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ORIGINAL ARTICLE

# Socio-Demographic Factors Associated with Late Presentation and Outcome of Febrile Children Admitted in a Tertiary Facility in North-Western Nigeria: A Comparative Study

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## Abstract

**Introduction:** Delay in seeking appropriate health care by caregivers is an important modifiable factor which contributes to childhood morbidity and mortality in developing countries. This study was carried out to assess the socio-demographic factors associated with late hospital presentation and outcome of acute febrile illnesses among children aged aged > 1 month to < 15 years in an emergency unit.

**Methods:** Children admitted with fever were recruited prospectively from October 2017 to March 2018 into a hospital-based comparative cross-sectional study in the Emergency Paediatric Unit of Usmanu Danfodiyo University Teaching Hospital (UDUTH), Sokoto. Admitted children were categorised into 2 groups (Group 1 = Late presenters; Group 2 = Early presenters). Group 1 were those with fever ≥ 3 days while group 2 were those with fever < 3 days before presentation. Relevant socio-demographic information and outcome were obtained. Data was analysed with SPSS version 23, and $p < 0.05$ was considered significant.

**Results:** 124 of 494 admissions were sampled. Late presenters were more likely to have 3 or more siblings (OR 2.3; CI: 0.97-5.5), fathers and mothers who lacked formal education (OR 1.9; CI: 1.4-2.6, OR 2.2; CI: 1.6-3.0), and more likely visited patent medicine vendors (OR 1.3; CI: 0.95-1.9). They also had longer duration of admission (OR 8.3; CI: 3.7-18.5) and were more likely to die (OR 3.1; CI: 0.3-30.7). Three of the 4 mortalities had presented late and all were of low social class families.

**Conclusion:** Late presentation was more associated with the uneducated parents with attendant longer duration of illness and higher mortality probably due to illness severity and lack of amelioration with prior treatment.

## Keywords

Late presentation, Children, Fever, Emergency, Socio-demographic, Outcome

## Introduction

According to the World Health Organization (WHO) [1], seeking early care and treatment for acutely ill children after onset of symptoms have been found to be associated with faster resolution, less progression to severe illness and better outcome. Fever is the commonest complaint seen in the emergency unit [2]. It is a symptom of potentially life-threatening infections in children of which malaria and bacterial infections predominate in the Tropics. However, children who by virtue of their age and developmental status are totally dependent on their parents and caregivers and most often than not are presented late to health facilities leading to complications associated with increased morbidity and mortality [3].

Most of the yearly childhood deaths occur in developing countries, Nigeria inclusive. In Africa, childhood mortality is 92 per 1000, about 16 times that of resource

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rich regions which is unacceptable given different programs and strategies in place to address child mortality [4]. These deaths are mainly from preventable conditions or illnesses that could have been promptly treated with simple interventions before complications ensue. This was the reason why the Integrated Management of Childhood Illnesses (IMCI) strategy was developed by the WHO and UNICEF. The strategy aimed at reducing child mortality from these common childhood diseases by improving health seeking behaviour of the family. This entails recognizing when a child is ill, instituting appropriate care and seeking appropriate timely help at health facilities [5].

Studies in different locations have revealed that many parents do buy time to assess the situation before taking a decision to seek appropriate care. Reasons include poor knowledge, high cost of health care coupled with lack of health insurance leading to high patronage of patent vendors and unauthorized health care providers [6-9]. In Nigeria, as well as other African countries seeking appropriate health care for acutely ill children by their caregivers is an important modifiable factor which contributes to childhood morbidity and mortality in developing countries.

Sokoto in North-western region of Nigeria has one of the highest rates of childhood mortality in the country [10]. This study was therefore carried out to assess the socio-demographic factors associated with late hospital presentation and outcome of acute illnesses among children aged < 15 years admitted into the Emergency Paediatric Unit (EPU) of Usmanu Danfodiyo University Teaching Hospital (UDUTH), Sokoto.

## Methods

The study was carried out at the EPU of UDUTH, Sokoto, a tertiary health facility located in the Sokoto State capital. The hospital is the apex referral centre for residents of Sokoto, Zamfara and Kebbi States; and the neighbouring Niger and Benin Republics in the West African sub-region [11].

### Study design

This was a comparative cross-sectional study conducted over a 6 month period (1st October 2017 to 31st March 2018).

### Study population

Comprised children aged > 1 month to < 15 years admitted into the EPU with acute febrile illness.

### Inclusion criteria

Those with febrile illness of < 7 days.

**Late presenters (Group 1):** These were children who were presented to the emergency with fever and other acute symptoms of duration of 3 days [3,9] up to 7 days.

**Early presenters (Group 2):** Conversely, these were children who were presented to the emergency with fever and other acute symptom duration of less than 3 days.

### Exclusion criteria

Those who had been referred from another centre or had been previously admitted for the present illness at another facility.

### Sample size determination

Prevalence of children presenting to the emergency unit after 3 days of 50.6% in a study in Abakaliki [12] was used for group 1 while for group 2; prevalence of 33% of those accessing treatment for malaria in less than 3 days was used from a study in Ghana [13].

$n = (Z1\text{-}\alpha/2 + Z\beta)^2 \times (p1q1 + p2q2) / (p1\text{-} p2)^2$

Z1-α/2 = percentage point of the normal distribution corresponding to the required (two-sided) significance level (α) of 0.05 = 1.96.

Zβ = one sided percentage point of the normal distribution corresponding to 100%- the power, power = 80% (100% - power) = 20% (i.e. p value of 0.2) = 0.84

p1 = prevalence of late presenters from a previous study = 50.6% = 0.506

q1 = complimentary probability of p1 = 1-p1 = 1 - 0.506 = 0.494

p2 = prevalence of early presenters from a previous study = 33.0% = 0.33

q2 = complimentary probability of p2 = 1 - p2 = 1 - 0.33 = 0.67

$$\frac{(1.96+0.84)^2 \times [(0.506\times 0.494)+(0.33\times 0.67)]}{(0.506-0.33)^2}$$

$$= \frac{7.84 * [0.249+0.221]}{0.176^2}$$

$$= 3.7/0.03$$

$$= 123.3 \sim 124$$

Therefore, 62 subjects were recruited into each group.

### Procedure of subject recruitment

Children with fever and other acute symptoms such as cough, coryza, convulsions, diarrhea and vomiting of ≤ 7 days duration were recruited daily by systematic random sampling from their case notes after they had been attended to and documentation made in the emergency unit. Early and late presenters were sampled separately. They were age and gender matched but not matched by diagnosis. Temperature was recorded with a battery powered electronic digital Thermometer inserted into the child's axillary region. All subjects recruited had informed consent requested from their caregivers and

further interview was carried out.

## Instruments of data collection

Their demographic characteristics which were entered into a standardized proforma included duration of chief complaint (fever) and care sought; age, occupation, educational status of parents, number of siblings. Socioeconomic index scores were awarded to each child based on the occupation and educational attainment of the parents or their substitutes according to the method proposed by Oyedeji [14]. Examination findings, final diagnosis made, duration of admission and outcome of illness were documented as they were followed up during their hospital stay.

The parent's educational status for purpose of analysis was categorized into non-formal and formal education. Non-formal education included attendance of Quranic school without Western education. Formal education ranged from completion of primary school to other levels of Western education. The parent's employment status was categorized as employed and not employed. Unemployed was used for any parent/caregiver who did not have a source of income as at the time of the child's admission for the previous 4 weeks [15].

The outcome after admission was categorized as 'alive', if the patient recovered and was discharged. The second category was 'dead', if mortality was recorded. Duration of admission as an outcome was categorized into duration either less than or more than 1 week.

## Data entry and analysis

Data was analysed using Statistical Package for Social Science (SPSS) statistical software (version 23.0). The prevalence rates were presented as percentages while the age distribution of the studied subjects was analysed and expressed as mean and standard deviation. Frequency distribution tables were used to illustrate results. Chi square test was used to determine associations between categorical variables, while Odd's ratio was used to measure association between an exposure or characteristic and outcome. Student t-test was used to assess the mean differences between the 2 groups. Data was checked for normality with the Kurtosis and skewness option and was found to be normally distributed.

**Table 1:** Sociodemographic characteristics of the study participants.

| Variables | Group 1 (Presented after 3 days) (n = 62) | Group 2 (Presented before 3 days (n = 62) | Test of significance |
|---|---|---|---|
| **Gender** | | | |
| Male | 36 (58.1) | 37 (59.7) | OR = 0.96, p = 0.85 |
| Female | 26 (41.9) | 25 (40.3) | 95% CI = 0.68 – 1.40 |
| | | | |
| **Age category** | | | |
| > 1 month – 5 years | 54 (87.1) | 48 (77.4) | OR = 3.12, p = 0.05* |
| > 5 years – < 15 years | 8 (12.9) | 14 (22.6) | 95% CI = 0.93 – 10.43 |
| | | | |
| **Mean Age** | | | |
| Age of child (months) | 50.6 ± 38.2 | 38.0 ± 36.2 | t-test = -1.6; p = 0.1 |
| Age of mother (years) | 29.2 ± 5.8 | 28.8 ± 4.8 | t-test; 0.01; p = 0.91 |
| Age of father (years) | 41.5 ± 7.4 | 41.7 ± 8.9 | t-test; -0.43; p = 0.76 |
| | | | |
| **Socioeconomic class** | | | |
| Upper | 1 (1.6) | 1 (1.6) | |
| Middle | 13 (29.0) | 26 (41.9) | **$X^2$ = 6.4** |
| Lower | 48 (77.4) | 35 (56.5) | **p = 0.04** |
| | | | |
| **Primary caregiver** | | | |
| Mother | 51 (82.3) | 58 (93.5) | OR = 3.12, p = 0.05* |
| Others | 11 (17.7) | 4 (6.5) | 95% CI = 0.93 – 10.43 |
| | | | |
| **Mother's educational status** | | | |
| Non formal | 31 (50.0) | 8 (12.9) | OR = **2.17,** p = **0.00** |
| Formal | 31 (50.0) | 54 (87.1) | 95% CI = **1.57 – 3.01** |
| | | | |

| | | | |
|---|---|---|---|
| **Mother's employment status** | | | |
| Unemployed | 35 (56.5) | 34 (54.8) | OR = 0.94, p = 0.86 |
| Employed | 27 (43.5) | 28 (45.2) | 95% CI = 0.46 – 1.9 |
| | | | |
| **Father's educational status** | | | |
| Non formal | 25 (40.3) | 7 (11.3) | **OR = 1.94, p = 0.00** |
| Formal | 37 (59.7) | 55 (88.7) | **95% CI = 1.4 – 2.6** |
| | | | |
| **Father's employment status** | | | |
| Unemployed | 18 (29.0) | 8 (12.9) | **OR = 1.54, p = 0.03** |
| Employed | 44(87.1) | 54 (71.0) | **95% CI = 1.1 – 2.2** |
| | | | |
| **Number of siblings** | | | |
| 1 – 2 | 10 (16.1) | 19 (30.6) | OR = 2.30, p = 0.04 |
| ≥ 3 | 52 (83.9) | 43 (69.4) | 95% CI = 0.97 – 5.5 |
| | | | |

* = Fisher's exact test

**Table 2:** Diagnosis of the study participants.

| | **Group 1 (Presented after 3 days) (n =62)** | **Group 2 (Presented before 3 days (n =62)** | **`Test of significance** |
|---|---|---|---|
| **Diagnosis** | | | |
| Severe malaria | 25 (40.3) | 22 (35.5) | |
| Pneumonia | 8 (12.9) | 11 (17.7) | |
| Febrile convulsion | 5 (8.1) | 9 (14.5) | $X^2$ = 11.1, p = 0.09 |
| Diarrhoea disease | 7 (11.2) | 6 (9.7) | |
| Sepsis | 6 (9.7) | 4 (6.5) | |
| Measles | 5 (8.1) | 4 (6.5) | |
| Malnutrition | 2 (3.2) | 2 (3.2) | |
| Sickle cell anaemia | 1 (1.6) | 3 (4.8) | |
| Acute kidney injury | 1 (1.6) | 0 (0.0) | |
| Meningitis | 1 (1.6) | 1 (1.6) | |
| Retroviral disease | 1 (1.6) | 0 (0.0) | |

Binary logistic regression analysis was additionally used to assess the effect of variables that were significant on bivariate analysis. The independent variables entered into the model as covariates included parental characteristics (occupational and educational status) and dependent variable was time of presentation (early or delayed). Father's educational status was used as the reference category.The B- coefficients, odd's ratio and 95% Confidence intervals of the odd's ratios were determined.

The level of statistical significance was set at p-value < 0.05.

## Results

There were 494 children admitted into the Emergency Paediatric Unit (EPU) of the hospital during the study period from October 1st 2017 to 31st March 2018. Out of this, 124 (25.1%) were selected for the study comprising 62 cases who presented at 3 days to 7 days after illness onset (group 1) and 62 controls who had presented at less than 3 days after illness onset (group 2).

Age distribution was as follows: 78 (62.9%) were aged 1 to 5 years, 24 (19.4%) were under 1 year of age while 22 (17.7%) were aged above 5 years ($\chi$ = 2.35, p = 0.3). There were 73 males (58.1%) and 51 females (41.1%) with no significant difference between the 2 groups by sex ($\chi$ = 0.03, p = 0.85).

The caregiver at presentation was the mother only in 53.2%, both parents in 34.7% and only father in 2.4%. The sociodemographic characteristics of both groups of children are shown in Table 1.

In Table 1, it is shown that most of the subjects were of low socioeconomic status and predominantly presented after 3 days of illness onset ($\chi^2$ = 6.4; P = 0.04). Also, a larger proportion of those who were not primarily under the care of their mothers presented after 3 days. There was no significant difference between the

**Table 3:** Route and time taken before presentation to the study centre.

| Variable | Group 1 (Presented after 3 days) (n = 62) | Group 2 (Presented before 3 days (n = 62) | Test of significance |
|---|---|---|---|
| **Mean duration before presenting (days)** | 7.05 ± 5.4 | 2.81 ± 2.6 | **t-test = p = 0.00** |
| | | | |
| **Route taken** | | | |
| Treated at home by parents – UDUTH | 29 (46.8) | 28 (45.2) | $X^2$ = 6.8, p = 0.33 |
| Treated at home by health workers – UDUTH | 1 (1.6) | 1 (1.6) | |
| Home – Patent vendor - – UDUTH | 17 (27.4) | 8 (12.9) | |
| Home – Patent vendor - PHC – UDUTH | 5 (8.1) | 6 (9.7) | |
| Home – GH – UDUTH | 8 (12.9) | 13 (21.0) | |
| Home – PH –UDUTH | 2 (3.2) | 5 (8.1) | |
| Others | 0 (0.1) | 1 (1.6) | |
| | | | |
| **Visited patent vendors** | | | |
| Yes | 22 (35.5) | 14 (22.6) | OR = 1.34, p = 0.08 |
| No | 40 (64.5) | 48 (77.4) | 95% CI = 0.95 – 1.90 |
| | | | |

**Table 4:** Outcome of admission and duration.

| Variable | Group 1 (Presented after 3 days) (n = 62) | Group 2 (Presented before 3 days (n = 62) | Test of significance |
|---|---|---|---|
| **Outcome of admission** | | | |
| **Alive** | 59 (95.2) | 61 (98.4) | OR = 3.10, p = 0.33 |
| **Dead** | 3 (4.8) | 1 (1.6) | 95% CI = 0.31 – 30.67 |
| | | | |
| **Duration of admission** | | | |
| < 1 week | 16 (25.8) | 46 (74.2) | OR = 8.2, p = 0.00 |
| >1 week | 46 (74.2) | 16 (25.8) | 95% CI = 3.69 – 18.47 |
| | | | |
| **Mean duration of admission (days)** | 10.2 ± 4.6 | 7.1 ± 6.4 | t-test = -2.9, p = 0.005 |

**Table 5:** Logistic regression of factors associated with early or late presentation.

| | p-value | Odds ratio | 95% C.I. for Odds ratio |
|---|---|---|---|
| **Socioeconomic status** | 0.992 | 0.943 | 0.368 - 2.412 |
| **Mother's educational status** | *0.016* | *3.794* | *1.284 -11.208* |
| **Father's educational status** | 0.185 | 2.131 | 0.694 - 6.670 |
| **Father's occupational status** | 0.326 | 1.714 | 0.584 - 5.026 |
| **Number of siblings > 3** | 0.398 | 0.665 | 0.258 - 1.713 |

**Table 6:** Relationship between mortality to sociodemographic characteristics on bivariate analysis.

| Characteristic | OR | 95% C.I | p-value* |
|---|---|---|---|
| **Number of siblings ≥ 5** | 4.5 | 0.5-44.5 | 0.20 |
| **Gender** | 0.8 | 0.3-2.2 | 0.5 |
| **Mother's occupational status** | 1.8 | 0.3-9.9 | 0.40 |
| **Mother's educational status** | - | - | 0.009 |
| **Father's occupational status** | 3.2 | 0.6-17.7 | 0.03 |
| **Father's educational status** | 3.0 | 0.5-16.6 | 0.05 |

*: Fisher exact test.

ages of the parents of the cases and controls; however, there was significant relationship with their educational status. More of the parents who had formal education presented earlier before 3 days for both fathers and

mothers as seen in Table 1. However, only the occupational status of the father was related to the time of presentation. Also, those with less siblings were likely to be present before 3 days (OR = 1.6).

In Table 2, it is seen that there is no significant difference with regards to the diagnosis in both groups as they show similar distribution distribution ($\chi^2$ = 11.1, p = 0.09).

In Table 3, it is seen that late presenters had a significantly longer mean duration of symptoms before presentation. Also, a larger proportion of them were taken to the patent vendors while more of the early presenters had been taken to general hospital and private hospital prior to the presentation. Among the early presenters, only 15 (24.6%) presented within 24 hours of onset of symptoms.

Table 4 shows the outcome characteristics of the subjects with respect to duration of admission and mortality. More late presenters had higher risk of dying and also had a mean longer duration of admission.

Table 5 shows the logistic regression analysis of the factors found to be significant on bivariate analysis. Controlling for other factors, it was seen that mother's educational status remained a significant predictor of early presentation to the hospital.

When association between sociodemographic parameters and outcome of mortality was analysed with Chi-square, it was seen that mortality was higher amongst those who had more > 5 siblings, uneducated mothers, uneducated fathers and those of low socioeconomic status. The levels of significance are shown in Table 6.

## Discussion

Most of the families of the children presenting to the emergency unit were of low socioeconomic status similar to studies done in other areas in and outside the country [3,9,16] which was not surprising given the effect on prevailing poverty on child health indices in the Tropics which leads to increases rates of preventable diseases and demand for emergency health care services [17]. Additionally, it was seen that those from lower social class accounted for a larger proportion of those that presented after 3 days as compared to the early presenters. Similar findings were reported by Gitau [6] in Kenya and Kassile [16] in Tanzania as more children from lower social class group presented late. This could also be accounted for by lack of health insurance and outrageous out of pocket expenditure fostered on the poorest who are also at the receiving end of high disease burden as shown in a report from the study area, Sokoto [18].

Mean ages of parents were no different between the early and late presenters similar to the studies by Gitau and Abdulkadir [6,9] on time to presentation to health facilities of febrile children. Also, between the 2 groups, there was no effect of age, gender on time of presentation. A previous study by Oladigbolu [19] in the study area on socioeconomic factors influencing utilization of healthcare services revealed that age, gender and religion and tribe were not associated with ability to pay for health services. This was attributed to a similar pattern of health seeking behaviour irrespective of these variables [19].

In this study, those from larger size families as typified by number of siblings of 3 or more were more likely to present late similar to findings in the previous studies [6,9]. This could also be due to relatively less funds and time being available to present the child earlier to the hospital on account of more competing demands from other children in the family. In line with this, it was also seen in this study that children whom their mothers were not their primary caregiver were more likely to present late. Similarly, Kassile [16] in a Tanzanian study also found that presence of one of biological parents and number of under-five children in the household predict delayed treatment-seeking decision for fever.

The other findings from this study were that the educational status of the parents especially that of the mother played a significant role in determining time lapse before presentation of febrile children to the study hospital. Educational status of mothers and employment status of fathers also imparted significantly on the survival outcome with more of the mortalities occurring amongst the mothers without formal education and unemployed fathers. Late presentation and prior treatment were more with the uneducated parents with attendant higher morbidity and mortality probably due to illness severity and lack of amelioration with prior treatment. It is well recognized that female education has wide reaching implications on child health and is the major child survival strategy that ensures others are attained [20]. However, in the study in Ilorin by Abdukadir [9], a surprising finding was that mothers with secondary education had a higher likely rate of late presentation. This was however attributed to increased advocacy for the home management of malaria by caregivers. In a study by Rees in Gambia [21], being resident in a core village and increased distance from the hospital were more associated with delayed presentation; however, these parameters were not accessed in this study.

The routes taken before arriving the study hospital between both groups were somewhat comparable. Although most cases and controls came to the hospital after home therapies failed, a large proportion of the late presenters had visited patent medicine dealers before presenting to the hospital, while larger proportion of the early presenters had visited general hospitals and private clinics. This is a quite different pattern from the report by Gitau [6] from Kenya where it was seen that most (both early and late) had visited private and other public hospitals. Only few had gone to patent pharmacy

store. This could be attributed perhaps to the more cosmopolitan nature of Nairobi compared to Sokoto and relatively higher socioeconomic status of population there. In a study by Mpimbiza [22] in Uganda, it was also found that patronizing drug shops was significantly associated with late presentation.

The late presenters had a poorer survival outcome as a well as a longer duration of admission compared to the early presenters. The risk of mortality among the late presenters was 3 times higher when compared to the early presenters, while they were 4 times more likely to die in the study by Gitau [6], however, their sample size was much larger. Malaria, diarrhoeal disease and pneumonia were the most frequent diagnosis both amongst the early and late presenters. This in turn reflects the pattern of disease presentation in other paediatric emergency units in the country [8,12,23], still buttressing the fact that more needs to be done on prevention especially health education.

This study is limited by the lack of case to case matching of the different diagnosis in the comparison groups.

## Conclusion

Late presentation was more with the uneducated and low socioeconomic class parents with attendant higher morbidity and mortality probably due to illness severity and lack of amelioration with prior treatment. We recommend improvement in primary prevention especially health education of the community on common diseases. Advocacy on child survival strategy especially female education will go a long way in reducing late presentation, hence subsequent reduction in morbidity and mortality from acute disease conditions.

## What is Already Know on this Topic

- Late presentation to the hospital is associated with increased likelihood of mortality and longer duration of admission in comparison to early presentation.
- A large number of those brought late may have sought care from unauthorized care givers.

## What this Study Adds

- This study affirmed the finding that late presentation to the hospital beyond 3 days of onset of acute illness is associated with increased likelihood of mortality.
- Uneducated parents especially mothers had higher rate of late presentation of their wards to the hospital with attendant higher mortality. Children of unemployed fathers also had higher mortality.

## Sources of Support

Nil.

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## Competing Interests

The authors declare no competing interest.

## Authors' Contributions

KOI and BOO conceptualized the study and wrote the initial draft. AA, FBJ, MAS, BGI, OBO, EUY all contributed to the data collection, statistical analysis and manuscript development. All the authors have contributed to the final version of this manuscript and have equally contributed to the management of the subjects.

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