treatment. However, 68% of caregivers also agreed that traditional medicine can treat malaria, and 52.9% expressed a preference for home treatment before hospital care, reflecting ambivalence alongside otherwise favourable attitudes toward formal care.

3.4 Mean knowledge and attitude scores

The mean knowledge score was 3.38 ± 1.56 out of a maximum of 8, and the mean attitude score was 19.36 ± 4.12 out of a maximum of 30 (Table 1). Overall, 58.4% of caregivers had poor knowledge and only 10.1% had good knowledge, indicating a generally poor level of malaria knowledge in this population, alongside a more moderate attitude profile.

Table 1
Mean Score of Respondents' Knowledge and Attitude

Domain	Maximum possible score	Mean ± SD
Knowledge	8	3.38 ± 1.56
Attitude	30	19.36 ± 4.12

3.5 Difference in knowledge across sociodemographic characteristics

Mean knowledge scores differed significantly across age groups, with caregivers aged ≥ 35 years recording the highest score (4.33 ± 1.52) compared with those aged 25–34 years (3.24 ± 1.56) and under 25 years (3.06 ± 1.27; $F = 11.78$, $p < 0.001$). A strong educational gradient was observed: caregivers with no formal education recorded the lowest score (2.71 ± 1.29), rising through primary (3.15 ± 1.26) and secondary education (3.17 ± 1.72) to tertiary education (4.63 ± 1.28; $F = 19.41$, $p < 0.001$). Formally employed caregivers scored highest (4.63 ± 1.38), compared with the unemployed (3.30 ± 1.48) and artisans, who scored lowest (2.51 ± 1.38; $F = 23.40$, $p < 0.001$). Caregivers earning ₦100,000 or more scored highest (5.10 ± 1.52), compared with those earning below ₦50,000 (3.26 ± 1.48; $F = 14.13$, $p < 0.001$). Significant differences were also found across ethnicity ($F = 5.51$, $p < 0.001$) and religion ($F = 14.25$, $p < 0.001$), with Yoruba and Muslim caregivers recording the highest scores, respectively. No significant differences in knowledge were found by sex ($t = 0.97$, $p = 0.332$) or marital status ($t = -0.49$, $p = 0.627$) (Table 2).

3.6 Difference in attitude across sociodemographic characteristics

Mean attitude scores followed a broadly similar pattern. Educational status showed the strongest gradient, rising from 16.35 ± 2.97 among caregivers with no formal education to 23.08 ± 2.81 among those with tertiary education ($F = 44.32$, $p < 0.001$). Formally employed caregivers recorded the highest attitude score (22.14 ± 3.76) compared with artisans (17.66 ± 3.71; $F = 14.53$, $p < 0.001$). Caregivers earning ₦100,000 or more scored highest (22.63 ± 3.88; $F = 9.10$, $p < 0.001$), and significant differences were also found across age ($F = 4.30$, $p = 0.014$), ethnicity ($F = 7.04$, $p < 0.001$), and religion ($F = 26.65$, $p < 0.001$), with Igbo and Muslim caregivers recording the highest attitude scores, respectively. As with knowledge, no significant differences in attitude were found by sex ($t = 0.24$, $p = 0.810$) or marital status ($t = -0.22$, $p = 0.829$) (Table 3).

Table 2
Difference in Mean Knowledge Score by Sociodemographic Characteristics

Variable	Group	Mean ± SD	Test statistic	p-value
Age	< 25	3.06 ± 1.27	F = 11.78	< 0.001
	25–34	3.24 ± 1.56		
	≥ 35	4.33 ± 1.52		
Educational status	No formal	2.71 ± 1.29	F = 19.41	< 0.001
	Primary	3.15 ± 1.26		
	Secondary	3.17 ± 1.72		
	Tertiary	4.63 ± 1.28		
Employment status	Formal	4.63 ± 1.38	F = 23.40	< 0.001
	Unemployed	3.30 ± 1.48		
	Artisan	2.51 ± 1.38		
Religion	Christianity	3.16 ± 1.48	F = 14.25	< 0.001
	Islam	3.89 ± 1.56		
	Traditional	2.07 ± 1.22		
Ethnicity	Hausa	3.36 ± 1.36	F = 5.51	< 0.001
	Yoruba	4.03 ± 1.37		
	Igbo	3.95 ± 1.37		
	Gbayi	2.86 ± 1.51		
	Others	3.50 ± 2.07		
Monthly income	<₦50,000	3.26 ± 1.48	F = 14.13	< 0.001
	₦50,000–99,999	3.29 ± 1.86		
	≥₦100,000	5.10 ± 1.52		
Marital status	Married	3.36 ± 1.51	t=-0.49	0.627
	Unmarried	3.47 ± 1.76		
Sex	Female	3.32 ± 1.50	t = 0.97	0.332
	Male	3.53 ± 1.67		

Table 3
Difference in Mean Attitude Score by Sociodemographic Characteristics

Variable	Group	Mean ± SD	Test statistic	p-value
Age	< 25	20.25 ± 3.66	F = 4.30	0.014
	25–34	18.89 ± 4.36		
	≥ 35	20.43 ± 3.14		
Educational status	No formal	16.35 ± 2.97	F = 44.32	< 0.001
	Primary	19.89 ± 3.91		
	Secondary	20.55 ± 3.72		
	Tertiary	23.08 ± 2.81		
Employment status	Formal	22.14 ± 3.76	F = 14.53	< 0.001
	Unemployed	19.16 ± 4.03		
	Artisan	17.66 ± 3.71		
Religion	Christianity	18.60 ± 3.80	F = 26.65	< 0.001
	Islam	21.16 ± 3.74		
	Traditional	14.87 ± 4.55		
Ethnicity	Hausa	19.02 ± 3.47	F = 7.04	< 0.001
	Yoruba	21.33 ± 3.78		
	Igbo	21.47 ± 3.72		
	Gbayi	18.45 ± 4.47		
	Others	17.63 ± 4.59		
Monthly income	<₦50,000	19.27 ± 4.02	F = 9.10	< 0.001
	₦50,000–99,999	16.86 ± 4.17		
	≥₦100,000	22.63 ± 3.88		
Marital status	Married	19.34 ± 4.08	t=-0.22	0.829
	Unmarried	19.47 ± 4.34		
Sex	Female	19.31 ± 4.10	t = 0.24	0.810
	Male	19.45 ± 4.17		

3.7 Independent predictors of knowledge (multivariable regression)

Bivariate comparisons (Section 3.5) showed that mean knowledge scores differed significantly across age, educational status, employment status, religion, ethnicity, and monthly income (all $p < 0.001$), but not by sex or marital status. To identify independent predictors while controlling for confounding, a multiple linear regression was fitted with knowledge score as the outcome. The overall model was statistically significant ($F = 10.577$, $p < 0.001$), with an R^2 of 0.490 (adjusted R^2=0.444), indicating that the included variables explained 49.0% of the variance in knowledge scores.

Seven variables emerged as significant independent predictors (Table 4). Age ≥ 35 years (vs. <25 years) was associated with a 1.076-point increase in knowledge score ($\beta = 0.253$, $p < 0.001$). Tertiary education (vs. no formal education) was associated with a 0.701-point increase ($\beta = 0.208$, $p < 0.001$). Formal-sector occupation (vs. unemployed) was associated with a 1.059-point decrease ($\beta = -0.228$, $p = 0.002$). Ethnicity and religion were also significant, with Muslim caregivers scoring higher than Christian caregivers ($\beta = 0.136$, $p = 0.028$). Awareness of the national treatment guideline was associated with a 1.139-point increase in knowledge ($\beta = 0.231$, $p < 0.001$) — the second-strongest predictor in the model. Financial constraint emerged as the single strongest independent predictor overall, associated with a 0.913-point decrease in knowledge score ($\beta = -0.246$, $p < 0.001$). Sex, marital status, and monthly income were not significant independent predictors once the other variables were controlled for.

3.8 Independent predictors of attitude (multivariable regression)

The same modelling approach was applied to attitude score. The overall model was statistically significant ($F = 9.582$, $p < 0.001$), with an R^2 of 0.466 (adjusted R^2=0.417). Education was the strongest predictor of attitude in the entire model: tertiary education (vs. no formal education) was associated with a 5.390-point increase in attitude score ($\beta = 0.440$, $p < 0.001$), the largest standardised effect of any predictor across both models (Table 5). Middle income (₦50,000–₦99,999, vs. below ₦50,000) was associated with a 2.571-point decrease in attitude score ($\beta = -0.132$, $p = 0.007$). The “other” ethnicity category (vs. Hausa) was associated with a 2.926-point decrease ($\beta = -0.160$, $p = 0.002$). Muslim caregivers scored 1.454 points higher in attitude than Christian caregivers ($\beta = 0.170$, $p = 0.007$), while caregivers practising traditional religion scored significantly lower than Christians ($\beta = -0.104$, $p = 0.036$). Awareness of the treatment guideline was associated with a 1.655-point increase in attitude score ($\beta = 0.127$, $p = 0.017$), while citing cost of treatment as a barrier was associated with a 1.201-point decrease ($\beta = -0.126$, $p = 0.030$). Sex, age, marital status, occupation, and financial constraint were not significant independent predictors of attitude once other variables were controlled for.

Table 4

Multiple Linear Regression: Independent Predictors of Caregivers' Knowledge Score *(Model: F = 10.577, p < 0.001; R^2=0.490, adjusted R^2=0.444)*

Predictor (reference group)	B	β	95% CI	p-value
Age ≥ 35 yrs (vs. <25 yrs)	1.076	0.253	0.552 to 1.601	< 0.001
Tertiary education (vs. no formal)	0.701	0.208	0.326 to 1.075	< 0.001
Formal occupation (vs. unemployed)	−1.059	−0.228	−1.711 to − 0.406	0.002
Ethnicity: Others (vs. Hausa)	−0.473	−0.134	−0.868 to − 0.075	0.020
Religion: Islam (vs. Christianity)	0.439	0.136	0.005 to 0.827	0.028
Awareness of treatment guideline	1.139	0.231	0.638 to 1.640	< 0.001
Financial constraint	−0.913	−0.246	−1.262 to − 0.565	< 0.001
Sex (male vs. female)	−0.220	−0.057	−0.654 to 0.214	0.321
Marital status (unmarried vs. married)	0.079	0.021	−0.283 to 0.442	0.668
Monthly income (≥₦100,000 vs. <₦50,000)	0.298	0.047	−0.491 to 1.087	0.670

B = unstandardised regression coefficient; β = standardised coefficient; CI = confidence interval.

Table 5

Multiple Linear Regression: Independent Predictors of Caregivers' Attitude Score *(Model: F = 9.582, p < 0.001; R^2=0.466, adjusted R^2=0.417)*

Predictor (reference group)	B	β	95% CI	p-value
Tertiary education (vs. no formal)	5.390	0.440	3.811 to 6.969	< 0.001
Monthly income ₦50,000–99,999 (vs. <₦50,000)	−2.571	−0.132	−4.432 to −0.703	0.007
Ethnicity: Others (vs. Hausa)	−2.926	−0.160	−4.800 to −1.053	0.002
Religion: Islam (vs. Christianity)	1.454	0.170	0.403 to 2.504	0.007
Religion: Traditional (vs. Christianity)	—	−0.104	—	0.036
Awareness of treatment guideline	1.655	0.127	0.301 to 3.009	0.017
Cost of treatment (barrier)	−1.201	−0.126	−2.278 to −0.125	0.030
Sex (male vs. female)	—	—	—	0.378
Age	—	—	—	0.295
Marital status	—	—	—	0.429
Occupation	—	—	—	0.719
Financial constraint	—	—	—	0.139

B = unstandardised regression coefficient; β = standardised coefficient; CI = confidence interval. B and CI not reported in source data for non-significant categorical terms marked "—".

4. Discussion

The overall level of malaria knowledge among caregivers in this study was poor, with a mean score of 3.38 out of 8 and fewer than one in ten caregivers demonstrating good knowledge. This is a concerning finding for a population responsible for the first line of malaria management in a country carrying one of the highest paediatric malaria mortality burdens globally (WHO, 2023). The finding that three-quarters of caregivers correctly identified mosquito bites as the cause of malaria is broadly consistent with a KAP study among Hausa communities in Kano State, which similarly found high awareness of mosquito-borne transmission (Dawaki et al., 2016). However, the coexistence of this correct knowledge with substantial misconceptions over 40% of caregivers in the present study attributing malaria to dirty environments or heat mirrors a wider pattern seen elsewhere in West Africa; a Ghanaian study identified numerous competing misconceptions about malaria causation among rural caregivers, including beliefs linking the disease to contaminated food and water (Boadu et al., 2020).

The near-universal inability to name any complication of malaria (90% of caregivers) is arguably the most concerning knowledge finding in this study, and it exceeds even the low awareness reported in a Delta State study, where 78% of caregivers could not identify a malaria complication (Onyiri, 2015). This gap matters clinically: caregivers who cannot recognise warning signs such as convulsions cannot be expected to trigger timely emergency care, a concern echoed by caregiver-perception research in the Democratic Republic of Congo (Okitawutshu et al., 2023).

The attitude findings present a more complex picture. The near-even split between caregivers who considered malaria a serious problem (50.3%) and those who did not (49.0%) points to a genuine attitudinal barrier to care-seeking, consistent with findings from Southwest Nigeria, where a similarly low perception of malaria severity was linked to high rates of home treatment (Falade et al., 2005), and from West Ethiopia, where low perceived severity was associated with a substantially higher likelihood of relying on home treatment rather than facility care (Mitiku & Assefa, 2017). At the same time, most caregivers in this study expressed trust in health facilities (78.2%) and agreement that early treatment prevents complications (75.0%) attitudes that did not translate into corresponding home-management practice, a disconnect this study's design cannot fully explain but which the literature typically attributes to structural access barriers such as cost and distance rather than attitude alone.

The strong and consistent socioeconomic gradient observed in the regression models driven independently by education, formal employment, ethnicity, religion, and financial constraint indicates that caregivers who are already most socioeconomically disadvantaged are also least equipped with the knowledge needed to manage malaria appropriately at home. Financial constraint emerged as the single strongest independent predictor of poor knowledge, and education as the strongest independent predictor of attitude, suggesting that these two levers economic support and educational attainment operate through partly distinct pathways to shape caregiver knowledge and attitude respectively. The absence of significant sex or marital-status effects in either model suggests that the gaps identified here are not primarily driven by gender roles in caregiving, but by structural socioeconomic access to information and services.

5. Conclusion

Knowledge of malaria among caregivers of under-five children in the FCT is poor and independently predicted by age, education, occupation, ethnicity, religion, guideline awareness, and financial constraint. Attitude, while comparatively more favourable, is independently predicted by education, income, ethnicity, religion, guideline awareness, and cost as a barrier to care. These findings support the need for targeted, accessible health education interventions particularly for caregivers with low educational attainment and low income to close persistent knowledge gaps and reinforce positive attitudes toward formal malaria care.

Declarations

Author Contribution

OMP conceived and designed the study, collected and analysed the data, and drafted the manuscript. ASM analysed the data and corrected the manuscript ETJ and OO supervised the study and critically reviewed the manuscript AOA and SIO read the manuscript and collected the data. All authors read and approved the final manuscript.”

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Data Availability

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

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