Annals of Health Research
Volume 4, Issue No 2: 162-173
July-December 2018
DOI: 10.30442/ahr.0402-8-19

ORIGINAL RESEARCH

Pattern of childhood morbidities and outcome of childhood admissions in a Nigerian public secondary healthcare facility

Oninla SO*[1], Fadugbagbe AO[2], Oninla OA[3], Otetubi OA[2]

[1]Department of Paediatrics, College of Health Sciences, LadokeAkintola University of Technology, Osogbo, Nigeria

[2]Department of Paediatrics, State Specialist Hospital, Akure, Nigeria

[3]Institute of Human Virology of Nigeria, Obafemi Awolowo University Teaching Hospital Complex, Ile-Ife, Nigeria

*Correspondence: Dr SO Oninla, P O Box 2545, O.A.U., 250005, Ile-Ife, Osun State, Nigeria; Email: sooninla@yahoo.com; ORCID - http://orcid.org/0000-0001-7484-1409.

Abstract

***Background*:** Patterns of morbidity and mortality in hospital populations are indicative of community health needs and can be useful in planning improved medical services.

Objectives: To determine the morbidity, mortality and outcome patterns, and the average duration of hospital stay of admitted children in the public secondary healthcare facility.

Methods: Available hospital records of children aged one month to 15years, admitted during a one year period (October 1, 2010, to September 30, 2011) were reviewed for relevant data such as age, gender, final diagnosis, outcomes and dates of admissions and discharges.

Results: Of the 1,266 records reviewed, 57.6% children were males, 42.4% females (Z= -10.9458; p=0.0001) and 82.5% were aged under-five years. Infections accounted for 81.6% of the morbidities, with malaria (39.2%), gastroenteritis (15.2%), pneumonia (10.9%), severe anaemia (4.2%) and septicaemia (3.0%) being the top five conditions. The duration of admission ranged from less than 24hours to 30 days, with a mean of 3.2 (2.8) days.

Nine hundred and ninety-eight (78.8%) children were discharged while 64 (5.1%) died; 85.9% of the deaths occurred among under-five children. Thirty-four (6.3%) out of 537 females and 30 (4.1%) out 729 males died (Z= 7.7374; p= 0.0001). The top three causes of mortality included malaria 26.6%, septicaemia 12.5% and pneumonia 10.9%. Fifty out of 59 deaths (84.7%) occurred within 72 hours and 7 (11.9%) in<24hours of admission.

Conclusions: Male children were more vulnerable to diseases while mortality was significantly higher among females. Infections dominated the causes of childhood morbidity and mortality in the public secondary healthcare facility, with under-five children bearing the brunt.

Keywords: Childhood, morbidities, Infectious diseases, Childhood deaths, Secondary Healthcare

Introduction

Anecdotal evidence suggests there is a changing pattern of diseases managed on paediatrics wards in Nigeria [1,-3] and elsewhere in Africa. [4] In previous studies, the major causes of morbidities and mortalities included protein-energy malnutrition, diarrhoeal diseases, pneumonia, measles and severe anaemia. [5,6] However, in more recent studies, malaria and its complications, septicaemia, pneumonia, severe anaemia and HIV including HIV-related diseases (AIDS) had

been documented to be leading causes of childhood morbidity and mortality.[1,2,3,7,8]

The changing pattern might be occasioned by improved immunisation coverage and various public health initiatives, leading to a reduction in morbidity and mortality from some infectious diseases. It may also be due to the increasing impact of new maladies such as the Human Immunodeficiency Virus (HIV) infection. [2,3] Perhaps, factors such as the on-going climatic changes with its attending seasonal variations may play a significant role. [9 - 11] Indeed, it may be a combination of very many different factors.

Irrespective of the basis, periodic review of clinical practice is an incredibly important exercise every healthcare facility should undertake to evaluate the existing services with the aim of improving patients care and outcomes. One effective way of doing this is by taking a look at the records of patients admitted into health facilities. Hospital-based data from morbidity and mortality reviews could be a reflection of what obtains in the community as a whole, [3,12] and the people's health care-seeking behaviour. [13,14] The data obtained from hospital-based reviews may be a tip of the iceberg when compared to the burden of diseases in the community. This was demonstrated by Adepoju, [15] who found a higher child mortality rate (181.5 deaths per 1000 births) in the community compared with 128.4 deaths per 1000 births in the hospital. Nevertheless, the data obtained from a hospital-based study is beneficial in evaluating existing facilities and services in order to improve amenities for patients care. [2,12,13]

Globally, the under-five mortality rate dropped from 93 deaths per 1,000 live births in 1990 to 41 in 2016. [16,17] At the country level, the under-five mortality rates in 2016 ranged from 2 deaths per 1,000 live births to 133, and Nigeria was among countries whose Under-Five Mortality Rate (U5MR) was>100 per 1000 live births. [16] On regional bases in Nigeria, the 1999 and 2008 Nigeria Demographic and Health Survey (NDHS) data revealed that the North-east had the highest U5MR of 222 followed by 217 for the North-west while the South-west recorded the lowest rate of 89 deaths per 1,000 live births. [18]

It is pertinent to note that although similar research work should be done periodically, none exists in published literature from State Specialist Hospital, Akure, which was established in 1957. Astonishingly, a review of databases also suggests a paucity of data from Ondo State, Nigeria on this research theme. In addition, most of the previous studies on childhood morbidity and mortality patterns were carried out in tertiary (teaching) hospitals [1,2,3,7,13,19-23] and just a few from secondary healthcare facilities(private mission hospitals).[8,17,24,25] Secondary healthcare level provides specialized medical services, diagnostic or therapeutic support services, and emergency services to children,[26] and aside these, substantial primary healthcare services are also rendered. Paucity or non-existence of data from secondary healthcare subsector (pubic General Hospitals) limits insight into and dissemination of information on intra-facility healthcare practices. Therefore, the objective of this study was to determine the morbidity, mortality and outcome patterns, and the average duration of hospital stay of admitted children in the public secondary healthcare facility.

Methods

This is a descriptive retrospective study covering a one-year period (October 1, 2010, to September 30, 2011). The study was conducted at the Department of Paediatrics, State Specialist Hospital, Akure (SSH, A), Ondo State, Nigeria. The hospital is the main secondary healthcare institution in the state with a population of 3,460,877 people. [27] Since its inception as a General Hospital in 1957, it has undergone various phases of reconstruction and now has 225-bed spaces, 65

of which are dedicated to children. An overall average patients' admission rate per annum in the hospital was 4,450. The hospital has nearly all specialities: paediatrics, surgery, internal medicine, obstetrics and gynaecology, ophthalmology, dentistry, ENT, family medicine and public health. Laboratory and radiological services support are available, and these comprised microbiology, chemical pathology, haematology, histopathology and radiology departments.

In the hospital, paediatric medical cases are admitted into the Children's Ward, Nursery, Special Care Baby Unit or the Male and Female medical wards, depending on their ages and cases. There is no dedicated children's emergency unit, but children are admitted to the paediatrics department through the Accident and Emergency unit, the general paediatric outpatient and the consultant clinics. Paediatrics department medical staff, which include interns, medical officers, senior medical officers, principal medical officers and visiting consultant paediatricians takes care of all paediatric medical cases in the hospital.

The admission and discharge registers of children admitted to the various wards were obtained from the Medical Records Department of the hospital. Available hospital records of children aged one month to 15 years admitted under the care of the Paediatrics department during the period of review were assessed and relevant data extracted. Data obtained from the records included the dates of admission and birth, age, gender, initial clinical diagnosis and differential diagnoses, final diagnosis, multiple diagnoses and outcomes. Also retrieved from the hospital records were: dates of discharge, the mode of discharge and complications observed in the patients. The length of hospital stay was calculated from the dates of admission and discharge. The final diagnoses were made after the children have been reviewed with the laboratory results by at least a senior medical officer or principal medical officer or consultant paediatrician. An autopsy is not routinely done on dead children because of religious and cultural beliefs; however, it can be requested for in special circumstances. The possible outcomes were a discharge from our care, discharge against medical advice (DAMA), absconding, referral, and death. Ethical approval was obtained from the Ethical Committee of LAUTECH Teaching Hospital, Osogbo.

Statistical analyses were performed using version 21.0 of the IBM SPSS Software Package (SPSS Inc, Chicago, IL, USA), and, in-silico. The package (SPSS) was used to determine frequencies, means, and to construct cross-tabulations; and statistical analyses with in-silico. Data were presented as frequency tables and mean ± standard deviations (x ± SD). Means and proportions were compared using Student's t-test and Z-statistics respectively. The means of non-normally distributed data were compared using non– parametric tests. Comparison of categorical variables and tests for association were made using Chi-Square (χ^2) tests. P-values <0.05 defined the level of statistical significance.

Results

The total number of children admitted during the period of review was 1,367. However, 1,278 (93.5%) hospital records of the admitted children were retrieved, while only 1,266 (92.6%) had adequate information. Therefore, the final data analyses were based on the 1,266 children with complete data; these comprised 729 (57.6%) males and 537 (42.4%) females, giving a male-to-female ratio of 1.36:1 ($Z = -10.9438$, $p = 0.0001$).The ages ranged from one month to 168 months. The mean age (standard deviation) was 38.0 (38.5) months, with 24 months as the median. The mean age of males was 36.7 (36.5) months and 39.9 (41.1) months for the females (Mann-Whitney U test $p = 0.873$). Under-five children accounted for

82.5% (1044/ 1266) of the admissions. Figure 1 shows the pattern of admissions based on age grouping.

Pattern of morbidities

Morbidities were mainly infections; 81.6% (1033/ 1266). Table I shows the details in relation to age groups. Malaria, gastroenteritis, pneumonia, severe anaemia and septicaemia were the top five reasons for admissions. Table II shows the breakdown of the causes of admissions in relation to age groups in decreasing order of frequency. Among children that had gastroenteritis (diarrhoeal disease), 13/193 (6.7%) had severe dehydration while the remaining 93.3% had some dehydration. Out of 138 children with pneumonia, 5 (3.6%) had anaemia, 3 (2.2%) had heart failure, 3 (2.2%) had empyema, 2 (1.5%) had pneumothorax and one (0.7%) each had dehydration and febrile convulsion.

Co-morbidities

Out of the 1266 children, 1082 (85.5%) had single morbidities while 184 (14.5%) had combinations of major morbidities. Commonly found co-existing conditions along with major illnesses included malaria (3.7%), gastroenteritis (diarrhoeal disease) (2.5%), upper respiratory tract infections (URTI) (2.1%), HIV and HIV-related conditions (1.3%) and sickle cell anaemia (HbSS) (1.1%). Others included pneumonia (0.6%), cerebral palsy (0.3%), meningitis (0.2%), otitis media (0.2%), septicaemia (0.2%) and under-nutrition (0.2%).

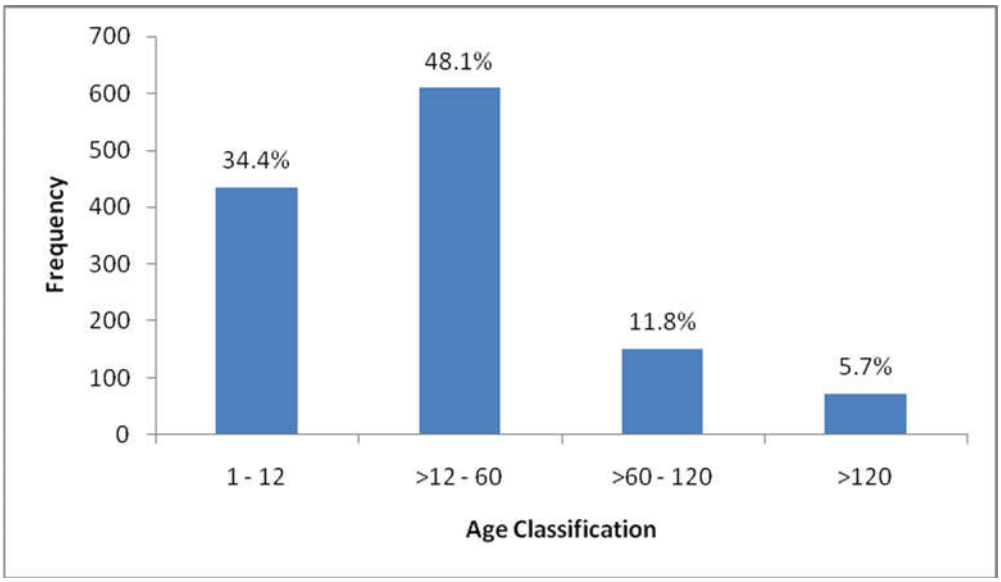

Figure 1: Pattern of admission based on age-grouping in months

Table I: Pattern of morbidities among hospitalized children in relation to age groups

Age group (months)	Diagnoses			
	Infectious N (%)	Non-infectious N (%)	*Other causes N (%)	Total N (%)
1 – 12	368 (84.6)	32 (7.4)	35 (8.0)	435 (100)
>12 – 60	493 (81)	61 (10.0)	55 (9.0)	609 (100)
>60 - 120	118 (78.7)	20 (13.3)	12 (8.0)	150 100)
>120	54 (75.0)	11 (15.3)	7 (9.7)	72 (100)
Total	1033 (81.6)	124 (9.8)	109 (8.6)	1266 (100)

$\chi 2 = 8.3063$; df =6 p < 0.2165

***Conditions which did not fit into infectious or non-infectious conditions for examples, severe anaemia and failure to thrive, the aetiologies of which were not stated in the hospital records.**

Paediatric-Surgical conditions

Twenty-one (1.7%) of the 1266 children had surgical co-morbidities. These excluded children solely admitted and managed by surgeons. Conditions co-managed with surgeons included typhoid perforation, cellulitis and pyomyositis with abscesses, pneumonia with pleural effusion and pneumothorax, chronic osteomyelitis, nephroblastoma, septic arthritis with effusion, Space-Occupying Intra-cranial Lesions and biliary atresia.

Duration of admissions

The duration of admission was accurately determined for 1,197 (94.5%) out of 1,266 children included in the study as such data for some children were missing. The duration of admission ranged from less than 24 hours to 30 days, with a mean (SD) of 3.2 (2.8) days. Twenty-three (1.9%) children stayed in the hospital for <24 hours while 799 (66.8%), 300 (25.1%) and 75 (6.3%) stayed 1-3 days, 4-7 days and >7 days respectively.

Table II: Diagnoses in relation to age groups in decreasing order of frequency

Diagnoses	Age groups in months				
	1 -12	**>12 – 60**	**>60 - 120**	**>120**	**Total**
	N (%)	**N (%)**	**N (%)**	**N (%)**	**N (%)**
Malaria	87 (20)	305 (50.8)	76 (50.7)	29 (40)	497 (39.3)
Gastroenteritis	127 (29.2)	57 (9.4)	4 (2.7)	5 (6.9)	193 (15.2)
Pneumonia	88 (20.2)	45 (7.3)	3 (2.0)	2 (2.8)	138 (10.9)
Severe anaemia♦	15 (3.5)	25 (4.1)	8 (5.3)	5 (6.9)	53 (4.2)
Septicaemia	14 (3.2)	14 (2.3)	10 (6.7)	1 (1.4)	38 (3.0)
Meningitis	10 (2.3)	16 (2.6)	5 (3.3)	0 (0.0)	31 (2.4)
Sickle Cell Anaemia	2 (0.5)	10 (1.6)	12 (8.0)	4 (5.6)	28 (2.2)
Typhoid fever	0 (0.0)	3 (0.5)	12 (8.0)	11 (15.3)	27 (2.1)
Asthma	2 (0.5)	15 (2.5)	1 (0.7)	2 (2.8)	20 (1.6)
Aspiration pneumonitis	11 (2.5)	8 (1.3)	0 (0.0)	0 (0.0)	19 (1.5)
Febrile Convulsion♦	3 (0.7)	15 (2.4)	0 (0.0)	0 (0.0)	18 (1.4)
Bronchiolitis	10 (2.3)	4 (0.7)	0 (0.0)	0 (0.0)	14 (1.1)
Under-nutrition	9 (2.1)	4 (0.7)	0 (0.0)	0 (0.0)	13 (1.0)
HIV infection	4 (0.9)	5 (0.8)	2 (1.3)	1 (1.4)	12 (0.9)
Measles	4 (0.9)	7 (1.2)	0 (0.0)	0 (0.0)	11 (0.9)
Cellulitis	6 (1.4)	3 (0.5)	0 (0.0)	0 (0.0)	9 (0.7)
Seizure disorders	1 (0.2)	6 (1.0)	1 (0.7)	0 (0.0)	8 (0.6)
Dysentery	2 (0.4)	5 (0.8)	0 (0.0)	0 (0.0)	7 (0.55)
Kerosine Ingestion	3 (0.7)	3 (0.5)	0 (0.0)	0 (0.0)	6 (0.5)
Pyomyositis	4 (0.9)	2 (0.3)	0 (0.0)	0 (0.0)	6 (0.5)
Nephrotic syndrome	0 (0.0)	3 (0.5)	2 (1.3)	0 (0.0)	5 (0.4)
Tetanus	0 (0.0)	1 (0.08)	2 (1.3)	2 (2.8)	5 (0.4)
Others causes*	33 (7.6)	63 (10.4)	15 (10)	12 (16.7)	123 (9.7)
Total	**435 (100)**	**609 (100)**	**150 (100)**	**72 (100)**	**1266 (100)**

♦Not caused by infectious or non-infectious causes (aetiological factors not stated in the hospital records)
***Causes with frequency less than 5**

Outcome of admissions

Nine hundred and ninety-eight (78.8%) children were discharged and 64 (5.1%) died, with an average monthly death rate of 5.3. The

deaths included 34 (53.1%) females and 30 (46.9%) males. On further analysis, 34 (6.3%) out of 537 females and 30 (4.1%) out 729 males died (Z= 7.7374 p = 0.0001). Among 184 children who had multiple diagnoses and co-morbidities, 8 (4.4%) died compared to 56 (5.2%) out of 1082 children with single morbidities. (Z = 2.0067 p= 0.04). Fifty-five (85.9%) of the 64 deaths occurred among under-five children as shown in Table III. Table IV shows outcome in relation to age groups, demonstrating mortality among each age group.

Malaria was the commonest cause of mortality among the children reviewed, and it accounted for 26.6% of the 64 deaths with case fatality rate (CFR) of 3.4%. Mortality rates in different clinical types of malaria presentations are compared in Table V. The contribution to mortality according to disease type included 12.5% from septicaemia, 10.9% from pneumonia, 6.3% from typhoid fever (enteritis 3 and perforation 1) and 4.7% from HIV/AIDS with CFR of 21.1%, 5.1%, 14.8%, and 25% respectively.

Table III: Survival and mortality in relation to age groups

Age groups (months)	Outcome		
	Survivors N (%)	*Dead N (%)	Total N (%)
1 – 12	411 (34.2)	24 (37.5)	435 (34.4)
>12 – 60	578 (48.1)	31 (48.4)	609 (48.1)
>60 – 120	145 (12.1)	5 (7.8)	150 (11.8)
>120	68 (5.6)	4 (6.3)	72 (5.7)
Total	**1202 (100)**	**64 (100)**	**1266 (100)**

$\chi 2 = 1.1592167$; df = 3 p = 0.76281

***Contribution of each age group to overall mortality**

Table IV: Outcome in relation to age groups

Outcome	Age groups in months				
	1 -12 N (%)	>12 – 60 N (%)	>60 - 120 N (%)	>120 N (%)	Total N (%)
Absconded	21 (4.8)	32 (5.3)	6 (4.0)	5 (6.9)	64 (5.1)
*DAMA	37 (8.5)	49 (8.1)	12 (8.0)	3 (4.2)	101 (8.0)
♦Died	24 (5.5)	31 (5.1)	5 (3.3)	4 (5.6)	64 (5.1)
Discharged	340 (78.2)	479 (78.7)	120 (80.0)	59 (81.9)	998 (78.8)
Referred out	13 (3.0)	18 (3.0)	7 (4.7)	1 (1.4)	39 (3.0)
Total	**435 (100)**	**609 (100)**	**150 (100)**	**72 (100)**	**1266 (100)**

$\chi 2 = 5.5766$; df =12 p = 0.9359

* *DAMA: Discharged Against Medical Advice*

♦ **Mortality among each age group**

Table V: Different types of malaria presentation in relation to outcome

Malaria presentations	Outcome		
	Survivor N (%)	Dead N (%)	Total N (%)
Prostration	252 (52.5)	3 (17.6)	255 (51.3)
Severe anaemia	96 (20)	7 (41.2)	103 (20.7)
Cerebral malaria	57 (12.0)	5 (29.4)	62 (12.5)
Febrile Convulsion	60 (12.5)	0	60 (12.10
Cerebral malaria with severe anaemia	4 (0.8)	1 (5.9)	5 (1.0)
Febrile convulsion and anaemia	4 (0.8)	1 (5.9)	5 (1.0)
Anaemic heart failure	3 (0.6)	0 (0.0)	3 (0.6)
Simple malaria	2 (0.4)	0 (0.0)	2 (0.4)
Cerebral malaria with dehydration	1 (0.2)	0 (0.0)	1 (0.2)
Intractable vomiting	1 (0.2)	0 (0.0)	1 0.2)
Total	**480 (100)**	**17 (100) *3.4%**	**497 (100)**

$\chi 2 = 18.877$; df = 8 p = 0.015

**Malaria case fatality rate*

Meningitis, gastroenteritis and tetanus, with CFR of 6.5%, 1.0% and 40% respectively, were each responsible for 3.1% of the overall deaths while other infectious conditions accounted for 4.7% of all deaths. Non-infectious conditions accounted for deaths among 3 (4.7%) out of the 64 childhood deaths while other causes were responsible for 13 (20.3%) deaths. Overall fatality rates in infectious, non-infectious and other conditions included 4.6%, 2.4% and 11.9%, respectively.

Of the 55 deaths recorded among under-five children, malaria accounted for 30.9%, septicaemia for 14.5% and pneumonia for 10.9%. In addition, HIV/AIDS, meningitis, gastroenteritis and aspiration pneumonitis were each responsible for 3.6% of the deaths among under-five children. Furthermore, 9 (14.1%) deaths out of 64 occurred among the older children; these comprised typhoid fever (enteric) with 3 (33.3%) out 9, tetanus was responsible for 22.2%, HIV for 11.1%, pneumonia for 11.1%, renal failure for 11.1% and 11.2% from other conditions.

The duration of admission data was only retrieved for 59 (92.19%) children who died. Seven out of the 59 (11.9%) died in less than 24 hours of admission. The modes of presentation of malaria in relation to the outcome of hospitalization are depicted in Table V while the details of the duration of hospital stay before death in relation to age groups are shown in Table VI.

Table VI. Duration of hospital stay before death in relation to age groups

Duration of hospital stay	Age groups in months				
	1 -12 N (%)	**>12 – 60 N (%)**	**>60 - 120 N (%)**	**>120 N (%)**	**Total N (%)**
<24 hours	0 (0.0)	0 (0.0)	3 (60)	4 (100)	7 (11.9)
1 – 3 days	18 (78.3)	25 (92.6)	2 (40)	0 (0.0)	45 (76.3)
4 -7 days	5 (21.7)	1 (3.7)	0 (0.0)	0 (0.0)	6 (10.2)
>7 days	0 (0.0)	1 (3.7)	0 (0.0)	0 (0.0)	1 (1.6)
Total	23 (100)	27 (100)	5 (100)	4 (100)	*59 (100)

$\chi 2 = 52.9918$; df = 9 p < 0.001

***Number of children that duration of admission could be calculated from available information**

Discussion

The total number of admissions (1,367 children) during the period of review was similar to the findings in some previous studies. [17,19,28,29] However, this figure may not reflect the actual morbidity rate in the community,[15] as the country's economic situation continues to deteriorate [30,31] and the populace seek seemingly cheaper alternative healthcare options. [15,31,32] Cognizant of earlier studies, [2,7,20,29] under-fives still accounted for a significantly higher percentage of children who required admissions in the present study. The persistence of this observation calls to question the effectiveness and the need for sustenance of many child survival health programmes which are targeted at the under-five children population.

Infectious conditions, especially malaria, dominated childhood morbidities in this review, similar to what had previously been reported in other parts of Nigeria. [8,19,20,24,25] Studies conducted a few decades ago indicated acute lower respiratory infections (ALRTI), gastroenteritis and anaemia as the most common medical causes of childhood hospital admissions.[5,6,8] Contrarily, malaria is the leading cause of childhood morbidity and mortality in the present study and a few other recent studies in Nigeria [1,8,17,33] and elsewhere in Africa, [34,35] The possible explanation for this observation may be the fact that there has been an increase in the prevalence of malaria parasites resistant to various anti-malarial drugs in recent years. [36,37]

The overall mortality rate of 5.1% recorded in this review from a government (public) secondary healthcare facility is comparable to what had been observed in tertiary healthcare institutions, [19,23,38,39] and in private mission hospitals. [8,17,24,25] The similarities of data from both levels of care is not surprising because the tertiary level sometimes provides primary and secondary healthcare services in Nigeria.[7] This may over-burden the tertiary level of care and reduce its efficiency and effectiveness in providing highly specialized healthcare required of the tertiary level of care. The corollary could be true with the secondary level being over-stretched to provide tertiary level services.

The mortality rate in this study is higher than the figures recorded in some reports [2,19,23,38] but lower than reports from other studies. [1,7,17,24] These wide variations may not be unconnected with the different methodologies employed by the researchers, especially in terms of inclusion criteria. Neonates were excluded in some studies, [2,8,19] and included in others,[1,7,14,40] while some authors utilized data obtained solely from the Children Emergency Wards.[19,20,22,23] The exclusion of neonates from the present review might have substantially reduced the observed mortality rate compared to the previous studies in which neonatal deaths contributed more than 50% to the overall mortality. [1,7, 40]

More males compared to females were hospitalized as observed in previous studies. [8,22,33] This may be attributable to the fact that males are more vulnerable biologically to diseases than females. [25] It is interesting to note, however, that the mortality rate among female children was significantly higher than that for male children, similar to reports from Benin City, Nigeria, [8] India [41] and China. [34] The reasons for the observed higher mortality rate among female children may be linked to gender preference of the parents for male off-springs for the cultural values placed on the male child, and health care-seeking behaviours or practices of the parents with respect to female children. [41] It is unclear whether this practice (gender discriminating family healthcare seeking behaviour) exists in the immediate locality of the study location. Therefore, there is a need to investigate factors which may determine the mortality pattern

among male and female children in our environment.

Under-five children accounted for a significantly high proportion (85.9%) of the deaths recorded in the present study in spite of the various health intervention programmes put in place to improve their survival. It was observed that a large percentage of the deaths were due to diseases not covered by common and popular childhood survival programmes such as routine immunization. Therefore, stakeholders in child survival strategies should make concerted efforts to strengthen the existing programmes or find simple and effective ways to reduce the impact of these diseases such as malaria, septicaemia, pneumonia, and typhoid fever – on children, especially those aged under-five.

The short duration of hospital stay among children is not surprising as most childhood illnesses are frequently acute and amenable to treatment provided correct diagnoses are made, possible complications identified promptly, and right treatments applied without delay. Deaths occurring within 24 hours of hospitalization occurred predominantly among the older children and this calls for concerted efforts to design programmes targeted at this age group, especially the adolescents, in order to meet their specific healthcare needs and challenges which differ from those of younger children. Late presentation to the hospital is the leading cause of early deaths among hospitalized children, especially within the first 24 hours of admission. [22] Late presentation is a relative term which could result from acuteness and rapid onset of complications in childhood diseases, financial constraints on the part of parents/guardians, long distance to a well staffed and equipped hospital, and lack of public ambulance services. Factors aggravating childhood mortality may also include the lack of essential equipment and good laboratory services in hospitals. (Unpublished data).

Absconding and DAMA from in-facility care are medico-social challenges encountered in clinical practice especially in resource-poor settings. Previously reported incidence of DAMA ranged from 0.8 to 5.7% compared to 8% recorded in this review. It must be stated that these studies were conducted in mission hospitals [17,25,42] and Children Emergency Units of teaching hospitals, [19,20,43,44] whereas the present study involved all hospitalized children in a public secondary healthcare facility. The reasons proffered by parents/guardians for DAMA included financial constraints, domestic obligations, the inconvenience of hospitalization and wrong perception of the child's health status. [17,42 Other reasons included a preference for out-patient care, resort to native treatment, hopelessness over the disease condition and dissatisfaction with hospital care.[43,44] In addition, unfriendly hospital environment and practices, irreconcilable medical and cultural/religious differences,[29] and the domineering role of grandparents and in-laws were also observed as causes. (Unpublished data)

The retrospective design of this study with attendant challenge occasioned by data loss is acknowledged as a limitation. Some diagnoses could have been missed as a result of missing hospital records, multiple entries of diagnoses and failure to carry out required laboratory investigations.

Conclusion

Male children were more vulnerable to diseases but mortality was significantly higher among females. Infectious diseases were the major causes of childhood morbidity and mortality in the public secondary healthcare facility, with under-five children bearing the greater burden. Malaria, gastroenteritis, pneumonia, severe anaemia and septicaemia were leading causes of childhood morbidity

and mortality. It is recommended that there should be refocusing and rebranding of the existing health programmes on child survival strategies and integrated management of childhood illness (IMCI) to ameliorate the observed high morbidity and mortality rates. The provision of rapid diagnostic tools for infections and safe and effective essential drugs to facilitate early diagnosis and prompt treatment are also desired.

Acknowledgement: We acknowledge with thanks, the contributions of the staff of the Health Information Department of the State Specialist Hospital, Akure, Nigeria towards the success of the study. The support of all the doctors and nurses who were involved in the care of the patients are appreciated. We are also grateful to the management of the hospital and the Hospitals Management Board, Akure, for the cooperation and supports.

Contributions of the authors: OSO conceptualized the research, participated in the study design, interpretation of data and drafted the initial manuscript. FOA contributed to the design of the work, wrote the protocol for data collection, and reviewed and edited the manuscript. OOA participated in data analysis and literature search. OOA participated in data acquisition and literature search. All the authors approved of the final version of the manuscript.

Conflicts of Interest: None declared.
Funding: Self-funded.
Publication History: Submitted 05 July 2018; Revised 15 September 2018; Accepted 28 September2018.

References

1. Fajolu IB, Egri-Okwaji MTC. Childhood mortality in children emergency centre of the Lagos University Teaching hospital. Niger J Paediatr 2011; 38(3):131–5.

2. George IO, Alex-Hart BA and Frank-Briggs AI. Mortality pattern in children: A Hospital-Based study in Nigeria. Int J Biomed Sci 2009; 5(4): 369-72.

3. Okechukwu AA. Morbidity pattern in paediatric outpatient unit of the University of Abuja Teaching Hospital, Gwagwalada, Nigeria. Niger J Clin Pract 2010; 13(1): 1-6.

4. Tette EMA, Neizer M, Nyarko MY, Sifah EK, Nartey ET, Donkor ES. Changing patterns of disease and mortality at the Children's Hospital, Accra: Are infections rising? PLoS ONE 2016; 1194). E0150387. DOI:10.1371/journal.pone.0150387.

5. Fagbule D, Joiner KT. Pattern of childhood mortality at the University of Ilorin Teaching Hospital. Niger J Paediatr 1987; 14: 1–5.

6. Adeyokunnu AA, Taiwo O, Antia AU. Childhood mortality among 22255 consecutive admissions in the University College of Hospital, Ibadan. Niger J Paediatr 1980; 7: 7–15.

7. Fetuga B, Ogunlesi T, Adekanbi F, Olanrewaju D, Olowu A. Comparative analyses of childhood deaths in Sagamu, Nigeria: implications for the fourth MDG. South Afr J Child Health 2007; 1: 106-11.

8. Onyiriuka AN. Morbidity and mortality patterns of post-neonatal paediatric medical admissions in a large mission hospital in Benin City, Nigeria. J Biomed Sci 2005; 4(1): 49-58.

9. Eke PO, Onafalujo AK. Effects of climate change on health risks in Nigeria. Asian J Bus Manage Sci 2011; 1(1): 204-15. www.ajbms.org

10. Idowu AA, Ayoola SO, Opele AI, Ikenweiwe NB. Impact of climate change in Nigeria. Iranica J Energy Environ 2011; 2(2): 145-52.

11. Ebele NE, Emodi NV. Climate Change and Its Impact on Nigerian Economy. J Sci Res Rep 2016; 10(6): 1-13.

12. Adams H, Geefhuysen J, Hansen JDL. A survey of admissions and deaths in a black Paediatric Department. S Afr Med J 1978; 53: 703-5.

13. IkefunaAN, Emodi IJ. Some characteristics of Paediatric admission at the University of Nigeria Teaching Hospital Enugu Nigeria. Niger J Clin Pract 2007; 10(3): 216-9.

14. Roy RN, Nandy S, Shrivastava P, Chakraborty A, Dasgupta M, Kundu TK. Mortality pattern of hospitalized children in a tertiary care hospital of Kolkata. Indian J Community Med 2008; 33: 187-9.

15. Adepoju AO. Differential pattern in child mortality rate in rural Nigeria. Ann Res Rev Bio 2015; 7(5): 309-17.

16. UN Inter-agency Group for Child Mortality Estimation. Levels and Trends in child mortality: Report 2017. UNICEF 2017 [Internet] Available from https://reliefweb.int/sites/reliefweb.int/files/resources/Child_Mortality_Report_2017.pdf [accessed on September 1, 2018].

17. Okoronkwo NC, Onyearugha CN, Ohanenye CA. Pattern and outcomes of paediatric medical admissions at the Living Word Mission Hospital, Aba, South East Nigeria. Pan Afr Med J 2018; 30(202). doi:10.11604/pamj.2018.30.202.15966.

18. Aigbe O, Zannu AE. Differentials in Infant and Child Mortality Rates in Nigeria: Evidence from the Six Geopolitical Zones. Inter J Human Soc Sci 2012; 2(16): 206-14.

19. Edelu BO, Eze JN, Oguonu T, Ndu IK. Morbidity and mortality pattern in the Children Emergency Unit of the University of Nigeria Teaching Hospital Enugu. Orient J Med 2014; 26 (3-4): 73-8.

20. Ndukwu CI, Onah S K. Pattern and outcome of post-neonatal pediatric emergencies in Nnamdi Azikiwe University Teaching Hospital, Nnewi, South East Nigeria. Niger J Clin Pract 2015; 18: 348-53.

21. Ighogboja IS, Angyo I, Okolo AA, Szlachetka B. Morbidity and mortality Pattern in Jos, Nigeria. Niger Med Pract 1995; 30:15-8.

22. Adeboye MA, Ojuawo A, Ernest SK, Fadeyi A, Salisu OT. Mortality pattern within twenty-four hours of emergency paediatric admissions in a resource-poor nation health facility. West Afr J Med. 2010; 29(4): 249-52.

23. George IO and Tabansi PN. An audit of cases admitted in the children emergency ward in a Nigerian tertiary hospital. Pak J Med Sci 2010; 26(3): 740-43.

24. Mouneke UV, Ibekwe RC, Eke CB, Ibekwe MU and Chinawa JM. Mortality among paediatric inpatients in Mile 4 Mission hospital, Abakaliki, south-eastern Nigeria: a retrospective study. Niger J Paed 2013; 40(3): 259–63.

25. Toma BO, Gyang M, Abdu1 H, Shwe D, Ekere IA, Ihekaike M. Paediatric morbidity and mortality in a Sub-urban Hospital in Jos, North -Central Nigeria. Int J Trop Dis Health 2015; 5(2): 156-64. DOI: 10.9734/IJTDH/2015/12683.

26. Erdmann AL, Andrade SR, Mello ALSF, Drago LC. Secondary Health Care: best practices in the health services network. Rev. Latino-Am. Enfermagem 2013; 21(Spec): 131-139. www.eerp.usp.br/rlae

27. National Population Commission, Nigeria. State Population. [Internet] Available from: http://www.population.gov.ng/index.php/state-population [Accessed on June 12, 2017].

28. Eck C, Pierre RB, Hambleton IR. Medical paediatric admission patterns at the University Hospital of the West Indies: issues for future planning. West Indian Med J2006; 55(5): 340-45.

29. Khan HI, Khaliq N, Afzal MF. Pediatric intensive care unit: Pattern of admissions. Professional Med J 2006; 13(3): 358-61.

30. Eko JE. Implication of economic recession on the health care delivery system in Nigeria. Soc Sci 2017; 6(1): 14-8. doi: 10.11648/j.ss.20170601.13.

31. Ekeopara CA, UgohaAM. The contributions of African traditional medicine to Nigeria's health care delivery system. Int Org Sci Res-J Human Soc Sci 2017; 22(5): 32-43.

32. Adefolaju T. Traditional and orthodox medical systems in Nigeria: The imperative of a synthesis. Am J Health Res 2014; 2(4): 118-24. doi: 10.11648/j.ajhr.20140204.13

33. Lawal OM, Temiye EO. Pattern of preschool children's admission and mortality in a private health facility in Lagos, Nigeria. Niger Med Pract 1998; 35(3/4): 42–6.

34. Chawla V, Haufton B. Pattern of childhood mortality at Harare central hospital, Zimbabwe. East Afr Med J 1988; 65: 238-45.

35. Menge I, Esamai F, Van Reken D, Anabwani G. Paediatric morbidity and mortality at the Eldoret District Hospital, Kenya. East Afr Med J 1995; 72: 165–69.

36. Trape JF. The public health impact of chloroquine resistance in Africa. Am J Trop Med Hyg 2001; 64 (Suppl): 12–7.

37. Whitty CJM, Allan R, Wiseman V, Ochola S, Nakyanzi-Mugisha MV, Vonhm B, *et al.* Averting a malaria disaster in Africa – where does the buck stop? Bull World Health Org 2004; 82(5): 381- 4.

38. Oyedeji GA. A comparative study of post-neonatal childhood admissions in Nigeria and Saudi-Arabia. Niger Med Pract 1996; 32: 71–4.

39. Abhulimhen-Iyoha BI, Okolo AA. Morbidity and mortality of childhood illnesses at the emergency paediatric unit of the University of Benin Teaching Hospital, Benin City. Niger J Paed 2012; 39: 71-4.

40. Ayoola OO, Orimadegun AE, Akinsola AK, Osinusi K. A five year review of childhood mortality at the University College Hospital, Ibadan. West Afr J Med 2005; 24: 175—9.

41. Ganatra B, Hirve S. Male bias in health care utilization for under-fives in rural community in Western India. Bull World Health Org 1994; 72(1): 101–04.

42. Onyiriuka AN. Discharge of hospitalized under-fives against medical advice in Benin City, Nigeria. Niger J Clin Pract 2007; 10(3): 200-4.

43. Ibekwe RC, Muoneke VU, Nnebe-Agumadu UH, Amadife MA. Factors influencing discharge against medical advice among paediatric patients in Abakaliki, Southeastern Nigeria. J Trop Pediatr 2009; 55(1): 39-41. doi: 10.1093/tropej/fmn100.

44. Okoromah CN, Egri-Okwaji MT. Profile of and control measures for paediatric discharges against medical advice. Niger Postgrad Med J 2004; 11(1): 21-5.