

CHILDHOOD MORBIDITY AND MORTALITY AT THE CHILDREN EMERGENCY ROOM OF A TERTIARY INSTITUTION, IN SOUTH EAST NIGERIA: A RE-APPRAISAL.

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ABSTRACT

Introduction: A regular reappraisal of the morbidity and mortality pattern in our children emergency rooms will go a long way in policy makings that will help in achieving the sustainable development goal (SDG)-3. With such evidence-based policies, childhood morbidity and mortality will surely reduce.

Objective: This study was aimed at re-appraising the morbidity and mortality pattern in our children emergency room (CHER), after the initial audit 10 years ago.

Methods: This was a retrospective descriptive study over a 7-year period. The study population comprised of all children aged 1 month to 16 years that presented to the CHER of the Abia State University Teaching Hospital, Aba, Nigeria, from January 2011 to December 2017. The age, gender, duration of illness before presentation, diagnoses and disease outcome of these patients, were all retrieved from the CHER register and hospital medical records.

Results: Six thousand eight hundred and twenty-five (6825) patients were seen over the study period. There were 4075 males and 2750 females, giving a Male: Female ratio of 1.5:1. Majority (>90%) of these patients were aged \leq 5 years. Severe malaria (24.5%), Gastroenteritis (20.9%), bronchopneumonia (20.1%) and septicaemia (14.7%) were the leading causes of admission into CHER. Mortality rate was 6.2%, with >80.0% of this death occurring in children aged \leq 5 years. Mortality was significantly associated with age and sex. Bronchopneumonia (37.0%) and severe malaria (33.0%) were the leading causes of death. A total of 5.1% of the patients were discharged against medical advice (DAMA).

Conclusion: There was an increase in our patient load, and significant reduction in child mortality at our CHER. Infections and malaria remained the leading causes of morbidity and death. Improvement in human and material resources in the CHER is inevitable in achieving SDG-3.

Keywords: Morbidity, Mortality, SDG, Children Emergency Room, Re-appraisal.

Running title: Childhood Morbidity and Mortality at the Children Emergency Room of a Tertiary Institution.

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INTRODUCTION

A regular appraisal of the morbidity and mortality pattern of childhood illnesses that presents to the children emergency units of our health care institutions will facilitate the achievement of Sustainable Developmental Goal (SDG)-3.¹⁻³ Such studies will also help in assessing our preparedness for prompt quality care.⁴

Malaria and infections were the leading childhood illnesses documented in previous Nigerian studies,⁵⁻⁸ including the one done at the children emergency room (CHER) of the Abia State University Teaching Hospital (ABSUTH), Aba, Nigeria.⁴

Past studies from the African sub-region have recorded unacceptable high morbidity and mortality rates among children that presented to the paediatric health care facilities of these institutions.⁹⁻¹⁴ These include mortality rates of 11.1%, 12.6%, 9.5%, 10.0%, 14.3%, and 15.1% from

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government hospitals in Lagos,⁹ Shagamu,¹⁰ Ibadan,¹¹ Ebonyi,¹² Lagos¹³ and Zaria¹⁴ respectively.

The previous study on the morbidity and mortality pattern of childhood illnesses done at the CHER of ABSUTH in 2008, by Okoronkwo et al⁴ showed a mortality rate of 9.6%. The aforementioned study was done 10 years ago, and between then and now, the paediatric department of ABSUTH has improved tremendously in terms of medical equipment, infrastructure and material resources.

This study was therefore set to review the current morbidity and mortality pattern of childhood illnesses that presented to our CHER from January 2011 to December 2017.

Materials and Methods

This study was carried out at the CHER of the ABSUTH, Aba. It was a retrospective review of medical records over a 7-year period. The Teaching Hospital is the only tertiary health institution located in the metropolis of Aba, Abia State. It is specifically located in Osisioma Local Government Area, of Abia State.

ABSUTH serves as a general/referral centre for patients resident in Aba metropolis, and adjoining cities and communities. The CHER is a 16-bed unit, which caters for paediatric emergencies (excluding trauma cases). Approximately 900 children present to CHER each year.¹⁵ It is covered 24 hours by a team consisting of a paediatric registrar and 2 house officers, supervised by a senior registrar in the morning shifts; and overseen by 2 consultants. The CHER has 4-6 oxygen cylinders (constantly replaced as they are being used), 2 oxygen concentrators, 2 cardiac monitors, a side laboratory, 4 suction machines (2 electric and 2 manual), 2 nebulizing machines, pulse oximeters, 2 mercury blood pressure apparatus with

different sizes of cuffs and emergency medications.

Patients stay in CHER between 24-48 hours or less, before being transferred to the major children's ward, or discharged.

The details of all patients that present to the CHER of ABSUTH are recorded in hard copy patient files which are kept with the hospital medical records department. Ethical clearance was obtained from the Ethics Committee of ABSUTH, Aba.

The total number of all the patients, aged 1 month to 16 years that attended CHER between January 2011 and December 2017 was retrieved from the hospital medical records.

Information extracted were the following: age and sex of the patient, presenting complaints, duration of illness before presentation, final diagnoses and outcome of illness.

Each patient was allocated a study number. Patients' names and hospital numbers were not written on the data base. Information was recorded on the study proforma, then de identified and keyed into a data base using a study number.

The data was analysed using SPSS (Statistical Package for the Social Sciences) software, version 20.0.¹⁶ Frequency tables were generated for all major variables of interest. Categorical variables were presented as percentages, and pie charts, while comparisons between such variables were done using the Pearson Chi Square test. Fishers Exact test was used wherever there was greater than 2x2 table, and the expected count in more than 20% of the cells on the table was less than 5. Chi Square test was also used to test for significance of association between mortality and other variables like age and sex. A confidence interval of 95% was used, and for all analyses, p-value < 0.05 was taken as

statistically significant.

Results

Six thousand eight hundred and twenty-five (6825) patients were seen over the study period. There were 4075 males and 2750 females, giving a Male: Female ratio of 1.5:1 (Table 1). More than 90% of these patients were aged 5 years or less (Table 1). There was a sustained increase in the number of patients presenting to CHER over the last 3 years of the study period (Table 1). Only 34.1% of the patients sort medical care at CHER when duration of illness was still within two days (Table 1). Others waited for 3 or more days before presenting to CHER. A significant number (22.3%) of patients came after more than one week of illness.

Severe malaria (24.5%), gastroenteritis (20.9%), bronchopneumonia (20.1%) and septicaemia (14.7%) and meningitis (7.7%) were the leading causes of admission into CHER (Table 2).

Four hundred and twenty-four (424) of these patients died, giving a mortality rate of 6.2% (Table 3), out of which 65% were males (Table 4). There was a statistically significant association between death and sex (p-value = 0.024). Over 80.0% of this death occurred in those aged 5 years or less, with 63.2% being infants (Table 4). There was a statistically significant association between death and age (p-value = 0.033). Two thousand six hundred (38.1%) patients were transferred to the children's ward. Three hundred and Fifty (5.1%) were discharged against medical advice, 3314 (48.6%) were well and discharged home, 125(1.8%) were referred, and 12(0.2%) absconded (Table 3). Bronchopneumonia (37.0%) and complicated malaria (33.0%) were the leading causes of death.

Discussion

The number of patients that presented to the CHER of ABSUTH during the study period showed an improvement over previous years.⁴ This can be attributed to the increase in the staff strength at the CHER as well procurement of more medical equipment

and material resources. The CHER was relocated from its position at the second floor of the ABSUTH main hospital complex to the ground floor, thereby making it more accessible. The present CHER is more child friendly in terms of decoration and arrangement. Again, majority of the current nurses at CHER in recent years are purely paediatric nurses who are more patient friendly and are trained to take better care of sick children. Another important factor that positively influenced more turn out at CHER is the establishment of an active side laboratory within the CHER. This may have removed some of the stress and "bottle necks" patients' relations face at the hospital main laboratories when their children are sent for urgent investigations.

Males presenting more in CHER is in keeping with previous studies.^{8,17-19} This could be buttressed by the family's male sex preference attitude^{10,11} in Nigeria and certain parts of Africa and Asia, whereby families seek health care earlier and more frequently for their male children, than for their daughters.

Families in Nigeria and certain parts of Africa and Asia preferring males over female children, both in education and health care seeking behaviours, is a documented observation in literature.^{18,20} More than 90% of the patients presenting to CHER being = 5 years of age shows that this age group has remained vulnerable to morbidity despite all the health campaign to the contrary. Again, more than 80% of the deaths in this study occurred in this same age group, majority of which are infants.

Past studies^{5,6,8,17} also documented that more than 80% of the paediatric morbidity and mortality occur in the under-5s. The need for achieving SDG-3 has become a global emergency, in view of persisting high under-5 mortalities. The relative lower immunity of the younger, compared to older children can explain why they make up the bulk number of the childhood population presenting with emergency

medical conditions. While existing child survival strategies need to be re-activated and intensified in our various institutions, there is need to formulate more policies that will win the tough fight against under-5 mortalities globally.

There was obvious delay in seeking health care by majority of the patients, looking at the duration of illness before presentation. Greater than 60% came to CHER after 2 days of illness. It is obvious that majority of this cohort of patients would have been treated as out-patients if they came days earlier. Illnesses get complicated when interventions are not sort early. This could explain why severe malaria exceeded the number of uncomplicated malaria in this study. Delay in seeking care in our environment may be caused by self-medication, illiteracy, poverty and ignorance, among other reasons.²¹

Poor utilization of available health services/late presentation have been implicated as a major factor in the persisting high under-5 mortality rate.^{9,22} Early health care seeking behaviour by patients contributes immensely to better outcome during an illness. Increased public awareness on early health care seeking behaviours and better delivery of healthcare to the society will help in reducing late presentations to our hospitals. The need for parents to bring their children early for medical care cannot be over-emphasized.

Malaria consistently remained the leading cause of morbidity in CHER for each year of the study period. This is in keeping with other studies.^{4,5-8} This was followed by gastroenteritis and bronchopneumonia in this study. Bad personal hygiene, poor environmental sanitation and overcrowding are among the causative factors implicated in both gastrointestinal and respiratory tract infections. The global economic meltdown may have worsened the living conditions of most families, including over-crowded accommodations,

all of which can predispose children to illnesses like bronchopneumonia.

Malaria and infections as leading causes of morbidity in the CHER agrees with other studies from the sub-region.⁵⁻⁸ This is in contrast to studies from the western world where non-communicable diseases form the major childhood morbidities in paediatric health facilities.²³ This calls for strengthening of the child survival strategies, like roll back malaria, National program on Immunization and IMCI. Again, all levels of disease prevention should be re-emphasized and practiced in our sub region. These will help achieve SDG-3, reduction of childhood mortality inclusive.

The mortality rate of 6.2% recorded in this study is lower than the 9.6% from the previous mortality audit at CHER of ABSUTH.⁴ It is also lower than the 11.1%, 12.6%, 9.5%, 10.0%, 14.3%, and 15.1% from Lagos,⁹ Shagamu,¹⁰ Ibadan,¹¹ Ebonyi,¹² Lagos¹³ and Zaria¹⁴ respectively. It is however higher than the 4.4% and 5.7% from Benin⁵ and from a mission hospital²⁴ at Abia state respectively. This repeat study at the CHER of ABSUTH highlights the need for regular follow up studies, even in the same centre, to re-assess our score cards towards achieving SDG-3.

The current mortality rate reduction in our CHER can be explained by the upgrading of the CHER, both in human and material resources. Replacing the previous nursing staff at CHER with pure paediatric nurses may also have positively impacted the outcome of children over the study period. Again, the residents' and house officers' call rooms used to be 2 stair floors away from the CHER, but recently, these call rooms are inside the new ABSUTH CHER complex. The later makes it easier for patients to be given prompt attention by the doctors on call who now reside in the CHER complex. When better medical equipment, well trained medical personnel, and a patient friendly environment are provided in a health facility, patients mortality rate

eventually drops.

More deaths among males compared to females in this study agrees with other studies.^{4,12,17,24} It has been observed in literature that males are at higher risk to mortality than females.^{25,26} This is due to differences in immune response between the two sexes.^{25,26}

Children aged = 5 years (more of Infants) died more than any other age group in this study. The vulnerability of this age group to morbidity and mortality has been observed in previous studies.^{4,12,17,19,24} In view of this, health care givers should be more proactive in managing the under-5s that present to our emergency units at any given time.

Bronchopneumonia, severe malaria and septicaemia were the leading causes of death in this study. Bronchopneumonia was the leading cause of death in 3 out of the 6 years in this review. It was also the first cause of childhood death from some past reviews at other centres.^{17,19} This is in contrast to most studies in Nigeria where severe malaria and septicaemia were the leading causes of death.^{5-7,11,12} In the last mortality audit at our centre, severe malaria and septicaemia were the first and second causes of death⁴ respectively. Bronchopneumonia was not a cause of death in the aforementioned study, which was done over a 5-month period.⁴ The differences in sample size and study duration may have affected the pattern of morbidity and causes of mortality observed between the two studies from ABSUTH.

Acute respiratory illness is still one of the major causes of under-5 mortalities globally.²⁷ Children with acute respiratory illness presenting to CHER should be given intensive care management in order to save their lives. The illnesses ranking highest in morbidity and mortality in this study are all preventable childhood diseases. Therefore, efforts geared towards prevention of common childhood illnesses should be intensified in the African sub-region as never before.

The DAMA rate of 5.1% in this study is lower than the 8.49%, 7.5% and 7.4% from Kuwait,²⁸ Abuja²⁹ and Bayelsa³⁰ respectively but higher than the 3.8% and 3.7% from India and Iran respectively.^{31,32} It is also higher than the rates documented in some Nigerian studies. These include the 3.8%, 3.8% and 2.3% observed at Ebonyi,¹² PortHarcourt,³¹ and a mission hospital in Abia state.²⁴ The DAMA rate in this study may be attributed to some of the reasons given by parents who insist on DAMA. These include: financial constraints, domestic obligations, inconvenience of hospitalization, perception that the child is well enough to leave the hospital, and extended length of stay in the hospital.^{28,31,34}

Conclusion

The number of children presenting to the CHER of ABSUTH has increased. Malaria, gastroenteritis and bronchopneumonia were the major morbidities. The under-5 age group bore the major burden of the morbidities and mortalities. The mortality rate at the CHER has dropped from 9.6% to 6.2%. Bronchopneumonia is the main cause of mortality followed by severe malaria. Improvement in human and material resources in the CHER improved patients' outcome. There is need for a regular re-appraisal of the morbidity and mortality pattern in our centres.

Funding

None

Conflict of interest

The authors have nothing to declare.

Table 1. Distribution of patients by age and gender

Age (Months)	2011	2012	2013	2014	2015	2016	2017	Total	Per-cent %
<6	200	280	240	260	275	400	395	2050	30.0
6-11	150	180	170	200	230	300	270	1500	22.0
12-60	400	350	310	390	300	420	530	2700	39.6
61-144	38	62	50	44	48	63	70	375	5.5
>144	20	21	29	33	32	16	49	200	2.9
Total	808	893	799	927	885	1199	1314	6825	100.0
Sex									
Male	197	232	660	703	736	721	826	4075	59.7
Female	200	340	290	418	416	523	563	2750	40.3
Total	397	572	950	1121	1152	1244	1389	6825	100.0
Duration of illness before presentation (days)									
< 1	90	80	80	87	103	90	95	625	9.2
1 - 2	170	120	311	631	101	160	207	1700	24.9
3 -7	150	214	317	190	427	830	847	2975	43.6
8 - 28	170	250	100	115	120	325	245	1325	19.4
>28	10	17	54	36	23	40	20	200	2.9
Total	590	681	862	1059	774	1445	1414	6825	100.0

Table 2. Distribution of various illnesses in children presenting to CHER

Diagnosis	2011	2012	2013	2014	2015	2016	2017	Total	Percent (%)
Severe malaria	188	192	230	242	313	250	260	1675	24.5
Gastroenteritis	101	173	196	213	216	215	311	1425	20.9
Bronchopneumonia	190	156	150	185	240	210	244	1375	20.1
Septicaemia	120	140	90	120	145	165	220	1000	14.7
Meningitis	45	60	60	50	66	125	119	525	7.7
Cerebral malaria	30	48	50	40	43	62	52	325	4.8
Uncomplicated Malaria	10	15	20	18	22	16	24	125	1.8
Others	60	50	40	50	60	50	65	375	5.5
Total	744	834	836	918	1105	1093	1295	6825	100.0

Table 3. Outcome of admitted patients over the study period.

Diagnosis	2011	2012	2013	2014	2015	2016	2017	Total	Percent (%)
Discharged	408	416	414	415	525	420	716	3314	48.6
Transferred to the -- --	321	417	414	320	512	200	416	2600	38.1
Referred Out	18	20	12	22	20	22	11	125	1.8
DAMA	68	60	54	46	50	37	35	350	5.1
ABSCONED	1	2	6	3	0	0	0	12	0.2
Died	111	94	63	61	44	28	23	424	6.2
TOTAL	927	1009	963	867	1151	707	1201	6825	100.0

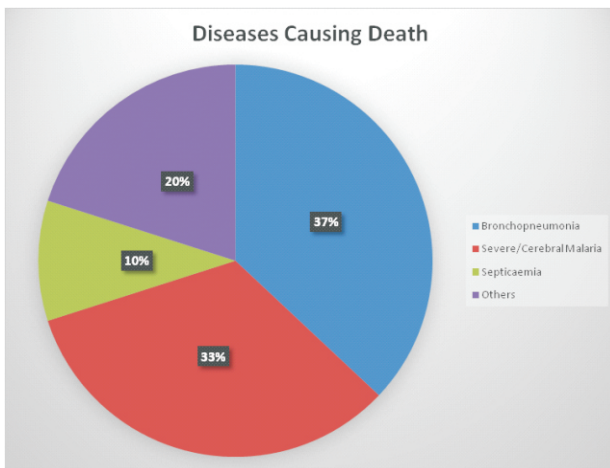
DAMA: Discharged Against Medical Advice.

Table 4: Disease outcome in patients by age and gender

Age (In years)	Dead No (%)	Alive No (%)	Total No (%)	p- value
< 1	268 (63.2)	3281 (51.3)	3549 (52.0)	
1-5	98 (23.1)	2632 (41.1)	2730 (40.0)	
>5	58 (13.7)	488 (7.6)	546 (8.0)	
Total	424 (100.0)	6401 (100.0)	6825 (100.0)	0.033
Sex				
Male	276 (65.1)	3764 (58.8)	4075 (59.7)	
Female	148 (34.9)	2637 (41.2)	2750 (40.3)	
Total	424(100.0)	6401 (100.0)	6825 (100.0)	0.024

Table 5. Pattern of diseases causing death over the study period.

Disease	2011	2012	2013	2014	2015	2016	2017	Total	Percent (%)
Bronchopneumonia	42	34	27	21	18	10	5	157	37.0
Severe Malaria	30	28	20	20	16	12	14	140	33.0
Septicaemia	20	11	6	2	0	1	2	42	10.0
Others	19	21	10	18	10	5	2	85	20.0
Total	111	94	63	61	44	28	23	424	100.0



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