Original Article

Mortality Pattern in Children Aged 1- 60 Months at a Tertiary Healthcare Institution, in Southeast Nigeria

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Abstract

Background: Under five mortality is a major health concern worldwide. Nigeria ranks third in under five mortality worldwide. Attaining the SDG 3.2, which aims at reducing neonatal mortality to 12% and under five mortality to 25% by 2030, can be made possible by regular evaluation of the under-five mortality status and its related factors. **Aim:** To evaluate the morbidity and mortality pattern and related factors in children aged 1-60 months at University Teaching Hospital in south-east Nigeria. **Methods:** A retrospective study of all admissions in children aged 1-60 months at the Paediatrics Department of Abia State University Teaching Hospital, from January 1st 2017 to 31st December 2017 was conducted. Results were presented prose and frequency tables. Test of significance for discrete variables was done using the Chi-square test. P-value <0.05 was regarded as significant. **Result:** There were 440 admissions. Males were 270 and females were 170 giving a male: female ratio of 1.6: 1. Many, 400 (90.9%) were in the 1-36 months age group, while 40 (9.1%) were in the 37- 60 months age group with no significant difference in their gender p= 0.153. Malaria 155 (35.2%), sepsis 95 (21.6%) and acute watery diarrhea 84 (19.1%) were the leading morbidities with significantly more morbidities recorded within the 1-36 month age group p=0.028. The greatest monthly morbidity 81 (18.4%) occurred in February. The mortality rate was 13.6% with sepsis, malaria and acute watery diarrhea being the leading causes of mortality; 82.3% were discharged home, 1.8% absconded, while 1.1% was discharged against medical advice. **Conclusion:** The mortality rate in this study was high. Morbidities and mortalities occurred significantly more in the 1-36 month age group and were due to preventable causes. Early diagnosis and aggressive treatment of diseases in the under-fives should be re-emphasized.

Keywords: Under five mortality; South-east Nigeria

Introduction

Child mortality is an indicator of the wellbeing of individuals and socioeconomic development of the society. [1] Child mortality is a huge health concern worldwide particularly in developing nations with particular reference to sub-Saharan Africa where children are more than 15 times more likely to die before the age of 5 than children in high income countries. [2,3] An estimated 5.6 million under-five deaths occurred worldwide in 2016 with over 80% of these occurring in sub-Sahara Africa and south Asia. [4] Only 6 countries (China, India, Pakistan, Nigeria, Ethiopia and the Democratic Republic of the Congo) accounted for half of all the aforementioned under-five (U-5) deaths. [4] Nigeria in particular, has the second highest absolute number of under-5 deaths (733,000) after India (1.1 million) and one of the highest U5MRs (104 deaths per 1000 live births) after Mali (111), Sierra Leone (114), Central African Republic (124), Chad (127) and Somalia (137). [5]

Sustainable Developmental Goals (SDGs) aim at reducing U-5 mortality rate (U-5MR) to at least as low as 25 deaths per 1000 live births by the year 2030. [6] The causes of U-5 mortality are largely preventable and include acute respiratory infections, diarrhoea, malaria, malnutrition. [4] These morbidities vary in pattern and extent from population to population and from region to region in these low resource nations. Within countries in Africa, for instance, there is a substantial variation in child mortality rates across administrative divisions. [7] Determining the aetiologies and related factors of U-5 morbidity and mortality in any population helps to highlight the magnitude and pattern of the problem and in strategizing goal-directed measures to curb the trend.

This study was, therefore, conducted to determine the U-5 mortality pattern and its related factors in a University Teaching Hospital in south-east Nigeria.

It is hoped that the findings would add to available data and constitute a veritable tool in formulating policies aimed at effectively stemming the trend in childhood morbidity and mortality.

Patients and Methods

This study was done at the Department of Paediatrics of the Abia State University Teaching Hospital, Aba, Nigeria. All

How to Cite this Article: Onyearugha CN, et al. Mortality Pattern in Children Aged 1- 60 Months at a Tertiary Healthcare Institution, in Southeast Nigeria. Ann Med Health Sci Res. 2020;10: 907-911.

admissions of children aged 1 month to 60 months from January 2017 to December 2017 were retrospectively reviewed.

The Department of Pediatrics is manned by 6 consultants, 12 registrars and 10 house officers (who do 3 monthly rotations before proceeding to other departments). All cases of admission were reviewed by at least the registrar on call before commencement of further management. Diagnosis was made on the patients based on clinical features and laboratory results.

All the case records of children admitted to the Children Emergency Unit and to the Pediatric ward were perused and relevant information extracted. The information included were age, gender, diagnosis, duration and outcome of admission.

Exclusion criteria

Exclusion criteria were surgical patients, children with gross congenital malformation, those aged > 60 months and patients with incomplete data.

Ethical clearance was obtained from the hospital's Ethics Committee.

Data analysis

Data was analyzed using SPSS Version 16. Proportions and chi-square analysis were done. Statistical significance was set at P value < 0.05.

Results

A total of 484 admissions were recorded over the study period but 44 were discarded due to incomplete data. Therefore, 440 were used for further analysis. There were 270 males and 170 females, giving a male: female ratio of 1.6: 1 [Table 1].

Majority of the U-5s, 400 (90.9%), were in the 1-36 months age bracket, while those in 37-60 month age category (40) constituted only 9.1% of the patients [Table 1]. However, there is no statistical difference in the male: female ratio in the two age groups (df: 1, p=0.153).

Malaria, 155 (35.2%), sepsis, 95 (21.6%), acute watery diarrhea, 84 (19.1%), bronchopneumonia, 62 (14.1%) were the leading morbidities in these patients [Table 2]. Significantly more morbidities 415 (94.3%) were recorded in the 1-36 month age category than in the 37-60 month age group where only 15 (5.7%) morbidities were recorded (p=0.028).

The greatest number of morbidities 81 (18.4%) occurred in February with 77 (95.1%) of that monthly morbidity occurring in children aged 1-36 months [Table 3]. Other distribution pattern is also shown in Table 3. The distribution of the 81 morbidities occurring in the month of February is as follows: acute watery diarrhea 35 (43.2%), malaria 20 (24.7%), sepsis

Table 1: Age and gender distribution of patients.

Age group (Months)	Male	Female	Total (%)
1-36	247	153	400 (90.9)
37-60	23	17	40 (9.1)
Total	270	170	440 (100.0)

Table 2: Morbidities in the patients.

Diagnosis	No. in 1-36 Months age group	No. in 37-60 Months age group	Total No. in both groups	Percentage (%)
Malaria	139	16	155	35.2
Sepsis	93	2	95	21.6
AWD	81	3	84	19.1
BPN	60	2	62	14.1
Meningitis	8	-	8	1.8
Pharyngitis	5	-	5	1.1
Dysentery	5	-	5	1.1
Orbital cellulitis	3	1	4	0.9
PEM	3	-	3	0.7
CCF	2	-	2	0.5
CHD	2	-	2	0.5
Seizure disorder	3	-	3	0.7
Abdominal malignancy	2	-	2	0.5
Sickle cell disease	2	-	2	0.5
ASA	1	-	1	0.2
HIV	1	-	1	0.2
Hypoglycemia with seizure	1	-	1	0.2
Evolving CP	1	-	1	0.2
Adenoid	1	-	1	0.2
Tetanus	1	-	1	0.2
Tonsillitis	1	-	1	0.2
S J S	-	1	1	0.2

AWD: Acute Watery Diarrhea, BPN: Bronchopneumonia, PEM: Protein Energy Malnutrition, CCF: Congestive Cardiac Failure, CHD: Congenital Heart Disease, ASA: Acute Severe Asthma, HIV: Human Immunodeficiency Virus, CP: Cerebral Palsy, SJS: Steven Johnson Syndrome.

13 (16.0%), bronchopneumonia 8 (9.9%), meningitis 3 (3.7%), congenital heart disease 1 (1.2%), Steven Johnson syndrome 1 (1.2%).

Majority, 362 (82.3%) of the admissions were discharged while 60 suffered mortality. The total of 60 deaths recorded among the 440 patients gave a mortality rate of 13.6% [Table 4].

Table 5 below shows that the leading causes of mortality were sepsis 29 (48.3%), malaria 17 (28.3%), and acute watery diarrhea 9 (15%). Overwhelming proportion, 58 (96.7%), of the mortalities occurred in the 1-36 months age group, while the 37 -60 months age group recorded only 2 (0.3%) mortalities. Notably, all the deaths recorded in the 1-36 months age group occurs in 1-12 month's age group.

Discussion

The mortality rate noted in our study was 13.6%. Though this is higher than the average mortality of 10% recorded for Nigeria in the UNICEF report. [8] There is a wide variation of values from different states of the country with states such as Osun and Ogun in southwest recording as low as 60 per 1000 live births while, states in the northwest including Sokoto, Kano, Jigawa, recorded as high as 200 under five mortality per 1000 live births. However, it is slightly lower than the 14. 2% recorded for some group of states, to which Abia state, the place of the present study belonged. [8]

Malaria (35.2%), sepsis (21.6%), acute watery diarrhea (19.1%) and bronchopneumonia (14.1%) as the leading morbidities in this study is similar to observations in previous studies. [9-11] These are amongst the leading aetiologies of U-5 morbidity and mortality worldwide, particularly in developing countries with Nigeria ranking second to India in absolute U-5 mortalities globally. [5] In the circumstance of low immunization coverage, widespread malnutrition, lack of adequate water supply, poor environmental sanitation and hygiene, poor health care seeking behavior of care givers and lack of easily accessed quality health care facilities which are rife in the poor resource nations, these morbidities are bound to be highly prevalent. [12-15] These morbidities are noted to be infectious and largely preventable by application of simple and cost effective measures including exclusive breast feeding, provision of potable water/ basic sanitation, with early diagnosis and treatment of diseases. [16,17]

Also, morbidities occurred significantly more in the 1-36 month age group than in the 37-60 month age bracket in our study. The 1-36 month age group are more vulnerable to diseases by virtue of their greater tendency to exposure to infectious agents by being more involved in exploratory tendencies around their environment including crawling and having greater tendencies

Table 3: Monthly distribution of morbidities.

Month	No in 1-36 Months	No in 36-60 Months	Total (%)
January	38	2	40 (9.1)
February	77	4	81 (18.4)
March	34	5	39 (8.9)
April	25	2	27 (6.1)
May	13	1	14 (3.2)
June	39	1	40 (9.1)
July	25	2	27 (6.1)
August	36	1	37 (8.4)
September	44	7	51 (11.6)
October	21	1	22 (5.0)
November	26	-	26 (5.9)
December	31	5	36 (8.2)

Table 4: Outcome of admissions.

Outcome	1-36 Months age group	37-60 Months age group	Total (%)
Discharged	343	19	362 (82.3)
Dead	58	2	60 (13.6)
Absconded	7	1	8 (1.8)
DAMA	5	-	5 (1.1)
Referred	5	-	5 1.1)

DAMA: Discharged Against Medical Advice

Table 5: Causes of death in the patients.

Cause	No in 1-36 Months age group	No in 37-60 Months age group	Total (%)
Sepsis	29	-	29 (48.3)
Malaria	15	2	17 (28.3)
AWD	9	-	9 (15.0)
BPN	2	-	2 (3.3)
Meningitis	2	-	2 (3.3)
HIV	1	-	1 (1.7)

AWD: Acute Watery Diarrhea, BPN: Bronchopneumonia, HIV: Human Immunodeficiency Virus

to put contaminated hands into their mouth. [18] Additionally, their host defense mechanisms are relatively immature when compared with the 37-60 month age bracket. [19]

Our study reveals that the greatest proportion of morbidities 81 (18.4%) occurred in the month of February. Also, the leading morbidities recorded in the month of February were acute watery diarrhea (43.2%), malaria (24.7%), and sepsis (16%). This is in consonance with some previous reports in Nigeria and other parts of the tropics where diarrhea was noted to have higher prevalence in the dry season, particularly in the months of January to March. [20-22] This could be explained by the fact that rotavirus which is the commonest aetiology of diarrhea occurs more commonly in cool dry seasons in the tropics. [22,23] Also, that diarrhea was the greatest morbidity recorded in the month of February in our study may be due to the fact that there is scarcity of water supply and poor sanitation during this period. Additionally, there is an unfortunate culture of indiscriminate littering of refuge and poor hygienic practices among the traders who constitute the greater proportion of working population in the city of this index study, thereby making faeco-oral transmission of diseases, including diarrhea, very common.

The high discharge rate observed in our study is similar to that reported from Gusau [24] Umuahia, [20] and Akure [25] but is higher than that reported from Azare, Bauchi state [26] and Abakaliki. [27] The higher discharge rate that was obtained in our study could be because the study involved all paediatric admissions in our department whereas those of Azare [26] and Abakaliki [27] were conducted in their emergency units with a large proportion of the patients being transferred to the ward. Therefore those discharged home from the emergency units will obviously be less than the discharges from the whole department (both emergency and the paediatric ward), as recorded in our analysis.

The mortality rate in our study is higher than that recorded in the study conducted at Calabar [28] and Abakaliki [27] due to the fact that' our study was on the under-five population, an age group in which significantly more morbidity and mortality occurs than in the general paediatric population. The later was the study population in both the Calabar [28] and Abakaliki [27] studies.

The 2.9% of discharge without official consent (1.8% of abscondment and 1.1% of DAMA) recorded in our study is higher than the 1.9% recorded in childhood medical admissions in Zaria, [29] 2% recorded in Yobe, [30] but less than 11.4% for admission for childhood malignancies in another study [31] and 8% recorded even in Akure. [25]. Similar reasons of financial constraints, unjustified expectation of dramatic recovery from severe or chronic illness due to ignorance, misconception of the degree of recovery of an ill child thereby requesting for a discharge, and resort to alternative therapy were universal for abscondment and DAMA among care givers in the reports from the other studies [20,24,25,32] and this index study.

However, in our survey, other notable reasons were impelling domestic and business obligations and misguided belief in traditional therapy for certain clinical presentations. In Abakaliki, it is the refusal of blood donation by Jehova's witness denomination [32] while in Akure it is the domineering role of grandparents and inlaws. [25] Whatever the reason, patient discharge without the official consent of the hospital has medical, social and ethico-legal implications on the patient, family and the hospital management. [33] It is often associated, with disruption in doctor-patient relationship, possible deterioration in the patient's illness, and increased costs of healthcare. Proper counselling of patients and their relatives about their disease condition, treatment and possible consequences of premature discharge should be undertaken and well documented prior to discharge. [33]

That sepsis, malaria and acute watery diarrhea were the leading causes of mortality in this study agrees with reports from Enugu, [34] where sepsis is the leading cause of mortality. This is however, in contrast with reports from Abakaliki, [27] Gusau [24] and Azare [26] where acute watery diarrhea, respiratory tract infection and severe malaria were the leading causes of mortality respectively. Sepsis being the greatest cause of mortality in our survey and Enugu study could be explained by the fact that our study was conducted in the under-five population and 77% of deaths in the paediatric age group in the Enugu study also occurred in the under-fives. In these 2 studies, most of the deaths occurred in infants, which may be attributed to sepsis resulting from the relative immaturity of the immune system of infants. [19] Also, the tendency of these infants being carried by their mothers to public crowded markets in the city exposes them to infections.

The case fatalities for sepsis, malaria and acute watery diarrhea were 30.5%, 11% and 10.7% respectively. The high case fatality from sepsis in this study compares well with other recent studies, with 38.5% in Nnewi [35] and 38.5% in Akure. [25] A high case fatality rate of 32.6% was recorded for measles and tetanus in a study conducted at Ibadan in 1990 [36] but it dropped to 8.4% for measles in a subsequent study in 2005. [37] Other infectious diseases recording less case fatalities than sepsis these days could be as a result of more aggressive preventive and management measures including immunization, use of insecticide treated nets, oral rehydration therapy and others.

Limitations of the Study

This was a hospital based as well as a retrospective study which is prone to certain limitations like small sample size and incomplete documentation of data respectively. Again, being a hospital based study; it may not reflect the true picture of childhood morbidity and mortality in the community.

Conclusion

The mortality rate in this study was high. Most morbidities in the under-five occurred in the 1-36 month age group with malaria, sepsis, acute watery diarrhea being the leading morbidities. Also most mortalities occurred in the 1-36 month age group with sepsis, malaria and acute watery diarrhea being the leading causes of mortality. Good environmental and personal hygiene will help to curb the trend of childhood mortality in our communities. These include hand washing after handling stools and before preparation/administration of feeds to young children. Also, other preventive measures including regular

immunization, environmental sanitation, and application of insecticide treated bed nets, oral rehydration therapy, as well as early diagnosis and treatment of diseases should be enhanced.

Acknowledgement

Our gratitude goes to the house officers that extracted the data from the Children Emergency Room and Children's Out Patient Clinic registers and case notes.

Competing Interests

The authors declare that they have no competing interests.

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