Utilization of Insecticide Treated Nets and Health Seeking Behavior for fever among Children under Five in Southwest Nigeria

Melford Esuabom (✉ esuabommelford@gmail.com)

University of Ibadan College of Medicine <https://orcid.org/0000-0001-6632-9093>

Mabel Kamweli Aworh

African Field Epidemiology Network

Chukwuma David Umeokonkwo

AFENET: African Field Epidemiology Network

Muhammad Shakir Balogun

AFENET: African Field Epidemiology Network

Eniola Bamgboye

University of Ibadan College of Medicine

Tukur Dahiru

Ahmadu Bello University Teaching Hospital

Research

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Abstract

Background

Malaria remains a burden globally with the WHO African region accounting for 94% of the overall disease burden and deaths in 2019. Nigeria alone accounted for 27% of total malarial cases and 23% of deaths. Insecticide-treated nets (ITN) use and receiving early care for fever represent the most cost-effective means of malaria prevention and control. In this study, we assessed the utilization of ITNs in households with under-five children in Southwest Nigeria, the health-seeking behavior of their caregivers for fever, and associated factors.

Methods

This was a secondary data analysis of the 2018 Nigeria Demographic and Health Survey. Analysis was restricted to under-five children residing in Southwest Nigeria. Multivariate analysis using logistic regression was conducted to determine factors associated with utilization of ITNs and care-seeking for fever in under-five children. Complex samples command of SPSS (Version 23) was used to account for survey sampling design.

Results

Of 2,281 under-five children in households with at least one ITN, 67.6% (1542) slept under an ITN the night before the survey. Predictors of ITN use were the age of child (<12 months), wealth index (poorest), number of nets in a household (2 or more), and number of household members (1-3). Of the 4,153 under-five children, 8.7% (360) had fever, and advice or treatment was sought for 72.4% (261). Predictors of good health-seeking behavior were the age of a child <12 months (AOR=2.81, 95% CI = 1.08-7.31), mothers' education, and state of residence. Mothers who had secondary education were less likely to report care-seeking than those with higher education (AOR = 0.43, 95% CI = 0.19-0.98). Mothers from Osun, Ekiti, and Lagos state were less likely to seek care than those from Ogun state.

Conclusion

We found that the utilization of insecticide-treated nets and seeking of care for fever in under five years of age in Southwest Nigeria were below the National Malaria Strategic Plan goal of 80% and 100% respectively. The state governments of Osun, Ekiti, and Lagos should develop strategies to improve ITN use and early seeking of care for fever in under-five children.

Background

Malaria is an infectious disease caused by species of the protozoan parasite, *Plasmodium* (predominantly *P. falciparum*) and, transmitted by *Anopheles* mosquitoes. Globally, there were an estimated 227 million cases of malaria in 87 malaria-endemic countries and an estimated 407,000 people died from malaria in 2019(1). Malaria is the third leading cause of death in children under five

years old (U5) years worldwide, after pneumonia and diarrheal disease, and accounts for almost one out of five deaths in children less than 5 years(2). The proportion of total malaria deaths among children U5 was 67% in 2019(1).

The prevalence of malaria is highest in sub-Saharan Africa, which accounted for 94% of cases totaling about 215 million cases in 2019(1). Nigeria (27%), the Republic of the Congo (12%), Uganda (5%), Mozambique (4%), and Niger (3%) accounted for 51% of all cases globally(1). Sub-Saharan Africa also accounted for 94% (384,000) of malaria deaths. Nigeria alone accounted for almost 23% of malarial deaths globally(1). In 2009, the Nigerian Federal Ministry of Health estimated that malaria was a direct contributor to 11% of overall maternal mortality, 25% of infant mortality, and 30% of under-five mortality. Children in regions of steady transmission are at increased risk of progression to severe disease compared to adults(3). Malaria also contributes to malnutrition in children, which indirectly leads to the death of half of all children under the age of five throughout the world(4)(5). Southwest Nigeria has the highest malaria prevalence in children under 5 (U5) (50.3%) according to a previous study(6). However, the 2015 Malaria Indicator Survey (MIS) and the 2018 Nigeria Demographic Health Survey (NDHS) reported a prevalence of 32.1% and 28.9% respectively(7)(8).

Nigeria has implemented 4 national malaria strategic plans (NMSP) to date. The fourth NMSP (2014-2020) aimed to achieve pre-elimination status and reduce malaria-related deaths to zero by 2020. Two objectives of this plan were to provide at least 80% of the targeted population with appropriate preventive measures and to treat all individuals with confirmed malaria in the appropriate health facilities and with effective antimalarial medicines(7). Preventive measures to be implemented include sustained mass distribution of long-lasting insecticide nets (LLIN). Insecticide-treated nets have been established to prevent malaria by reducing the number of infective bites by mosquitoes. ITNs are cost-effective and evidence suggests that they result in a 44% reduction in the incidence of severe malaria episodes in persons who used ITNs compared to those who did not according to a systematic review(9).

Effective malaria case management is important for preventing morbidity and mortality among children under five. This includes seeking early treatment (within 24 hours) at a health facility. In this study, we analyzed data to assess the utilization of ITNs among children U5 in the Southwest region of Nigeria and factors associated with the use of ITNs, health-seeking behavior of caregivers for fever in children U5, and associated factors.

Methods

Study Design

We conducted secondary data analysis on the data set obtained from the 2018 Nigerian Demographic Health Survey (NDHS 2018). The 2018 NDHS is a nationally representative survey conducted by the National Population Commission (NPC). ICF International provided technical assistance through the DHS program which is funded by the United States Agency for International Development (USAID). Other

agencies were involved in providing technical and financial support for the successful implementation of the survey.

Study Setting

Southwest Nigeria is one of the 6 geopolitical zones in Nigeria comprising of the following states: Ekiti, Lagos, Osun, Ondo, Ogun, and Oyo. The area lies between longitude $2^{\circ} 31'$ and $6^{\circ} 00' E$ and latitude $6^{\circ} 21'$ and $8^{\circ} 37' N$ with a total land area of $77,818\text{km}^2$. It has 2 distinct seasons which are the rainy season (April-October) and the dry season (November-March). The predominant language spoken in the region is Yoruba. However, several other ethnic groups exist. The population in Southwest is estimated to be 27,511,892 based on the NPC Census of 2006 (10). The majority of the occupants are farmers, traders, artisans, etc.

Study Population

The study focused on children U5 who were de facto members of households that owned at least 1 ITN in Southwest, Nigeria. Furthermore, a subset of children U5 who had a fever in the 2 weeks before the survey was also studied.

Data Collection

The 2018 NDHS was conducted from August to December 2018. The sampling frame used for the survey was the Population and Housing Census of the Federal Republic of Nigeria (NPHC) which was conducted by the NPC in 2006. The sampling for the survey was done using a stratified sampling method conducted in 2 stages. Stratification was achieved by dividing the 36 states and the Federal Capital territory into 2 strata: urban and rural. A total of 41,668 households were selected for the sample, of which 40,666 were occupied. Of the occupied households, 40,427 were successfully interviewed, yielding a response rate of 99%. Women aged 15-49 years old were interviewed in selected households and the women's questionnaire included questions related to children in these households. We obtained household ownership of at least one ITN by merging the Household member recode (PR) and the Household Recode (HR) data set. We further extracted data from the merged data set for children U5 who were de facto members of households that owned at least 1 ITN in Southwest Nigeria and had slept in the house the night before the survey. This resulted in a total of 1,887 children or 2,281 after applying sample weights. Assessment of health-seeking behavior for fever in children U5 was done using the children recode (KR) data set. We first extracted data on children U5 living in Southwest Nigeria, resulting in a weighted count of 4,153, and then extracted data on children who had fever 2 weeks before the survey. This resulted in a total of 322 children or 360 after applying sample weights.

Data Analysis

Analysis was conducted using SPSS (version 23.0). The dependent variable for net utilization was whether a child U5 slept under an ITN the night before the survey in households that had at least 1 ITN.

The dependent variable for fever health-seeking behavior was whether a caregiver of a child U5 who had a fever within the past 2 weeks preceding the survey sought advice or treatment. This includes those who sought advice or treatment from the following sources: public sector, private medical sector, shop, market, itinerant drug seller, and community-oriented resource person. We excluded advice or treatment from traditional practitioners. Independent variables for net use were classified as child and household factors. Child factors included the age and gender of a child. Household factors were type of place of residence, wealth index, age of household head, gender of household head, number of nets in a household, number of de facto household members, and state of residence. In addition to child and household factors, maternal factors were included as independent variables for fever health-seeking behavior. This includes women's age group, religion, highest education level, literacy level, and marital status. Descriptive statistics were conducted on dependent and independent variables. Chi-square was used to test the association between child factors, maternal factors, household factors, and outcome variables. The level of significance was set at 5% and 10% for ITN use and seeking advice or treatment of fever respectively. Multivariate analysis was done using logistic regression to test the strength of association between the independent and dependent variables at a 95% confidence interval. The Complex Samples analysis method was used to account for the sampling technique and weighting factor applied in the survey. Results are presented as tables and figures.

Results

Description of Sample Characteristics and utilization of nets for children U5

Table 1 is a description of sample characteristics of children U5 in households with at least one ITN in southwest Nigeria. The majority of children in this study were within the age group 12-35 months (41.3%, n=942) and 36-59 months (40.3%, n=918). About half of the children were males (51.7%, n=1,179) and a majority were urban residents (72.7%, n=1,659). The majority of children lived in households classified as rich under the wealth index (44.5%, n=1016). The proportion of households with males as heads of the household was higher than that of females (85%, n=1,940). The highest proportion of children were from Lagos (24.9%; n=568) and Oyo state (23.9%, n=544), n=522). Half of the children were from households that had only one ITN (50.2%, n=1146). The majority of children were from households with between 4 to 6 household members (65.6%, n=1497). About one-third of the children slept under an ITN the night before the survey (67.6%, n=1542, Table 1).

Table 1
Description of sample characteristics and utilization of net by children U5
(n=2281)

Variable	Frequency	Proportion (%)
Child factors (n=2,281)		
Age (in months)		
<12	421	18.4
12-35	942	41.3
36-59	918	40.3
Gender		
Male	1,179	51.7
Female	1,102	48.3
Household factors		
Type of place of Residence		
Urban	1,659	72.7
Rural	622	27.3
Gender of household head		
Male	1,940	85.0
Female	341	15.0
Age of household head (in years)		
<29	225	9.8
29-49	1,640	71.9
≥50	416	18.2
Wealth Index		
Poorest	69	3.0
Poorest	172	7.6
Middle	396	17.3
Richer	629	27.6
Richest	1,016	44.5
Number of mosquito nets		

Variable	Frequency	Proportion (%)
1	1,146	50.2
≥2	1,135	49.8
Number of household members		
1-3	418	18.3
4-6	1,497	65.6
≥7	367	16.1
State of residence		
Oyo	544	23.9
Osun	294	12.9
Ekiti	151	6.6
Ondo	341	15.0
Lagos	568	24.9
Ogun	383	16.8
Utilization of ITN by children U5 in households with at least one ITN		
Child slept under an ITN the night before the survey		
Yes	1,542	67.6
No	739	32.4

Factors Associated with Children U5 Sleeping Under Insecticide Treated Nets

Table 2 is a summary of the association between dependent variables (child factors and household factors) and the utilization of ITN. Type of place of residence, wealth index, state of residence, age of a child, number of nets in a household, age of household head, and number of household members were associated with children U5 sleeping under ITNs ($p < 0.05$). Table 3 is a summary of the results of multivariate analysis showing the adjusted odds ratios (AORs). Age of child, wealth index, number of nets in households, number of household members, and state of residence were significantly associated with children sleeping under ITNs ($p < 0.05$). Children less than 12 months were more likely to sleep under ITN than those aged 36-59 months (AOR= 1.79, CI= 1.33-2.41, $p = 0.001$). Children from households classified poorest were more likely to sleep under an ITN than those from the richest households (AOR= 2.60, CI= 1.15-5.90, $p = 0.022$). Having more than one net was positively associated with children sleeping under ITN (AOR= 1.64, CI= 1.17-2.30, $p = 0.004$). Children from households with 1-3 members (AOR= 2.29, CI= 1.45-3.63, $p = 0.001$) and 4-6 members (AOR= 1.50, CI= 1.04-2.15, $p = 0.03$) were more likely to sleep under

an ITN than children from households with 7 and above members. Children from Osun (AOR= 0.49, CI= 0.27-0.87, p=0.016), Ekiti (AOR= 0.34, CI= 0.19-0.60, p= 0.001) and Lagos states (AOR= 0.49, CI= 0.26-0.90, p= 0.022) were less likely to sleep under an ITN than those from Ogun State

Table 2
Factors associated with ITN use in children U5 in Southwest Nigeria (n=2,281)

Variable	Child slept under ITN		p value
	Yes	No	
	Freq (%)	Freq (%)	
Child factors			
Age (in months)			
<12	320(76.0)	101(24.0)	0.001
12-35	642(68.1)	300(31.9)	
36-59	581(63.2)	337(36.8)	
Gender			
Male	800(67.9)	379(32.1)	0.812
Female	742(67.3)	360(32.7)	
Household factors			
Type of place of residence			
Urban	1078(65.0)	581(30.0)	0.005
Rural	464(74.7)	158(25.3)	
Gender of Household head			
Male	1314(67.7)	626(32.3)	0.838
Female	228(67.0)	113(33.0)	
Age of household head			
<29	177(78.5)	48(21.5)	0.021
29-49	1094(67.6)	546(33.3)	
≥50	272(65.4)	144(34.6)	
Wealth index			
Poorest	56(80.6)	13(19.4)	0.008
Poorer	126(73.0)	46(27.0)	
Middle	268(67.8)	128(32.2)	
Richer	461(73.3)	168(26.4)	

Variable	Child slept under ITN		p value
Richest	632(62.2)	384(37.8)	
Number of mosquito nets			
1	724(63.2)	422(36.8)	0.008
≥2	818(72.1)	317(27.9)	
Number of household members			
1-3	317(76.0)	101(24.0)	0.005
4-6	1004(67.1)	493(32.9)	
≥7	221(60.1)	146(39.9)	
State of residence			
Oyo	420(77.3)	124(22.7)	0.001
Osun	185(63.0)	109(37.0)	
Ekiti	81(53.6)	70(46.4)	
Ondo	236(69.3)	105(30.7)	
Lagos	319(56.1)	249(43.9)	
Ogun	300(78.4)	82(21.6)	

Table 3
Multivariate analysis of factors associated with the use of ITN in children
U5

Variable	AOR	95% CI
Age of child (in months)		
36-59	1.00	
<12	1.79	1.33-2.41
12-35	1.22	0.94-1.59
Type of place of residence		
Urban	1.00	
Rural	1.12	0.80-1.56
Age of Household head		
≥50	1.00	
<29	1.56	0.87-2.80
29-49	1.14	0.83-1.57
Wealth index		
Richest	1.00	
Poorest	2.60	1.15-5.90
Poorer	1.46	0.78-2.70
Middle	1.27	0.81-1.98
Richer	1.53	0.97-2.41
Number of mosquito nets		
1	1.00	
≥2	1.64	1.17-2.30
Number of household members		
≥7	1.00	
1-3	2.29	1.45-3.63
4-6	1.50	1.04-2.15
State of residence		
Ogun	1.00	

Variable	AOR	95% CI
Oyo	1.05	0.60-1.83
Osun	0.49	0.27-0.87
Ekiti	0.34	0.19-0.60
Ondo	0.58	0.31-1.07
Lagos	0.49	0.26-0.90

Health seeking behavior of caregivers in Southwest Nigeria for fever in Children U5

Table 4 is a summary of the health-seeking behavior of caregivers of children U5 who had a fever within 2 weeks preceding the survey. Figure 1 is a summary of where treatment was first sought for children U5 with fever. Of the 4,153 children in Southwest Nigeria, 8.7%, (n=360) had a fever in the last 2 weeks preceding the survey. Of these, advice or treatment for fever was sought for 72.4% (n=261). The proportion of children for whom advice or treatment was sought for the same day or the next was 43.6%. More than a quarter of respondents (27.6%, n=60) took their children to government health centers, while 17.7% (n=53) took their children to chemists/private medical stores. Table 5 is the result of bivariate analysis of independent variables of seeking advice or treatment for fever in children U5. Factors associated with seeking advice or treatment for fever were the age of the child, literacy level of the mother, highest educational level, sex of household head, wealth index, and state of residence ($p < 0.1$). Table 6 is the result of multivariate analysis of factors associated with seeking advice or treatment for fever in children U5. Age of child, the religion of caregiver, and mother's educational level were associated with seeking advice or treatment for fever ($p < 0.05$). Caregivers of children less than 12 months old and within 12-36 months were more likely to seek advice or treatment for fever than caregivers of children aged 36-59 months (aOR= 2.81, CI= 1.08-7.31, $p = 0.034$ and aOR= 1.86, CI= 1.02-3.39, $p = 0.042$). Muslim caregivers were more likely to seek advice or treatment for fever than Christians (aOR= 2.56, CI= 1.30-5.03). Caregivers with secondary school education were less likely to seek care than those with higher education (aOR= 0.43, CI= 0.19-0.98, $p = 0.045$). Mothers from Osun state (aOR = 0.06, CI = 0.01-0.52), Ekiti state (aOR = 0.09, CI = 0.01-0.71), and Lagos state (aOR = 0.11, CI = 0.01-0.92) were less likely to seek care than those from Ogun state.

Table 4
Health seeking behavior of caregivers in southwest Nigeria for fever in children U5

Variable	Frequency (%)
Child had fever in last 2 weeks (n=4153)	
No	3776 (90.9)
Yes	360 (8.7)
Don't know	16 (0.4)
Child received treatment for fever (n=360)	
Yes	261 (72.4)
No	100(27.6)
Number of days after fever began sought treatment (n=360)	
Same-day or next	157 (43.6)
2-4	101 (28.0)
>5	102 (28.3)

Table 5
Factors associated with seeking advice or treatment for fever in children U5 in Southwest Nigeria

Variable	Total	Sought advice/treatment		p value
		Yes	No	
		Freq (%)	Freq (%)	
Child factors	360			
Age (in months)				
>12	51	43(83.2)	8(16.8)	0.065
12-35	174	130(74.7)	44(25.3)	
36-59	135	88(65.3)	47(34.7)	
Gender				
Male	186	138(74.2)	38(25.8)	0.405
Female	175	123(70.4)	52(29.6)	
Maternal factors				
Age				
15-24	50	40(80.5)	10(19.5)	0.109
25-34	186	141(75.8)	45(24.2)	
>35	124	79(63.9)	45(36.1)	
Education				
No education	23	13(57.8)	10(42.2)	
Primary	55	36(65.8)	19(34.2)	
Secondary	217	155(71.3)	62(28.7)	
Higher	66	57(86.6)	9((13.4)	
Religion				
Christian	217	147(67.8)	70(32.2)	0.038
Islam	143	114(79.4)	29(20.6)	
Current Marital status				
Single, divorced, widow	21	13(60.3)	8(39.7)	0.278
Married/living with partner	340	248(73.1)	92(26.9)	

Variable	Total	Sought advice/treatment		p value
Literacy				
Cannot read at all	70	36(52.1)	34(47.9)	0.001
Can read part or whole sentences	291	225(77.2)	66(22.8)	
Household factors				
Type of place of residence				
Urban	269	198(73.7)	71(26.3)	0.354
Rural	91	62(68.3)	29(31.7)	
Wealth Index				
Poorest	18	11(59.7)	7(40.3)	0.004
Poorer	41	24(58.0)	17(42.0)	
Middle	58	31(53.8)	27(46.2)	
Richer	100	75(74.9)	25(25.1)	
Richest	143	120(83.8)	23(16.2)	
Number of household members				
1-3	85	67(79.1)	18(20.9)	0.313
4-6	227	159(70.0)	68(30.0)	
≥7	48	34(71.5)	14(28.5)	
Gender of household head				
Male	301	224(74.5)	77(25.5)	0.094
Female	59	36(61.7)	23(38.3)	
Age of household head				
<29	34	25(73.0)	9(23.0)	0.937
29-49	274	197(71.9)	77(28.1)	
>50	53	39(74.4)	14(25.6)	
State of Residence				
Oyo	60	49(80.8)	11(19.2)	0.023
Osun	72	47(65.8)	25(34.2)	
Ekiti	53	32(60.4)	21(39.6)	

Variable	Total	Sought advice/treatment	p value
Ondo	50	31(61.0)	19(39.0)
Lagos	97	76(78.4)	21(21.6)
Ogun	28	26(93.4)	2(6.6)

Table 6
Multivariate analysis of factors associated with seeking
advice or treatment for fever in children U5 in Southwest
Nigeria

Variable	AOR	95% CI
Age of child (in months)		
36-59	1.00	
<12	2.81	1.08-7.31
12-35	1.86	1.02-3.39
Religion		
Christian	1.00	
Islam	2.56	1.30-5.03
Literacy		
Can read part or whole	1.00	
Cannot read at all	0.31	0.08-1.08
Mother's education		
Higher	1.00	
No education	0.39	0.05-3.20
Primary	0.80	0.23-2.86
Secondary	0.43	0.19-0.98
Gender of household head		
Female	1.00	
Male	1.59	0.75-3.36
Wealth index		
Richest	1.00	
Poorest	0.49	0.10-2.53
Poorer	0.47	0.16-1.37
Middle	0.39	0.15-1.00
Richer	0.91	0.41-2.03
State of Residence		

Variable	AOR	95% CI
Ogun	1.00	
Oyo	0.17	0.02-1.39
Osun	0.06	0.01-0.52
Ekiti	0.09	0.01-0.71
Ondo	0.09	0.01-1.00
Lagos	0.11	0.01-0.92

Discussion

In this study, utilization of ITN for children U5 was above average. This could be due to the mass distribution of nets during campaigns and antenatal visits combined with continuous education of caregivers during hospital visits on the need for bed net use by children U5 as a preventive measure for malaria. This should lead to a reduction in cases of malaria among children U5 in the region. This is similar to findings from previous studies in Osun State (58.3%) and Southwest Nigeria (67.5%), but higher than that reported in a study in Calabar in Nigeria where only 25% of children U5 slept under bed nets(11) (6)(12). This result is also similar to that in a study in the Niger Delta zone where 61.3% of children slept under bed nets(13). More importantly, this is higher than that reported in the 2015 NMIS report (39.2%), indicating an increase in the utilization of ITNs by children U5(7). However, utilization by children U5 in southwest Nigeria was lower than the NMSP target of 80%(7).

Predictors of utilization of ITNs for children U5 were the age of a child, state of residence, number of nets in a household, and number of household members. Children aged 35 months and below were more likely to sleep under an ITN than older children. This is consistent with findings from other studies in Myanmar and Malawi(14)(15). Children within this age group are more likely to sleep with their parents thus making it more likely for the child to sleep under an ITN. Children in households with a higher number of nets were more likely to sleep under an ITN than those with a single net. This implies that the more nets a household possesses, the more likely it is for children U5 to sleep under ITNs. Children in households with fewer members were more likely to sleep under an ITN than children in households with more members. This is similar to findings in a previous study in Nigeria and Ethiopia(16)(17). There was no statistically significant association between type of place of residence and children U5 sleeping under an ITN. However, the proportion of children who slept under an ITN was higher in rural than urban settings. Children from households within the poorest wealth index were more likely to sleep under an ITN than children than those from households within the richest wealth index. This may be due to rich households being located in well-developed areas of states and the feeling of safety from mosquitoes by respondents. Association between caregivers' socioeconomic status and use of bed nets by children under five was also reported in a study in Ebonyi, Southeast Nigeria(18). In another study, children from

wealthier households were more likely to use the nets than children from poorer households in Tanzania and Uganda(19). The WHO World Malaria Report 2020 indicated that ITN use was generally pro-poor or close to a perfect equality in West African Countries(1).

The majority (74.4%) of caregivers who reported that children U5 had a fever in the last 2 weeks, sought treatment for the fever. This is similar to findings from a previous study in Northern Nigeria (76.7%) and higher than that obtained in studies in Kaduna State, Nigeria, the Democratic Republic of the Congo, Myanmar, and Mozambique(66.7%) (14)(20)(21)(22)(23). This finding is however lower than the 100% target of the NMSP(24). Also, government health facilities and private medical stores were the places most caregivers sought treatment when children U5 had a fever. The utilization of government and private health facilities should be encouraged as it fulfills a core objective of the NMSP(24). This finding is similar to that obtained in a study in Northern Nigeria and Ethiopia(21)(25). Previous studies among caregivers of children U5 also revealed that most caregivers seek treatment from private medical stores(21)(25). This could be due to the presence of these stores in great numbers in communities of developing countries. The utilization of government and private health facilities should be encouraged as it is one of the objectives of the NMSP. Less than half of the respondents sought treatment for children with a fever the same day or next. This is similar to the findings in a study in Ethiopia which reported only 38.7% of children received treatment within 24hrs of fever onset(25). Age of child, caregivers' religion, and education were predictors of seeking advice or treatment for fever. Seeking treatment was higher for children less than 12 months old than children aged 36-59 months. This is similar to findings from a study in Burkina Faso(26). A study in Myanmar revealed that seeking treatment or advice for treatment was higher for children <36 months than older children. This may be due to caregivers perceived severity of fever in younger children compared to older children. Odds of seeking advice or treatment was higher in Muslim caregivers than Christian caregivers. Caregivers with higher education were more likely to seek care than those with secondary education. This is contrary to findings in a previous study in Mozambique where caregivers with higher education were less likely to seek care(23). Mothers of children from Osun, Ekiti and Lagos were less likely to seek care than those from Ogun state.

This study was a cross-sectional study. Thus, a causal relationship could not be established between dependent and independent variables. The survey responses could also be affected by social desirability bias and recall bias as women were asked questions on net use the previous night and fever in children within 2 weeks preceding the survey. Nevertheless, the results of this study revealed important findings that could help future policy planning.

Conclusion

This study showed that utilization of ITN and seeking care for fever in children U5 in Southwest Nigeria was below the national targets. The governments of Osun, Ekiti, and Lagos should develop and implement strategies to improve net use and health-seeking behavior for children U5.

Abbreviations

AOR: Adjusted Odds Ratio, CI: Confidence Interval, ITN: Insecticide-treated nets, U5: Under 5, NDHS: Nigeria Demographic Health Survey, NPC: National Population Commission, NMSP: National Malaria Strategic Plan, WHO: World Health Organization, LLIN: Long-lasting insecticide nets.

Declarations

Acknowledgments

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Authors' contributions

ME and MKA were involved in the design of the study, analysis, interpretation of findings, and drafted the manuscript. CDU, MSB, EB, and TD were involved in the interpretation of results and critical review of the manuscript. All the authors read and approved the final version of the manuscript.

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The study did not require funding as it was secondary data analysis.

Availability of data and materials

The dataset used may be availed by the DHS program on justifiable request.

Ethics Approval and Consent to participate

The survey protocol was reviewed and approved by the National Health Research Ethics Committee of Nigeria (NHREC) and the ICF Institutional Review Board. Informed consent for the survey was obtained from each respondent at the beginning of every individual interview. Confidentiality was maintained by the survey interviewers as records were serialized and did not disclose the identity of respondents.

Approval for use of Nigeria's DHS 2018 data set for secondary analysis was granted on 18th May 2020 by ICF International. The accessed data set was kept on a passworded computer.

Consent for publication

Not applicable

Competing interests

The authors declare that they have no competing interest

Author Details

¹Nigeria Field Epidemiology and Laboratory Training Program, Abuja, Nigeria. ²Department of Veterinary and Pest control services, Federal Ministry of Agriculture and Rural Development, Abuja, Nigeria. ³Department of Community Medicine, Alex Ekwueme Federal University Teaching Hospital, Abakaliki, Ebonyi State, Nigeria. ⁴Department of Epidemiology and Medical Statistics, College of Medicine, University of Ibadan, Ibadan, Nigeria. ⁵Department of Community Medicine, Ahmadu Bello University, Zaria, Kaduna State, Nigeria.

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Figures

Figure 1

Place where treatment of fever for children U5 was first sought