



# Modifiable cardiovascular disease risk factors among residents of Sokoto Metropolis, Nigeria

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## ABSTRACT

### Background

Majority of cardiovascular disease (CVD) is caused by risk factors that can be controlled, treated or modified, however, there are also some major CVD risk factors that cannot be controlled. The study aimed to assess and profile the modifiable risk factors of cardiovascular diseases among residents of Sokoto metropolis, Nigeria.

### Methods

This is a population-based study and a descriptive cross-sectional survey design was utilized for the study. A multi-stage sampling technique was used to select a total of 902 respondents for the study. A closed-ended questionnaire was used to collect data on the following: arterial hypertension, diabetes mellitus, obesity, dyslipidemia, smoking, physical activity, and sociodemographic parameters. These were analyzed with SPSS version 17.0 and result presented with simple table.

### Results

Middle-aged adult made up 39% of the total respondents followed by those aged between 25 and 39 years that accounted for 35% while the elderly aged 65 years and above constituted just 3.7%. Ten percent were obese (7% of men were obese as compared to 13.6%) and almost one third reported engaging in some physical activities while 7% reported smoking cigarette. Out of 12 respondents that had deranged total cholesterol, 7 were male while 5 females, and while 14 of the men had deranged HDL, 10 women's HDL was abnormally high. Only two of the men out 88 that had lipid profiling were found to have Dyslipidaemia as against five out 112 women.

### Conclusion

Generally the study reveals the rising prevalence of cardiovascular risk factors however they were more prevalent among elderly respondents aged 65 years and above. There is urgent need of programme that will focus on life style and eating habit in order to reverse the emerging trend of non-communicable diseases.

**Keywords:** Sokoto, CVD, Modifiable Risk Factors, CHD

GJMEDPH 2017; Vol. 6, issue 3

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Conflict of Interest—none

Funding—none

## INTRODUCTION

Cardiovascular disease (CVD) is the leading cause of death and disability worldwide. It is expected that by 2020, CVD would prevail as the leading cause of death and disability over infectious diseases globally.<sup>1</sup> Cardiovascular diseases encompass atherosclerotic vascular diseases like coronary heart disease (CHD), cerebrovascular disease (CBVD), and peripheral arterial diseases.<sup>1</sup>

In recent years, demographics and health surveys have reported increasing malaise of CVD among individuals of all socioeconomic strata.<sup>2</sup> According to recent statistics, incidences of CVD-related death and disability in low-income countries have grown at an alarming pace.<sup>3</sup> In developing countries, progressive urbanization and adoption of “western” lifestyle has contributed to the increasing burden of cardiovascular diseases.<sup>4</sup> Due to poor literacy rates and lack of awareness of disease symptoms, worse disease outcomes continue to be seen in developing countries who are ill-equipped to handle this burden.<sup>5</sup> This is reflected in the rising rates of hospital admissions and mortality from CVD at an early age which in turn inflates the Disability adjusted life years.<sup>6-9</sup> It has been reported that the single largest risk factor for cardiovascular mortality in the US is high blood pressure, directly responsible for 45% of all CVD deaths, closely followed by obesity, physical inactivity, high cholesterol, and smoking.<sup>10-11</sup> Fortunately, many of these metabolic and lifestyle risk factors are modifiable and relatively simple to monitor.

The increased risk of CVD from established modifiable risk factors—tobacco use, hypertension, diabetes mellitus, and hypercholesterolemia is well documented and multiple studies have revealed that modifiable risk factors are responsible for a large number of premature deaths due to CVD.<sup>11-12</sup> More recently, non-established behavioral and lifestyle risk factors like obesity, physical inactivity, and sedentary behavior have been studied.<sup>13</sup> Presently, the greatest public health challenge to developing countries is to control epidemics of chronic non communicable diseases, specifically CVD, CHD, diabetes and stroke which have caused almost doubled mortality rates than other communicable diseases in Nigeria.<sup>13</sup>

Interaction among many environmental and genetic factors are said to determine the kind of diseases an individual will develop. The modifiable environmental risk factors of cardiovascular diseases can be prevented and changed by making healthy choices, behavioral modification including life style. Understanding and documenting the risk factors, which are the sources of biochemical abnormalities observed in the cardiovascular diseases will enable stakeholders to forecast the impending burden and the way forward.

## MATERIAL AND METHODS

Sokoto state comprised of 23 Local Government Areas (LGA) and five out of these make up metropolis. These include Sokoto North, Sokoto South, Wamakko and part of Dange-shuni and Kware. The study populations comprised of adult who reside within the metropolis for at least the past six months. A cross-sectional survey design was used. Each of these LGA consisted of at least ten political wards with each ward having number of district/settlements unevenly distributed. A total of one thousand residents were to be recruited into the study but nine hundred and two respondents finally participated in the survey. A multistage sampling technique was used to select the participants.

First, a simple random sampling method (balloting technique) was used to select five wards from each LGA. A list of all wards by local government areas in the metropolis was obtained and used as sampling frame. Secondly, from the each selected wards, five settlements were selected using simple random sampling method (Balloting technique). Third, a random sample of required size was selected from each district/settlement using a probability proportionate to size (PPS) based on population distribution. Forth, a systematic sampling method was used to compounds (household) based on proportion allocated to each selected settlement. From selected household, a questionnaire was administered to one eligible participant, and where more than one eligible that consented to participate, a simple random sampling method (Balloting technique) was used to select one person.

Data was collected by face-to-face interview using a closed-ended questionnaire. Self-administered interview method was used for participants who could read and write while interviewer-administered method was used for participants who could not read and write. Research assistants were drawn from the political wards selected for study and adequately trained to ensure adequacy and accuracy of the information to be collected during the interviews. After the training, research assistants were posted to their wards to administer the questionnaires. Data collected was analyzed using Statistical Package for the Social Science (SPSS) version 17.0.

Dyslipidaemia is defined using Adult Treatment Panel III (ATP III) guidelines, when one or all of the following were found: Total cholesterol greater than or equal to 200mg/dl (5.2mmol/l), Low density lipoprotein cholesterol greater than or equal to 130mg/dl (3.3mmol/l), triglycerides greater than or equal to 150mg/dl (1.7mmol/l) and high density lipoprotein cholesterol less than or equal to 40mg/dl (1.03mmol/l) in men or less than or equal to 50mg/dl (1.3mmol/l) in women.

Mean and standard deviation were calculated for continuous variables while categorical variables were expressed in frequencies and percentages. The results were presented in tables.

Ethical clearance was obtained from Sokoto state Health Research Ethics Committee and the District head of each of the selected ward granted permission for community entry. In addition, individual consent was obtained from the participants before the questionnaires were administered.

## RESULTS

Table 1 results shows that middle-aged adult made up 39% of the total respondents followed by those aged between 25 and 39 years that accounted for 35% while the elderly aged 65 years and above constituted just 3.7%. More than half (53.4%) of the respondents were males. Nearly half (47.4%) had only Qur'anic education while among those that had formal education, only 18.3% had completed secondary education. Thirty five percent were unemployed, 26.6% were trading and 24.3% were Government employee. The majority ethnic group was Hausa/Fulani (79.4%) and others (small ethnic groups) together accounted for 12.4%. One-third (30%) of the respondents had an estimated annual household income of less than N50,000 while 18% had an estimated annual income of between N50,000 and N100,000. Majority (57%) of the respondents lived in houses with shared facilities while 43% lived in self-contained houses (flat and Bungalow).

**Table 1 Demographic and Socio-Economic Characteristics of Respondents**

Variables	Frequency	Percentage
<b>Age Groups (Years)</b>		
20- 24	208	23.1
25-39	311	34.5
40-64	350	38.8
≥ 65	33	3.7
<b>Sex</b>		
Male	481	53.4
Female	419	46.6
<b>Educational Level</b>		
No formal	474	52.7
Primary school	84	9.4
Secondary school	164	18.3
Post-secondary	174	19.5
<b>Ethnicity</b>		
Hausa/Fulani	738	79.4

Ibo	29	3.1
Yoruba	48	5.2
Others	115	12.4
<b>Marital Status</b>		
Single never married	266	29.2
Married	582	63.9
Single ever married	63	6.9
<b>Occupation</b>		
Unemployed	314	34.8
Student	55	6.1
Unskilled workers	36	4.0
Businessmen/traders	242	26.8
Skilled artisan	37	4.1
Civil servant	219	24.3
<b>Respondents Estimated Annual Household Income</b>		
<50,000	147	30.0
<100,000	89	18.2
<200,000	77	15.7
500,000-900,000	112	22.9
1,000,000 and above	65	13.3

The result in table 2 reveals that 10% of respondents were obese and almost one third reported engaging in some physical activities while 7% reported smoking cigarette. The lipid profiles shows that 3.5% had

derangement of all the cholesterol combined while 16% and 9% of women and men had deranged HDL respectively and 6.5% had deranged level of LDL.

**Table 2 Distribution of Some Cardiovascular Risk Factors among Study Respondents**

Variables	Frequency	Percentage
BMI ( $\geq 30$ )	92	10.2
Physical activity	314	34.8
Hypertension	212	23.6
Cigarette smoking	63	7.0
Alcohol consumption	53	5.9
Random Blood Sugar ( $>11.1$ mmol/l)	123	13.7
Total cholesterol: $\geq 200$ mg/dl (5.2mmol/l)	12	6
HDL $\leq 40$ mg/dl (1.03mmol/l) in men [N = 88]	14	15.9
HDL: $\leq 50$ mg/dl (1.3mmol/l) in women [N = 112]	10	8.9
LDL: $\geq 130$ mg/dl (3.3mmol/l)	13	6.5
Triglyceride: $\geq 150$ mg/dl (1.7mmol/l)	41	20.5
Deranged Total cholesterol, HDL, LDL and Triglyceride combined	7	3.5

*BMI= Body Mass Index; HDL= High Density Lipoprotein; LDL= Low Density Lipoprotein*

Table 3 results shows 7% of men were obese as compared to 13.6% of women while only one female reported smoking cigarette as against 62 male that smoke cigarette. Out of 12 respondents that had deranged total cholesterol, 7 were male while 5 females, and while 14 of the men had deranged HDL, 10 women's HDL was abnormally high. Only two of the men out 88 that had lipid profiling were found to have Dyslipidaemia as against five out 112 women.

Table 3 Disaggregation of Anthropometric and Metabolic Risk Factors by Gender of Respondents

Variables	Men (N = 481)		Women (N = 419)	
	Frequency	Percentage	Frequency	Percentage
BMI: $\geq 30$	35	7.3	57	13.6
Cigarette smoking	62	12.9	1	0.2
Alcohol consumption	47	9.8	6	1.4
Random Blood Sugar: 11.1 mmol/l	66	13.7	57	13.6
Hypertension (140/90mmHg)	125	25.4	87	20.8
Total cholesterol: $\geq 200$ mg/dl (5.2mmol/l)	7	7.9	5	4.5
LDL: $\geq 130$ mg/dl (3.3mmol/l)	5	5.7	8	7.1
HDL, Men: $\leq 40$ mg/dl (1.03mmol/l)	14	15.9	-	-
HDL, Women: $\leq 50$ mg/dl (1.3mmol/l)	-	-	10	8.9
Triglyceride: $\geq 150$ mg/dl (1.7mmol/l)	12	13.6	29	25.9
Deranged Total cholesterol, HDL, LDL and Triglyceride combined	2	2.3	5	4.5

Mmol/l= Millimoles per litre; mg/dl= milligram per deciliter

Table 4 results shows that about 5% young adult with age bracket between 20 to 24 smoke cigarette and 1% were found to be obese. Generally the cardiovascular risk factors are more prevalent among

elderly respondents aged 65 years and above. And also five of the elderly respondents were found to have Dyslipidaemia compared to two among two among the middle-aged respondents.

Table 4 Disaggregation of Anthropometric and Metabolic Risk Factors by Respondents Age

Age group	20-24 years (N = 208)		25-39 years (N = 311)		40-64 years (N = 350)		$\geq 65$ years (N = 33)	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Variables								
BMI $\geq 30$	3	1.4	18	5.8	59	16.9	12	36.4
Cigarette smoking	10	4.8	27	8.7	23	6.6	3	9.1
Alcohol consumption	0	0	18	5.8	30	8.6	5	15.2
RBS: $>11.1$ mmol/l	0	0	9	2.9	101	28.9	13	39.4
Hypertension:(140/90mmHg)	0	0	10	3.2	89	25.4	8	24.2
					N=167		N=33	
Total cholesterol: $\geq 200$ mg/dl	-	-	-	-	9	5.4	3	9.1
LDL: $\geq 130$ mg/dl	-	-	-	-	7	4.2	6	18.2
HDL, Men: $\leq 40$ mg/dl	-	-	-	-	6	3.6	8	24.2
HDL, Women: $\leq 50$ mg/dl	-	-	-	-	6	3.6	4	12.1
Triglyceride: $\geq 150$ mg/dl	-	-	-	-	13	7.8	28	84.8
Deranged Total cholesterol, HDL, LDL and Triglyceride combined	-	-	-	-	2	1.2	5	15.2

Freq = frequency; %= percentage

## DISCUSSION

Many of the developed nations had experienced epidemiological transition of diseases, however in Africa and Nigeria in particular what is obtainable is rising incidence of communicable diseases and rapidly emerging non-communicable diseases.

Rapidly changing life style and eating habit in order to align with western culture is probably most attributable reason for the emergence of non-communicable diseases in the country. This is characterized by fast growing joints and entries of fast food and increasing appetite for genetically

modified food and product everywhere in the cities and also consumed by rural communities. The tragedy of these double burden of communicable and non-communicable diseases is complete collapse of already over stretched and weaken health system and reduction in life expectancy.

The study reported the prevalence of hypertension of 23.6% but lower than that found in Port Harcourt, Nigeria where the prevalence was reported to be 40.8%,<sup>14</sup> and higher than 21% reported by a study in Oghara, Delta State, Nigeria.<sup>15</sup> There was an age-related increase in the prevalence of hypertension. This is not surprising as blood pressure tends to rise with age and hence the possibility of a greater burden of hypertension as people lives longer. The potential impact is the additional stretching health resources, which is already failing the utilization stress test. Similar studies have also documented a higher prevalence of hypertension with increasing age.<sup>16-18</sup> The prevalence of hypertension across the both sexes however showed little difference. The country's economy and health care system is greatly affected by the morbidity and mortality caused by hypertension and CVDs alone. It has therefore become absolutely necessary to reduce this burden and this can be achieved if its diagnosis is made early and prompt management instituted.

The prevalence of cigarette smoking in this study was 7%. This is far lower than that found in a rural community in Edo State and in Ogara, Delta State (both in Nigeria) where the prevalence was 16.8% and 15.8% respectively.<sup>15,19</sup> This prevalence can be attributed to modernization and westernization of our culture, where the western culture and style of living are copied and emulated regardless of its negative effect on health. The need therefore arises to reverse this ugly trend and unhealthy style of living in order to forestall these impending epidemics of NCDs. The prevalence of cigarette smoking increased with increasing age in this study and this has also been reported in other studies elsewhere.<sup>20-21</sup> More male respondents (13%) compared to the female respondents (0.2%) smoked cigarette. This could be attributed to the cultural and religious practice in the environment and women even if they smoked, would do so in hiding due to the stigma attached to

smoking being associated with promiscuity. Further studies that will involve taking blood sample for analysis of cotinine level will give a better picture of tobacco smoking prevalence.

Twelve percent of respondents in this study were found to be obese (BMI  $\geq$  30) with a higher rate in females (13.6%) than males (7.3%). This is in consonance with a study in Delta State and Ekiti State, Nigeria which found a prevalence of obesity to be 16.9% and 14.4%.<sup>15,22</sup> The finding also concurred with reports of several other studies.<sup>23-25</sup> The higher rate of obesity in females may be related to their life in this part of country as many are full house wife that encourage sedentary, while male are more involved physical activities arising from their farming activities and occupation.

Cigarette smoking of any amount, elevated blood pressure, elevated serum total cholesterol and low-density lipoprotein cholesterol (LDL-C), low serum high-density lipoprotein cholesterol (HDL-C), diabetes mellitus, and advancing age have been identified as the major and independent risk factors for Chronic Heart Diseases (CHD). The Framingham Heart Study and other studies have established the quantitative relationship between these risk factors and CHD risk.<sup>26</sup> Elevated blood pressure (to which 13 per cent of global deaths is attributed), is the leading cardiovascular diseases risk factor in terms of attributable deaths, followed by tobacco use (9 per cent), raised blood glucose (6 per cent), physical inactivity (6 per cent) and overweight and obesity (5 per cent).<sup>27</sup>

This study found prevalence of Dyslipidaemia among the study group of 3.5% and that of total cholesterol of 6%. This figure is low possibly reflecting the low level of cholesterol in diet of most the people and nature of our occupation such as farming and transport system that force resident to engage in physical activity most at times strenuous. In 2008, the global prevalence of raised total cholesterol among adults was 39 per cent (37 per cent for males and 40 per cent for females). The prevalence noticeably increases according to the income level of the country. In low-income countries, around 25 per cent of adults have raised total cholesterol, while in high-

income countries, over 50 per cent of adults have raised total cholesterol.<sup>27</sup>

## CONCLUSION

In conclusion, except for hypertension, obesity and physical inactivity, the low proportion of most of the cardiovascular risk factors such as smoking and dyslipidaemia was impressive. However, it is important to further emphasize the health benefits of reducing risk factors in an educational programme in this kind of community. The high prevalence of hypertension in this community is of concern, with possible sequel of stroke, cardiac arrest, and heart failure. Therefore, this report highlights an urgent need for preventive and control educational programmes in this community.

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