

ORIGINAL ARTICLE

Assessment of Cardiovascular Disease Awareness and Risk Factors in A Market Population in Nnewi, Nigeria

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ABSTRACT

The prevalence of cardiovascular disease risk factors is dramatically increasing in low and middle-income African countries-including Nigeria, particularly in urban areas with rates expected to rise considerably with time. Cardiovascular diseases (CVDs) are causes of worldwide preventable morbidity and mortality. Antecedents of cardiovascular disease, notably atherosclerosis, begin in early life, making primary prevention efforts necessary from childhood. A cross sectional descriptive study was carried out in ultra modern main market Nnewi, an urban community in South-Eastern Nigeria to assess cardiovascular disease awareness and risk factors in both male & females aged 30-70 years. A total of 200 individuals made up of 82 (82%) males and 18 (18%) females were recruited. The mean age of the subjects was 40.16±8.25 years. The Prevalence of different cardiovascular risk factor in the subjects were as follows: overweight 90 (45%), obesity 32 (16%), high blood pressure 92 (46%), tobacco use 22 (11%), history of Diabetes mellitus 16 (8%), family history of CVD 22 (11%), regular alcohol consumption 62 (31%), borderline high cholesterol 34 (17%) and high cholesterol 16 (8%). Serum triglycerides and total cholesterol showed significance between different age categories, being highest within 30-39 years age category ( $p < 0.05$ ). The study showed very low awareness (3%) of importance of lipid profile test among participants. Also there was a very poor attitude towards B.P check. Only 3% checked their BP weekly, 15% weekly, 3% twice yearly, and 79% do not check at all. This study shows appreciably cardiovascular risk among this population in addition to poor awareness towards risk factor assessment by participants. Proper education of this population will help reduce cardiovascular risk and the onset of cardiovascular disorders.

**KEY WORDS:** cardiovascular disease, cardiovascular disease risk factors, cardiovascular disease awareness, lipid profile, C-reactive protein, body mass index, blood pressure.

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INTRODUCTION

The cardiovascular system consists of the heart and blood vessels [1]. On the other hand, cardiovascular diseases are a group of diseases that affect the heart and blood vessels. In other words, cardiovascular diseases (CVDs) or heart disease refers to the following entities: Coronary artery disease (CAD), Cerebrovascular disease (CVD), Peripheral artery disease (PAD) and Aortic atherosclerosis [2]. Cardiovascular diseases which include coronary heart disease and stroke are the most common non-communicable diseases globally, responsible for an estimated 17.8 million deaths in 2017, of which more

than three quarters were in low-income and middle-income countries [3]. Cardiovascular diseases remain a major cause of morbidity and premature death throughout the world with the principal underlying pathology attributable to atherosclerosis and hypertension. Hypertension is the major risk factor for cardiovascular morbidity and mortality [4]; [5]. The relationship between blood pressure (BP) and risk of cardiovascular events is continuous, consistent and independent of other risk factors. The higher the blood pressure, the greater the chances of CVDs occurrence [5].

By the year 2030, the United Nations Sustainable Development Goals aim to reduce premature mortality from non-communicable diseases by a third [6] and cardiovascular diseases (CVDs) are number one leading cause of premature death worldwide. Cardiovascular diseases continues to ravage the world population despite the coordinated efforts been made by various world health authorities in curtailing the menace of CVDs. CVDs are the number one cause of death globally: more people die annually from CVDs than from any other cause. In 2016, an estimated 17.9 million people died from CVDs, representing 31% of all global deaths. Of these deaths, 85% are due to heart attack and stroke [7]. Also, In Nigeria, CVDs accounted for 11% of all deaths in 2018 [8]. Coronary artery disease and stroke account for 80 % of CVD death in males and 75 % of CVD deaths in females [9], and mortality rate seems to be higher in males than females of same age [10]. Notably, CVDs are precipitated by a number of risk factors classified as modifiable and non-modifiable risk factors. Modifiable risk factors are those behavioural risk factors such as unhealthy diet, physical inactivity, harmful use of alcohol and smoking which lead to effects such as increased blood pressure, increased blood sugar levels, increased blood lipid levels, overweight and obesity [8]. These factors are preventable by way of healthy diet, physical activity and controlled lifestyle [11]. Conversely non-modifiable risk factors refer to other risk factors which are not preventable and these include increasing age, male gender, family history and genetic disposition [12]; [13]. Therefore it has become incontrovertibly important that these risk factors be prevented, managed and controlled if the goal of reducing the morbidity and mortality accounted for by CVDs is anything to go by. This can only be achieved through proper evaluation, documentation, policy formulation and sensitization of the target population by way of public enlightenment programme. Evidence shows that incidence of cardiovascular disease is on the rise and with an associated poor survival outcome. Cardiovascular disease and death have increased at a fast rate in low and middle-income countries [14] and despite the increasing prevalence trend, the awareness of many people about their cardiovascular disease risk status is still low [15]. Based on this trend, there is need to assess risk factors which predispose to cardiovascular diseases among different population who may be at risk; and this can be used to predict risk of developing CVDs. Thus, in the present study we assessed the cardiovascular disease awareness and risk factors in a market population in Nnewi, Nigeria.

## **MATERIAL AND METHODS**

### **Research design**

This is a cross-sectional descriptive study devised to assess cardiovascular disease awareness and risk factors among a market based population in Nnewi, Anambra State.

**Study Area:** The location for this research was limited to the Ultra Modern Main Market Nnewi, Anambra State.

### **Study population**

The study population consists of two hundred (200) apparently healthy subjects who are motorcycle spare parts dealers at the Ultra modern main market, Nnewi. Subjects have been in business for a minimum of 5 years and are above 30 years of age.

### **Inclusion Criteria**

The study was delineated to subjects who are motorcycle spare parts dealers above 30years of age, and who have been in business for a minimum period of five years.

### **Exclusion criteria**

Subjects with known history of renal and hepatic failure, immune-compromised state or with known infection and those younger than 30years were excluded from the current study.

### **Ethical consideration**

The ethical approval for the study was obtained from College of Health Science, Nnamdi Azikiwe University Nnewi Campus Ethical committee. Informed consent was also obtained from the subjects prior to participation.

### **Data collection**

All measurements were conducted between 8:00 AM and 10:00 AM at designated market.

Questionnaires were administered to the subjects and data obtained included age, gender, family history of cardiovascular disease, history of Diabetes, physical activity, Alcohol intake, and smoking status.

### Anthropometrics measurements

Weight and height were measured in clothing without shoes and body mass index (BMI) was calculated as: BMI= weight (kg) / height (m<sup>2</sup>).

Height was obtained with a measuring tape attached to a wood while weight was by use of a manual weighing scale.

### Blood pressure reading

Systemic blood pressure was obtained using an OMRON automatic digital blood pressure monitor on the left arm after 10-minute rest using a cuff of appropriate size with the subject in the sitting position. Blood pressure was expressed as Systolic and Diastolic rate.

### Blood sampling

Five (5) ml of venous blood was collected by venipuncture after overnight fasting in all subjects for estimation of serum levels of total cholesterol, high density lipoprotein cholesterol (HDL-C), Low density lipoprotein cholesterol (LDL-C), triglycerides and C-reactive protein. Samples were allowed to clot and separation performed by centrifugation at 4000rpm for 10minutes.

### Definition of Risk Factors:

Hypertension was defined as systolic blood pressure  $\geq$  140mmHg and/or diastolic blood pressure  $\geq$  90mmHg or being on pharmacological treatment for hypertension.

Overweight and generalized obesity were defined as body mass index (BMI)  $\geq$  25 and 30 kg/m<sup>2</sup>, respectively. High cholesterol was defined as: 5.17- 6.18mmol/L for borderline high and  $\geq$ 6.21mmol/L for very high.

### Determination of C-reactive protein

The serum C-reactive protein was estimated by Enzyme Linked Immunosorbent Assay method using the C-reactive protein High Sensitive (hsCRP) ELISA kit obtained from AccuDiag Calabasas, USA by following strictly the manufacturer's instruction.

### Estimation of Biochemical parameters

Total cholesterol (TC), Triglyceride (TG), High density lipoprotein cholesterol (HDL-C) and Low density lipoprotein cholesterol (LDL-C) were determined using diagnostic sera kits by RANDOX Laboratories UK according to the enzymatic method as described by Ahaneku *et al.* [16].

### Statistical analysis

Data generated from the study was analyzed using Statistical Package for Social Sciences version 20. Results were expressed as mean values (standard deviation) and comparison for statistical significance was by student's *t*-test for continuous variables or Anova analysis for categorical variables. The level of significance level was set at  $P \leq 0.05$ .

## RESULT

A total of 200 individuals made up of 164 (82.0%) males and 36 (18%) females took part in the study. The mean values of characteristics of the population as well as comparison of cardiovascular risk factors in different age groups and among the different genders are as shown in tables 1 to 3.

**Table 1: MEAN $\pm$ SD comparison of cardiovascular risk factors between genders using the Students t-test**

Risk factor	Male (n=164)	female (n=36)	t-value	P -value
Age (years)	40.09 $\pm$ 8.77	40.50 $\pm$ 5.43	-0.192	0.848
BMI (kg/m <sup>2</sup> )	25.67 $\pm$ 5.43	27.56 $\pm$ 5.04	-1.776	0.079
SBP (mmHg)	134.44 $\pm$ 17.33	130.06 $\pm$ 15.96	-0.985	0.327
DBP (mmHg)	85.82 $\pm$ 17.55	89.22 $\pm$ 14.60	-0.766	0.445
TC (mmol/l)	4.61 $\pm$ 1.05	4.95 $\pm$ 0.86	-1.283	0.203
LDL-c (mmol/l)	2.67 $\pm$ 0.93	2.88 $\pm$ 0.89	-0.900	0.371
HDL-c (mmol/l)	1.19 $\pm$ 0.38	1.26 $\pm$ 0.25	-0.726	0.470
TG (mmol/l)	1.65 $\pm$ 0.85	1.73 $\pm$ 0.71	-0.376	0.707
CRP (mg/l)	0.41 $\pm$ 0.05	0.61 $\pm$ 0.05	-1.520	0.132

In Table 1, Risk factor association with gender was not statistically significant ( $P > 0.05$ ) for all of the risk factors evaluated.

**Table 2 MEAN±SD comparison of cardiovascular risk factors between age categories using ANOVA (n=200).**

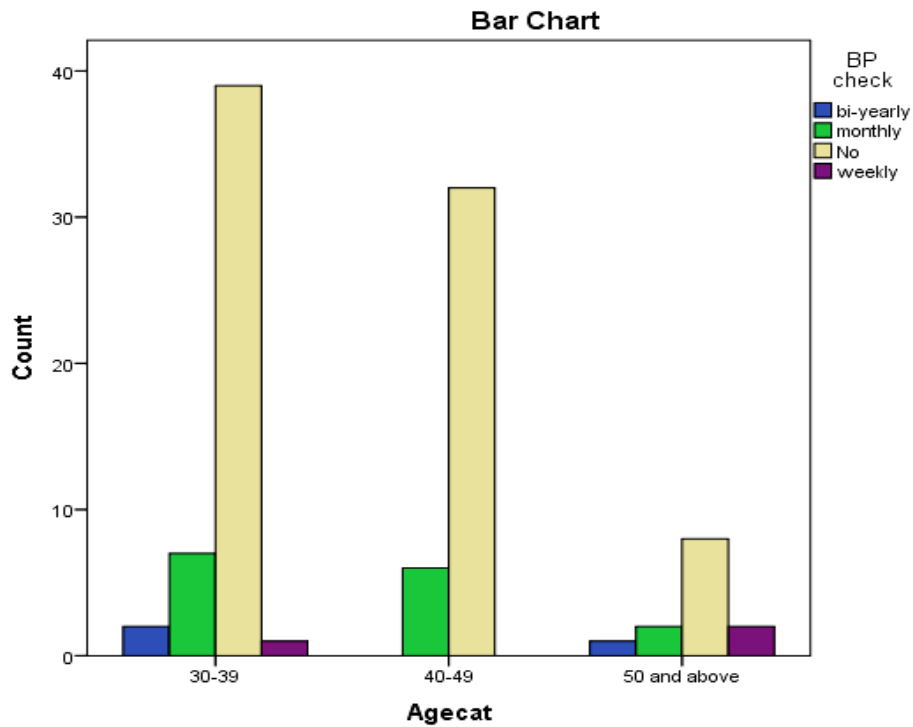
Variables	Age categories (years)			F-value	P-value
	30-39 N=98	40-49 N=76	≥50 N=26		
TC (mmol/l)	4.91±1.12	4.38±0.86	4.62±0.97	3.112	0.049*
HDL-c (mmol/l)	1.22±0.36	1.18±0.36	1.22±0.35	0.135	0.874
TG (mmol/l)	1.89±0.82	1.43±0.72	1.45±0.90	4.153	0.019*
LDL-c (mmol/l)	2.83±1.09	2.55±0.73	2.70±0.74	0.980	0.379
Diastolic BP (mmHg)	86.04±16.68	85.39±12.20	90.92±28.23	0.530	0.590
Systolic BP (mmHg)	132.12±16.35	132.82±11.13	141.85±29.62	1.761	0.177
BMI (kg/m <sup>2</sup> )	25.78±4.32	25.92±3.02	27.15±5.98	0.587	0.560

\*represents significance

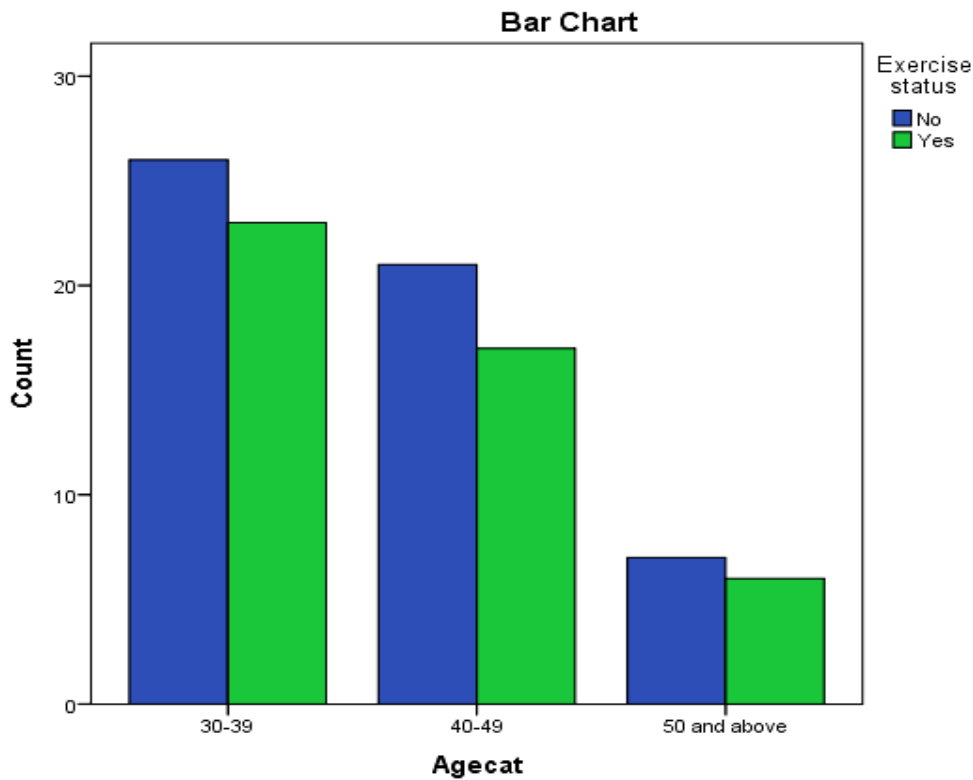
In Table 2, Risk factor comparison among various categories of age group was statistically significant for TC (P=0.049) and TG (P=0.019). BMI, SBP, DBP, LDL-c, HDL-c, and CRP did not show any significant trend within age groups (p>0.05).

**Table 3: Frequency table showing population characteristics**

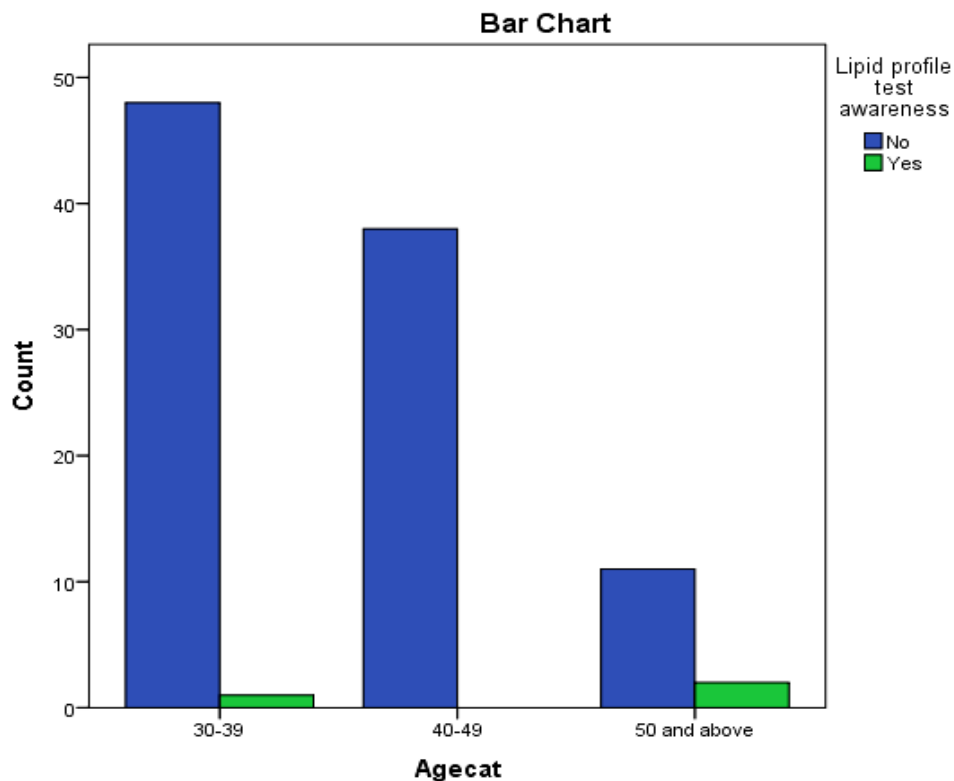
		Frequency	Percentage (%)
Normal		146	73
Total	High normal	38	19
Cholesterol	High	16	8
Tobacco	No	178	89
Intake	Yes	22	11
History of	No	178	89
Diabetes	Yes	16	8
Mellitus	Unknown	6	3
Alcohol	Regularly	62	31
Consumption	Occasionally	42	21
No		96	48
High dietary	No	24	12
Fat consumption	Yes	176	88
Overweight		90	45
BMI	Obese	32	16
Normal		78	39
Family history	No	164	82
of CVD	No idea	14	7
Yes		22	11
Normal		106	53
BP		92	46
high		2	1
Low			



**Figure1:** Pattern of Blood pressure (BP) check among the various age categories of participants  
 Frequency of blood pressure check among the various age categories were generally poor with the first category recording minimal frequency value, second category recording minimal frequency value and the third category also recording minimal frequency value.



**Figure 2:** Frequency of exercise among various age categories of the participant  
 Frequency of exercising and non-exercising participants among the various age categories differs. The value obtained for non-exercising participants seems good.



**Figure 3:** Awareness of lipid profile and other related tests among the various age categories of the participants

Awareness of lipid profile test among the various age categories were poor with the first category recording minimal frequency value, second category recording no frequency value and the third category recording minimal frequency value as well.

## DISCUSSION

Cardiovascular disease remains a principal contributor to the death rate globally and more especially in the developing countries such as Nigeria perhaps owing to the increasing rate of sedentary life style, and consumption of junk foods. This study was undertaken to evaluate cardiovascular disease awareness and risk factors among an urban based market population aged between 30 to 70 years in Nnewi, Anambra state, south-eastern Nigeria.

The gender bias in favour of males in this particular study can be explained by the nature of the business activities in the study area which is dominated by males. Also the bias can be explained by the unresponsiveness and un-cooperating attitude of majority of female within the study area.

Among these subjects, the incidence of hypertension and overweight was more prevalent whereas hypercholesterolaemia was still relatively low.

Overweight was a common risk factor in this study as shown in table 3. About 45% of the population had BMI values above 24kg/m<sup>2</sup>. This may be as a result of over indulgence in alcohol intake, high dietary fat consumption and inadequate physical inactivity as subjects are seated for long hours during trading hours especially when customers are not forthcoming. Obesity and overweight are characterized by too much body fat especially around the waist. Excess weight increases strain on the heart, blood pressure, cholesterol, and triglycerides all of which are capable of causing heart disease. Obesity accounted for 16% in the present study which is very close to the value reported earlier by Ngwogu *et al.* in apparently healthy adults living in Aba, Abia State, Nigeria [17]. It is however lower than some values documented by some previous studies [18] but some other researchers reported slightly higher values than in the present study [19].

Majority (73%) of subjects within the study group have normal total cholesterol level while the minority with values at borderline high (19%) and high (8%) are at greater risk of cardiovascular disease. Low incidence of high total cholesterol may be explained by the high cutoff ( $\geq 6.21$  mmol/l) used to define high total cholesterol when compared to other studies carried out on prevalence of cardiovascular disease risk

factor in Nigeria [20-21]. Application of cutoff greater than >5.2mmol/l would have given a prevalence of 27% in contrast to the 8% obtained with the cutoff adopted. Cholesterol is atherogenic, hence are capable of inducing plaque formation within medium and large sized arteries leading to occlusion of the supply of oxygenated blood to the heart with a resultant cardiac muscle ischemia.

Comparison of risk factors among different age categories was only statistically significant for total cholesterol and triglycerides. Total cholesterol and triglycerides showed significant difference between the 30-39 and 40-49 age groups, being higher in participants within 30-39 years age group which may be explained by regular alcohol consumption (31% of population) and higher fat consumption among this group relative to others.

High blood pressure was high in this study with 46% of the subjects having values above normal (Table 3). This may be masked however if one goes by the mean values of the blood pressure variables which were all within normal limits. This may be explained by the cutoff used to define hypertension. In episodes of high blood pressure, there is a high pressure within the arteries. As the heart tries to pump against this pressure, its work rate increases and over time this causes the heart muscle and arterial wall to thicken with a consequent reduction in oxygen supply to the heart predisposing to heart diseases.

About 31% of the populations were regular alcohol consumers. Incidence of history of diabetes mellitus was recorded in 8% of the population. Incidence of family history of CVD and tobacco use was of 11% among the study population. Subject under these categories possess a greater risk of cardiovascular disease.

Significant difference was not observed in the association of cardiovascular disease risk factors with gender (Table 1). This finding in this study is in contrast with other studies carried out in urban regions in Nigeria [18]. This may be due to the gender bias in this study.

High dietary fat consumption was recorded in this study group with majority (88%) of the study subjects having their usual daily diet as 'Ofekwu' and fried plantain which may be a contributing factor in subject's overweight and obese state.

Despite the increasing prevalence trend, the awareness of many people about their cardiovascular risk status is still low [15]. The level of subjects' awareness of their cardiovascular health status in this study is quite low compared with some studies elsewhere [22]. This is very worrisome. The knowledge of the subjects is clearly demonstrated by poor awareness of lipid profile test and reduced frequency of blood pressure check (Table 3).

## CONCLUSION AND RECOMMENDATION

Lifestyle pattern and nature of work has significant contribution to the risk of developing heart diseases. Lipid profile test awareness and blood pressure check is poor. The consequences of these risk factors in the face of low awareness call for more public health awareness campaigns to educate the general public especially those who may be prone to cardiovascular disease either by virtue of lifestyle, age, gender or family history of cardiovascular disease. Emphasis of awareness campaign should be on education about cardiovascular disease, its risk factors, regular lipid profile test, as well as lifestyle modifications.

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