

Hypertension- The Major Cause of Morbidity, Hospitalisation and Mortality among Non-Communicable Diseases in The Gambia

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ABSTRACT

Aim

This study aimed at investigating the major cause of morbidity, hospitalisation and mortality among Non-Communicable Diseases (NCDs) in The Gambia, in an effort to raise awareness on the alarming trend and thus stimulating appropriate responses from stakeholders.

Method

Descriptive and inferential statistics were used to analyse a nation-wide routine hospital-based data on NCDs in The Gambia. Data were also presented in tables showing the trend of morbidity (in and out-patient case), hospitalisation and mortality between 2008 and 2011.

Result

Hypertension as a risk factor for cardiovascular diseases constitutes more than half (55%) of all hospital admissions due to NCDs while cardiovascular diseases as a whole constitute well over 60% of all hospital admissions from NCDs. Of all NCDs studied, morbidity due to hypertension constitutes 80%, nearly responsible for all morbidities due to cardiovascular diseases for the years considered. Seventy percent (70%) of all deaths due to NCDs were caused by cardiovascular diseases, and hypertension was an important factor for NCDs related mortality (47.9% in 2008 to 55.8% in 2011; p-value = 0.13). There were increments in morbidity and mortality due to hypertension and cardiovascular diseases between 2008 and 2011. However, there was reduction in hospitalisation due to cardiovascular diseases, but not the case with hypertension (incremental change). The differences in morbidity and hospitalisation were statistically significant for cardiovascular diseases (p< 0.0001 and p= 0.034 respectively) while only increment in morbidity due to hypertension was statistically significant (p <0.0001).

Conclusion

This study shows that hypertension as a risk factor for cardiovascular disease is the greatest cause of morbidity, hospitalisation and mortality among NCDs in The Gambia. Hence, a holistic approach tailored towards preventing the acquisition/onset of the modifiable risk factors (of hypertension and CVD) should be instituted as well as programmes capable of preventing target organ damage among the population already affected.

Keywords: Hypertension, Cardiovascular diseases, NCDs, morbidity, hospitalisation, mortality, The Gambia, Public Health

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1. INTRODUCTION

Hypertension is the risk factor for cardiovascular diseases such as stroke, coronary heart disease, left ventricular hypertrophy, congestive cardiac failure, aortic dissection and aortic aneurysm[1] The notion that cardiovascular disease (CVD) is a western disease or disease of the developed countries is no longer true [1-3]. It is the commonest chronic non-communicable disease (NCDs) throughout the world [4], and hypertension is fast becoming a household name even in the most remote part of Africa.

Hypertension and cardiovascular diseases in general, are important cause of morbidity and mortality, constituting significant medical and socio-economic burden in Africa [1,3,5]. The direct medical cost of cardiovascular diseases in sub-Saharan Africa is quite enormous [5] and this might have increased over time given the increasing prevalence.

There are rapidly accumulating data clearly indicating that the developing world including Africa, now bears dual burden of pre-transitional (infections, infestations and nutritional disorders) and post-transitional diseases[3,5-8]. In African countries undergoing this epidemiological transition, morbidity and mortality due to NCDs, which include cardiovascular disease (stroke and heart disease), cancer, diabetes and chronic respiratory diseases, may have surpassed communicable diseases [9]. Reddy and Yusuf have recognised the need to address the looming epidemic of NCDs in developing countries [3], however, there have not been strong responses [3,10], especially in Africa, owing to lingering public health challenge with infectious diseases, poor political will and greater drive from development partners [11,12].

In 2011, United Nations General Assembly (UNGASS) in recognition of the impending global NCDs pandemic introduced resolutions aimed at tackling this next public health challenge [13]. Unfortunately, since the introduction of policies on a global level to address the problem of NCDs, the recognition of the scale of the problem and efforts to address them are lagging behind in low and middle-income countries (LMICs), particularly in Africa.

Fewer epidemiological studies or surveys have been done in Africa to evaluate NCDs and their major biological risk factors including hypertension, compared to data originating from Europe and North America [6]. Specifically, in The Gambia, only one study conducted in 1997 showed that the national prevalence of hypertension was 24.2%, using a BP cut-off point of 140/90mmHg [14]. Subsequently, there has been no specific recently published report evaluating the contribution of hypertension and/ or cardiovascular diseases to morbidity and mortality due to NCDs in The Gambia, either from hospital-based data or community based survey.

58 Consequently, the objective of this study was to investigate the major cause of morbidity,
59 hospitalisation and mortality among NCDs in The Gambia, in a bid to increasing awareness
60 on the alarming trend, and thus stimulating appropriate responses from stakeholders.

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62 **2. METHODS**

63 **2.1 Study Area**

64 The Gambia is the smallest mainland country in Africa. It occupies an area of 11,295km²
65 (land and water). The country is divided into North and South Banks by the River Gambia.
66 The Gambia has an estimated population of 1.83million [15]. The Gambia population is
67 mainly ethnic Africans (99%) and 1% non- African. The ethnic Africans are composed of
68 Mandinka (42%), Fula (18%), Wolof (16%), Jola (10%), Serahule (9%), and others
69 constituting 4% (15). There has been significant rural-urban migration (49% in 1990) with
70 57% of the population being urban residents in 2009 [9]. Life expectancy at birth rose from
71 54years in 1990 to 60years in 2009 [9]. The Gambia is one of the least developed countries
72 in the world, ranking 168 out of 187 countries with comparable data on the human
73 development index (HDI) in 2011 [16].

74 **2.2 Data**

75 The Disease Control Unit of the Ministry of Health and Social Welfare (MOHSW), The
76 Gambia provided NCD surveillance data. NCDs data are collected routinely from health
77 facilities and hospitals throughout the country.

78 The public health service delivery system is composed of three tiers; primary, secondary and
79 tertiary. Services are provided by a teaching hospital (tertiary), 6 general hospitals and 36
80 health facilities at the secondary level and 492 health posts at the primary level. The public
81 health system is complemented by 34 private and Non-Governmental Organization clinics.
82 Diagnoses of the diseases were made by clinicians, specifically doctors in most cases,
83 working at both general hospitals (secondary health care institutions) and the teaching
84 hospital (tertiary health centre). However, at the lowest level of care, i.e., primary health
85 care, there are algorithms being employed for diagnosis by community health practitioners
86 for some conditions, while referrals were made to higher levels of care in cases where
87 diagnoses cannot be made. The doctors admit patients and ascertain cases of mortality as
88 required. It should be noted that pathological causes of deaths are rarely investigated in this
89 environment; therefore these data are exclusive of autopsy diagnoses.

90 The Health Management Information System Unit centrally coordinates health data,
91 including chronic non-communicable diseases data, in The Gambia. The software
92 application being used for the database is DHIS version2. Data entry by data entry clerks
93 mainly takes place at the Regional Health Level with some inputs at the peripheral levels.

Data were verified manually before and after entry from the source documents. The source documents were the hospital medical case files. Data were extracted using MS access queries facilities and through selection criteria in statistical software. Cases were those that have diagnoses of any of the NCDs in the database. Verifications were done by data entry supervisors. There are restrictions to the database as only data management team has access to it. Each patient has a unique identifier, and other mechanisms are instituted to prevent duplication. The database also has protected data field (names of individuals) which improves data quality. Other consistency checks and validation rules were in place.

The surveillance system during the reporting period studied surpassed the 80% target for both timeliness and completeness of data.

Cardiovascular disease, for the purpose of this study, was defined as hypertension and all other forms of cardiac and vascular diseases recorded in the NCD surveillance database in the Gambia for the reporting period

2.3 Analysis

Both descriptive and inferential analysis of NCDs data for the years 2008 and 2011 were undertaken. While disease counts were expressed in proportions (and percentages), chi-square statistic was used to test for significant differences in the proportions of diseases of interest between 2008 and 2011. It should be noted that total cases include all the patients seen by clinician on out-patient basis and those that were admitted based on the severity of their clinical presentations or based on clinicians' judgement/discretion while those admitted were a sub-set of all the cases.

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3. RESULTS

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Table 1: Distribution (in Percentages) of NCDs in The Gambia by morbidity, admission

and mortality for 2008

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2008*	Hypertension	Diabetes	Renal	Cardiac disorders	Hepatic disorder	Cancer	Asthma	Total
Total cases	46549 (79.2%)	2153 (3.7%)	129 (0.2%)	709 (1.2%)	78 (0.1%)	215 (0.4%)	8934 (15.2%)	58767
Total Admission	1194 (54.2%)	182 (8.3%)	55 (2.5%)	260 (11.8%)	55 (2.5%)	25 (1.1%)	432 (19.6%)	2203
Total Death	80 (47.9%)	11 (6.6%)	10 (6.0%)	38 (22.8%)	11 (6.6%)	4 (2.4%)	13 (7.8%)	167

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*Degree to which cardiovascular disease (cardiac disease and hypertension), diabetes, cancer, asthma, renal and hepatic diseases account for NCDs related hospitalisation, admission and mortality in the year 2008

Table 2: Distribution (in Percentages) of NCDs in The Gambia by morbidity, admission and mortality for 2011

2011*	Hypertension	Diabetes	Renal	Cardiac Disorders	Hepatic disorder	Cancer	Asthma	Total
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Total cases	56533 (80.3%)	3231 (4.6%)	82 (0.1)	675 (1%)	100 (0.1%)	140 (0.2%)	9621 (13.7%)	70382
Total Admission	1345 (55.6%)	203 (8.4%)	57 (2.4%)	187 (7.7%)	75 (3.1%)	52 (2.2%)	501 (20.7%)	2420
Total Death	115 (55.8%)	19 (9.2%)	2 (1%)	30 (14.5%)	11 (5.3%)	12 (5.8%)	17 (8.2%)	206

*Degree to which cardiovascular disease (cardiac disease and hypertension), diabetes, cancer, asthma, renal and hepatic diseases account for NCDs related hospitalisation, admission and mortality in the year 2011

Table 3: Differences in the variables of interest between 2008 and 2011

Diseases	Morbidity 2008 : 2011	p -value	Admission 2008: 2011	p-value	Mortality 2008: 2011	p-value
Cardiovascular diseases*	80.4% : 81.3%	0.0003	66.0%: 63.3%	0.034	70.7% : 70.4%	0.96
Hypertension	79.2%: 80.3%	<0.0001	54.2% : 55.6%	0.305	47.9% : 55.8%	0.13
Diabetes	3.7% : 4.6%	<0.0001	8.3% : 8.4%	0.920	6.6% : 9.2%	0.35
Asthma	15.2% :13.7%	<0.0001	20.7%:19.6%	<0.0001	7.8% : 8.2%	0.87

*Cardiovascular Diseases include cases of hypertension and cardiac disorders

Level of significance:p-value <0.05

In 2008, 80.4% of morbidity due to NCDs was attributed to cardiovascular diseases, of which hypertension accounted for 79.2%. The morbidity due to cardiovascular diseases increased marginally to 81.3% in 2011, and this change was statistically significant (p= 0.0003). Compared to 2008, hypertension accounted for 80.3% of morbidity due to NCDs in the year 2011 (p< 0.0001). As per mortality in the year 2008, 70.7% of deaths were caused by cardiovascular diseases, and hypertension was responsible for nearly half (47.9%) of the deaths. There was hardly any significant change (from 2008) in the percentage of deaths (70.4%) caused by cardiovascular diseases in 2011(p-value = 0.96), however, the contribution of hypertension alone to mortality due to NCDs increased from 47.9% to 55.8%, and this difference (increment) was not statistically significant (p-value= 0.13).

66% of all hospitalisations due to NCDs in 2008 were due to cardiovascular diseases and this dropped significantly to 63.3% in 2011(p= 0.034). However, hypertension was responsible for over half of all hospitalisations due to NCDs for years 2008 (54.2%) and 2011(55.6%), but the difference between 2008 and 2011 was not statistically significant (p =0.305)

It is interesting to find that asthma, a chronic inflammatory airway disease, accounted for higher numbers of morbidity and hospital admissions than the combined cases of renal, hepatic disorders and cancers in The Gambia. The differences in these variables for Asthma between 2008 and 2011 were tested; there were statistically significant differences in morbidity and hospitalisation(p-value for both variables was <0.0001) but there was no statistically significant differences in mortality (p = 0.87). Though there was no difference in

the numbers of deaths due to diabetes mellitus ($p=0.35$) between 2008 and 2011, diabetes mellitus (DM) appears to be the 3rd most important cause of morbidity, hospitalisation and mortality among NCDs in The Gambia.

4. DISCUSSION

The present study (as shown in the results) found hypertension and/or cardiovascular diseases as the major cause of morbidity, hospitalisation and mortality due to NCDs in The Gambia. This finding is similar to what has been reported in some African countries. For instance, hypertension and its complications have been found to be a major cause of morbidity and mortality in medical wards in Nigeria (17, 18). It appears hypertension as a risk factor for CVD has been silently evolving at both individual and population levels without it being noticed or adequately attended to in Africa. For instance, the epidemic of hypertension has been described since 1979 in Ghana [19] and recent review has demonstrated an increase or probably persistence in the prevalence [20]. Similar increased or relatively high prevalence have been found in other African countries [21, 22]. Furthermore, the present finding confirms previous report from the Gambia that showed Hypertension is common in both rural and urban settings. It seems hypertension is ubiquitous in The Gambia, given the different nomenclatures ascribed to it by the major ethnic groups. For example, the Mandikas (largest ethnic group) calls it “*yelle selle kurang*” (*literal meaning-blood climbing sickness*); the fulas (*the 2nd largest ethnic group*) calls it “*Jijan Jahwodan*” or sometimes “*Tansion*” (*meaning rising blood pressure*) while the Wolof (3rd largest ethnic group) refers to it as “*deret bu dek*” (*literal meaning- blood that rise*). Perhaps, Hypertension is no longer alien to indigenous West Africans, even in remote areas.

Even though, hypertension is an important risk for CVD, is becoming widespread, and the level of awareness of the health consequences is low [3]. This underscores the need for an aggressive but systematic approach at all levels towards preventing the acquisition of the risk factors, timely diagnosis and effective management of the disease, and thus prevention of complications. cursory investigation by the authors have shown that there is paucity of information on the risk factors and the complications of the CVD, even among urban residents in the Gambia, and this is expected to be worse among the rural inhabitants. As a result of poor socio-economic conditions, poor health education and limited access to health services, many individuals are unaware of their health conditions, when they are aware (of being hypertensive) - they are often non-compliant to anti-hypertensive medications, and sometimes resort to unorthodox practices, such as the use of boiled leaves of bamboo plant, soaking of certain tree barks, garlic consumption e.t.c.

188 The risk factors of CVD are well documented in the literature and seem applicable to The
189 Gambia, even though there may be some local national variations. Scholars have asserted
190 that nutritional and demographic transition being experienced in many sub-Sahara African
191 countries is a product of urbanisation, economism, westernisation and globalisation [23-25].
192 These have inadvertently resulted in change in dietary patterns, lifestyles and behaviour
193 (reduced physical activity, use of tobacco in any of its forms, increased alcoholism) with their
194 adverse health consequences, as seen in the rising levels of NCDs. There are other factors
195 such as genetics which may have implications with respect to differing drug sensitivity, early
196 onset of the disease and complications.

197 The life course approach may particularly be of immense relevance in understanding the
198 aetiopathogenesis of cardiovascular diseases and other NCDs. This may be a particular
199 important research direction for understanding and delivering NCDs based interventions in
200 sub-Saharan African countries, given the poverty level, low level of education and unequal
201 distribution of wealth in the region. The life course approach involves the studies of
202 biological, behavioural and psychosocial pathways that function across an individual's life
203 course as well as intergenerational, to influence the development of chronic diseases [26].
204 The life course approach provides a way of understanding how socio-environmental
205 determinants of health experienced at various stages of life development can differentially
206 predict or determine the development of chronic diseases, as mediated by early life specific
207 biological processes [26, 27].

208 However, it should be noted that other NCDs, especially, Diabetes appears to be common in
209 the Gambia, and could potentially worsen the growing morbidity and mortality associated
210 Hypertension, in view of the syndromic nature of both diseases, aside it acting
211 alone (diabetes and its complications) as a possible cause of morbidity and mortality. Asthma
212 is of note as well and may become more important due to inverse care and increasing
213 urbanisation in The Gambia.

214 Overall, the main finding from the present study points to an urgent call for action against
215 CVD and its risk factors, and NCDs as a whole, before they become an international health
216 emergency in the Africa region, as it is the case of TB-HIV/AIDS. A lot has been written but
217 not much has been done. Hence, there is need for stronger political action from the UN and
218 African Union (AU), though much more is expected from African leaders in the areas of
219 formulating and implementation of relevant policy and strategic framework to address NCDs.

220 **4.1 Limitation of the study**

221 Other forms of NCDs such as neuropsychiatric conditions, stroke, haemoglobinopathies and
222 other chronic lung diseases were not captured in this short report. Apart from this, this report
223 was based on secondary NCDs data that were primarily gathered from hospital and

224 peripheral health facilities, therefore, they are unlikely to be an accurate figure or true
225 reflection of the burden of NCDs in The Gambia. This may be the case, because certain
226 NCDs, particularly NCDs like hypertension, may be asymptomatic, hence, many affected
227 individuals may not have presented themselves at the health facilities. Furthermore, there
228 exists skewness in the geographical distribution of health facilities in The Gambia, as the
229 very urban inhabitants have more access to health care services than the rural inhabitants
230 who are mainly poor agrarian community. Therefore, there may be gross under-reporting
231 from the rural areas, even though we do not expect more cases of NCDs in the rural areas,
232 and the data have not been disaggregated by location.

233 Also, the results were not standardised to the Gambian population, and it should not be
234 assumed that the findings can be generalised across all demographics in the Gambia.
235 However, the finding provides a snapshot of the morbidity, mortality and hospitalisation due
236 to NCDs in The Gambia that can sensitise and provide lead to researchers and policy
237 makers on the urgent need to combat the looming epidemic of chronic diseases in The
238 Gambia.

239 Surveillance in the Gambia, particularly for chronic disease is still very much evolving, and
240 hence still facing technical and logistic challenges, which may not make the data quite
241 reliable. Though, effort is being geared towards improving the surveillance system via staff
242 training and computerisation of data (use of databases) at all levels as against traditional
243 practices of paper documentation (especially at the peripheral level), which may be
244 problematic in this setting.

245 Furthermore, autopsy is rarely done in this environment owing to religious and cultural
246 barriers, therefore, many cases of sudden deaths (both at home and in the hospital) may be
247 related to or caused by cardiovascular diseases and other NCDs, which might not have be
248 captured by these data.

249

250 **5. CONCLUSION**

251 Clearly, hypertension, a risk factor for cardiovascular disease, is the greatest cause of
252 morbidity, hospitalisation and mortality among NCDs in The Gambia. Furthermore, there is a
253 possibility of an ongoing but silent epidemic of hypertension in The Gambia, as it is the case
254 in many developing African countries. However, there is a need for an epidemiological
255 survey to properly quantify and characterise the disease and the risk factors in The Gambian
256 context.

257 With increasing urbanisation and its attendant psycho-social stress, reduced physical activity
258 patterns and improper dietary habit, rising levels of obesity and low level of awareness with
259 respect to behavioural and lifestyle modification, hypertension and in general, cardiovascular

diseases as a public health problem will persist or worsen in The Gambia and by extension, Africa, except there is an urgent strong national or regional response.

5.1 Key messages from the paper

1. Hypertension is widely known even in most remote part of The Gambia, despite the prevailing challenge of infectious diseases and poverty

2. Hypertension constitutes more than half (55%) of all hospital admission due to NCDs while cardiovascular diseases in general constitute well over 60%.

3. Of all NCDs studied, morbidity due to hypertension alone constitutes 80%, nearly responsible for all morbidities due to cardiovascular diseases for the years considered.

4. 70% of all deaths due to NCDs were caused or related to cardiovascular diseases while hypertension has steadily risen between the years studied, as the most important risk of death due to NCDs (47.9% in 2008 to 55.8% in 2011; p value =0.13)

5. Given the present situation in many African countries, the rising trend of NCDs, especially cardiovascular disease, will continue to grow possibly into an epidemic proportion faster than anticipated (and eventually becoming a public health emergency).

COMPETING INTERESTS

The authors declare no conflict interest and the opinions expressed in this study do not represent that of the government of The Gambia and authors' institutions. The authors did not receive any financial support from any organization or individual to conduct this study.

AUTHORS' CONTRIBUTIONS

Semeeh Akinwale Omoleke designed the study, managed the literature search and wrote the first draft of the manuscript. Sannah Sambou coordinated the data acquisition and provided relevant information about The Gambian Health System. Ismael Abubakar performed statistical analysis while Luqman Adewale Oyeyemi read and critically reviewed all the manuscript drafts. All authors read and approved the final manuscript.

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354 APPENDIX

355

357 **Table 4: Distribution (counts) of NCDs by morbidity, hospital admission and mortality for 2008**

2008	Cardiovascular Diseases	Diabetes	Asthma	Others	Total
Morbidity	47,258	2,153	8,934	422	58,767
Admission	1,454	182	432	135	2,203
Mortality	118	11	13	25	167

358 *Note: Total Morbidity includes in and out-patient cases*

359 **Table 5: Distribution (counts) of NCDs by morbidity, hospital admission and mortality for 2011**

2011	Cardiovascular Diseases	Diabetes	Asthma	Others	Total
Morbidity	57,208	3,232	9,621	322	70,383
Admission	1,532	203	501	184	2,420
Mortality	145	19	17	25	206

361 *Note: Morbidity includes in and out-patient cases*

362