

Paediatric medical morbidity and mortality in a suburban hospital in Jos, North -central Nigeria

Abstract

Background: Even though globally there has been some decline in childhood mortality, figures still remain high in sub-Saharan Africa. The pattern of morbidity and mortality in health care institutions may be a reflection of the disease burden of the community which it serves and will facilitate prevention/ control strategies. This study was conducted to determine the pattern of paediatric medical morbidity and mortality in a secondary level hospital in a sub – urban area in Jos, North – central Nigeria.

Materials and Methods: This retrospective study is a review of paediatric admissions into the Vom Christian Hospital. The paediatric department of the Jos University Teaching Hospital started posting trainee residents to the hospital in May 2012 for the community paediatric posting under the supervision of consultants. Relevant data on all children who were admitted into the Vom Christian Hospital between May 2012 and April 2013 with medical conditions were retrieved from the admissions register and other records. The data was analyzed using Microsoft Excel and Epi info7. A $P < 0.05$ was considered statistically significant.

Results: A total of 334 children aged between birth and <18 years were admitted during the period, out of which 235 (70.4%) were children less than 5 years old. Infections (221, 66.2%) were the major causes of morbidity. Out of all the 334 admissions, 304 (91%) were discharged, 7 (2.1%) left against medical advice, 6 (1.8%) were referred, while 17 (5.1%) died. Malaria was the

22 commonest cause of morbidity (102, 30.5%) and mortality (6, 35.3%). Severe protein energy
23 malnutrition had the highest case fatality rate (25%).

24 Conclusions: The burden of paediatric morbidity and mortality is in children under 5 years and
25 are mainly preventable. An emphasis on malaria eradication and child survival strategies will
26 help to reduce childhood morbidity and mortality.

27 Key words: paediatric, morbidity, mortality, Nigeria.

28 **Introduction**

29 Globally, there has been some decline in childhood mortality since 1990 , however, significant
30 disparities in child mortality persists across the Regions.¹ Sub-Saharan Africa continues to lag
31 behind other regions, both in terms of its overall reduction in the under-five mortality rate
32 (U5MR) and its pace of decline in the total number of under-five deaths. The region accounted
33 for 50% of all under-five deaths by 2012.¹ Most of these deaths are still from preventable causes
34 like Pneumonia, diarrhoea, malaria, undernutrition and neonatal complications. Nigeria
35 contributes 13% of all under five deaths worldwide, ranking 9th globally with an U5MR of
36 124/1000 (2012).¹

37
38 In Nigeria, with a total population of over 162 million , 50 % of the population live in rural
39 areas.² Various national surveys in Nigeria have indicated higher childhood mortality rates in
40 rural areas where there are fewer facilities and health personnel , compared to urban areas.³
41 ⁴Studies in developing countries have indicated varying causes of morbidities with varying case
42 fatality rates.⁵⁻⁸

43 The causes of morbidity and mortality differ from place to place and may vary from time to time
 44 even within the same region. These should be determined for every community in order to
 45 identify the prevailing health needs and strategize to effectively address these problems. The
 46 pattern of admissions in health care institutions may be a reflection of the disease burden and
 47 health needs of the community which it serves. Furthermore, this information will guide
 48 appropriate allocation of scarce resources.

49 The objective of this study was to determine the pattern of paediatric admissions, major causes of
 50 morbidity and mortality at Vom Christian Hospital located in a sub-urban resource poor area in
 51 North Central Nigeria.

52 **Materials and methods:**

53 **Study Setting and subjects:**

54 The study was conducted at Vom Christian Hospital, a secondary level mission hospital situated
 55 in Vom, a sub-urban area in Jos South Local Government Area (LGA), North Central
 56 Nigeria. The hospital was established in 1922 under the Church of Christ in all Nations (COCIN),
 57 and is dedicated to the needs of the local community, though the hospital served most parts of
 58 Northern Nigeria for many years. It has a total bed capacity of 300 beds, while the children's
 59 ward has 34 beds. There is no dedicated children's emergency unit, but children are admitted
 60 either through the accident and emergency unit or through the general outpatient clinic. In
 61 addition, the hospital also has a small neonatal unit with a capacity for 6 babies which has an
 62 inborn and outcome section where sick neonates that require close monitoring are admitted. Other
 63 neonates are admitted beside their mothers in the maternity ward.

The paediatric department of the Jos University Teaching Hospital started posting trainee residents to Vom Christian hospital in May 2012 for the community paediatric posting after signing amemorandum of understanding (MOU) with the hospital. This was sequel to the review of the postgraduate training curricula of the National and West African Colleges in 2011, in order to train paediatricians with a broad thinking perspective and to meet the health needs in the country. The posting commenced in May 2012 with the posting of the first trainee resident there, under the supervision of consultants from the department. Each posting lasted for two months according to the College requirements

Study design and data collection: This was a retrospective descriptive study of all paediatric admissions into the hospital over a oneyear period from May 2012 to April 2013. An admissions / discharge register was opened and kept of all children aged between birth to <18 years who were admitted into the paediatric unit of the hospital. The register was updated daily and was checked regularly by the supervising consultants. Data of all consecutive admissions of all children with non-surgical (medical) conditions was entered into the register. The records of all children admitted from May 2012 to April 2013 were retrieved from the register. The data collected included date of admission, age, gender, anthropometry, final diagnosis, treatment, outcome, date of discharge or death, etc.

Ethical considerations: The study was approved by the management of the Vom Christian Hospital, while ethical clearance was obtained from the Human Research Ethics Committee of the Jos University Teaching Hospital, Jos.

86 Data analysis:

87 Data collected was entered into a spread sheet using Microsoft Excel and Epi info7. Frequency
88 tables were drawn and descriptive statistics was used to analyze the obtained data. Chi square
89 was used for comparison of categorical data. A P value of < 0.05 was considered statistically
90 significant.

91 **Results**

92 A total of 334 children aged between birth and <18 years were admitted during the one year
93 period, 191 male and 143 female giving a male: female ratio of 1.3: 1. Fifty- six (16.8%) were
94 aged < 2 months, 179 (53.6%) were between the ages of 2 months and < 5 years, while 99
95 (29.6%) were 5 years or older. Thus, 70.4% (235) of all the paediatric admissions were children
96 under the age of 5 years.

97 Morbidities:

98 Malaria was the most common morbidity amongst all the children accounting for 30.5%(102) of
99 all admissions during the period. This was followed by septicemia(55, 16.5%) and sickle cell
100 disease (30, 9.0%). The other causes of morbidity are shown in Table 1. The less frequent
101 diagnoses like chronic liver disease, afebrile seizures, nephrotic syndrome, poisonings, near
102 drowning, etc. were categorized as others.

103 The main causes of morbidity in the various age groups are also shown in table 1. Septicemia
104 was the most common diagnosis among infants under 2 months of age (24, 42.9%). This was
105 followed by perinatal asphyxia (17, 30.4%) and prematurity (6, 10.7%). In children between 2
106 months and < 5 years, malaria was the most common morbidity accounting for 69 (38.6%) of the
107 179 children admitted. Other morbidities in this age group included septicemia (27, 15.1%),

pneumonia (17, 9.5%), acute gastroenteritis (14, 7.8%), etc. Amongst children aged 5 years and above, malaria was still the most common diagnosis (31, 31.3%), followed by sickle cell disease (24, 24.2%) and acute bacterial meningitis (11, 11.1%).

Outcome:

Out of all the 334 admissions, 304 (91%) were discharged, 7 (2.1%) left against medical advice, 6 (1.8%) were referred to higher level institutions that had higher facilities, while 17 (5.1%) died.

Mortalities:

Seventeen of the 334 children admitted during the period died, giving a mortality rate of 5.1%. These were made up of 11 male and 6 female, the difference was however not statistically significant ($\chi^2 = 0.41$, $P = 0.52$). Twelve (70.6%) of the children that died were between 2 months - < 5 years old, while 3 (17.7%) were < 2 months of age. Thus, the majority of the Children that died were under 5 years old (15, 88.3%).

Infections contributed to 76.5% of the mortalities. In terms of specific diagnosis, malaria was the most common cause of mortality (6, 35.3%), followed by acute bacterial meningitis (4, 23.5%). The other causes of deaths and their contribution to the total mortalities are shown in table 2. With regards to case fatality however, severe protein energy malnutrition had the highest case fatality rate (25%), followed by acute bacterial meningitis and prematurity (16.7% each). The case fatality rates for the other diseases are also shown in table 2.

Discussion

This retrospective analysis was conducted to determine the pattern of paediatric morbidity and mortality in a secondary level health facility located in a sub-urban area in North Central Nigeria.

The main findings of our study were: the major morbidity and mortality in the paediatric ward are in children under five years of age, with infections being the most significant causes. Additionally, malaria was the commonest cause of morbidity and mortality. In infants less than 2 months of age, the commonest causes of morbidity and mortality were prematurity, perinatal asphyxia and septicemia. The overall mortality rate was 5.1% and there was no statistically significant difference between the sexes. Finally, the Case Fatality Rate was highest for severe protein energy malnutrition, acute bacterial meningitis and prematurity.

The results of this study indicate that the burden of paediatric morbidity at the VCH is in children under 5 years of age, contributing to 70% of admissions. The situation appears to be similar not only in Nigeria but also in other developing countries with figures ranging from 66% to 90% of total paediatric medical admissions being children under 5 years of age.^{9 - 13}. These children are vulnerable and predisposed to various diseases. Their health status is widely recognized as an important indicator of the level of child health and overall development. Thus they are the target age group for the millennium development goal (MDG) 4. It is therefore important that intervention strategies should target this age group in order to achieve the MDGs. The male: female ratio of children admitted was 1.3 : 1. The male preponderance in terms of childhood admissions in the present study is similar to those in other studies.^{9, 10} It may be related to the increased biological vulnerability of males to infection or it may be a reflection of the demography of the population.

Overall in the present study, infections (including malaria, septicemia, AGE, pneumonia, meningitis) were the major reasons for admissions (66%), with malaria being the highest

152 morbidity (31%). These findings are comparable to those of other studies in Nigeria and some
 153 African countries. Similar to the finding in this study Some authors also found malaria to be the
 154 most common reason for paediatric admissions accounting for 32% in Bayelsa state in S. Nig,
 155 ¹⁰, 44% from Benin⁹, E. Nigeria in 2012, 13% in Enugu, E. Nigeria ¹¹, 33% in Kenya ⁸ and 38%
 156 from Zaire¹⁴ These countries are holo-endemic for malaria and may be an indication of
 157 inadequate control measures in the study group. This brings to question the impact of the recent
 158 malaria eradication programmes. With year 2015 just one year away, concerted efforts will need
 159 to be placed on control of malaria especially in rural/ sub-urban communities like ours. Some
 160 other studies from some other developing countries even though also found infections to be the
 161 commonest morbidity, however, in contrast to our study acute respiratory infections (ARI) and
 162 gastroenteritis (GE) were the major causes of morbidity.^{6,12,15,16} The relatively low morbidity
 163 from ARI in our study may also be a reflection of improved immunization in Nigeria, which
 164 reduces susceptibility to ARIs. An improvement in the control of diarrhea disease programme
 165 may also explain the relatively low prevalence of diarrhea in the current study. With regards to
 166 the various age groups, infections was still the main reason for admission in all the age groups,
 167 specifically with malaria being the most common morbidity in children aged 2 months to < 5
 168 years and also in children > 5 years. This is similar to reports from other studies ^{10,17,18} Although
 169 infections was also the main reason for admissions in children < 2 months, however unlike in the
 170 former age groups, septicemia was the major morbidity (42.9%) with malaria contributing
 171 only 3.6 %. Other causes of admission in this age group included perinatal asphyxia and
 172 prematurity. Possible reasons for the low prevalence of malaria in infants < 2 months includes:
 173 low susceptibility of this age group to malaria, and also the intermittent preventive prophylaxis
 174 against malaria given to all pregnant women during ANC.

175 With regards to mortality, the overall paediatric mortality rate in the unit during the period was
 176 5.1 %. This is similar to reports from other authors from Nigeria and other developing countries;
 177 6.5% reported by Mouneke²⁰ from Abaliki, 9% from UNTH Enugu,¹¹ 8.2 % in Kenya⁸, 9.5% by
 178 Ayoola from Ibadan²¹, 6% Bucens from East Timor²², and 7.5% from Ethiopia.¹⁶ Some other
 179 authors reported a higher rate of 12.6% from Ife.²³ Similar to the morbidities, there was a male
 180 preponderance in the mortalities, even though this was not statistically significant. Similar
 181 reasons can be adduced for this finding, in addition to the fact that it may be a reflection of the
 182 male predominance of the admissions. Other authors have documented similar
 183 findings.^{20,23} Furthermore, children under 5 years made up most of the mortalities (88%). Some
 184 authors have similarly documented a high mortality rate among children less than five years;
 185 89.6% in Sagamu²³, > 80% in EPU Benin,⁹ 85% in Bayelsa,¹⁰ and 85.2% from Port
 186 Harcourt²⁴. A little differently, Chukwu¹¹ reported 58% from UNTH, Enugu but excluded
 187 neonates; while Monueke²⁰ reported 97.2% from Abaliki inclusive of 5 year olds.

188 Malaria was the main cause of mortality in the current study (35.3%). This is similar to
 189 reports from other parts of the country where malaria was the major cause of mortality with
 190 figures ranging from 19.6% to 37.5%.^{9,10,20} This indicates that malaria is still a major problem in
 191 our country and early recognition of symptoms, prompt diagnosis and early treatment may be
 192 useful in the reduction of these mortalities. Mothers should be taught to identify symptoms and
 193 to seek treatment early. The commencement of malaria management from the community via use
 194 of rapid diagnostic tests (RDTs) and artemisin – based combination therapy (ACTs) is also
 195 recommended. In contrast to our findings, Chukwu and colleagues from UNTH Enugu, reported
 196 malignancies as the main cause of mortality (20.4%), this was followed by other non –
 197 communicable diseases like renal and cardiac diseases; while malaria contributed to only 2.4%

198 of the deaths. The reason for this difference can be explained by the fact that the Enugu study
199 included only children in the main wards, excluding the emergency units. Also, the fact that it is
200 a tertiary referral centre may explain the high mortalities from non-communicable diseases
201 probably from referred cases.

202 Even though malaria was the main cause of mortality in our study, its case fatality rate was low
203 (5.9%). Severe PEM had the highest case fatality rate of 25%. This was followed by acute
204 bacterial meningitis and prematurity, 16.7%. Duru and colleagues from Bayelsa reported PEM to
205 have a case fatality rate of 22.9 which was the 2nd highest medical CFR. In the Enugu report,
206 tetanus had the highest CFR of 67%, followed by HIV/AIDS, 27% and malignancies, 24%. The
207 CFR for severe PEM was however low, 9.6% in their report. In another report from Zimbabwe,⁷
208 severe PEM had a similar CFR 28.7%, to that of the current study. It is therefore necessary that
209 PEM should be screened for and treated early to prevent this high CFR. Similarly, immunization
210 against meningitis should be conducted regularly especially in the older children in view of its
211 relatively high CFR. In addition, high risk pregnancies should be managed properly/ referred in
212 order to reduce prematurity, while improving neonatal facilities may reduce the CFR from
213 prematurity.

214 In conclusion, children less than 5 years of age bear the greater burden of paediatric morbidity
215 and mortality in Vom, Jos, Nigeria. Infections in general with malaria in particular, is the major
216 cause of morbidity and mortality in Vom, Jos, Nigeria.

217 The main limitation of this study is the short duration of review, one year. The findings are
218 however relevant as a preliminary report that will help in planning and will also serve as a
219 baseline for subsequent reviews.

We recommend a refocus on health programmes like child survival strategies and IMCI targeted especially towards children less than 5 years. Prevention of infections via hygienic health habits is also encouraged. In addition, malaria eradication programmes should be intensified with diversification of methods and outreaches to the surrounding communities that the hospital serves. Furthermore, Mothers should be taught to identify signs of illness and seek treatment early. Finally, use of RDTs and ACTs in the community, at the PHC level will facilitate early diagnosis and treatment of malaria.

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292 Table 1: Frequency of Paediatric morbidities by age group in Vom

293		All patients	< 2 months (%)	2 months - < 5 years(%)	≥ 5 years(%)
294	Diagnosis No. (%)	No. (%)	No. (%)		No. (%)
295	Infections:	221 (66.2)	26(46.4)	141(78.8)	54 (54.5)
296	Malaria	102 (30.5)	2 (3.6)	69(38.6)	31 (31.3)
297	Septicemia	55 (16.5)	24(42.9)	27(15.1)	4(4.0)
298	Acute bacterial meningitis	24 (7.2)	0 (0)	13(7.3)	11(11.1)
299	Acute gastroenteritis	20(6.0)	0 (0)	14 (7.8)	6 (6.1)
300	Pneumonia	18(5.4)	0 (0)	17 (9.5)	1 (1.0)
301	Pulmonary tuberculosis	2 (0.6)	0 (0)	1 (0.6)	1 (1.0)
302	Non- infectious:				
303	Sickle cell disease:	30(9.0)	0(0.0)	6(3.4) 24(24.2)	
304	Severe PEM	4(1.2)	0(0.0)	4(2.2) 0(0.0)	
305	Perinatal:				
306	Perinatal Asphyxia	17(5.1)	17(30.4)	0 (0.0)	0 (0.0)
307	Prematurity	6 (1.8)	6(10.7)	0 (0.0)	0 (0.0)
308	Neonatal jaundice	3(0.9)	3(5.4)	0 (0.0)	0 (0.0)
309	Others:	53(15.9)	4(7.1)28(15.6)	21(21.2)	

310 **Total :334(100)** **56(100)** **179(100)** **99(100)**

311 *Others includes: Poisonings, Nephrotic syndrome, Near drowning, chronic liver disease,
312 afebrile seizures, etc

313 ** PEM – Protein energy malnutrition

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317 Table 2: Causes of paediatricmortality and Case Fatality Rates in Vom

318	Diagnosis	Total no. of patients	Total no. of deaths(% of Total Mortalities)	Case fatality rates
319	Malaria	102	6 (35.3)	5.9
320	Acute bact. meningitis	24	4 (23.5)	16.7
321	Perinatal asphyxia	17	2 (11.8)	11.8
322	Acute gastroenteritis	20	2 (11.8)	10.0
323	Septicemia	32	1 (5.9)	3.1
324	Prematurity	6	1 (5.9)	16.7
325	Severe PEM	4	1 (5.9)	25.0
326	Total :		17 (100)	

327 *bact. – bacterial

328 ** PEM – Protein energy malnutrition