Mothers’ Socioeconomic Differentials and Management of Malaria in Nigeria

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Abstract

About 150 million Nigerians live in areas of intense malaria transmission. Malaria has the greatest prevalence, close to 50% in children aged 6 to 59 months. A review of literatures revealed that more than 80% of malaria episodes received treatment outside of the existing government health care system. This means that treatments are rarely sought at health care facilities and are most often inappropriate or delayed. Reasons underlying these practices range from mothers’ socioeconomic status to difficulty in accessing health care facilities. Therefore, this study re-examined whether mothers’ socioeconomic characteristics and barriers to access health care facilities are major factors that influence mothers’ choice of treatment and delays in seeking treatment of malaria among under-five children in Nigeria. The study used Nigeria Demographic and Health Survey kids recode dataset. The data were analyzed using STATA 12 software. The result showed significant relationship between religion ($\chi^2 = 216.24, p < .05$), education ($\chi^2 = 257.55, p < .05$), occupation status ($\chi^2 = 21.88, p < .05$), wealth index ($\chi^2 = 207.08, p < .05$), type of residence ($\chi^2 = 18.56, p < .05$), region of residence ($\chi^2 = 350.82, p < .05$), and type of treatment sought and delay in seeking treatment for malaria. Also, the likelihood of seeking medical and prompt treatment among mothers with four different barriers is significantly less (odds ratio = 0.53; $p < .05$; 95% confidence interval = [0.38–0.75]), when compared with their counterparts without any barrier. The study concluded that mothers’ socioeconomic status and access to health care facilities must be improved to ensure appropriate and prompt use of health care facilities for treatment of malaria among under-five children in Nigeria.

Keywords

social sciences, under-five, mortality, demographics, early childhood, education, socioeconomic, childhood, malaria, Nigeria

Introduction

Malaria poses a major public health challenge as the third leading cause of death among under-five children worldwide. About 3.3 billion people are affected by malaria, almost half of the world’s population, in 106 countries and territories. World Health Organization (WHO) estimates that 216 million cases of malaria occurred in 2010, 81% in the African region that resulted in 655,000 malaria deaths in 2010, and 86% were children under 5 years of age (WHO, 2010). Thirty countries in sub-Saharan Africa account for 90% of global malaria deaths. Nigeria, Democratic Republic of Congo (DRC), Ethiopia, and Uganda account for nearly 50% of the global malaria deaths. Malaria is the second leading cause of death from infectious diseases in Africa, after HIV/AIDS, and the third leading cause of death for children after pneumonia and diarrheal disease worldwide (U.S. Agency for International Development [USAID] / President’s Malaria Initiative [PMI], 2011).

About 150 million Nigerians—almost the entire population of the country—live in areas of intense malaria transmission (WHO, 2008). Malaria has the greatest prevalence, close to 50%, in children aged 6 to 59 months in the South-West, North-Central, and North-West regions while it has the least prevalence, 27.6%, in children aged 6 to 59 months in the South-East region (USAID/PMI, 2011). According to studies, an estimated one in five children is due to malaria, which accounts for more than 300,000 deaths among under-five children every year. It is also believed to contribute up to 11% maternal mortality, 25% infant mortality, and 30% under-five mortality in Nigeria. In addition to the direct health impact of malaria, there are also severe social and economic burdens on communities and the country as a whole, with about 132 billion Naira lost to malaria annually in the form of treatment costs, prevention, loss of work time, and so on (Federal Ministry of Health, 2009).

As part of the child survival strategy, WHO and United Nations Children’s Emergency Fund (UNICEF), in 1995,
intensified effort and initiated the Integrated Management of Childhood Illnesses (IMCI) to assist developing countries reduce childhood mortality caused by most childhood killer diseases: diarrhea, acute respiratory infections, malaria, measles, and malnutrition. (WHO/UNICEF, 1997). Malaria control activities in Nigeria are planned and implemented through the primary health care (PHC) system (WHO, 2006). The strategy used for the implementation of the national anti-malarial treatment policy is that of Roll Back Malaria (RBM). The RBM strategy for the control of malaria has as one of its key elements that patients with malaria should have access to appropriate and adequate treatment within 24 hr of the onset of symptoms. However, the use of health care facilities as the first resort for malaria and treatment/management has been shown to be low in many African countries, including Nigeria. Treatments are rarely sought at health care facilities and are most often inappropriate or delayed (Guyatt & Snow, 2004; Kofoed, Rodrigues, Hedegaard, Rombo, & Aaby, 2004; Müller, Traore, Becher, & Kouyate, 2003). Less than 15% of the malaria episodes treated at home is treated correctly. Most fevers in children are treated with simple fever drugs, such as paracetamol and aspirin, but not with anti-malarial drugs. Even when anti-malarial drugs are purchased, they are commonly administered in inappropriate doses (WHO, 2004).

A review of mothers’ malaria treatment-seeking behavior in Nigeria revealed that more than 80% of malaria episodes received treatment outside the existing government health care system (Ajayi & Falade, 2006; Olaogun, Ayandiran, Olasode, Adebayo, & Omokhodion, 2005). Reasons underlying these practices range from maternal literacy and health education, socioeconomic status, difficulty in accessing health care facilities, attitude of health personnel, cultural beliefs on the ease of use of traditional herbs, and support for treatment offered by other household members (Feyisetan, Asa, & Ebigbola, 1997; Mermert & Nasbagasanyi, 2002; Namusobyia, 1998; Pérez-Cuevas, Guiscafré, Romero, Rodríguez, & Gutiérrez, 1996; WHO/UNICEF, 2003).

These shortcomings encourage treatment of malaria at home with drugs bought from shops and herbal preparations (Baume, Helitzer, & Kachur, 2000; Pérez-Cuevas et al., 1996; Salako et al., 2001). “These treatments are usually incorrect or sub-optimal” (Brieger, Osamor, Salami, Oladepo, & Otusanya, 2004; Jimmy, Acheolonu, & Orji, 2000). Mothers and caregivers only usually visit a health centre or hospital after the illness has failed to respond to several drugs and ineffective self-treatment. These practices increase morbidity and mortality in addition to contributing to possible emergence of drug resistance among under-five children in Nigeria (Okonkwo, Akpala, Okafor, Mbah, & Nwarwu, 2001; WHO/UNICEF, 2003).

Meanwhile, studies have shown that existing interventions could prevent many deaths among children if they are presented for appropriate and timely care (Jones et al., 2003). The WHO estimates that seeking prompt and appropriate care could reduce child deaths due to malaria, diarrhea, and acute respiratory infections by 20% (WHO, 1999). However, there are controversial findings on whether the use of modern health services is often influenced by individual perceptions of the efficacy of modern health services, religious beliefs, residence, occupation, place of delivery, wealth status, level of education, and so on (Adetunji, 1996; Adeyemi, 2000; Ene-Obong, Uwaegbute, Iroegbu, & Amazigo, 1998; Fapohunda & Beth, 2004; Hill, Kendall, Arthur, Kirkwood, & Adjei, 2003; Mekonnen & Mekonnen, 2002; Pate, 2001; Sabitu, 2004; United Nations Population Fund [UNFPA], 2002, 2004). Therefore, this article examined the influence of mothers’ socioeconomic characteristics and barriers to access health care facilities on mothers’ choice of treatment and delays in seeking treatment of malaria among under-five children in Nigeria.

Research Questions

Against the above background, the fundamental questions that readily come to mind are as follows:

Research Question 1: Do mothers’ socioeconomic characteristics (age, level of education, occupation, religion, wealth index, etc.) have significant influence on type of treatment sought and prompt treatment of febrile illness?

Research Question 2: Does barrier in accessing health care facilities have any influence on type of treatment and prompt treatment of malaria?

Method

Data Collection Method

The Nigeria Demographic and Health Survey (NDHS) kids recode data set was used for this study. The survey was cross-sectional. It was designed to provide specific information on population and health indicators at the national, zonal, and state levels. Information collected includes birth histories, in-depth demographic and socioeconomic information on illnesses, medical care, immunizations, and anthropometric details of children (National Population Commission [NPC] [Nigeria] & ICF Macro, 2009). Therefore, from the sampling frame of 33,385 of all married women interviewed in Nigeria, 18,028 women with at least a child aged 12 to 59 years were extracted, out of which 3,068 women whose child has had at least an history of malaria episode in the last 2 weeks before the survey were extracted for this study having applied the weighting factor.

Data Analysis

Having obtained the data set and extracted the eligible respondents, the data were analyzed using STATA 12 software. The analysis involved three stages. The first stage is
univariate analysis, at this stage, mothers’ background characteristics such as age, marital status, religion, education, place of residence, and so on, were examined. The bivariate analysis involved comparison and testing for significance between two variables such as mothers place of residence and type of treatment sought, mothers’ education and type of treatment sought, and so on. The third stage involved the multivariate analysis that further analyzed the relationships between independent and dependent variables. At this stage, logistic regression models were used based on the selected variables that were significant at the bivariate level.

Therefore, the following regression models were developed to predict the likelihood of medical and prompt treatment of malaria.

Model 1. (Model built with socioeconomic factors and type of treatment sought)

\[
\log \left( \frac{P}{1-P} \right) = a + b_1 X_1 + b_2 X_2 + b_3 X_3 + \cdots + b_n X_n,
\]

where \(P\) is probability of accessing medical treatment for malaria, \(a\) is the intercept, \(b\)'s are the slopes, \(X_1\) is respondents’ religion, \(X_2\) is respondents’ level of education, \(X_3\) is respondents’ occupational status, \(X_4\) is respondents’ place of residence, \(X_5\) is respondents’ wealth quintile, and \(X_6\) is respondents’ barrier to access health care facilities (\(n = 6\)).

Model 2. (Model built with selected significant socioeconomic factors and delay in accessing health care)

\[
\log \left( \frac{P}{1-P} \right) = a + b_1 X_1 + b_2 X_2 + b_3 X_3 + \cdots + b_n X_n,
\]

where \(P\) is the probability of accessing prompt treatment, \(a\) is the intercept, \(b\)'s are the slopes, \(X_1\) is respondents’ wealth index, \(X_2\) is respondents’ place of residence (\(n = 2\)).

All the analysis was done at 95.0% significance level (\(p\)-value, <0.05).

Measurement of Some Variables

- **Malaria**: Fever was used as a proxy for malaria. According to the NDHS, fever is the main symptom of malaria, the proportion of febrile children in the population is a proxy for assessing malaria prevalence, and any reduction in the malaria disease burden should lead to a reduction in the overall prevalence of fever (NPC & ICF Macro, 2009)

- **Type of treatment**: Type of treatment was accessed in three ways: (a) no treatment, (b) home/traditional treatment, and (c) medical treatment at second level of analysis (Note: level of treatment was dichotomized at the third level of analysis into: 1. Medical treatment, 0. Otherwise).

- **Delays in seeking treatment**: Delay in treatment was categorized into two: (a) treatment within 24 hr (prompt) of onset of symptoms and (b) treatment after 24 hr (delay).

**Result of the Study**

The Table 1 below presents the sociodemographic characteristics of the respondents. Majority of the mothers are within the age 25 and 39 (64.1%) while 95.1% of them are married with shared religious affiliation as Christian (43.1%) and Muslim (54.9%). Almost half (46.5%) of the women had no education, while 31.0% and 22.5% had primary and post secondary education, respectively. By occupation, more than half (67.3%) of the mothers were working at the time of the survey. About half (49.2%) of the respondents are within the lower wealth index. Also, three quarter (75.1%) of the respondents lives in the rural area as one quarter of their counterparts live within the urban centers (24.9%). By region of residence, 22.0%, 30.0%, 14.0%, and 17.2% of the women lives in North-East, North-West, South-East, and South-South, respectively, while others lives in North-Central (8.3%) and South-West (8.5%), respectively. More than half (54.1%) of the children received medical treatment; about one third (27.6%) received traditional or home-based treatment whereas about one fifth received no treatment during the recent episode of malaria. In addition, more than half (52.7%) of the mothers delayed in seeking medical treatment for their children while less than half (47.3%) of their counterparts sought prompt medical treatment for their children. In assessing barrier to access health care, findings showed that about one third (31.9%) of mothers had no barrier, one fifth (21.0%) had permission as a constraint, and more than one tenth (14.5%) had permission and money as a barrier, while 23.3% and 9.3% of the rest had permission/money/distance/transportation as a barrier in accessing health care facilities.

The Table 2 below presents the bivariate analysis of the relationship between mothers’ socioeconomic characteristics, type of treatment sought, and delay in seeking treatment. From the table, findings revealed no significant relationship between marital status (\(\chi^2 = 11.32, p > .05\)) and type of treatment sought. Across all ages (\(\chi^2 = 16.40, p < .05\)), tendency to seek medical treatments increases consistently with age of mothers. The proportion of never married (65.1%), widowed, or divorced women (66.3%) who sought medical treatment for their children is 10% point greater than the proportion of their married women (53.6%) counterparts.

Findings on mothers’ age (\(\chi^2 = 1.96, p > .05\)) and marital status (\(\chi^2 = 3.70, p > .05\)) show no significant relationship with delay in seeking treatment. Overall, 47.3% of mothers received prompt treatment for their children against their counterparts (52.7%) who delayed in seeking treatment for their children. By marital status, less than half of never married mothers (41.4%) and married mothers (47.3%) treat their children promptly within 24 hr of onset of symptoms as against more than half (57.2%) of widowed/divorced mothers who treat their children promptly.
Table 1. Percentage Distribution of Respondents by Sociodemographic Characteristics.

| Variables                  | Frequency | %  |
|----------------------------|-----------|----|
| Age                        |           |    |
| 15-24                      | 1,015     | 25.6|
| 25-34                      | 1,935     | 64.1|
| 35-40+                     | 1,018     | 10.3|
| Current marital status     |           |    |
| Never married              | 120       | 3.0 |
| Married                    | 3,771     | 95.1|
| Widow/divorced             | 77        | 1.9 |
| Religion                   |           |    |
| Christian                  | 1,713     | 43.1|
| Islam                      | 2,177     | 54.9|
| Others                     | 78        | 2.0 |
| Level of education         |           |    |
| No education               | 1,846     | 46.5|
| Primary                    | 893       | 22.5|
| Secondary+                 | 1,229     | 31.0|
| Occupational status        |           |    |
| Not working                | 1,299     | 32.7|
| Currently working          | 2,669     | 67.3|
| Wealth index               |           |    |
| Lower                      | 1,954     | 49.2|
| Middle                     | 765       | 19.3|
| Upper                      | 1,249     | 31.5|
| Place of residence         |           |    |
| Urban                      | 987       | 24.9|
| Rural                      | 2,981     | 75.1|
| Region                     |           |    |
| North-Central              | 330       | 8.3 |
| North-East                 | 872       | 22.0|
| North-West                 | 1,189     | 30.0|
| South-East                 | 555       | 14.0|
| South-South                | 682       | 17.2|
| South-West                 | 340       | 8.5 |
| Type of treatment          |           |    |
| No treatment               | 723       | 18.2|
| Medical treatment          | 2,148     | 54.1|
| Traditional/others         | 1,097     | 27.6|
| Delay in seeking treatment |           |    |
| No delay (within 24 hr)    | 1,306     | 47.3|
| Had delay (>24 hr)         | 1,457     | 52.7|
| Barrier to access health care |       |    |
| No problem                 | 1,265     | 31.9|
| Permission                 | 836       | 21.0|
| Permission/money           | 575       | 14.48|
| Permission/money/distance  | 925       | 23.3|
| Permission/money/distance/transport | 367 | 9.3 |
| Total                      | 3,968     | 100.0|

Source. Author’s work; Data computed from 2008 Nigeria Demographic and Health Survey.

Also, there exists a significant relationship between religion ($\chi^2 = 216.24, p < .05$), education ($\chi^2 = 257.55, p < .05$), occupation status ($\chi^2 = 21.88, p < .05$), wealth index ($\chi^2 = 207.08, p < .05$), type of residence ($\chi^2 = 18.56, p < .05$), region of residence ($\chi^2 = 350.82, p < .05$), and type of treatment sought for malaria. The proportion of Christian mothers who sought medical treatment (66.2%) for their children is about 20% point greater than the proportion of their Muslim (44.6%) counterparts who sought medical treatment for their children. Meanwhile, of those who sought medical treatment, less than half (48.4%) of Christian mothers and 46.2% of Muslim mothers sought prompt medical treatment as against more than half (51.8% vs. 53.5%) of their counterparts who delayed in seeking treatment.

Type of treatment and delay in seeking treatment varies consistently with mothers’ level of education: 69.0% for mothers with secondary education and above, 59.0% for those with primary education, and 49.0% for those with no education. The percentage of mothers who did not seek any treatment or sought treatment at home/traditional places is 10% point lower among mothers with primary (12.6% and 27.9%) education compared with their counterparts without any education (25.8% and 32.5%). Although not significant, but the proportion of mothers who gave prompt malaria treatment to their children increased consistently with level of education: 44.8% versus 55.2% of mothers with no education; 47.3% versus 52.7% of those with primary education; and 50.4% versus 49.6% of those with secondary or post secondary education sought prompt malaria treatment and delayed treatment, respectively, for their children.

By occupational status, 56.7% of working mothers against 48.8% of non-working mothers received medical treatment for their children while 17.3% and 26.0% of working mothers as against 20.3% and 31.0% of non-working mothers received no treatment and home/traditional treatment for their children. Meanwhile, the proportion of mothers with prompt malaria treatment increase slightly with occupational status: 47.8% for working mothers versus 46.0% for non-working mothers.

Also, more than half, 59.5% and 68.2%, of mothers within the middle and higher wealth index against 43.0% of those within the lower wealth index sought medical treatment for their children. Of those who sought treatment, larger percentage of mothers (57.9%) in the lower wealth index delayed as against 45.0% and 50.1% of their counterparts within the middle and higher wealth index that delayed in seeking treatment for malaria. Meanwhile, 58.7% versus 52.6% of urban and rural women sought medical treatment, respectively, while the percentage of rural women who delayed in seeking treatment is about 10% point greater than the percentage of their urban counterparts that delayed in seeking medical treatment.

By region of residence, more than half of the mothers in the South-East (71.9%), South-South (66.3%), North-Central
(60.2%), and South-West (60.1%) sought medical treatment for their children, while about one third of them in the North-East (24.2%), North-West (34.3%), North-Central (27.5%), and South-West (32.8%) received either home or traditional treatment for their children. Meanwhile, North-East (21.7%) and North-West (33.1%), across all regions, signify a region with higher percentage of children without any treatment during the illness.
Finally, the likelihood of seeking medical treatment among mothers with four different barriers or difficulties combined (permission, money, distance, transport) is consistently and significantly less (OR = 0.53; \( p < .05; \text{CI} = [0.38 - 0.75] \)) when compared with their counterparts with either barriers/difficulties with permission (OR = 1.12; \( p > .05; \text{CI} = [0.88 - 1.45] \)); barriers/difficulties with permission and money (OR = 0.84; \( p > .05; \text{CI} = [0.69 - 1.14] \)); or barriers/difficulties with permission, money, and distance (OR = 0.86; \( p > .05; \text{CI} = [0.69 - 1.08] \)); as well as those without any barrier/difficulties.

**Discussion of Findings**

This study examined mothers’ socioeconomic differentials and management of childhood malaria using the 2008 NDHS kids recode data set. Overall, 3,968 children had fever 2 weeks before the survey with majority of them within the age bracket 12 to 35 months. Averagely across all ages, exactly half of the children received treatment from medical centers, about one third received treatment at home or traditional health providers while about one fourth of the rest received no treatment at all. Meanwhile, against the fourth key element of RBM strategy of accessing appropriate and adequate treatment within 24 hr of onset of symptoms, a little more than half of the mothers delayed beyond 24 hr before seeking treatment for their children. In line with D’Souza’s (2003) research findings, delay in seeking treatment could be influenced by past experience with similar illnesses which motivate mothers to play a “waiting game” to see if the illness subsides on its own, particularly in situations where the cost of care is an inhibitory factor (D’Souza, 2003).

Urban mothers were found to have better chance of giving their children medical and prompt treatment during malaria illness than their rural mother counterparts. Also, greater percentage of children within South-East, South-South, North-Central, and South-West regions received medical treatment when compared with other regions. Conversely, greater percentage of mothers in the North-East, North-West, and North-Central have the highest proportion of children with fever whose treatment were delayed or were not treated at all or treated at home with traditional herbal medicine. These findings are in line with Guyatt and Snow’s (2004), Kofoed et al.’s (2004), and Müller et al.’s (2003) research findings, which concluded that malaria treatments are rarely sought at health care facilities and are most often inappropriate or delayed.

The significant relationship found between religion, medical choice of treating malaria, and prompt treatment of malaria corroborate earlier findings by Adamu (2001), Addai (2000), and Adetunji (1996), as this study revealed that Islamic mothers and those in the other religion are significantly less likely to give medical and prompt treatment to their children during malaria illness when compared with their Christian counterparts.

As the numbers of difficulties faced in seeking treatment increase (57.7% for permission; 55.1% for permission and money; 52.1% for permission, money, and distance; and 35.3% for permission, money, distance, and transportation), the percentage of women who sought medical treatment for their children decreases, respectively. Also, the proportion of mothers whose children received prompt treatment varies consistently with numbers of difficulties encountered.

The Table 3 below presents the odds ratio (OR) of the general binary logistic regression for the likelihood of receiving medical and prompt treatment for children aged 12 to 59 months who had malaria within 2 weeks preceding the survey. The logistic regression was built with two models by selecting all mothers’ socioeconomic factors that have a significant relationship with type of treatment and delay in treatment at the bivariate level of analysis. The first model therefore examined the likelihood of receiving medical treatment with the selected mothers’ socioeconomic factors while the second model examined the odds of giving prompt treatment with the selected significant socioeconomic factors at the bivariate level of analysis having controlled for region of residence.

Findings from logistic regression at this multivariate level of analysis showed that the odds of seeking medical treatment for children by their mothers vary proportionally with level of education. Mothers with no education (OR = 0.62; \( p < .05; \text{CI} = [0.47 - 0.81] \)) and primary education (OR = 0.67; \( p > .05; \text{CI} = [0.67 - 1.14] \)) are less likely to seek medical treatment for their children compared with their counterparts with secondary education and above. Mothers within the middle (OR = 0.77; \( p < .05; \text{CI} = [0.59 - 1.00] \)) and lower wealth index (OR = 0.49; \( p < .05; \text{CI} = [0.37 - 0.64] \)) are significantly less likely to seek medical treatment; as they are also less likely to seek prompt treatment (OR = 0.91; \( p > .05; \text{CI} = [0.98 - 1.76] \) vs. OR = 0.81; \( p > .05; \text{CI} = [0.62 - 1.05] \)) for their children when compared with mothers within the higher wealth index.

Meanwhile, the logistic regression at this level found no significant relationship between mothers’ occupational status and likelihood of seeking medical and prompt treatment for childhood malaria. However, findings showed that the odds of seeking medical treatment among mothers who were not working (OR = 0.88; \( p > .05; \text{CI} = [0.57 - 0.88] \)) is less when compared with that of their counterparts in the working class category. Furthermore, Islamic mothers (OR = 0.72; \( p < .05; \text{CI} = [0.55 - 1.71] \)) and those in the other religion (OR = 0.98; \( p < .05; \text{CI} = [0.14 - 2.27] \)) are significantly less likely to take their children for medical treatment compared with their Christian counterparts.

Also, the odds of giving medical treatment (OR = 0.34; \( p > .05; \text{CI} = [1.07 - 1.69] \)) as well as prompt treatment (OR = 0.82; \( p > .05; \text{CI} = [0.63 - 1.06] \)) among mothers in the rural area are significantly less when compared with the odds of giving medical treatment as well as prompt treatment among mothers in the urban centers.

**Discussion of Findings**

This study examined mothers’ socioeconomic differentials and management of childhood malaria using the 2008 NDHS kids recode data set. Overall, 3,968 children had fever 2 weeks before the survey with majority of them within the age bracket 12 to 35 months. Averagely across all ages, exactly half of the children received treatment from medical centers, about one third received treatment at home or traditional health providers while about one fourth of the rest received no treatment at all. Meanwhile, against the fourth key element of RBM strategy of accessing appropriate and adequate treatment within 24 hr of onset of symptoms, a little more than half of the mothers delayed beyond 24 hr before seeking treatment for their children. In line with D’Souza’s (2003) research findings, delay in seeking treatment could be influenced by past experience with similar illnesses which motivate mothers to play a “waiting game” to see if the illness subsides on its own, particularly in situations where the cost of care is an inhibitory factor (D’Souza, 2003).

Urban mothers were found to have better chance of giving their children medical and prompt treatment during malaria illness than their rural mother counterparts. Also, greater percentage of children within South-East, South-South, North-Central, and South-West regions received medical treatment when compared with other regions. Conversely, greater percentage of mothers in the North-East, North-West, and North-Central have the highest proportion of children with fever whose treatment were delayed or were not treated at all or treated at home with traditional herbal medicine. These findings are in line with Guyatt and Snow’s (2004), Kofoed et al.’s (2004), and Müller et al.’s (2003) research findings, which concluded that malaria treatments are rarely sought at health care facilities and are most often inappropriate or delayed.

The significant relationship found between religion, medical choice of treating malaria, and prompt treatment of malaria corroborate earlier findings by Adamu (2001), Addai (2000), and Adetunji (1996), as this study revealed that Islamic mothers and those in the other religion are significantly less likely to give medical and prompt treatment to their children during malaria illness when compared with their Christian counterparts.
In line with earlier studies by Pérez-Cuevas et al. (1996) and WHO/UNICEF (2003), which associate maternal literacy and mothers’ education with utilization of health care facilities, this study also revealed that type of treatment and prompt treatment of malaria varies monotonically with mothers’ level of education. Mothers with no education or with primary education are less likely to seek medical and prompt treatment for their children compared with their counterparts with secondary education or more. Efforts therefore need to be intensified on health education with emphasis on the importance of identifying vital malaria signs and giving prompt and appropriate care to febrile children within 24 hr of onset of the symptoms as advocated by WHO (2004).

Also, this study showed that the proportion of mothers with prompt malaria treatment increased slightly with occupational status. That is, mothers who are currently working are more likely to seek medical and prompt treatment of malaria for their children. In addition, mothers’ wealth index showed a significant relationship with type of treatment sought and delay in seeking treatment. Mothers within the middle and lower wealth index are significantly less likely to seek medical treatment; as they are also less likely to seek prompt treatment for their children when compared with their counterparts within the higher wealth index.

Furthermore, findings revealed that larger percentages of urban mothers sought medical treatment for their children when compared with their counterparts in the rural areas. The odds of giving medical treatment and prompt treatment among mothers in the rural area was found to be significantly less when compared with the odds of giving medical treatment and prompt treatment among mothers in the urban centers. In addition, our findings showed that rural mothers are more likely to delay in seeking treatment compared with their urban counterparts. These findings are in line with the

**Table 3.** General Binary Logistic Regression Models 1 and 2 for the Likelihood of Receiving Medical and Prompt Treatment for Children Aged 12 to 59 Months who had Malaria within 2 Weeks Preceding the Survey.

| Selected variables                  | Type of treatment received (medical treatment) | Delay in accessing medical treatment (no delay) |
|------------------------------------|-----------------------------------------------|-----------------------------------------------|
|                                    | Model 1                                      | Model 2                                      |
|                                    | Odds ratio (SE) | p value | 95% CI   | Odds ratio (SE) | p value | 95% CI   |
| Socioeconomic factors              |                                               |                                               |
| Level of education                 |                                               |                                               |
| Secondary+                         | RC                                            |                                               |
| None                               | 0.62 (0.09) | .001** | [0.47 - 0.81] |                                               |
| Primary                            | 0.88 (0.12) | .334   | [0.67 - 1.14] |                                               |
| Wealth index                       |                                               |                                               |
| Higher class                       | RC                                            |                                               |
| Middle class                       | 0.77 (0.10) | .049** | [0.59 - 1.00] | 0.91 (0.20) | .065   | [0.98 - 1.76] |
| Lower class                        | 0.49 (0.07) | .000** | [0.37 - 0.64] | 0.81 (0.11) | .107   | [0.62 - 1.05] |
| Occupation status                  |                                               |                                               |
| Working                            | RC                                            |                                               |
| Not working                        | 0.88 (0.08) | .158   | [0.74 - 1.05] |                                               |
| Religion                           |                                               |                                               |
| Christianity                       | RC                                            |                                               |
| Islam                              | 0.72 (0.08) | .004** | [0.57 - 0.88] |                                               |
| Others                             | 0.98 (0.28) | .940   | [0.55 - 1.71] |                                               |
| Place of residence                 |                                               |                                               |
| Urban                              | RC                                            |                                               |
| Rural                              | 0.34 (0.16) | .011** | [1.07 - 1.69] | 0.82 (0.11) | .131   | [0.63 - 1.06] |
| Barriers to in access HCF          |                                               |                                               |
| No constraint                      | RC                                            |                                               |
| Permission                         | 1.12 (0.15) | .346   | [0.88 - 1.45] |                                               |
| Per/money/                         | 0.86 (0.09) | .186   | [0.69 - 1.08] |                                               |
| Per/money/distance                 | 0.84 (0.11) | .355   | [0.69 - 1.14] |                                               |
| Per/money/distance/transport       | 0.53 (0.09) | .000** | [0.38 - 0.75] |                                               |

Note. Standard errors are in parenthesis. Model 1 = Model built with significant socioeconomic factors and type of treatment; Model 2 = Model built with selected significant socioeconomic factors and delays in accessing health care. CI = confidence interval; RC = reference category; HCF = health care facilities.

**p .05.**
studies conducted by Adeyemi (2000), Mekonnen and Mekonnen (2002), Sabitu (2004), and UNFPA (2002, 2004), which concluded that there are differences in utilization of health care facilities and maternal health care services between urban and rural areas.

Findings on barrier or difficulties in accessing health care facilities and prompt treatment revealed a significant relationship in line with research findings by Hill et al. (2003), Mermert and Nsabagasanyi (2002), and Namusobya (1998), where they concluded that lack of finance for medical consultation and treatment, distance from health care facilities, and so on, are important barriers to accessing health care facilities. Therefore, these research findings also concluded that difficulties/barriers to access health care facilities significantly decrease medical and prompt treatment of malaria in children.

Conclusion and Policy Recommendation

Having used both bivariate and multivariate level of analysis, findings from this study concluded that mothers’ socioeconomic characteristics and barriers to access health care facilities are significant factors militating against medical and prompt treatment of malaria in Nigeria. As revealed by this study, about 50% of febrile children are never seen within health care facilities. They are either treated at home or not treated at all. Therefore, appropriate and prompt use of health care facilities for treatment of malaria within 24 hr of onset of symptoms are critical to the successful achievement of the United Nation’s Millennium Development Goal 4, which calls for a two-thirds reduction in child mortality by 2015.

Although, National Policy on Malaria Diagnosis and Treatment (Federal Ministry of Health, 2005, 2010) promotes the treatment of uncomplicated malaria at home with artemisinin-based combination therapies (ACTs). However, it is disappointing that many people did not know about ACTs, and many of those who know cannot afford it. Also, misdiagnosis and management of malaria for other febrile illnesses at home have been established by studies to be contributing to over-diagnosis of malaria and irrational use of anti-malarial drugs which have the potential for facilitating resistance to these drugs as emphasized by WHO (2010).

Therefore, to reduce childhood mortality due to malaria, home management of malaria must be discouraged, “both by the ministry of health and the religious leaders,” and mothers must be sensitized to respond promptly to treatment of malaria in their children within health care facilities. Also, modern, equipped, and affordable health care facilities must be increased in the rural areas. Most of the rural areas do not have access to good health care systems. Usually, there are no accessible roads to the health centers, which in turn are poorly equipped and have inadequate drugs for malaria treatment. This poses a serious threat to clinical management and treatment of malaria and also influence people who cannot afford anti-malarial drugs to tend toward self-medication with local herbs. Finally, as mothers’ education has been associated with medical and prompt treatment of malaria, investing in women’s education through free education as well as intensive campaign to motivate them to go for higher level of education will be a worthwhile effort. Higher education will enhance their wealth index and occupational status which will in turn have a positive influence on their ability to care for children.

Limitation of the Study

The study make use of a secondary data obtained from the 2008 Nigeria Demographic and Health Survey, which is a nationally representative data, and the author was not opportune to get the data in its natural settings. Thus, there are some limitations as predetermined by the data in terms of the questionnaire design and variable measured. For instance, mothers’ knowledge of severity of malaria sickness as well as perceived benefit of prompt initiation of treatment was not measure and therefore cannot be measured by this study. Also, cases of missing values and high non-response rate are common in the data set, and this was responsible for some variation in the row totals in the “Analysis” section.

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