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Sociodemographic Determinants of Mortality in Hospitalized Under-Five Children at a Secondary Health Care Centre in the Niger Delta

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Authors' contributions

This work was carried out in collaboration between all authors. MMO designed the study, wrote the protocol performed the statistical analysis, and wrote the first draft of the manuscript. MOU and FOU managed the literature searches. All authors read and approved the final manuscript.

Research Article

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ABSTRACT

Aims: To determine the socio-demographic factors associated with mortality in hospitalized under-5 children in the Niger Delta region of Nigeria.

Study Design: Cross-sectional study.

Place and Duration of Study: Paediatric unit of Mariere Memorial Central Hospital Ughelli, Nigeria between October 2011 and February 2012.

Methodology: All inpatients aged 29 days to 60 months who met the inclusion criteria were consecutively enrolled and information on a range of demographic and clinical factors obtained using a structured questionnaire. The primary outcome variable was mortality. Data was coded and analysed using SPSS version 16 software.

Results: Of the 600 children recruited for the study, 345(57.5%) were males while 255(42.5%) females. The case fatality rate was 51(8.5%). Significant risk factors associated with mortality were maternal age >30 years ($p=0.001$), low maternal educational status (0.001), lower socioeconomic class ($p=0.006$), late presentation ($p=0.004$). However, multiple logistic regression analysis showed late presentation to be

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the strongest determinant of mortality. ((OR=4.83, 95%CI: 1.458 to 15.993, p=0.01).
Conclusion: Social factors play a significant role in the eventual health outcomes in hospitalized under-5 children with late presentation being the strongest predictor of mortality. Effort should therefore be made at creating awareness on seeking early treatment for childhood illnesses in recognized hospitals.

Keywords: Demographic factors; mortality; under-5 children; Nigeria.

1. INTRODUCTION

Nigeria is the most populous country in Africa with an estimated population of 158,000,000 in 2010 and an annual population growth rate of 2.5%. Nigeria is classed as a low-income country with a Gross Domestic Product (GDP) of 202 billion dollars (World Bank data, 2010). About 64% of its population is reported as living below the international poverty line of \$1.25 per day (UNICEF Statistics, 2010). The majority (67%) of Nigeria's population live in rural areas. Currently, children under five years constitute 17.1% of its population, which makes every unit change in mortality to reflect great effect in the population (National Population Commission, 2009). In 2010, the under-five mortality rate(U5MR) was reported as 143 per 1000 live births and although this represents 33% decrease on the U5MR reported in 1990, this still translates into a significant number of deaths in children aged under five years in 2010 (UNICEF Statistics, 2010). The main causes of deaths in the under fives include nutritional deficiencies and illnesses particularly malaria, diarrhoeal diseases, acute respiratory infections and vaccines preventable diseases (Bryce, 2005).

In a bid to address the problem of under-five mortality and identified health inequities, Nigeria has adopted and implemented to a certain extent a number of major global initiatives that are aimed at improving health outcomes in children. These include Safe Motherhood Initiatives, Baby-friendly Hospital Initiative, Child Survival Strategy and Integrated Management of Childhood Illnesses. Additionally, in some Nigerian states including Delta state, user fees in state owned hospitals for all children aged less than five years has been abolished with the aim of minimizing the impact of out-of-pocket health care expenses. These interventions may have resulted in some improvement in reported child health indices, the rate of improvement is however slow and the U5MR still remains one of the worst in the sub-Saharan region of Africa (UNICEF Statistics, 2010).

The contribution of social factors as determinants of health outcomes has gained considerable interest as a method to help explain the existence of health inequalities among individuals and population. This is because while medical care is important, there is growing body of evidence that it is not enough to overcome adverse health outcomes (Charlemaigne and Anne, 2009). Some studies have demonstrated a link between inequitable and delay access to health care services and poor health outcomes following childhood illnesses (Nakagawa et al., 2001). The factors identified to be associated with these delays or difficulties in accessing health services include low socio-economic status, non-recognition of danger signs in an ill child, cultural beliefs and practices, often leading to self care, use of home remedies and consultation with patent medicine sellers and traditional healers (Nyamongo, 2002). Most of these beliefs and practices are reinforced by the older relatives in the house whose advice are usually very instrumental and cannot be ignored (Delgado et al., 1994). These factors and other social determinants of health ultimately influence health

experiences and outcomes at an individual and community level. To support policy development, it is essential to further explore the impact of social factors on reported health outcomes in children. To this end, this study aimed to assess the contributory role of a number of socio-demographic factors on mortality of children aged less than five years admitted to the pediatric unit of a secondary health care facility located in the Niger Delta region of Nigeria.

2. MATERIALS AND METHODS

2.1 Study Setting and Design

This was a cross-sectional study undertaken at Mariere Memorial Central Hospital Ughelli, Nigeria. Ughelli is a suburban city in the Niger Delta area. It is inhabited mainly by the Urhobo ethnic group with an estimated population of 89,521 (World Gazetteer, 2012). The hospital is a 170-bed secondary health care facility that provides specialist healthcare and serves as a referral centre for hospitals and clinics in nine Local Government Areas of Delta State. The pediatric ward is a 24-bed unit that also serves as a quasi-emergency room and provides care to children aged one month to 16 years requiring a range of acute and specialists' medical care.

2.2 Participants

The study population was drawn from all children admitted into the pediatric ward during the study period of October 2011 and February 2012. Children were eligible to be recruited if they were aged between aged 29 days to 60 months and in-patients on the pediatric ward during the study period. Parents whose children were eligible to be enrolled were informed about the study, and were only included after obtaining written informed consent. Exclusion criteria included all children aged 28 days and above 60 months and those children whose mothers declined consent. All recruited children were accompanied by their mothers and all patients were managed as per unit protocol.

2.3 Ethical Issues

Ethical approval for this study was obtained from the Research and Ethics Committee of the Delta State Ministry of Health and clearance obtained from the hospital management.

2.4 Data Collection

The data collection instrument was a structured questionnaire which was pre-tested with some modifications made prior to its use in the study. Information was collected on a range of demographic, clinical risk factor(s) and outcome variable that included age of child and mother, sex, ethnic group of parents, marital status of parents, duration of illness prior to presentation, pre-admission treatment. Other variables included in the questionnaire are weight, height, clinical diagnosis and clinical outcome. The primary outcome variable was mortality following admission, also referred to as 'Poor disease outcome' in this study.

The duration of illness prior to presentation was categorised as 'Early' if the patient presented <24 hours and 'Late' if the presentation was more than 24 hours. Mothers aged >30 years were classified as 'Older' mothers and healthcare sought outside regulated hospital, clinics and health centres was classified as Unorthodox care. A reported

educational qualification below secondary school level was classified as 'Low' educational qualification (Ogunlesi and Olanrewaju, 2010).

A socioeconomic class based on an ordinal scale was assigned to each participant using the mother's educational attainment and father's occupation as recommended by (Olusanya and Okpere, 1985).

2.5 Statistical Analysis

All data was entered directly into Statistical Package for the Social Sciences (SPSS) version 16 software. Key punching errors were rectified and logical errors corrected. Recoding of existing variables was done while descriptive and inferential statistics were employed in the analysis of the data. A range of demographic variables recorded for children with and without poor clinical outcome were compared using a chi-square test, odds ratio (OR) and adjusted odds ratio (AOR) to identify any statistically significant association with the primary outcome variable. Variable with statistically significant ($p < 0.05$) effects were included in the multivariate logistic regressions analysis.

3. RESULTS

During the study period, there were 753 admissions to the paediatric unit and questionnaires were successfully completed on six hundred children (response rate: 79.7%). The study population had a mean age of 18.1 ± 1.3 months and a median of 15 months with males accounting for 57.5% of participants.

Of the 600 respondents, just over three-quarter (462/600; 77.0%) reported seeking pre-hospital medical care from unorthodox sources and a similar proportion presented late to the hospital (>24 hours after onset of illness). Almost half of the mothers of the study subjects were unmarried (282/600; 47.0%) and 246/600; 41.0% of the mothers were older mothers. Just over a quarter (156/600; 26.0%) of mothers had low educational qualifications compared with (69/600; 11.5%) of fathers while a little over a third (207/600; 34.5%) of patients belonged to low socio-economic class. Analysis of clinical outcomes showed that 549(91.5%) were discharged home while 51(8.5%) died during admission.

Table 1 present the findings of the association between the primary outcome measure and range of covariates. This revealed a statistically significant association between under-5 mortality and late presentation to the hospital ($p=0.004$), having an older mother ($p=0.001$), belonging to a low socio-economic class ($p=0.006$, low maternal ($p=0.001$) and paternal ($p=0.01$) educational attainment.

Multiple logistic regressions of statistically significant covariates showed that children of older mothers were 67% less likely to have poor disease outcome (OR=0.33, $p=0.000$) while children that present late to hospital (>24 hours) were almost five times more likely to have a poor disease outcome (OR=4.83, $p=0.01$) as shown in Table 2.

This study also showed that severe malaria and gastroenteritis accounted for more than half of the admissions among the study population with a case fatality rate of 8.5% as shown in Table 3.

Table 1. Association between socio-demographic factors and under-five mortality

Factors	Clinical outcome following admission		*AOR	p-value
	Died n=51 (%)	Discharged n=549 (%)		
Gender				
Male	33(64.7)	312(56.8)	1.393	0.347
Female	18(35.3)	237(43.2)		
Age				
<12months	23(45.1)	291(53.0)	1.338	0.344
13-36 months	18(35.3)	201(36.6)		
37-60months	10(19.6)	57(10.4)		
Duration of illness before presentation				
>24 hours	48(94.1)	414(75.4)	5.217	0.004
24 hours	3(5.9)	135(24.6)		
Place of pre-admission health care				
Traditional/Medicine sellers		420(76.5)	1.433	0.438
Hospital	42(82.4) 9(17.6)	129(23.5)		
Marital Status				
Unmarried	30(58.8)	252(45.9)	1.684	0.105
Married	21(41.2)	297(54.1)		
Mother's age				
>30 years	33(64.7)	213(38.8)	2.892	0.001
30 years	18(35.3)	336(61.2)		
Mother's educational status				
No education/Primary	24(47.1)	132(24.0)	2.808	0.001
Secondary and above	27(52.9)	417(76.0)		
Father's educational status				
No education/Primary	12(23.5)	57(10.4)	2.656	0.010
Secondary and above	39(76.5)	492(89.6)		
Socio-economic class				
Lower	27(52.9)	180(32.8)	2.306	0.006
Middle/Upper	24(47.1)	369(67.2)		

*AOR – Adjusted Odds Ratio

Table 2. Logistic regression of socio-demographic factors associated with under-five mortality

Factors	Odd ratio	p-value	95% CI	
			Lower	Upper
Mother's educational Status ^a	0.526	0.148	0.220	1.257
Father's educational Status ^a	0.721	0.450	0.309	1.683
Low socio-economic class	1.247	0.612	0.531	2.929
Older Mothers	0.330	0.000	0.179	0.609
Late presentation	4.829	0.010	1.458	15.993

CI: Confidence interval

^aEducational status below secondary school

Table 3. Major causes of death among the study subjects

Main diagnosis	Number of children	Number of deaths	% case fatality rate
Severe malarial anaemia	181	15	8.3
Cerebral malaria	34	11	32.4
Gastroenteritis	105	9	8.6
ALRTI*	86	6	7.0
Febrile convulsion	64	2	3.1
Measles	21	3	14.3
Meningitis	23	2	8.7
Asthma exacerbation	7	0	0
Sickle cell anaemia	5	0	0
Tetanus	7	2	28.6
Malnutrition	17	1	5.9
Miscellaneous	50	0	0
Total	600	51	8.5

*Acute lower respiratory tract infection

4. DISCUSSION

This study found a mortality of 8.5% among hospitalized under-5 children over a five month period. This is higher than the 4.5 % mortality reported in a retrospective study at a mission hospital in Benin City (Onyiriuka, 2005). Although, it is not possible to know whether our result is time dependent because of the short study period, the lower mortality in the earlier study could also be attributable to the inherent problem of retrospective studies such as missing data and case files, giving the manual record keeping still being practiced in our hospitals. There is a greater risk of mortality amongst under-5 children living in the Niger Delta region largely due to deficient social infrastructure and services, high unemployment, social deprivation and endemic conflicts inspite of the region accounting for more than 90% of Nigerian's wealth (Antai, 2011).

Socio-cultural factors remain very strong as it relates to child health care in Nigeria even in the face of modern development. These are institutionalized norms and values of the society which guide the actions of individual with respect to the aetiology and treatment of childhood illnesses. Even though, modern public health technology is available to combat the major causes of under-5 mortality, Nigerian children continue to die (Ogunjuyigbe, 2004).

One of the strongest independent predictor of death found in the present study was late presentation. More than three-quarter of the children were taken to either the traditional healers or the patent medicine seller for treatment before being brought to the hospital; this is despite the abolition of user fee in public hospitals by the Delta State government. This finding is consistent with an earlier report from Kenya (Gichobi, 2010). The reason for this practice may be due to the perception that some illnesses are not meant for the hospital especially on the assumption that the condition may be mild, self-limiting and responsive to or relieved by local herbs or simple medication. Although, there is evidence to suggest that abolition of user fee helps alleviate the impact of absolute poverty on health (Ridde and Morestin, 2009), there are other determinants that may influence health seeking behaviour and access to health services. These include transportation cost, distance to health facilities and perceived loss of working time (Asenso-Okyere and Dzator, 1997).

A strong causal link has been established between maternal education and child mortality with previous studies showing that every 1-year increment in maternal education was associated with a 7-9% reduction in U5MR (Gakidou, 2010). Maternal education has also been shown to be the single most important factor responsible for variations in childhood mortality in Nigeria (Caldwell, 1979). Our study demonstrates this association between low maternal educational attainment and under-five mortality. Low level of maternal education inhibits her capacity to obtain process and understand basic health information on child health. She is more likely to associate the aetiology of illnesses with evil spirits, and resort to the use of traditional medicine as the first line of treatment for childhood illnesses. She is less likely to assert herself on most issues including appropriate care seeking for her ill child. These ultimately lead to inappropriate health seeking behavior resulting in avoidable death from preventable diseases. Although only 26% of the mothers had lower educational qualification, more than three-quarter presented late to the hospital, a factor that contributed significantly to most of the deaths. This implies that there might be a need to provide specific health education to women through health talks in hospitals and clinics, churches and mosques and in the community on appropriate care-seeking behavior.

It has been reported that older mothers were less likely to seek medical care early for their children because they were inclined to use their experience and customs in child rearing which most times emphasizes the role of alternative therapies with attendant consequences of child mortality (Taffa and Chepngeno, 2005). This assertion was however not corroborated by the result of our study as the odds of under-5 mortality among children of older mothers were reduced by 67%. Though, this finding is consistent with that of a secondary analysis of Nigerian demographic and health survey 2008 data (Kayode, 2012), it is however in contrast, some other research findings which revealed no effect of maternal age on under-5 mortality (Bailey, 1988; Manda, 1999).

5. CONCLUSION

The findings of this study have shown that social factors play a key role in the eventual health outcome in hospitalized under-5 children. It can also be concluded that late presentation is an independent predictor of mortality in hospitalized children under the age of five years. It therefore goes without saying that in order to improve health outcomes and reduce inequities in U5MR, there must be effective leadership in the area of appropriate health policy formulation, as well as strengthening of the health systems. Effort should also be directed at awareness campaign on seeking early treatment for childhood illnesses in recognized health care institutions. The religious and community leaders will be pivotal to the success of such an initiative and women with low educational attainment as well as those in the lower rung of the socioeconomic ladder should be particularly targeted so as to achieve the United Nations Millennium Development Goal 4.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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