

The Pattern and Trend of Non-communicable Diseases in Children in Jos, North Central Nigeria: A Four-year Review

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Authors' contributions

This work was carried out in collaboration between all authors. Author ESY conceived and designed the study, collected data, performed the statistical analyses and wrote the first draft. Author HOA managed the analyses, literature search. Authors IIA, OOI and EUE collected the data, managed analyses, and contributed to the design of the study and literature search. All authors read and approved the final manuscript

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ABSTRACT

Aims: Non-communicable diseases (NCDs) are becoming significant causes of morbidity and mortality. However very little information is available in our setting on the trend of NCDs in children. The aim is to determine the pattern and trend of NCDs in children in Jos, Nigeria.

Study Design: This is a retrospective study of patients that were admitted and managed for NCDs. The relevant clinical information was extracted from the hospital records.

Place and Duration of Study: The Emergency Paediatrics Unit (EPU) of the Jos University Teaching Hospital (JUTH), Jos Nigeria, between January 2012 and December 2015.

Methodology: The study was a retrospective descriptive study where all records of children admitted into the EPU of JUTH within the period under review were retrieved. The bio-data of all patients and diagnoses made during the course of admission were documented. Those with

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inconclusive diagnoses and neonates were excluded. Data collected were entered into Epi Info version 7.2. The data was presented in frequencies and percentages and categorical variables were analyzed with the chi-square test. P value < 0.05 was regarded as statistically significant.

Results: A total of 2273 children's records were reviewed of which 36.7% had NCDs with the NCDs prevalence ranging from 29.5% - 40.5%. The three commonest NCDs were sickle cell disease (SCD), seizure disorder and severe protein energy malnutrition (PEM). There was a steady increase in the prevalence of seizures and PEM over the period. The prevalence of the diseases fluctuated over the years under review.

Conclusion: The burden of diseases in children appears to be shifting towards non-communicable diseases as shown in the rising trend of NCD in our study. Therefore, there is an urgent need for relevant stakeholders to develop and ensure implementation of policies to curtail this menace which is also increasing the morbidity and mortality of children especially those less than five years of age.

Keywords: Admission; children; Jos; North-central Nigeria; non- communicable diseases; trend.

ABBREVIATIONS

AGN : Acute Glomerulonephritis
AKI : Acute Kidney Injury
CD : Communicable disease
CKD : Chronic Kidney Injury
EPU : Emergency Pediatric Unit
HREC : Health Research Ethical Committee
JUTH : Jos University Teaching Hospital
NCD : Non Communicable disease
PEM : Protein energy malnutrition
SCD : Sickle cell disease
WHO : World Health Organization

1. INTRODUCTION

Non communicable diseases (NCDs) are chronic non-transmissible medical conditions capable of causing serious debilitation and disability and in recent times have been observed to be occurring with alarming frequency even in children [1-4]. Adogu et al. [5] from Port Harcourt Nigeria, noted in their study that, though common infectious and parasitic diseases such as malaria and HIV/AIDS remain major health problems in many developing countries, the number of cases of non-communicable diseases have been observed to be increasing especially over the last two decades. This is therefore impacting negatively on already over-burdened health services in these countries [5].

The common NCDs include diseases like sickle cell disease, diabetes mellitus, neurological disorders (like seizure disorders, cerebral palsy, mental retardation), renal conditions (like nephrotic syndrome, chronic renal failure), cardiovascular disorders (like congenital heart diseases, valvular heart diseases), injuries amongst others. Recent reports show that NCDs

are now the most frequent cause of death in most countries with 80% of NCD deaths occurring in low and middle income countries as well as accounting for nearly two thirds of all deaths globally [1,2,6,7]. Reports show that in 2008 NCDs alone accounted for 36 million out of the 57 million deaths worldwide. These deaths were mainly due to cardiovascular diseases, cancers, diabetes, and chronic lung diseases [1,7].

The World Economic Forum reported that if the current trends of NCDs continue, deaths from NCDs will increase by 15 per cent over the next decade, with cardiovascular diseases and cancer deaths alone expected to increase by 10 million [1]. All of which would constitute a major threat to world economy [1]. On the other hand, deaths from communicable diseases (CDs) have been projected to decline by about 7 million over the next 20 years [8-11]. Studies from Nigeria, Sub-Saharan Africa and other developing countries have demonstrated that the observed trend in NCDs over the last decade is due to a continuous change in lifestyle which has increased the burden of NCDs even in Low and Middle income countries [3,9-17].

Therefore in view of the high disease burden in developing countries and limited available resources, there is the need to allocate these resources to priority areas. These decisions however have to be evidence based and this can only be achieved when disease patterns are constantly reviewed by health institutions.

This study was therefore undertaken in Jos University Teaching Hospital (JUTH) Jos, Nigeria, to determine the trend of NCDs in children admitted into the Emergency Paediatrics

Unit of the hospital over a 4 year period. This information would enable us to identify the pattern and trend of NCDs for our own environment and the findings are expected to serve as a baseline for future research on identifying the risk factors for NCDs for our environment. It is hoped that the resultant conclusions from this study would enable the government and health institutions selectively allocate resources based on needs of the communities with healthcare professionals also providing efficient interventions.

2. METHODOLOGY

The study was a descriptive retrospective study where all records of children that were admitted into the Emergency Paediatric Unit (EPU) of Jos University Teaching Hospital between 2012 and 2015 were reviewed. Jos University Teaching Hospital is a tertiary health care centre located in North central Nigeria. It caters to referrals from at least five neighboring states. It is a 500 bedded facility with the Pediatric department having 90 beds. The pediatric unit is divided into the emergency paediatric unit, paediatric medical ward, paediatric outpatient department and the special care baby unit. The site of this study was the emergency paediatric unit.

The patients recruited for this study were divided into those with communicable diseases and those with Non-communicable diseases. The bio-data like the age, sex and diagnoses of all patients made during the course of admission were obtained. Those whose diagnoses were inconclusive diagnosis as well as neonates were excluded from the study. All the information obtained was entered into Epi Info Version 7.2 and analyzed.

2.1 Data Analysis

All data collected were analyzed using Epi Info version 7.2 and WIN PEPI computer programs for epidemiologist's software version 11.65 [18]. The data were summarized as frequencies and percentages while categorical variables were analyzed with the chi-square test and WIN PEPI. A *P* value of < 0.05 was regarded as statistically significant.

3. RESULTS

There were 2273 admissions into the emergency Paediatric unit (EPU) of Jos University Teaching hospital (JUTH) from 2012-2015. Out of this, 835

(36.7%) had NCDs while 1438 (63.3%) had Communicable Diseases (CDs). The yearly distribution of the NCDs is shown in Table 1. The commonest NCDs were SCD 308 (36.9%), seizure disorder 92 (11.0%), Severe protein energy malnutrition (PEM) 55 (6.6%), congenital heart diseases (CHD) 46 (5.5%), Malignancies 45 (5.4%), Acquired heart diseases 41 (4.9%) and Acute Kidney Injury (AKI)/Chronic Kidney Injury (CKD) 35 (4.2%) as shown in Table 2.

The highest frequency of NCDs was observed in 2015 and the least in 2013. The age group most affected is 1 month-5years followed by 6-10 years and then 11-15years as shown in Table 3 and Fig. 1.

A total of 1317 males were admitted of which 482 had NCDs. While of the 956 females admitted 353 had NCDs. A higher proportion of males were more affected with NCDs when compared with the females giving a male to female ratio of 1: 0.7. The difference in proportions was not found to be statistically significant (*p* value 0.873).

4. DISCUSSION

This study showed a cumulative prevalence of NCD'S of 36.7% over the four year period while it ranged from 29.5% to 40.5% (see Table 1) during the four year period. Though there is a significant relationship between those that have CDs and those that have NCDs across the years, the prevalence of NCD's in this study is higher than the rates reported by Otaigbe et al. [7] (19.8%) and Emordi et al. [11] (24%). The difference could be accounted for by the fact that those studies were conducted in a different region of the country. However, the trend did not show a clear increase over the five year period. What was observed was a fluctuation of the prevalence with a sharp drop in the third year, followed by a sharp rise in the fourth year. The sharp drop in the third year may be accounted for by the sharp decline in the number admission for that year which was majorly due to the industrial strike actions during that period. A higher proportion of males were affected with NCDs when compared with the females and the difference in proportions was not found to be statistically significant (males 482 (57.7%), females 353 (42.3%) (*p* value 0.873).

The commonest NCD observed in children were SCD, Seizure disorders, severe PEM, Congenital heart diseases and malignancies. It is worthy to

note that NCDs were commonest in the children under 5 years of age. There is a significant relationship between those that have SCD and those that don't have across the years. The high prevalence of SCD in this study is probably due to the high prevalence of the disease in the country with a reported disease prevalence of 20-30 per 1000 live births [19] and considering the fact that the country is the most populous nation in the region and has the largest population of patients with sickle cell disease in the world [20-22]. The trend for SCD over the period under review is similar to the trend for all the other NCDs.

The prevalence of Seizure disorders, and PEM in our study was high and similar to what was also

observed by other authors, they remain a problem for developing countries [23,24]. Protein energy malnutrition (PEM) is still a major public health issue in many developing countries with the condition being associated with as much as 50–60% of under-five mortality and a constellation of morbidities in developing nations [25]. In Nigeria there are various persisting social determinants of PEM, such as poverty, illiteracy, unemployment, corruption, inequalities, inequities and manmade conflicts [25,26]. The trend for both Seizures and PEM in this study show a rise in prevalence over the four year period and this is quite unfortunate as generally most of the causes of both PEM and seizures in our environment are preventable [27,28].

Table 1. Distribution of communicable and non-communicable disease from 2012-2015

Diseases	Year				Total (%)	χ^2	P value
	2012 (%)	2013 (%)	2014 (%)	2015 (%)			
CD	391 (60.2)	518 (68.2)	93 (70.5)	436 (59.5)	1438 (63.3)	18.103	P = 0.001*
NCD	258 (39.8)	241 (31.8)	39 (29.5)	297 (40.5)	835 (36.7)		
Total	649 (100.0)	759 (100.0)	132 (100.0)	733 (100.0)	2273 (100.0)		

Table 2. Trend of non-communicable disease from 2012-2015

Diseases (NCD)	Year				Total (%)	χ^2	P value
	2012 (%)	2013 (%)	2014 (%)	2015 (%)			
SCD	96 (37.2)	112 (46.5)	8 (20.5)	92 (31.0)	308 (36.9)	18.473	0.001*
Seizure disorders	20 (7.7)	23 (9.5)	6 (15.4)	43 (14.6)	92 (11.0)	7.727	0.052
Severe PEM	22 (8.5)	2 (0.8)	2 (5.1)	29 (9.8)	55 (6.6)	19.568	0.001*
Congenital heart disease (cyanotic & Acyanotic)	17 (6.6)	7 (2.9)	2 (5.1)	20 (6.7)	46 (5.5)	4.586	0.205
Malignancies	17 (6.6)	10 (4.1)	2 (5.1)	16 (5.4)	45 (5.4)	1.460	0.691
Acquired heart disease	16 (6.2)	7 (2.9)	3 (7.7)	15 (5.0)	41 (4.9)	3.657	0.301
AKI & CKD	11(4.3)	7 (2.9)	5 (12.8)	12 (4.0)	35 (4.2)	8.245	0.041
AGN	9 (3.5)	5 (2.1)	0 (0.0)	7 (2.3)	21 (2.5)	2.224	0.527
Poisoning	2 (0.8)	5 (2.1)	1 (2.6)	9 (3.0)	17 (2.0)	3.543	0.315
Diabetic Keto-Acidosis	4 (1.5)	6 (2.5)	0 (0.0)	6 (2.0)	16 (1.9)	1.384	0.709
Cerebral palsy	2 (0.8)	6 (2.5)	3 (7.7)	3 (1.0)	14 (1.7)	11.600	0.009
Nephrotic syndrome	2 (0.8)	2 (0.8)	1 (2.6)	7 (2.3)	12 (1.4)	3.549	0.314
Acute severe asthma	3 (1.2)	3 (1.2)	1 (2.6)	3 (1.0)	10 (1.2)	0.711	0.871
Others	37 (14.3)	46 (19.2)	5 (12.8)	35 (11.9)	123 (14.8)	5.838	0.120
Total	258	241	39	297	835 (100.0)		

Others were Laryngomalacia, Myelomeningocele, Hysteria, Conversion disorder, Down's syndrome, Foreign body, Chronic liver diseases, Peptic ulcer disease, Congenital pyloric stenosis, Adenotonsillar hypertrophy.

NB: Low admissions was recorded in 2014 because of industrial disharmony in the hospital

Table 3. Age group

Disease	Age group				Total
	1 month-5 y	6-10 y	11-15 y	16-20 y	
NCDs	436 (52.2%)	163 (19.5%)	157 (18.8%)	79 (9.5%)	835 (100.0%)

Chi-square 87.16 P value < 0.001

NB: For age-group 16-20years, only patients less than 18 years were considered which is the Paediatric age group

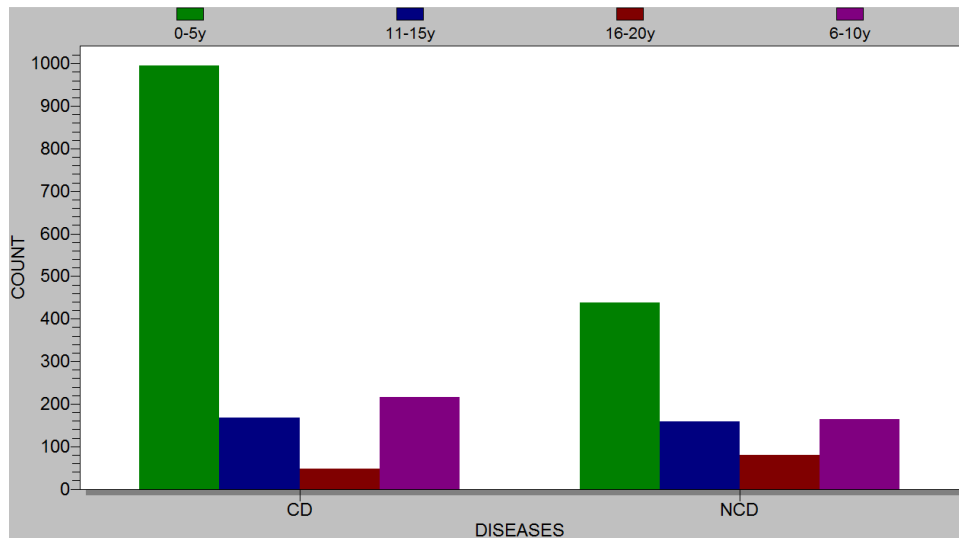


Fig. 1. Age group distribution of diseases

The twentieth century saw the main cause of mortality transiting from acute to chronic illnesses. According to the WHO global watch in 2011, thirty-eight million deaths occur each year due to non-communicable diseases (NCDs), mainly cardiovascular diseases, cancers, respiratory diseases, and diabetes and when the injuries are taken into account NCDs were responsible for 70% of all deaths; with 80% of the NCD deaths occurring in Low and middle income countries. The estimation made by WHO is that over the next 10 years deaths from NCDs will increase by 17% with the greatest increase in the African and Eastern Mediterranean Regions [1].

In the developed world NCDs often result from modifiable lifestyle risk factors, such as tobacco use, problems of alcohol use, unhealthy diet, and lack of physical activity, leading to overweight, raised blood pressure, and cholesterol levels which mainly occurs in adults [2]. However, in children in this study sickle cell disease, seizure disorder and severe malnutrition were the three commonest NCD's in our environment. With the burden of NCD's in this study ranging from 29.5% to 40%, shows a rising trend when

compared to previous studies and this supports the fact that the burden of NCDs is high and may soon surpass the communicable diseases if urgent and necessary steps are not taken to address them [29].

The peak age of NCD's in this study was in the 1month-5 year age group. This is bringing to the fore the fact that children under five years of age are the vulnerable group of children for both communicable and non-communicable diseases. Sickle cell disease makes up almost 40% of the burden of NCD's in each of the year under review. This finding is similar to studies from Southeast Nigeria where sickle cell disease is also the commonest NCD in children [7,11]. This is in line with the WHO report that SCD is high in sub-Saharan Africa and about 150,000-200,000 children in Nigeria are born with sickle cell anemia annually with SCD contributing up to 16% of under-five deaths in individual West African countries [4,30]. This brings to the fore the fact that there is need for more intensive health promotion and health education on the need for counseling and prenatal screening for sickle cell disease. It is also essential to provide adequate funding for NCDs related programmes,

legislative backing to prevent and control NCDs as well as strengthen the health care system so as to reduce the burden of the disease [4].

An interesting observation in this study was the finding of seizure disorder was the second commonest NCD. With the prevalence of seizure disorder almost doubling between 2012 and 2015. This could be related to factors such as perinatal and early postnatal morbidities, central nervous system infections (bacterial meningitis, viral encephalitis) including parasitic infestations like cerebral malaria amongst others which are known to be more common in childhood [31-33]. It could also be attributed to poor seizure control because these were patients seen at the emergency unit. Therefore the need for effective primary health care with emphasis on the prevention of childhood infectious diseases, improved antenatal care, care at delivery and very importantly effective health education especially on regular use of medications and early presentation to the health facilities cannot be overemphasized.

The third commonest NCD observed was severe protein energy malnutrition. This is not surprising when according to the Nigerian Bureau of statistics, [34] as at 2010 about 69% of Nigerians are still living below the poverty line. Extreme poverty remains high in parts of Nigeria, where political instability, low access to education and inadequate health care are contributing factors of the nation's high rate of poverty. The high burden of malnutrition was reported by Olaf Muller [26] who reported that 852 million people were undernourished worldwide and 815 million of this was in developing countries. Though there are policies on ground to tackle malnutrition, implementation of these policies has remained poor. Therefore, it is necessary to address the problem of poverty from the grass root. The government must encourage and subsidize agriculture as well as encourage and support small and medium scale industries while ensuring an atmosphere of peace where agriculture and local businesses can thrive. In addition to improving the education of the girl child so that she can know how to make use of locally available resources to provide a balanced meal for her family. An enlightened girl child is also more likely to be empowered and capable of accessing health care for her children.

Managing other NCD like heart diseases (congenital and acquired), Malignancies and

kidney disorders are still important as these conditions as seen in this study collectively contribute significant to emergency room visits in our environment. Interventional catheterization, peritoneal dialysis/ haemodialysis and histochemical assay for malignancies which are not readily available need to be made available to improve care of these patients.

5. CONCLUSION

The burden of NCD's in children in our environment is very real and when compared with previous studies on the rise. Our study also shows that children under the age of five are most especially affected and there is a need for government agencies and relevant stakeholders to come together and implement already existing policies that would help reduce the burden of these diseases.

It is essential that government and policy makers ensure services that are targeted to reduce poverty, educate the girl child and sensitizing the rural populace who are mostly at risk to improve on weaning practices, to seek healthcare services early and to improve child survival through the child survival strategies which are cheap and affordable. Government should also provide legislative backing funds for the prevention and control of NCDs. Health systems should be strengthened to manage NCDs through training and retraining of professionals, research and provision of adequate/relevant facilities in our hospitals.

The medical record system in our institution should be improved and upgraded using computers because some data were not captured in the hard copy registers and that would have enriched this study.

CONSENT

It is not applicable.

ETHICAL APPROVAL

Approval for this study was obtained from the Health Research Ethical Committee (HREC) of Jos University Teaching hospital (JUTH).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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