

## Diabetes Mellitus and the Other Non-Communicable Diseases - Experience from Abia State University Teaching Hospital, Aba, Southeast, Nigeria

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### Abstract

**Introduction:** Burden of diabetes mellitus and the other non-communicable diseases in Nigeria has been on the increase in recent years. There is paucity of published literature on the pattern and outcome of medical admissions of the non-communicable diseases (NCDs) in Aba, Southeast, Nigeria and this constitutes the rationale for this study.

**Subjects and Methods:** Patients admitted to the medical wards of Abia State University Teaching Hospital, Aba, on account of NCDs between May 1, 2007 and April 30, 2017 were recruited into the study. Nurses' admission/discharge registers, death certificates and patients case notes were used to extract the needed data for this study. All relevant data extracted were entered into and analyzed with Statistical Package for Social Sciences (SPSS) software.

**Results:** A total of 4641 patients were admitted because of diabetes mellitus-related complications and the other non-communicable diseases (NCDs), made up of 2245 (48.4%) males and 2396 (51.6%) females. Non-communicable diseases were the predominant diagnoses among the 6587 medical in-patients within the study period and they included cardiovascular diseases, DM-related complications, cancers, chronic liver diseases, chronic kidney diseases and chronic lung diseases at 42.7%, 26.3%, 2.9%, 6.7%, 9.03% and 2.8% respectively. With an overall mortality of 22.5% among the NCD admissions, the commonest cause of NCD deaths were the cardiovascular diseases especially stroke. A large percentage of the subjects that died (75.7%) passed on within the acute phase of hospitalization.

**Conclusion:** The burden of diabetes mellitus and the other NCDs in the medical wards of the only teaching hospital in Aba, Southeast Nigeria is worrisome. Mortality of the NCDs in the medical wards is high especially from stroke and DM.

**Keywords:** Diabetes Mellitus; Medical Wards; Non-Communicable Diseases; Southeast; Nigeria

### Abbreviations

ABSUTH: Abia State University Teaching Hospital; CKD: Chronic Kidney Diseases; CLD: Chronic Liver Diseases;

CVDs: Cardiovascular Diseases; DAMA: Discharge Against Medical Advice; DM: Diabetes Mellitus; NCDs: Non-Communicable Diseases; NHIS: National Health Insurance Scheme; NNMSAP: Nigerian National Multisectorial Action Plan; SSA: Sub-Saharan Africa; WHO: World Health Organization

## Introduction

Non-communicable diseases are noninfectious diseases which are usually chronic in nature. The major causes of NCDs are the cardiovascular (CVDs), diabetes mellitus, cancers and chronic lung diseases [1,2]. Currently, there is a global trend towards NCDs as documented in some literatures [3,4] and NCDs affect the developing nations more than the developed ones [5,6]. In developed countries, NCDs are the main causes of death but of late, the same trend of illnesses and mortality is playing out in the developing countries [5,6]. Nigeria and other Sub-Saharan African (SSA) countries are passing through a phase of epidemiological transition [7] in which they have a decline in infectious diseases rates and a rise in NCDs as the main causes of death. Similarly, these low and middle income countries are said to be facing the double burden of communicable and non-communicable diseases [8]. A projection by the WHO is that by 2020, NCDs would contribute more than infectious diseases as the main cause of medical admissions and adult deaths [9]. It is documented that cardiovascular and infectious diseases were currently the main causes of medical admissions and in-patients mortality in sub Saharan Africa [10].

The four major NCDs (CVDs, DM, cancers and chronic lung diseases) cause death in 20% of persons aged 30 and 70 years and are responsible for 82% of all NCD deaths [11]. Currently, NCDs remain the commonest cause of deaths globally and their mortality is increasing. It is, also, documented that a large percentage of all NCD deaths globally occurred before the age of 70 years in the low and high income countries [11].

This trend to increasing burden of NCDs in the low and middle income countries is attributed to rapid urbanization, affluence, increasing life expectancy, westernization of their diets, sedentary lifestyles and resultant obesity. Again, until recently, the World has not shown interest and concerns for the NCDs to the extent that NCDs were not mentioned in the Millenium Development Goals [12]. No wonder, it was only on August 6, 2019 that.

Nigeria launched the Nigerian National Multisectorial Action Plan (NNMSAP) for the prevention and control of NCDs aimed at eliminating NCDs between 2019 and 2025. Before then, the WHO 2018 Country Profile reported that NCDs accounted for an estimated 29% of all deaths in Nigeria with deaths due to CVS diseases being the highest at 11% [14]. Even at this, Chinene, *et al.* [13] observed that in Nigeria, some major NCDs like cancers, sickle cell diseases and mental health disorders are not budgeted for and not covered by the National Health Insurance Scheme (NHIS), leaving the affected persons and community to pay out of pocket.

It is documented that risk factors for NCDs [15-17] include the following behavioral risk factors (tobacco use, alcohol consumption, unhealthy diets or physical inactivity) and metabolic risk factors (elevated blood pressure, overweight and obesity, hyperglycaemia or hyperlipidaemia). In SSA countries including Nigeria, Ghana and South Africa, the burden of NCDs is increasing while communicable diseases such as malaria, cholera, malnutrition, viral haemorrhagic fevers etc are still wreaking havoc [15-17]. The commonest CVDs are coronary artery diseases, cerebrovascular accidents (stroke), heart diseases secondary to systemic hypertension, systemic hypertension, disorders of heart rhythms and cardiac failure [18]. In South Africa, the commonest cause of adult deaths is HIV/AIDS while CVDs come next at 40% of deaths in adults [19]. In recent hospital based studies in Nigeria [20-22], CVDs were significant causes of hospitalization. In a study in Pakistan [23], in descending order, systemic hypertension, ischemic heart diseases and DM were the predominant NCDs noted.

Several Nigerian studies and a national survey on NCDs are documented [24-29], In Abia state, Southeast Nigeria; published literature on NCDs burden is scanty. This, therefore, informed the rationale for this study. By determining the admission patterns and treatment outcome of NCDs in the medical wards of ABSUTH, Aba, we obtained some useful data that would influence medical practice in the sub-region.

## Methods

### **Study design and location**

We carried out a retrospective study on medical records of adult patients aged 15 years and above admitted on account of NCDs into the medical wards of ABSUTH, Aba. Aba is an epicenter of commercial activities in the Southeastern region of Nigeria and ABSUTH is the only tertiary health facility in the city. She gets referrals from all the primary and secondary health facilities in Aba. There are 60 beds and 2 isolation wards in the medical wards. Medical in-patients are admitted from the accident and emergency unit, medical out-patients clinic, Anti-retroviral Therapy (ART) clinic, transfers from the wards of the other specialties of the hospital such as surgery and obstetrics/gynaecology. The Department of Internal Medicine, ABSUTH, Aba has Consultants in the subspecialty units in the department with resident doctors and house officers. There are other support units in the medical wards such as the nursing unit, medical records, pharmacy section and the cleaners.

### **Inclusion criteria**

Patients admitted in the medical wards on account of diagnoses of NCDs and aged 15 years and above were included in the study. A patient admitted in the medical ward for another diagnosis within the study period was counted as two or more depending on their number of visits and diagnoses.

### **Exclusion criteria**

Patients who had surgeries and developed medical complications during the postoperative period were not included in the study. We did this to avoid confusions in their durations of hospital stay. Patients whose data were incomplete or missing were excluded.

### **Recruitment/Data collection**

Between May 1, 2007 and April 30, 2017, 4641 patients that met the inclusion criteria participated in the study. Because of incomplete or missing data, 183 patients with diagnoses of NCDs were excluded from the study. Patients' case notes, medical wards' Admission/Discharge registers and Death certificates were used to extract the following data: total number of medical admissions, demographic characteristics of subjects admitted for NCDs and treatment outcome at the medical wards. From each patient's record, age, gender, definitive diagnosis, duration of hospital stay and outcome during admission were noted. The outcome measures for the study were improved, died, discharged against medical advice (DAMA) or transferred to another specialty outside the medical wards or to another health facility.

### **Ethical approval**

This was obtained from the Institution's Health Research Ethics Committee before the study commenced.

### **Statistical analysis**

Data collected for the study were entered into and analyzed with Statistical Package for Social Sciences (SPSS Inc. Chicago IL. USA) version 23.0 statistical software. Mean values and standard deviations (SD) were calculated for continuous variables such as the ages of the study participants and the means were compared using independent two samples t-test. For the duration of hospital stay of the study subjects, median and interquartile range were calculated because of the skewness of the data. Frequency of the diagnosis, sex and outcome of medical ward treatment were categorical variables in the study which were summarized using proportions expressed in percentages. Comparison of the categorical variables was done using the non-parametric test, chi square test and the level of statistical significance was set at  $p < 0.05$ .

**Results**

Out of the 6587 medical admissions within the study period, 4641 (70.5%) patients were admitted because of NCDs, made up of 2245 (48.4%) males and 2396 (51.6%) females with a ratio of 1: 1.07. The age range was 15 – 103 years with a mean age of 57.17 ± 16.55 years; male 57.95 ± 16.53 years, female 56.43 ± 16.54 years. Difference in the mean ages of the male and female patients was statistically significant (t = 3.144, p = 0.002). The range of duration of hospital stay was 1 - 123 days while the median duration of hospital stay and interquartile range were 8 and 10 days respectively. Demographic characteristics of the study subjects were as shown in table 1. The elderly population (60 years and above) and the middle age population (40 - 59 years) were the predominant age groups among the NCD admissions at 48.1% and 37.0% respectively (as shown in Table 2),

Indices	Frequency (n=4641) (%)
Gender:	2245 (48.4)
Male	2396 (51.6)
Female	
Mean age (±SD)	57.17±16.55
Mean age male (±SD)	57.95±16.53
Mean age female (±SD)	56.43±16.54 (t=3.144, p=0.002)

**Table 1:** Demographic characteristics of patients presenting with NCDs in the medical wards of ABSUTH, Aba. Age distribution of the subjects.

**Profile of NCDs admission in ABSUTH, Aba**

The predominant NCDs in this study were cardiovascular diseases (42.7%), DM related complications (26.3%), chronic kidney diseases (9.03%), chronic liver disease (6.7%), cancers (2.9%), chronic lung diseases (2.8%) and chronic dyspepsia (2.3%). Thyrotoxicosis was a diagnosis in females only while Alzheimer’s disease/dementia was predominantly seen in the males. Details are shown in table 2.

Non-communicable diseases	Male	Female	Total (n=4641) (%)
DM related complications	599	621	1220(26.3)
Cardiovascular diseases:			
Stroke	382	449	831
Heart failures	373	422	795
Systemic hypertension	103	213	316
CAD/ischemic heart disease	23	12	35
Cardiac arrhythmia	1	2	3
			Total=1980(42.7)
Cancers	74	60	134(2.9)
Chronic Lung diseases:			
Bronchial asthma	33	29	62
COPD	33	36	69
			(Total=131)(2.8)

Chronic liver diseases	175	135	310 (6.7)
Chronic kidney diseases	241	178	419 (9.03)
Others:			
Sickle cell disease	32	16	48
Alzheimer’s disease/Dementia	23	7	30
Chronic dyspepsia ± UGIB	48	58	106 (2.3)
Epilepsy	21	27	48
Osteoarthritis	5	14	19
Severe anaemia of unknown cause	14	40	54
Spinal cord injury	12	7	19
Thyrotoxicosis	0	8	8
			Total=332(7.2)
Miscellaneous other diseases			115(2.5)

**Table 2:** Pattern of NCDs causing hospitalizations in the medical wards of ABSUTH, Aba.

Key: CAD= coronary artery disease, COPD= chronic obstructive pulmonary disease, UGIB= upper gastrointestinal bleeding.

**Outcome of hospitalization of patients with NCDs in the medical wards of ABSUTH, Aba**

Outcome of NCD admissions into the medical wards were as follows: 3335 (71.9%) improved, 1045 (22.5%) died, 189 (4.1%) were discharged home against medical advice and 72 (1.6%) were transferred to other facilities or specialties of ABSUTH, Aba (Table 3). Of the NCD deaths, 727 (69.6%) were aged less than 70 years. There is a statistically significant difference in outcome of the age groups ( $X^2 = 75.276, p = 0.001$ ). Details are shown in Table 3. The males were in majority in those who were discharged against medical advice. There was no statistically significant difference in the outcome of the male and female patients ( $X^2 = 3.64, p = 0.28$ ). Details are summarized in table 4.

Age groups (years)	Male	Female	Improved	Died	DAMA	Referred	Total (n=4641)(%)
<20	37	36	60	7	2	4	73(1.6)
20-39	266	352	451	111	32	24	618(13.3)
40-59	836	880	1241	373	75	27	1716(37.0)
60-69	489	555	746	236	53	9	1044(22.5)
70 and above	617	573	837	318	27	8	1190(25.6)
Total	2245	2396	3335	1045	189	72	4641(100)

**Table 3:** Gender and outcome of NCD admissions stratified by age groups in ABSUTH, Aba. Key:

DAMA= discharged home against medical advice.

Gender	Home	Died	DAMA	Referred	Total
Male	1619	497	100	29	2245
Female	1716	548	89	43	2396
Total	3335	1045	189	72	4641

**Table 4:** Gender and outcome of NCD admissions in ABSUTH, Aba.

Key: DAMA: discharged home against medical advice.

With an overall NCD mortality in the medical wards of 22.5%, the predominant causes of death within the study period, in descending order, were CVDs, DM related complications, CKD, CLD and cancers at case fatality rates of 45.7%, 23.8%, 11.0%, 9.9% and 3.7% respectively (Table 5).

Outcome	CVDs	DMRC	Cancers	C lung dx	CKD	CLD	Others	Total (n=4641) (%)
Home	1424	915	79	118	260	178	361	3335 (71.9)
Died	478	249	39	10	115	103	51	1045 (22.5%)
DAMA	67	46	11	3	19	23	20	189 (4.1)
Transferred	11	10	5	0	25	6	15	72 (1.6)
Total	1980	1220	134	131	419	310	447	

**Table 5:** Outcome of treatment of the major NCDs that caused medical admissions in ABSUTH, Aba.

Key: Home= improved and discharged home, DAMA= discharged against medical advice, CVDs= cardiovascular diseases, DMRC=diabetes mellitus related complications, C lung dx= chronic lung diseases, CKD= chronic kidney diseases, CLD= chronic liver diseases.

Majority of the NCDs mortalities (75.7%) were recorded within the first week of medical admission and by the end of the second week, 89.5% of the NCD deaths had occurred. By day 30 on admission, 95.3% of all those that improved have been discharged home (Table 6).

Day of admission	Home (n=3335)	Died (n=1045)	DAMA (n=189)	Referred(n= 72)
Day 1	28	249	38	7
Day 2	100	168	19	7
Day 3	163	132	16	7
Day 4	207	94	11	8
Day 5	208	51	11	8
Day 6	195	44	12	3
Day 7	278	53	10	1
	Total=1179(35.4%)	Total=791(75.7%)	To- tal=117(61.9%)	Total=41(57%)
Day 8	293	29	12	3
Day 9	185	28	5	3
Day 10	233	23	8	2
Day 11	151	24	3	0
Day 12	132	16	8	2
Day 13	155	18	3	7
Day 14	140	6	3	4
	Total=2468(74.0%)	Total=935(89.5%)	To- tal=159(84.1%)	
Day 15	143	11	4	1
.to day 30	711	86	22	9
	Total=3179(95.3%)	To- tal=1021(97.7%)	To- tal=181(95.8%)	

**Table 6:** NCDs admission outcome on a day-by-day basis from day of hospitalization.

## Discussion

The main findings of this study were that the NCDs were major causes of medical admissions with the CVDs and DM related complications as topmost among the NCDs. Stroke, a CVD, was the commonest cause of NCD deaths and a high NCD mortality was noted especially within the initial days of hospital admissions.

Non-communicable disease admissions accounted for 70.5% of all medical admissions and this high proportion of NCDs contribution to medical admissions is similar to findings in Ido Ekiti [21], Abakiliki [24], Portharcourt [30], Enugu [20] and Southeast Ethiopia [31]. These observations are in tandem with reports of increasing burden of non-communicable diseases globally. This could be explained by the westernized diets, sedentary lifestyles, resultant obesity and rapid urbanization taking place in Nigeria and the other sub-Saharan African countries. This NCD in-hospital predominance could, probably, be due to the epidemiologic transition from communicable diseases (CDs) to that of NCDs in Africa as reported by Omran [3]. It may, also, be a reflection of the WHO projection that by 2020, NCDs would be the leading cause of medical admissions and adult deaths [9].

Cardiovascular diseases accounted for 42.7% of the NCD admissions in this report. This figure is higher than what was obtained in other Nigerian hospital based studies in Portharcourt [30], Enugu [20], Ido Ekiti [21] and Keffi [22] where CVDs were responsible for 35.7%, 20.46%, 32.1% and 37.7% respectively. Reasons for the disparities in the CVD contributions to NCD admissions in these studies are not clear. Differences in the cardiovascular risk factors, economic activities, cultural and psychosocial factors in the different regions of Nigeria could be playing some roles. Cardiovascular diseases, a major cause of NCD admissions in this study, corroborate the conclusion by Etyang and Gerard Scott that cardiovascular diseases were currently in the forefront of medical admissions and in-patient deaths in sub Saharan Africa [10].

Risk factors for cardiovascular diseases can be modifiable or non-modifiable; the former include diabetes mellitus, hyperlipidemia/dyslipidemia, sedentary lifestyles/physical inactivity, systemic hypertension, obesity, tobacco use and alcohol consumption. The implication of this is that the contribution of cardiovascular diseases to NCD admissions could be reduced considerably by addressing the modifiable risk factors of CVDs via proper health education, economic empowerment of the people, adequate healthcare financing, and effective national health insurance policy.

In this report, diabetes mellitus came second (23.8%) after CVDs as a cause of NCD admissions. This is comparable to the report in Keffi [22] and Portharcourt [30] where DM related complications came second too and accounted for 23.7% and 18.5% of NCD admissions respectively. However, in a report from Pakistan [23], DM related complications were the second commonest cause of NCDs at only 14.6% behind CVDs at 73.1%. It is important to note that in the Pakistan study, tobacco use and drug abuse were the predominant risk factors for CVDs. This may not be the situation with the local Nigerian studies.

In this study, CLD and CKD contributed significantly more to in-patient hospitalization than chronic lung diseases and cancers. This observation is comparable to the report in Portharcourt [30] where chronic kidney diseases contributed 16.8% of NCD admissions in the medical wards. The burden of cancers and chronic lung diseases may have been underestimated in this study because many patients with chronic lung diseases (bronchial asthma or chronic obstructive pulmonary diseases) may have been treated as outpatients while many cancer patients may be receiving care from other specialties, therefore, were not captured in our data sources. Chronic liver diseases and CKDs were not included in the four major NCDs (CVDs, cancer, chronic respiratory diseases and DM) which were reported to be responsible for 82% of NCD deaths globally [9]. Again, CLDs and CKDs were not major contributors in the WHO report where it was noted that NCDs accounted for an estimated 29% of all deaths in Nigeria [14]. This is worrisome and calls for measures to stem down CKD and CLD as causes of NCDs in Nigeria.

Among the NCD admissions, 71.9% improved and were discharged home within the study period. This is comparable to the 68.4% noted in Ekiti state [21], Southwest Nigeria but higher than the 47.99% and 64.4% noted in Osogbo [32], Southwest, Nigeria and Keffi [22], Northcentral, Nigeria respectively. Reason for this disparity in the outcomes of in-hospital treatment of NCDs in these Nigerian health facilities is not obvious since they operated under similar socioeconomic, political and health care systems. The middle aged group suffered more deaths, 373 (35.7%) than any other age group in this study where the overall in-patient mortality of NCDs was 22.5%. Again, the middle age population constituted a majority of the NCD admissions in our study. This is not good for the nation's economy since this age group is the major provider of labour in every country. Deaths in those less than 70 years in the index study was 69.6% of the NCD deaths and this is much higher than the 48% reported for the low and middle income countries [11].

Finally, CVDs especially stroke was the commonest cause of death in this study and in another hospital based study in Southeast Ethiopia [31]. This finding is in keeping with reported cases in Africa where the case fatality rate of stroke is estimated at about 35% but ranges from as low as 14.9% to as high as 77% when due to cerebral haemorrhage [33]. In Nigeria, mortality rates of stroke are very high with a range of 21% - 45% [34-38] and it is worthy of note that most of the NCD mortalities in our study and the study in Asella, SouthEast Ethiopia [31] occurred within the acute phase of hospitalization. It could be explained by late presentations to hospitals when not much could be done for the patients. In the Ethiopian study, majority of the NCD deaths (61.4%) were recorded within the first 7 days of hospital stay. In the setting of a dedicated stroke unit where multidisciplinary care services are provided, outcome of NCD admissions would always be more favorable. In a study in Jos [39], Nigeria, death toll from stroke at the end of 30 days in the ward was 95.2%. This is comparable to the 97.2% of the NCD deaths noted in this study.

Prevention and control of NCDs is more cost effective than their in-hospital management which is fraught with high morbidity and mortality. However, challenges to prevention and control of the NCDs in Nigeria are enormous as observed by Chinenye., *et al.* [13] who noted inadequate political commitment to NCD control, inadequate funding of NCDs by government, lack of multisectoral collaboration on NCDs, dearth of reliable national data on NCDS and inadequate research funding for NCDs.

Exclusion of study subjects on account of incomplete and missing data is a limitation of the index study. Their inclusion may have changed the conclusions of this report. This is a common limitation of retrospective studies. Another important limitation of the index study was that there were no postmortem examinations to confirm the clinical diagnoses in the patients that died as a result of NCDs while in the medical wards.

## **Conclusion/Recommendations**

This study has shown that the NCDs accounted for the majority of medical admissions in ABSUTH, Aba, Southeast Nigeria. Women and the elderly population were disproportionately affected and the in-patient mortality of the NCDs is high especially from stroke. Elderly patients and persons presenting with stroke will have favorable outcomes if managed in dedicated geriatric and stroke units in Nigeria and the SSA. It is, also, recommended that countries should integrate NCD prevention and control into the mainstream of their national development planning including poverty reduction strategies and national budget allocation.

## **Conflicts of Interest**

Nil.

## **Author's Contributions**

1. Dr Marcellinus O. Nkpozi - Conception and design of the research, with drafting of the manuscript. He, also, takes overall responsibility for the study.

2. Dr Chidiebele M. Ezeude - collection and analysis of the data.
3. Dr Ignatius Ezeani - interpretation of the data and statistical analysis.
4. Prof Sunny Chinenye - Final approval and critical revision of the manuscript.

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