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## Mortality among paediatric inpatients in Mile 4 Mission hospital Abakaliki, south-eastern Nigeria: a retrospective study

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**Abstract Background:** In the sub-Saharan Africa, one in every five children dies before their 5<sup>th</sup> birthday, mostly from preventable causes. Recent data from Nigeria, show infant and under-5 mortality rates of 88 and 143 deaths per 1000 live births respectively. Although significant efforts have been made in the last two decades towards the reduction of childhood mortality, the rate still remains unacceptably high.

**Objective:** The aim of the current study was to evaluate the pattern and causes of paediatric (childhood) mortality at Mile 4 Mission Hospital, Abakaliki. This will help us to know exactly what happens in a small mission hospital with few facilities and limited skilled medical personnel. In addition, this is the very first time this study was undertaken in this hospital

**Materials and Methods:** The records of admissions and deaths of children managed at the Mile 4 Mission Hospital from the 1st January 2009 to 31st December 2009 were retrieved from the

Medical Records Department for analysis.

**Results:** Of the 1110 patients admitted within this period, 72 died giving an overall mortality of 6.5%. There were 43 males and 29 females, giving a male: female ratio of 1.5:1. Most of the deaths 58 (80.6%) occurred among children aged younger than 2 years. Malaria was the most common presumed cause of death, followed by gastroenteritis and bronchopneumonia. Twelve and half percent (12.5%) of the children died within 24 hours of admission. The commonest causes of death within 24 hours were severe anaemia, pneumonia and gastroenteritis. The modal months for childhood mortality in this hospital were May and August.

**Conclusion:** Mortality was commonest among children younger than 2 years of age. Malaria, gastroenteritis and pneumonia were the commonest causes of death. A proactive planning taking into account the seasonal variation of these diseases could reduce the childhood mortality in this centre

### Introduction

Approximately, 7.6 million children die annually from the effects of diseases and poor nutrition. In the sub-Saharan Africa, for instance, one in every five children dies before their 5<sup>th</sup> birthday; most of these deaths are preventable.<sup>1,2</sup>

In Nigeria, significant effort has been made in the past two decades towards the reduction of childhood morbidity and mortality through introduction of policies like improved immunization coverage, provision of good health facilities and increase in the number of health personnel.<sup>1-4</sup> Despite these efforts, childhood mortality rate is still high. Recent data report infant and under-5 mortality rates of 88 and 14 deaths per 1000 live births

respectively.<sup>1-4</sup> Paucity of local epidemiological data hinders the development of appropriate intervention strategy; most reports in Nigeria are from hospital-based studies and in spite of their limitations have been a useful tool.<sup>5-10</sup>

Most previous mortality reports in Nigeria were from government owned tertiary health facilities that were highly endowed in both personnel and equipments.<sup>5-10</sup> These facilities being referral centres may select the more severe cases and may not reflect the societal pattern. There are few studies that highlight the experience in primary/secondary health facilities, and none from mission hospitals.<sup>5-10</sup> This is important because private sectors attend to more than 60% of medical conditions,

and mission hospitals play important role in health care delivery especially in South-eastern Nigeria.<sup>5-10</sup>

The aim of this study was to report the disease pattern, and causes of deaths among children admitted at the paediatric ward of Mile 4 Mission hospital, Abakaliki.

## Materials and Methods

Mile 4 Mission Hospital is located approximately 6 kilometres from Abakaliki, the capital city of Ebonyi State, South-Eastern Nigeria. It was established in 1946 by the Roman Catholic Church to provide care for patients with Tuberculosis and Leprosy. Its scope of care was later expanded to address the health needs of people living around the area who are mostly peasant farmers.

More than 2000 Paediatric cases are attended to in the Outpatient clinic that is run by the Medical Officers/NYSC doctor. Of this number approximately 1500 of them are children above the Neonatal age. In the current study, 74% of this figure was admitted into the Paediatric ward. The Paediatric department of the hospital includes a separate in-patient ward that caters for children above the Neonatal age and a fairly well equipped Special Care newborn Unit that is housed in the same building with the Maternity ward and Obstetrics and Gynaecology Theater. For the purpose of this study, only data records of the patients admitted into the in-patient ward were used, as such, excluding the data from the Newborn Unit.

The Paediatric in-patient ward is made up of two very large rooms each measuring roughly about 25feet by 15feet. They collectively house about 50 medium sized cots and five adult beds for older children as well as an isolation room at the very end of it. There is no dedicated children emergency ward, thus all children who are admitted are kept in the in-patient Paediatric ward. The ward makes use of the Hospital Laboratory and blood bank, while all radiological requests are either carried out at the Teaching Hospital that is located about seven kilometres away or at the Federal Medical Centre that is about five kilometres away.

The Paediatric department of the hospital was started in the 2005 but was effectively put to use in 2009. The department is manned by two Post-NYSC Medical Officers and two Youth Corp Doctors who do the daily ward rounds as well as take the night calls. They are supervised by a visiting part-time Consultant Paediatrician who consults there twice a week, and is also available on call basis in cases of emergencies, and diagnostic and or management challenges. The Nursing Staff includes 8 General Nursing Officers and 1 Matron.

The study was carried out retrospectively using data retrieved from ward register and the hospital's Medical Records Department, between 1st January 2009 and the 31st December 2009. Data extracted from the records included age, sex, date of admission, death, date of death, and probable cause of death. Postmortem examination was not done for the patients because of lack of

facility for this service. The data collected were entered into the data editor of SPSS software package version 19.0. Analysis was involved calculating simple percentages and, proportions and constructing, charts and tables. The influence of sex, age, disease entities, and duration of hospital stay on outcome (death) was assessed. Proportions were compared. The differences in proportions were tested for statistical significance using the students T –tests. Significance was based on  $P < 0.05$ .

## Results

A total of 1110 (74%) patients were admitted into the Paediatric ward out of the 1500 children (Excluding Neonates) that were seen during the study period. Of this, 72 (6.5%) died, 43 of them were males and 29 were females. The male: female ratio was 1.5:1.0.

In Table 1 the pattern of admissions and deaths are shown. The ages of the children ranged from 5weeks to 16years with a mean age of  $17.1 \pm 13.1$  months. Most of the admissions 875 (78.8%) and deaths 58 (80.6%) were among children  $\leq 24$  months of age.

**Table 1:** The distribution of admissions and mortality according to the age group of the study population.

Age group (MTHS)	Admissions	Mortality per age group	Mortality per age group (%)
> 4wks-12mths	550	36	6.6
13-24	325	22	6.8
25-36	119	10	8.4
37-48	43	1	2.3
49-60	25	1	4.0
>60	48	2	4.2
Total	1110	72	6.5

Table 2 highlights the various causes of death among these children. Malaria (37.5%), Gastro-enteritis (23.6%), bronchopneumonia (15.3%) and anaemic heart failure (15.3%) were the major causes of deaths. Most of the deaths due to gastroenteritis (76.4%) occurred in infancy, while deaths due to severe malaria occurred in older age-groups. The mean duration of hospital stay was  $3.9 \pm 4.1$  days, with 25% of the patients dying within 24 hours of admission. Majority of deaths (58.3%) occurred in the first 72 hours of admission. Seventeen children (23.6%) died after spending between the four and five days, while the rest 13 (18.1%) were on admission for longer than five days.

**Table 2:** Causes of deaths among the study population and age distribution

Causes	Total	Percentage of total
Malaria	27	37.5
Gastroenteritis	17	23.61
Bronchopneumonia	11	15.28
Anaemic Heart Failure	11	15.28
Meningitis	4	5.55
Septicaemia	1	1.39
Haemorrhage	1	1.39
Total	72	100.0

Table 3 shows the relationship between the causes of death and duration of admission. Majority of children with severe anaemia (54.5%) died within 24 hours of admission. The relationship between duration of hospital stay and cause of death was however, not statistically significant.

**Table 3:** Association between duration of stay and cause of death

Duration of stay	Causes						
	Ma-laria	G/e	Bpn	S.anaemia	Men-inigitis	Septi-caemia	Haemo-Rrhage
≤1	3	4	4	6	1	-	-
2	4	4	1	1	2	-	1
3	6	2	2	1	-	-	-
4	5	2	-	-	-	1	-
5	5	1	1	1	1	-	-
>5	4	4	3	2	-	-	-
Total	27	17	11	11	4	1	1

( $\chi^2$  Fischer's Exact = 40.28; df = 42; P-value = 0.73)

In Table 4 the monthly distribution of deaths and its causes is shown. The peak period of recorded mortality was between May and August 40 (55.6%). The modal month was August 17(23.6%). These deaths were mainly due to severe malaria 19 (47.5%), pneumonia 8 (20.0%) and severe anaemia 6(15.0%). A smaller peak in February was mainly due to gastroenteritis 5(71.4%). The monthly differences in the causes of death was statistically significant (Fischer's exact= 97.3, p= 0.02).

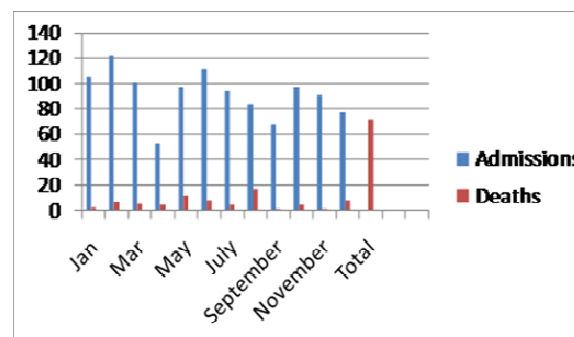
**Table 4:** Causes of death with relationship to monthly distribution

Months	Causes						
	Ma-laria	G/E	BPN	S.anaemia	Men-inigitis	Septi-caemia	Haemo-Rrhage
Jan	-	1	-	1	-	-	-
Feb	-	5	1	-	1	-	-
Mar	-	4	-	1	-	-	-
Apr	3	-	1	-	-	-	-
May	3	3	3	-	2	-	-
Jun	2	2	2	2	-	-	-
Jul	2	-	-	2	-	-	-
Aug	12	-	3	2	-	-	-
Sept	-	-	-	1	-	-	-
Oct	-	-	-	2	1	1	-
Nov	1	-	-	-	-	-	-
Dec	4	2	1	-	-	-	1
Total	27	17	11	11	4	1	1

Fischer's exact = 97.30 df = 77 P-value = 0.023

Figure 1 shows the distribution of the number of admissions and number of deaths recorded among the study population. More of the patients were admitted between the months of January and March while the months of May and August recorded the highest number of deaths.

**Fig 1:** Monthly distribution of admitted cases – Average admission / Month



## Discussion

The mortality rate of 6.5% is lower than the 12.2%, reported in Ebonyi State University Teaching Hospital, a tertiary health facility located in the same Abakaliki. It thus appears that in spite of the limitations in personnel and facilities, the institution is able to offer commendable service to their clients. This difference could also be due to referral bias, as the more severe cases may have been referred to Teaching Hospital, thereby resulting in their reported higher mortality.

Like in most previous reports from Nigeria and sub-Saharan Africa, males and children younger than 24 months constitute the bulk of the mortalities.<sup>5-12</sup> The children in this age group are more prone to diarrhoea and pneumonia because of their increased risk as a result of poor hygiene and feeding practices.<sup>13-15</sup> The male preponderance may reflect the male preference in the typical African society. The reason for the preponderance of male death could be due to the protective effect of the double X chromosome in the females as opposed to the males is unclear, but similar trend has been reported previously in most reports from Nigeria.<sup>5-9</sup> In India it was postulated that because of cultural bias for males they are brought to the hospital earlier and more frequently and may account for the higher proportion of male admissions and mortality.<sup>16,17</sup> There is need to conduct local research to determine if the same reason applies in Nigeria.

According to studies from Nigeria and other African countries, malaria is still a leading cause of mortality in children under 5years.<sup>5-10</sup> In our index study, malaria (37.5%) was the commonest cause of death. The persistence of severe malaria as the predominant cause of childhood mortality in 2009 in Nigeria may suggest that the Roll Back Malaria program and Millennium development goal have not achieved their desired results. However the extent these programs have been implemented in this centre and city may not be known. The reasons for this include the high cost and unavailability of the artemisinin based combination drugs, poor mobilization and sensitization about the use of insecticide treated nets, fake and adulterated drugs and late presentations to hospitals for treatment. Gastroenteritis, bronchopneumonia and

severe anaemia were the other common causes of death. This trend has been severally reported from other centre programs targeted at controlling or eradicating these diseases in this country, and has remained the same in the past 40 years, in spite of several programs targeted at controlling or eradicating them.<sup>13-15</sup>

The seasonal distribution of the causes of deaths could be explained by the fact that the major causes of these deaths; malaria and bronchopneumonia occur more frequently during the wet season. Wet season encourages breeding of mosquitoes that transmit malaria and provides chilling environment for micro-organisms which may result in pneumonia.<sup>5-9</sup> On the other hand, gastroenteritis occurred more during the early part of the year which coincides with the dry season.<sup>5-9,13-15</sup> During this period there is scarcity of potable drinking water which encourages the transmission of faeco-oral infections. This pattern had been reported by previous Nigerian studies.<sup>5-9,13-15</sup>

In spite of lack of a dedicated Children Emergency Unit, the proportion of mortalities in the first 24hours (25%) is lower than previous reports of between 49% and 53% from tertiary institutions in Nigeria.<sup>6,7,9</sup> This lower figure may partly be due to the early transfer of severe cases to the two tertiary hospitals located in the town. Most of the deaths recorded within the 1<sup>st</sup> 24hours in this study were due to Gastroenteritis with dehydration/shock, severe anaemia with cardiac failure and bronchopneumonia with severe hypoxaemia which obviously connote late presentation. It is to be noted that deaths from these conditions should be preventable and efforts to do so in this centre should be intensified

## Conclusion

This study has shown that mortality in Mile 4 Mission Hospital was commonest among children younger than 2 years of age and was due to infectious diseases such as severe malaria, gastroenteritis and pneumonia. There was also a seasonal variation of the diseases. To reduce these deaths in line with the MDGs, preventive strategies such breastfeeding, immunization, improved hygiene and sanitation, malaria prevention using insecticide treated bed nets etc should be implemented in the community. Similarly, community based management of diarrhoea, malaria and pneumonia, if implemented on a wide scale basis will contribute to a further reduction of cases. The medical officers in the facility should be equipped with the relevant skills to ensure early diagnosis and prompt management of children presenting with emergencies; equipment and supplies to improve the management of the cases should also be put in place.

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