

Rural-Urban Disparities and Factors Associated with Delayed Care Seeking for Fever by Mothers of Under-Five Children, Lgabi LGA, Kaduna Nigeria.

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Research

Keywords: Malaria, Mothers, Fever, Treatment-seeking, Under-fives, Knowledge, Nigeria

Posted Date: May 19th, 2020

DOI: <https://doi.org/10.21203/rs.3.rs-29457/v1>

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Version of Record: A version of this preprint was published on August 18th, 2020. See the published version at <https://doi.org/10.1186/s12936-020-03371-w>.

Abstract

Background Fever in under-five children (U5) is the commonest presenting complaint in general practice and mothers' recognition is an entry point for fever treatment including malaria. This study describes rural - urban disparity in fever prevalence, mothers' malaria knowledge, and care seeking for fever in U5 and the associated factors.

Methods A cross-sectional survey was conducted among 630 mother-child pairs [rural (300) and urban (330)] selected randomly using a multi-stage sampling from 63 villages in Igabi LGA, Kaduna State, Nigeria. Trained female data collectors administered a pre-tested structured questionnaire to collect information on mother-child demographic profiles, malaria knowledge, fever episodes in birth order last child in two weeks prior to survey, and care - seeking for fever within 48 hours of onset. Care sought for fever > 48 hours of onset was defined as delayed care seeking. Malaria knowledge was categorized into good, average and poor if the final scores is ≥ 75 th , 50 th - 74 th , and < 50 th percentiles, respectively. Frequency, proportions, and odds ratio were calculated. Statistically significant was set at p-value < 0.05.

Results The median age (interquartile range) of rural mothers was 30 (IQR, 10) years compared to 27 (IQR, 6) years in urban. Of the 70.0% (441/629) U5 children with fever, 58.5% (258/441) were in rural settlements. A third of the mothers whose child had fever sought care. Mothers in rural settlement were 2.7 (CI: 1.8 – 4.2, $p < 0.01$) times more likely to delay care seeking for fever, and those with no knowledge of malaria transmission were 70% less likely to seek care (OR: 0.3, CI: 0.2 – 0.7). On the other hand, poor perception of malaria as a major health problem (OR: 2.1, CI: 1.4 – 3.1), and poor knowledge of cause of malaria (OR: 1.7, CI: 1.1 – 2.5) were associated with delayed seeking for fever among urban mothers.

Conclusions Disparity existed between fever prevalence in U5 children, care -seeking practices by their mothers, and factors associated with delayed care seeking for fever. Fever treatment for high impact malaria elimination needs a context specific intervention rather than 'one-size-fits-all' approach. Also, intensify efforts to educate mothers on malaria.

Background

Globally, 228 million malaria cases and 405,000 deaths were reported in 2018; India and 18 African countries accounted for 85% of these cases [1]. Children were more vulnerable with 67% of deaths in those less than the age of five years [1]. In 2018, Nigeria was the first among the 11 countries with high malaria burden globally, accounting for 25% of cases and 24% of deaths globally; although 40% of the population at risk slept under long-lasting insecticidal nets [1]. There was a one-fifth reduction (20%) in the proportion of under-five children (U5) that were positive for malaria using the malaria rapid diagnostic test from (45%) in 2015 [2] to (36%) in 2018 [3].

Recently, data have shown a global reversal in the gains of malaria control [4]. Malaria account for significant burden of febrile illnesses in endemic areas [5] and to achieve the vision of malaria elimination, a country-led 'High burden to High impact' approach was recommended by WHO in 2018.

The approach aimed at redirecting the static global malaria control response with focus on high malaria burden countries for impact. The pillar two of this approach emphasized the use of strategic information rather than one-size-fits-all approach to drive this impact. This encourage sub-national evidence-based stratification strategic information and interventions to drive impact for improve malaria elimination [4]. This underscores localized effort with focus on high-burden settings where intensified malaria interventions efforts are targeted at drastic reduction in malaria cases and deaths.

In Nigeria, like in other tropical countries, fever serves as a useful marker for recognition of infectious in under-five children including malaria [6, 7]. The prevalence of fever in U5 children in Kaduna State, Nigeria in 2018 was 26% [3]. Fever is a primary complaint for a third of all paediatric consultations in general practice [6, 8], and an entry point for parents or mothers to seek medical attention for U5 children including malaria diagnosis and case management [7, 9, 10]. Though fever is not a pathognomonic sign of malaria, it usually trigger mothers to take further actions in seeking appropriate care which may be diagnosed as malaria eventually [1].

Mothers' health seeking behaviour for febrile illness in U5 children is not commensurate with the high malaria burden in Nigeria, a country with favourable climatic conditions for malaria transmission [1, 2, 4, 11, 12]. Usually, mothers being the most-at-home in Nigeria take the first step in seeking treatment for their febrile child [13]. The knowledge and perception of the causes of the fever, and fever as indicator of illness severity may contribute to mothers' decision on how, when, and where to seek treatment advice. The Nigeria Demographic Health Survey 2018 revealed that 29% of mothers with no education had the highest proportion of children with a fever in the past 2 weeks [3] and six out of ten mothers sought advice from private sectors like patent medicine vendors and pharmacists. Additionally, home self-medication is a common response of mothers to fever like in other high malaria endemic countries [6, 13, 11]. Therefore, several factors may influence mothers to seek care or advice for fever within 48 hours of onset in U5 children.

Some of the factors influencing mothers' seeking advice or treatment for fever are short duration of fever [1], the season (rainy season) of the fever which coincides with high prevalence of malaria, source of treatment [14], rapid recovery from fever, rural location, availability of community-based health workers at health facilities, availability of malaria commodities in the health facilities, mother's level of education, mothers knowledge and perception of fever and malaria [10, 15], lack of money for transportation and other expenses to treat the fever, and the age and sex of the child [16], perception of the family decision maker, mothers' employment status [17], household size of less than four members [12], and hospital waiting time [13, 18–21]. These factors differ from one locality to another and within sub-populations. They influence mothers' care seeking behaviour for fever treatment in U5 children.

Despite the several measures put in place to reduce the prevalence of fever, a quarter of U5 children in Kaduna Nigeria had fever in last 2 weeks in 2018 National Demographic Health Survey. Therefore, to develop a context specific approach to fever treatment and drive high impact malaria elimination process in Igabi LGA Kaduna Nigeria, this study will provide information for intervention development. Therefore,

it aimed to describes rural - urban disparity in fever prevalence, mothers' malaria knowledge, and associated factors with delayed care seeking for fever in U5.

Methods

Study area

Igabi Local Government Area (LGA) with headquarters at Turunku, is one of the 23 LGAs in Kaduna State, North-west geopolitical zone, Nigeria. It has a population of 557,624 and is sub-divided into five urban districts, which are, Afaka, Birnin-yero, Kwarau, Rigachikun and Rigasa, and seven rural districts namely, Fanshanu, Gwaraji, Igabi, Kerawa, Sabo-Birnin, Turunku, and Zangon Aya. The LGA is located 650 m above sea level, between latitude $10^{\circ} 47' 0''$ N and longitude $7^{\circ} 46' 0''$ E in the tropical Sahel to Sudan Savannah with annual rainfall varying from 1000–1500 mm and highest precipitation of 72% in August. The rainy season and period of high malaria transmission is usually from June to October. The annual mean temperature is 34°C . This can rise to 41°C at the peak of the dry season in April and drop to as low as 12°C in January during severe harmattan. The prevalence of malaria cases diagnosed microscopically among under-five children in Kaduna state is 36.7% [2] This study employed a cross-sectional design.

Study Design And Population

This was a part of a larger study that has been published and addressed the characteristics of women of child bearing age (WCBA) associated with Long-lasting insecticidal nets (LLIN) ownership and utilization [22]. Moreover, the current analysis focused on rural - urban disparity in fever prevalence, mothers' malaria knowledge, and associated factors with delayed care seeking for fever in U5 children. Mothers and their under-five children with at least 12 months of residence in the selected households in the community were included. Anyone with cognitive deficits, or any chronic and debilitating illness that hinders effective participation in an interview was excluded.

Sample Size Determination

Using the formula, $n = z^2pq/d^2$ at 95% confidence interval (1.96), the percentage for children with fever for whom advice or treatment was sought in North-Western Nigeria is 63.6% [23] with a confidence limit of +/- 5%, and a non-response rate of 10%. To adjust the required sample size for cluster sampling design, a correction factor of 1.5 design effect was used as a less heterogenous communities in this district was assumed. Therefore, the calculated minimum sample size was 615. However, a minimum sample size of 630 was used to accommodate the sample size for the WCBA study [22].

Sampling Technique

Participants were selected using multi-stage sampling technique (Fig. 1).

The sampling technique has been described elsewhere [22]. In Stage 1, Igabi LGA was stratified into rural and urban wards and ten wards were randomly selected. These included six rural wards - Fanshanu, Gwaraji, Igabi, Sabo-Birnin, Turunku, Zangon Aya and four urban wards - Afaka, Birnin-yero, Rigachikun, and Rigasa. For the selection of a cluster or village/settlement in stage 2, we used the household enumeration data generated by WHO/UNICEF during micro-planning for the mass long-lasting insecticidal nets (LLIN) campaign in these settlements as the sampling frame. With a sample size of 630, to improve the validity and precision of estimates and considering a wide community representation (population variance), using a probability proportional to size; 63 villages or clusters (i.e., 30 rural and 33 urban) were randomly selected with a cluster size of 10. Using the list of the households in each village/settlement generated during micro planning for mass LLIN distribution, ten households were systematically selected from each village/settlement at stage 3. One mother each was interviewed in a household. In a selected household with multiple eligible mothers of under-five children, one was randomly selected by the ballot and recruited into the study. The last childbirth order of the eligible mothers was recruited into the study and if the last child was a set of twins, one of the twins was randomly selected by balloting.

Data Collection

Data was collected by ten trained female community health extension workers and nurses who speak English and Hausa languages fluently and reside within the district from September to October 2015 as described elsewhere [22]. They were supervised by five undergraduate medical students. The data collection tool was a pretested, structured questionnaire adapted from the Malaria Indicator Survey [24, 25] and other literature [26, 27]. This was used to collect information on demographic profile, mother's knowledge of malaria, history of fever onset in under-five children and mothers' fever treatment seeking behaviour within 48 hours of fever onset. The malaria knowledge items were questions from the literature, malaria indicator surveys and demographic health surveys. The questionnaire's face and content validity, item's accuracy, relevance, and clarity has been described elsewhere [22]. The knowledge of malaria was assessed using six thematic areas including cause of malaria, mode of malaria transmission, mosquito feeding time, malaria symptoms, malaria diagnosis and malaria prevention. Participants who correctly responded that mosquito bites caused malaria, malaria transmissions to humans is through the bite of mosquito, malaria mosquito feeding time was night-time, malaria symptoms are fever and any other symptoms, and malaria preventions by using either the Long Lasting Insecticidal Nets, Indoor Residual Spray or mosquito repellent coils were given "1" and incorrect responses scored "0". The individual score was calculated by finding a percentage of total score obtained from maximum allowable score of 6 and knowledge of malaria was categorized using percentile scores. Good knowledge of malaria, if final score falls at 75th percentile or more, score between 50th to 74th percentile as average knowledge and poor knowledge if score was < 50th percentile.

Study Variables

The outcome or dependent variables for this study was mothers' care/treatment seeking advice for fever within 48 hours of onset. Independent and explanatory variables were under-five children and respondents' characteristics and mother's knowledge of malaria items. Fever was assumed by mothers after tactile palpation of the children's skin and felt the hotness beyond normal. However, any fever episode in under-five children two weeks prior to the survey was taken as history of fever from which questions were asked from the mothers to know if advice or treatment was sought. Delayed care seeking for fever was defined as inability of the mothers to seek care for U5 children within 48 hours of fever onset [28].

Data processing and analysis

Data were entered and analysed using Epi-Info version 7 statistical software. We calculated frequency and proportions for socio-demographic characteristics, knowledge of malaria, presence of fever in under-five children in last two weeks, and mothers seeking advice or treatment for fever within 48 hours of onset. We calculated median (range) for continuous descriptive variables, frequency and proportions for categorical variables. Chi squared test was used to test for association between dependent outcome and independent categorical variables; results were presented in odd ratios at 95% confidence interval (C.I). To understand the associations between explanatory variables and delayed care seeking for fever, a rural-urban stratification analysis was done. Any associated factors with p value ≤ 0.2 were selected for upward loading into multivariable logistic regression model to identify predictors of delayed care seeking for fever by the mothers. Results of all statistical analyses were considered significant at p-value of < 0.05 .

Results

Mothers and under five children's characteristics

Six hundred and twenty-nine (99.8%) mothers or caregivers completed the interview of which 258 (41.1%) were employed, and 300 (47.7%) were living in rural communities. The median (interquartile range, IQR) age of mothers in the rural communities was higher 30 (IQR, 10) than the urban 27 (IQR, 6). Table 1 shows that 61.7% (185/360) of rural mothers had no education, but 45.3% (149/329) urban mothers had secondary level of education. There were significant differences in the rural and urban mothers' age ($p = 0.001$), educational level ($p = 0.001$) and occupations ($p = 0.001$). The median age (IQR) of the children was 12 months (IQR, 12). Of the 629 children 56.4% (355/629) were males, 50.6% (318/629) were aged 1–12 months and 29.1% (183/629) aged 13–24 months.

Table 1
Sociodemographic characteristics of respondents by location of residence (Rural/Urban), Igabi LGA, Kaduna Nigeria (N = 629)

Characteristics	Rural	Urban	Total
Mother's age group (Years)			
15–19	11 (3.7)	11 (3.3)	22 (3.5)
20–24	34 (11.3)	56 (17.0)	90 (3.5)
25–29	63 (21.0)	141 (42.9)	204 (32.4)
30–34	112 (37.3)	72 (21.8)	184 (29.3)
35–39	54 (18.0)	28 (8.5)	82 (13.0)
40–44	21 (7.0)	17 (5.2)	38 (6.0)
> 44	5 (5.5)	4 (4.4)	9 (1.4)
Tribe			
Fulani	6 (02.0)	33 (10.0)	39 (6.2)
Hausa	276 (92.0)	254 (77.2)	530 (84.3)
Igbo	0 (0.0)	9 (2.7)	9 (1.4)
Yoruba	0 (0.0)	15 (4.6)	15 (2.4)
Others*	18 (6.0)	18 (5.4)	36 (5.7)
Educational level			
None	185 (61.7)	70 (21.3)	255 (40.5)
Primary	90 (30.0)	54 (16.4)	144 (22.9)
Secondary	25 (8.3)	149 (45.3)	174 (27.6)
Tertiary	0 (0.0)	56 (17.0)	56 (8.9)
Occupation			
Housewife	208 (69.3)	153 (42.4)	361 (57.5)
Trader	39 (13.0)	72 (21.9)	111 (17.6)
Civil servant	5 (1.7)	55 (16.7)	60 (9.5)
Craft/Artisan	20 (6.7)	34 (10.3)	54 (8.6)
*Nupe (8), Jaba (3), Ebira (3), Gwari (1), Kanuri (1), Mada (1) Shuwa arba(1)			
Urban under-five children were younger, median age (IQR) was 12 (IQR 12) months compared to 24 (IQR 12) months in rural children.			

Characteristics	Rural	Urban	Total
Farmer	28 (9.3)	6 (1.8)	34 (5.4)
Student	0 (0.0)	9 (2.7)	9 (1.4)
*Nupe (8), Jaba (3), Ebira (3), Gwari (1), Kanuri (1), Mada (1) Shuwa arba(1)			
Urban under-five children were younger, median age (IQR) was 12 (IQR 12) months compared to 24 (IQR 12) months in rural children.			

Knowledge Of Malaria

Overall, 553 (87.9%) respondents knew that malaria is transmitted to humans through the bites of infected mosquito, 432 (68.7%) knew that malaria causing mosquitoes commonly feed on humans at night-time, 527 (83.8%) knew malaria symptoms, and 381 (60.6%) knew that malaria Rapid Diagnostic Testing kit and microscopy are useful in detecting if malaria causing organisms (parasites) is the cause of a fever. Of all the respondents, 342 (54.4%) mentioned that malaria can be prevented with the use of LLINs, indoor residual spray and mosquito repellent coils.

Table 2
 Knowledge of malaria among respondents by location of residence (Rural/Urban),
 Igabi LGA, Kaduna Nigeria, (N = 629)

Knowledge Items	Rural	Urban	Total
Cause of malaria			
Mosquito bite	145 (48.3)	212 (64.4)	357 (56.8)
Fever	17 (5.7)	0 (0.0)	17 (2.7)
Stagnant water, dirty environment,	21 (7.0)	32 (9.7)	53 (8.4)
No response	117 (39.0)	85 (25.8)	202 (32.1)
Malaria transmission route to humans			
Bite of malaria infected mosquito	261 (87.0)	292 (88.7)	553 (87.9)
Through contaminated water and foods	9 (3.0)	22 (6.7)	31 (4.9)
Don't know	30 (10.0)	15 (4.6)	45 (7.2)
Malaria mosquito feeding time			
Night-time	156 (52.0)	276 (83.9)	432 (68.7)
Both day and night-time	73 (24.3)	44 (13.4)	117 (18.6)
Day time	11 (3.7)	4 (1.2)	15 (2.4)
Don't know	60 (20.0)	5 (1.5)	65 (10.3)
Malaria Symptoms			
Headache	217 (72.3)	262 (79.6)	479 (76.1)
Fever	269 (89.7)	309 (93.9)	578 (91.9)
Shivering	162 (54.0)	119 (36.2)	281 (44.7)
Vomiting	164 (54.7)	188 (57.1)	352 (56.0)
Nausea	40 (13.3)	86 (26.1)	126 (20.0)
Dizziness	44 (14.7)	115 (34.9)	159 (25.3)
Loss of appetite	28 (9.3)	96 (29.2)	124 (19.7)
Diarrhoea	50 (16.7)	38 (11.5)	88 (14.0)
Malaria diagnosis			
Testing blood with RDT	158 (52.7)	128 (38.9)	286 (45.5)
Symptomatically	58 (19.3)	134 (40.7)	192 (30.5)

Knowledge Items	Rural	Urban	Total
Blood microscopy	47 (15.7)	48 (14.6)	95 (15.1)
Don't know	37 (12.3)	19 (5.8)	56 (8.9)
Malaria Prevention			
LLINs	108 (36.0)	144 (43.8)	252 (40.1)
Indoor Residual Spray	1 (0.3)	66 (20.1)	67 (10.5)
Use mosquito coil or repellent	51 (17.0)	90 (27.4)	141 (22.4)
Clearing of grasses/avoid breeding sites	197 (65.7)	228 (69.3)	425 (67.6)
Wearing long sleeve shirts	9 (3.0)	10 (3.0)	481 (76.1)
Knowledge of malaria			
Good	114 (38.0)	121 (34.6)	268 (42.6)
Average	77 (25.7)	94 (26.9)	165 (26.2)
Poor	109 (36.3)	135 (38.5)	196 (31.2)

Fever occurrence in under-five children and mothers' care seeking practice

Overall, 441 (70.0%) of the respondents reported any fever episode in last two weeks before survey among their under-five children but only 155 (35.2%) sought advice for care/treatment of fever within 48 hours of onset. Fever in last two weeks was commonly reported by mothers of under-five children in rural settlements 258/300 (86.0%) than the urban counterpart 183/329 (55.6%). But less rural mothers 63/258 (24.4%) than the urban counterpart 92/183 (50.3%) sought care or advice for fever within 48 hours of onset.

Of the 155 mothers who sought advice for care/treatment for fever within 48 hours of onset, 52 (33.5%) did home self-medication, 28 (18.1%) sought care at general hospital, 27 (17.4%) went to the pharmacy or patent medicine vendors' shop, 17 (11.0%) visited private hospitals and 5 (3.2%) sought advice from traditional/herbal treatment home. More rural mothers, 195/258 (75.6%) compared to 91/183 (49.7%) from urban settlements did not seek advice or care for fever within 48 hours. Of the 155 mothers who sought advice for care or treatment for fever within 48 hours of onset, 115 (74.2%) were given drugs to treat fever or what was perceived to cause the fever, but only 17 (11.0%) had their children's blood tested for malaria, and 11 (7.1%) had their children hospitalised following the fever episode (Table 3).

Table 3
Fever in under-five children and mothers' care seeking practice for fever, Igabi LGA, Kaduna
Nigeria,

Characteristics	Rural	Urban	Total	OR (95% C.I)	p Value
Child had fever (n = 629)					
Yes	258 (86.0)	183 (55.6)	441 (70.0)	4.9 (3.3–7.3)	< 0.01
No	42 (14.0)	146 (44.4)	188 (30.0)		
Total	300 (47.7)	329 (52.3)	629		
Mother sought care within 48 hrs (n = 441)					
No	195 (75.6)	91 (49.7)	286 (64.8)	3.1 (2.1–4.7)	< 0.01
Yes	63 (24.4)	92 (50.3)	155 (35.2)		
Total	258 (58.5)	183 (41.5)	441		
Child given drugs for fever (n = 155)					
Yes	41 (65.1)	74 (80.4)	115 (74.2)	0.4 (0.2–0.9)	< 0.04
No	22 (34.9)	18 (19.6)	40 (25.8)		
Total	63 (52.6)	92 (47.4)	155		
Any nets in household for sleeping (n = 629)					
Yes	269 (89.7)	228 (69.3)	497 (79.0)	3.8 (2.5–6.0)	< 0.01
No	31 (10.3)	101 (39.7)	132 (21.0)		
Total	300 (47.7)	329 (52.3)	629		

Factors associated with delayed care seeking for fever in U5 children

Women who lived in rural communities were three times more likely to delay seeking care compared to their urban counterpart (OR: 3.1, 95% CI: 2.1–4.7, $p < 0.001$) as shown in Table 4. Mothers with no formal education were twice more likely to delay care seeking for fever (OR: 1.8, CI: 1.2–2.7, $p = 0.003$) compared to those with formal education. Those who sees malaria as not a major health problem were thrice more likely (OR: 2.6, CI: 1.2–5.6, $p = 0.01$) to delay care seeking for fever in U5 and those having poor knowledge of cause of malaria were twice more likely to delay care seeking compared to mothers with good knowledge (OR: 1.7, CI: 1.1–2.5, $p = 0.01$). Those who had poor knowledge of malaria mosquitoes feeding time were twice more likely to delay care seeking for fever in U5 children (OR: 1.7, CI: 1.1–2.6, $p = 0.01$).

Table 4

Factors associated with delayed care seeking for fever by mothers of U5 children, Igabi LGA, Kaduna Nigeria. (N = 441)

Characteristics	Delayed care seeking		Total	95% CI	p Value
	Yes	No			
Mother's age < 30 years					
Yes	122 (59.8)	82 (40.2)	204	0.7 (0.4–0.9)	0.04
No	164 (69.2)	73 (30.8)	237		
Type of community					
Rural	195 (75.6)	63 (24.4)	258	3.1 (2.1–4.7)	< 0.01
Urban	91 (49.7)	92 (50.3)	183		
Mother's had formal education					
No	150 (72.1)	58 (27.9)	208	1.8 (1.2–2.7)	< 0.01
Yes	136 (58.4)	97 (41.6)	233		
Religion					
Christianity	11 (78.6)	3 (21.4)	14	2.0 (0.6–7.4)	0.27
Islam	275 (64.4)	152 (35.6)	427		
Malaria, a major health problem					
No	40 (81.6)	9 (18.4)	49	2.6 (1.2–5.6)	0.01
Yes	246 (62.8)	146 (37.2)	392		
Mothers knows what causes malaria					
No	137 (71.4)	55 (28.6)	192	1.7 (1.1–2.5)	0.01
Yes	149 (59.8)	100 (40.2)	249		
Mothers knows mode of malaria transmission					
No	27 (57.4)	20 (42.6)	47	0.7 (0.4–1.3)	0.26
Yes	259 (65.7)	135 (34.3)	394		
Mothers knows mosquitoes feeding time					
No	111 (72.5)	42 (27.5)	153	1.7 (1.1–2.6)	0.01
Yes	175 (60.8)	113 (39.2)	288		
Mothers knows malaria symptoms					

Characteristics	Delayed care seeking		Total	95% CI	p Value
No	232 (65.9)	120 (34.1)	352	1.3 (0.7–2.0)	0.35
Yes	54 (60.7)	35 (39.3)	89		
Mothers knows how to detect if fever is caused by malaria					
No	189 (66.5)	95 (33.5)	284	1.2 (0.8–1.8)	0.32
Yes	97 (61.8)	60 (38.2)	157		
Mothers knows malaria prevention measures					
No	142 (61.2)	90 (38.8)	232	0.7 (0.4–1.0)	0.09
Yes	144 (68.9)	65 (31.1)	209		
Total	286 (64.9)	155 (35.1)	441		

Overall, the observed significant associations between mothers' characteristics and delayed care seeking for fever was modified by rural – urban community stratification. On stratification, among the urban mothers, the perception that malaria is not a major health problem (OR: 2.1, CI: 1.4–3.1) and not knowing the cause of malaria (OR: 1.7, CI: 1.1–2.5) were the significant factors associated with delayed care seeking for fever in U5. But in rural dwelling mothers, those who did not know the mode of malaria transmissions were 70% less likely to delay care seeking for fever (OR: 0.3, CI: 0.2–0.7).

The predictors of mothers delaying seeking care for fever were rural location and mothers' perception that malaria is not transmitted to human through mosquito bites. Mothers in rural settlements were about thrice more likely to delay care seeking for fever in U5 children (adjusted OR: 2.7, CI: 1.8–4.2, $p < 0.01$). Finally, mothers who lacked the knowledge of malaria transmissions to humans were 60% less likely to delay seeking care for fever in U5 children (adjusted OR: 0.4, CI: 0.2–0.8, $p = 0.02$).

Discussion

This study describes rural - urban disparity in fever prevalence, mothers' malaria knowledge, and factors associated with delayed care seeking for fever in U5 children at Igabi LGA, Kaduna state, Nigeria. The rural – urban disparity exists in the age of U5 children and their mothers. Also, the urban mothers were more educated, currently employed and knowledgeable on malaria than their rural counterparts. However, the rural dwelling mothers reported high prevalence of fever in U5 children, but those who sought care for fever were few.

Living in rural settlement is associated with low level of education and may influence poor knowledge of malaria [1]. In line with previous literature, the urban mothers were exposed to formal education earlier, have access to newspapers, television, internet and social media for health information [3]. This may account for good knowledge of malaria among urban mothers than their rural counterparts. The mothers'

knowledge of malaria and the recognition of fever in U5 children is vital to activate care seeking for treatment [15]. The knowledge among urban mothers does not translate to high proportion of households with mosquito nets and utilization by U5 children [22] compared with high proportion of rural mothers with poor knowledge [3].

In Nigeria, fever episode is usually common in rural communities and was corroborated in this study [2]. The educational level of mothers may influence their decision to seek advice for care or treatment of fever in U5 children within 48 hours of onset. In this study, fever episode among U5 children in last 2 weeks occurred in three out of four. This was higher than a quarter reported in the 2018 DHS and 52.1% reported in 2015 Malaria Indicator Survey (MIS) for North West Geopolitical Zone, Nigeria [2], a survey that was done at same time as this study. Also, more fever episodes were reported in rural U5 children, like what was reported for Kaduna state in 2018 DHS where mothers in rural communities reported high proportion of U5 children with fever. Also, mothers living in urban communities sought advice for fever in U5 children earlier than rural mothers [3]. The proportion of mothers who sought advice promptly for care or treatment of fever episode within 48 hours of onset in U5 children was similar to 31.4% reported in 2015 MIS but lower to a study in Northern Nigeria that reported 61.5% [19], and 73% reported for Kaduna State in DHS 2018 [3] but higher than 28.6% reported in Ethiopia [10].

Approximately, four out of ten mothers sought care from a skilled health workers in hospital or primary health centre similar to other studies from Northern Nigeria [17, 19] but higher than 28% in 2018 DHS [3]. The study like others, reported similar proportions of mothers who sought care at pharmacy shops or patent medicine vendors [15, 12, 16, 18, 29] but some mothers resorted to self-medication at home and this proportion was lower to a study from south eastern Nigeria [18] and Myanmar [16]. Good knowledge of malaria transmission and prevention has been found to be associate with care seeking from skilled health workers for fever treatment [21], self-medication at home for fever in U5 children has also been associated with mothers' level of education [1] and was the case in our study, as three out of five mothers with formal education practiced self-medication in this study. Generally, factors like rural location of settlement, having a child who slept under LLIN a night before the survey and lack of knowledge on malaria transmission were associated with mothers delaying seeking advice or care for treatment of fever episode in under-five children within 48 hours of onset.

Different factors dictate why mothers of U5 children will not seek advice for care or treatment of fever within 48 hours of onset. In rural settlements, mothers are likely not to seek care for fever due to their poor exposures to formal education and health information [8]. High proportions of rural settlements have more households with any mosquito nets for sleeping and utilization by U5 children compared with urban settlements. This was directly related to fever episodes in rural U5 children but indirect relationship to mothers seeking advice for care or treatment of fever within 48 hours of onset. Rural mothers have low level of education and those with no knowledge of malaria transmissions were 70% less likely to seek advice early for treatment of fever in under – five children (OR: 0.3, CI: 0.2–0.7). The lack of knowledge on malaria transmission by mothers may possibly account for inappropriate use of available LLIN resulting to high fever episode in rural U5 children. The poor perception of malaria as not a major health problem

and not knowing the cause of malaria by urban mothers were the factors associated with not seeking advice for care or treatment of fever in U5 children within 48 hours of onset.

The rural - urban disparity shows that 'one-size-fits-all' approach to malaria elimination will not be effective but a context specific intervention to drive impact for malaria elimination [4]. It shows that factors responsible to mothers delaying seeking care for fever in U5 children differs in general population compared to and between rural and urban settlements. The type of residence is an event modifier of mothers' characteristics and delay care seeking for fever. Since low education among rural dwellers accounted for high U5 fever episode and not seeking care for febrile children [1], health education, health literacy campaigns, community sensitization to improve mothers understanding of fever and appropriate use of LLIN will be of help. Whereas in urban mothers, having formal education was associated with the practice of home self-medication for fever episode in U5 children.

For Igabi LGA to achieve greater impact in malaria elimination program, different interventions for behavioural change should be implemented in rural areas with high burden of U5 fever episode. Therefore, using a strategic information to drive high impact for fever treatment in rural areas that has high burden of U5 children with fever and mothers delaying care seeking for fever in U5 children, will reduce the number of children dying of malaria [4].

The demographic characteristics in this study were similar to the 2018 Nigeria Demographic Health Survey (DHS) [3]. Further strength of this study lies in the large sample size, being a community survey with sample size well spread in urban and rural settlements of Igabi LGA. The study may not be without any limitations. It may not be generalizable to Kaduna state's populations, prone to social desirability, and information bias. The information on the last child or youngest child of the mothers were collected to minimize information bias and participants were encouraged to speak the truth, assured of their confidentiality and that no consequences if they declined to participate. Moreover, the findings are useful for the LGA wherein this study was carried out. Despite these limitations, this study is valuable to identify areas with high burden of fever episode for intervention that will yield high impact for malaria elimination in the LGA.

Conclusions

Generally, disparity existed between fever prevalence in U5 children, care -seeking practices by their mothers, and factors associated with delayed care seeking for fever. The differences in rural-urban mothers' characteristics factors will influence care-seeking. To rapidly scale up fever treatment for high impact on malaria elimination, the LGA and sub-national Malaria Elimination Program should employ context specific interventions rather than 'one-size-fits-all' approach for malaria elimination strategy in Kaduna State, Nigeria.

Abbreviations

LLIN
Long-Lasting Insecticidal Nets
LGA
Local Government Area
WCBA
Women of child-bearing age
MIS
Malaria Indicator Survey
WHO
World Health Organization
UNICEF
United Nations Children's Fund

Declarations

Ethics approval and consent to participate

Ethical approval referenced MOH/ADM/744/VOL.1/326 was obtained from the Ethical Review Committee of Ministry of Health, Kaduna State, Nigeria. The LGA's Director of the Primary Health Care granted verbal permission and directed the ward focal persons in charge of the selected settlements to support. Participants were informed of the nature of the survey, benefit and risks, and their right to participate and decline at any time during the interview. We obtained written informed consent from each respondent before the interview but verbally seek the permission from the household head. Participants were assured of their confidentiality and identified using code numbers.

Consent for publication

Not applicable.

Availability of data and materials

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

Competing interests

The authors declare that they have no competing interests.

Funding

This study was supported by Cooperative Agreement Number U2R6H000046 funded by the United States Centres for Disease Control and Prevention through African Field Epidemiology Network to NFELTP. Its contents are solely the responsibility of the authors and do not necessarily represent the official views of

the United States Centres for Disease Control and Prevention or the Department of Health and Human Services.

Authors' contributions

OJB conceived the study and was responsible for its design, data collection, analysis and interpretation; and writing the draft manuscript. OA contributed to conceptualization of the study and the design of its protocol, data interpretation, drafting, formatting and final revision of the manuscript for important intellectual content. IOA contributed to data interpretation and revision of the manuscript for intellectual content. All authors read and approved the final revised manuscript.

Acknowledgements

The authors thank the participants for their cooperation We also thank the Nigeria Field Epidemiology and Laboratory Training Programme (NFELTP) for the financial support for the conduct of this study. We used Mendeley reference manager and Epi info software in this manuscript.

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Figures

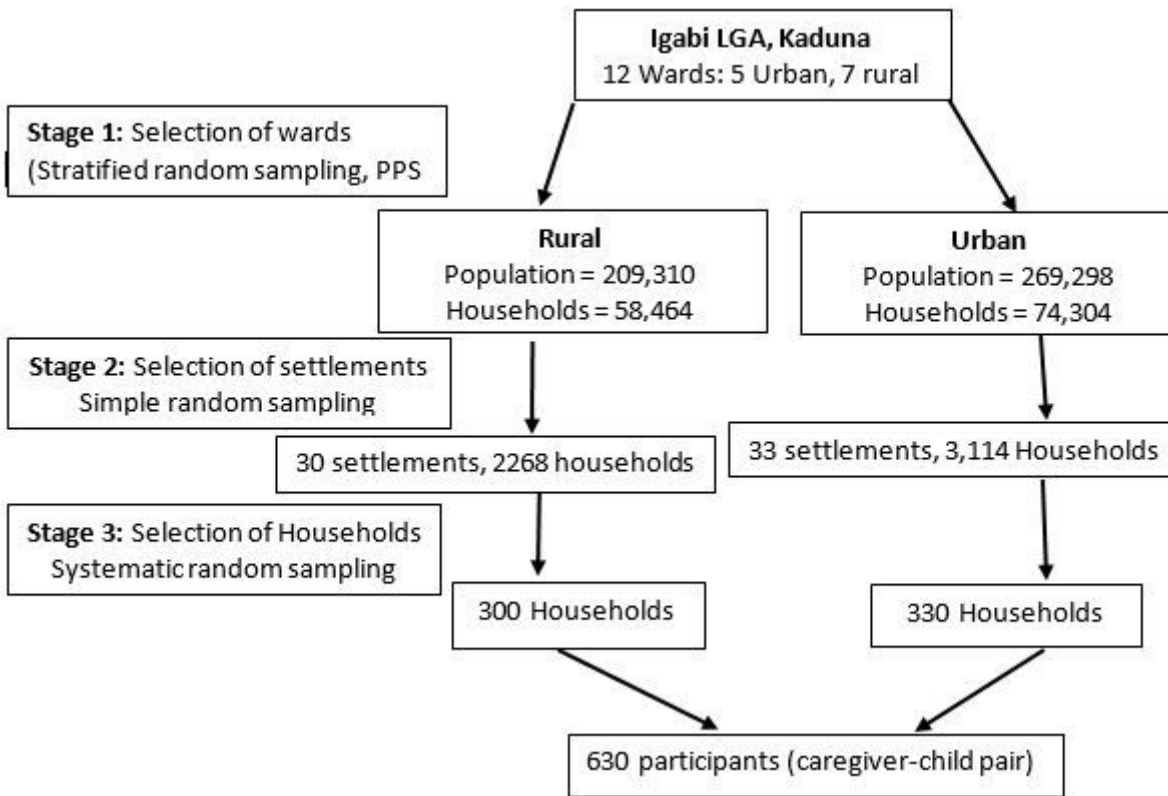


Figure 1

Schematic representation of sampling technique