Sociodemographic and Clinical Determinants of Time to Care-Seeking Among Febrile Children Under-Five in North-Central Nigeria

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ABSTRACT

Objectives: Our study sought to determine the time parents of febrile children under the age of five took to seek competent medical care. We also looked at the possible sociodemographic/clinical factors that influenced this presentation. *Methods:* Four hundred and nine under-fives presenting at the emergency unit with a history of fever in the last 48 hours along with their mothers were recruited over four months. Relevant sociodemographic information as well as symptoms and duration of illness were obtained. Multinomial regression analysis was performed to determine the predictors of early and late presentation. *Results:* Over half (57%) of patients presented within 24 hours of onset of fever. The mean age of the children and mothers were 22±15 months and 30±5 years, respectively. High social class (odds ratio (OR) 6.5, 95% CI 1.6–26.4), Hausa ethnic group (OR 19.3, 95% CI 5.7–65.6), convulsions (OR 3.2, 95% CI 1.6–6.5) and appearance of other symptoms (OR 6.0, 95% CI 3.0–12.0) were significant predictors of early presentation. Secondary school education, belonging to another ethnic group, and non-resolution of fever were significant predictors of late presentation. *Conclusion:* The majority of febrile under-fives came to the hospital to seek competent medical care within the first 24 hours of illness. However, there is a need for more parental education on early hospital presentation for parents of low socioeconomic status and educational background.

F ever is a very common symptom/sign in children that frequently indicates ill-health.[1,2] Often, it is the earliest symptom reported by parents and a source of great fear to them. A wide variety of conditions can lead to fever in children; however, in developing countries, most cases result from infections and infestations. Screening studies for malaria have revealed that it is responsible for between 15 and 57% of fever among children in Nigeria.[3,4] Other common causes of fever include respiratory and urinary tract infections (RTI/UTI), diarrheal disease, and sepsis.[5] Early diagnosis and treatment remains a cardinal principle in the appropriate management of several infections in children including, malaria, RTI, and UTI.[6,7]

In 2000, the African Heads of States in Abuja, Nigeria, declared that by the end of 2005, at least 60% of those suffering from malaria should have easy access to appropriate and affordable treatment within 24 hours of the onset of symptoms.[6] This target was subsequently scaled up to 80% in 2013.[8] This recommendation led to governments at various levels instituting programmes to ensure early access to appropriate therapy. These strategies included deployment of rapid diagnostic tests at the community/facility level, community and home management of malaria, and provision of affordable and effective artemisinin-based antimalarial combination therapy, amongst others.[8] These strategies are aimed at ensuring the child with malaria promptly receives an appropriate antimalarial. Despite the above recommendation and strategies, major delays still exist in access to appropriate health services. The Nigerian multiple indicator cluster survey in 2011 reported a wide variation in the proportion of children with malaria receiving antimalarial drugs within 24 hours ranging from 8.6% in Kebbi state to 80.0% in Lagos state.[9] Only one of the 36 states met the recommended 80% target.[9]

While the above data relate largely to malaria, the general principles are still applicable to most febrile illnesses in children. Thus, it is recognized that a major contributor to disease severity and mortality in febrile children is the time to presentation at a health care facility.[10] Therefore, our study sought to explore sociodemographic and clinical factors influencing the time to presentation to a competent

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health facility for febrile under-fives in Ilorin, North-Central Nigeria.

METHODS

This descriptive, cross-sectional study was conducted at the children's emergency unit of the University of Ilorin Teaching Hospital, in the North Central Region of Nigeria as part of a larger study. The hospital is a tertiary care facility; however, it provides primary and secondary levels of care to individuals within its immediate environs. The study participants were children under the age of five and their parents. A minimum sample size of 384 children was calculated and 409 children and their parent(s) were eventually recruited over a four-month period between August and November 2009.

Ethical clearance was obtained from the University of Ilorin Teaching Hospital's Ethical Review Committee. Individual informed consent was also obtained from the mother, father, or the caregiver of the child, as applicable.

Parents of children under five years of age, with children admitted to the children's emergency unit with complaints of fever in the last 48 hours, were recruited consecutively. Study participants were recruited at presentation, after providing initial care. Children with critically ill health and siblings of previously recruited children were excluded. All study participants answered a structured interviewer-administered questionnaire. Relevant sociodemographic data of the child and parents was obtained with details of the presenting symptoms and any others. The duration of the illness and the time to first presentation at a competent health care facility was determined. We defined "competent health care" as presentation to and care provided at a health clinic, primary, secondary, or tertiary hospital and excluded patent medicine vendors, faith homes and "health workers in the neighborhood". Socioeconomic class was assigned according to the method proposed by Oyedeji et al,[11] using the occupation and educational status of each parent.

SPSS Statistics (SPSS Inc., Chicago, USA) version 20 was used for statistical analysis. Frequency distribution tables and cross-tabulation of variables were generated. The mean and standard deviation for quantitative variables were provided and the proportion for qualitative variables was also determined. Basic tests of statistical significance such as chi-square (χ^2) and one-way analysis of variance (F-test) were utilized as required. Early presentation was defined as presentation within 24 hours of onset of fever and late presentation as presentation after three days of onset.[3,6] Multiple logistic regression analysis was used to identify significant predictors of early and late presentation using a model created from variables that were significant on a univariate analysis. Categorical variables were modelled as dummy variables; that is, an ordinal relation was not imposed. Both main effects and interactions between variables were considered. A p-value of <0.050 was considered significant.

RESULTS

Four-hundred and nine children aged two to 56 months and their mothers were recruited over the study period. The mean ages of the mothers and children were 30±5 years and 22±15 months, respectively. There were 252 male children (61.6%). The predominant ethnic group of the mothers was Yoruba (75%). Seventy percent of parents (n=285) were Muslim and 30% were Christian (n=124 parents). Thirty-two percent of mothers belonged to the high social class (social classes I and II), 28% (n=114) were of the middle class (social class III), and 40% (n=165) belonged to the low classes (social class IV and V). Two hundred and thirty-three parents (57%) sought competent care for their children within 24 hours of fever onset, 138 sought care one to three days after onset of symptoms and the remaining 38 parents waited more than three days [Table 1]. Parents were asked the reason for the current presentation. Reasons included, other symptoms (61%), worsening of fever (51%), perceived discomfort in the child (49%), non-resolution of fever (45%), non-resolution of other symptoms (26%), convulsions (19%), and fear of brain damage (11%). Some gave multiple responses. The reasons for presentation were stratified among the various categories of duration of illness before presentation to determine any association.

Multinomial logistic regression was used to identify predictors of early (<24 hours) and late (>3 days) presentation using the variables of maternal socioeconomic status, highest educational qualification, number of siblings, and ethnic group (variables that were significant in the univariate analysis) in the creation of the model. Reasons for

Table 1: Distribution of selected sociodemographic variables according to the time of presentation to a competent health care setting.

Variable	<1 day n=233	1–3 days n=138	>3 days n=38	Total (%) (n=409)	OR (95% confidence interval)
Mean maternal age	29.97 (4.43)	29.95 (4.34)	31.74 (5.67)		F=2.657, p= 0.07
Social class					
I-II	96 (23.5)	23 (4.3)	11 (2.7)	130 (31.8)	0.2 (0.1–0.4)
III	73 (17.8)	35 (8.6)	6 (1.5)	114 (27.9)	0.4 (0.3–0.6)
IV-V#	64 (15.6)	80 (19.6)	21 (5.1)	165 (40.3)	
Religion					
Islam#	159 (38.9)	105 (25.7)	21 (5.1)	285 (69.7)	
Christianity	74 (18.1)	33 (8.1)	17 (4.2)	124 (30.3)	0.8 (0.5–1.2)
Ethnic group					
Yoruba#	160 (39.1)	117 (28.6)	20 (4.9)	297 (72.6)	
Hausa	33 (8.1)	4 (1.0)	2 (0.5)	39 (9.5)	0.2 (0.1–0.5)
Ibo	9 (2.2)	5 (1.2)	1 (0.2)	15 (3.7)	0.9 (0.3–2.4)
Others	31 (7.6)	12 (2.9)	15 (3.7)	58 (14.2)	0.7 (0.4–1.2)
Number of siblings					
0–2	162 (39.6)	78 (19.1)	16 (3.9)	256 (62.6)	0.6 (0.4–0.9)
≥3#	71 (17.4)	60 (14.7)	22 (5.4)	153 (37.4)	
Highest maternal education					
None	31 (7.6)	35 (8.6)	6 (1.5)	72 (17.6)	3.7 (2.0–6.6)
Primary	30 (7.3)	44 (10.8)	5 (1.2)	79 (19.3)	4.9 (2.7–8.6)
Secondary	77 (18.8)	30 (7.3)	20 (4.9)	127 (31.1)	1.6 (0.9–2.6)
Tertiary#	95 (23.2)	29 (7.1)	7 (1.7)	131 (32.0)	

Data presented as mean±SD.
OR=odds ratio; F= one-way analysis of variance ; # Reference category.

Table 2: Multinomial logistic regression analysis for predictors of early presentation (<1 day) of febrile children.

Variable#	B**	OR (95% confidence interval)
High social class	1.9	6.5 (1.6–26.4)
Middle social class	0.9	2.5 (0.8–8.1)
Low social class*	0	
Hausa	3.0	19.3 (5.7–65.6)
Ibo	-1.6	0.2 (0.1–0.8)
Yoruba*	0.0	
Others$	-0.3	0.8 (0.3–2.2)
No education	-1.2	0.3 (0.1–1.3)
Primary education	-1.7	0.2 (0.0–0.9)
Secondary education	1.0	0.4 (0.1–1.2)
Post-secondary education*	0.0	
Worsening of fever	1.3	3.6 (1.7–7.6)
Non-resolution of fever	-1.1	0.6 (0.2–0.6)
Occurrence of convulsions	1.2	3.2 (1.6–6.5)
Appearance of other symptoms	1.8	6.0 (3.0–12.0)

#Early presentation (<1 day) compared against one to three days and more than three days combined.
*The parameter is set to zero as it as a reference category and is therefore redundant.
**Estimated logit coefficient.
$Others refer to Nupe, Fulani, Baruba, Igala ethnicities.
OR: odds ratio.

presentation (worsening of fever, non-resolution of fever, occurrence of convulsions, and appearance of other symptoms) were subsequently added on to the model [Tables 2 and 3]. The multinomial logistic regression model goodness of fit measure (Nagelkerke R^2), was statistically significant (χ^2=240.4, degree of freedom(df)=24, p<0.005). The model explained 53.9% of the variance in the categories of time to presentation. High maternal social class increased the odds of a child being brought within 24 hours of onset of the disease for care six-fold while being of Hausa ethnicity increased the odds 19-fold. Other significant predictors of early presentation were convulsions and the appearance of other symptoms [Table 2]. The chances of late presentation were significantly increased by belonging to the other ethnic groups (Nupe, Fulani, Baruba, Igala), non-resolution of fever, and mothers having a secondary school education [Table 3]. Worsening of fever and belonging to the middle social class were associated with a negative risk of late presentation [Table 3].

DISCUSSION

Many children in developing countries die from common infections such as malaria that present in

Table 3: Multinomial logistic regression analysis of predictors of late presentation (>3 days) of febrile children.

Variable[#]	B[**]	OR (95% confidence interval)
High social class	0.2	1.2 (0.2–7.3)
Middle social class	-3.2	0.0 (0.0–0.2)
Low social class*	0.0	
Hausa	1.2	3.3 (0.4–24.1)
Ibo	2.1	8.0 (0.5–130.7)
Yoruba*	0.0	
Others[$]	3.1	21.1 (5.2–84.6)
No education	-0.3	0.7 (0.1–4.7)
Primary education	1.1	3.1 (0.3–28.9)
Secondary education	4.1	59.7 (8.1–438.6)
Post-secondary education*	0.0	
Worsening of fever	-2.8	0.1 (0.0–0.3)
Non-resolution of fever	1.4	4.2 (1.4–12.9)
Occurrence of convulsions	-0.7	0.5 (0.1–1.7)
Appearance of other symptoms	0.7	2.1 (0.7–6.4)

[#] Late presentation (>3 days) compared against less than one day and one to three days combined.
*The parameter is set to zero as it as a reference category and is therefore redundant.
[**] Estimated logit coefficient.
[$] Others refer to Nupe, Fulani, Baruba, Igala ethnicities.
OR=odds ratio.

the early phase with fever alone.[12] Early care-seeking in developed countries for febrile children has been consistently shown to have a positive influence on child health.[7]

In our study, 57% of parents sought competent health care for their febrile children within 24 hours. This is below the Roll Back Malaria recommendations of 60% and far below the revised recommendation of 80%. A 2011 multiple indicator cluster survey conducted in the study state (Kwara) revealed only 29.9% of children with a fever received antimalarial drugs within 24 hours of onset of fever.[9] Thus, the number of parents seeking care early in our study (57%) suggests changes in health seeking behavior. Possible factors responsible for these changes include the ready availability of rapid diagnostic tests for malaria, availability of highly subsidized antimalarials, and community mobilization drives.[8] Nevertheless, our finding should be interpreted with caution as we studied only children brought to the hospital and the results do not reflect the numerous children that never received hospital care. Rutebemberwa et al,[13] studied a Ugandan population of children with fever and reported 44% of parents seeking medical care within 24 hours. The predictors of early presentation in this study were high social class, parents of the Hausa ethnic group, occurrence of convulsions, and the appearance of other symptoms. Rutebemberwa and colleagues[13] similarly reported socioeconomic status as a predictor of presentation with the poorer parents presenting later than the less poor parents. Other studies have reported similar findings.[14,15] The effects of socioeconomic status are probably related to the costs of transportation, laboratory investigations, and medications. This effect was further exemplified by the multiple indicator survey where parents who ranked higher on the wealth index quintiles were more likely than the poorest on the index to have taken their children for care within 24 hours of onset of ill health (51.4% vs. 13.8%, respectively).[9] Thus, in the setting of developing countries cost potentially remains a strong determinant of care. The provision of affordable care may improve care-seeking behavior among parents in Ilorin. A study in Nairobi, Kenya, also reported the influence of maternal ethnic group on care seeking behavior. Here, mothers of the Kamba ethnic group sought care earlier than the other groups.[16]

Dramatic symptoms like convulsions are often confusing and scary to parents and often lead to actions that are of no benefit or dangerous.[17] It was comforting to note that convulsing children were more likely to be brought to the hospital early on. However, this should be interpreted with caution as being a hospital-based study the findings may not be completely generalizable to the community as the study population are parents who have sought care already and did not include parents who never brought their child to the hospital. Additionally, the appearance of other symptoms would suggest to parents worsening illness and lead to care seeking. However, our study did not define these other symptoms (excluding convulsions). Rutebemberwa et al,[13] found children with fast breathing were most likely to present early and those with pallor to present late. An unusual finding of this study is the association between the mother's secondary school education and increased chances of late presentation. The reason for this is unclear but may be related to increasing advocacy for home management of malaria. It is conceivable that parents who are more educated are more likely to self-medicate and

thus present late; however, further research will be required to elucidate this relationship.

The Roll Back Malaria programme initially set modest targets of 60% of people affected by malaria having prompt access to treatment within 24 hours of onset of symptoms by 2005. This was subsequently scaled-up for wider coverage. However, this study has shown that a major limiting factor to achieving this target is getting parents to bring their children to the hospital within 24 hours of illness onset. One of the important implications of these findings is the need to pass across the appropriate message during mass education campaigns for parents to seek care in febrile children irrespective of the presence of other symptoms. While these messages are passed to all, it is necessary to provide more focus for parents of low socioeconomic status and educational background.

CONCLUSION

Most of the parents sought care early for febrile ill health in their children and the significant predictors of early presentation were high social class, mothers of the Hausa ethnic group, appearance of other symptoms, and the presence of convulsions.

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