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# Prevalence of Coronary Heart Diseases Risk Factors in Adults Population Living in Nigeria's Largest Urban City

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## Abstract

Coronary Heart Disease (CHD) remains a major cause of morbidity and a leading contributor to mortality worldwide. This study was conducted to determine the prevalence of risk factors of CHD in apparently healthy adult's population living in Nigeria's largest urban city. Five hundred subjects were selected using systematic sampling technique. Data were collected using a pre-tested, semi-structured questionnaire to obtain information on socio-demographic characteristics, lifestyle, physical activities and other risk factors. Anthropometric measurements were made using standard procedures, while food intake data was collected using 24-hr dietary recall. Blood samples of the selected healthy subjects were analyzed for haematological indices. Data were analyzed using Pearson Product Moment Correlation to establish relationships among variables. Logit model was used in predicting major risk factors for CHD. The results showed that prevalence of overweight among urban and rural subjects was 37.6% and 26.8%, respectively while 28.4% of urban and 17.2% of rural subjects had waist-hip ratio indicating high risk of heart disease. Sixty-eight percent of urban subjects and 52% of rural had energy intake above 75% Recommended Dietary Allowance (RDA), while 80% urban and 68% rural subjects met above 75% RDA for protein. Total Cholesterol (TC) was above 240 mg/dl in 28% and 20% of urban and rural subjects, respectively. Triglycerides (TG) was >200 mg/dl in 36% of urban and 28% rural healthy subjects. Low density lipoprotein (LDL) (>l60 m g/dl) was similar in 20% of rural and urban subjects. High density lipoprotein (HDL) was <40 mg/dl in 16% and 20% of urban and rural subjects respectively. There was positive relationship between blood pressure and nature of job ($r = 0.033$, $p<0.0l$), blood pressure and age ($r =0.122$; $p<0.0l$), blood pressure and alcohol consumption ($r = 0.021$, $p<0.05$). Logit model used in predicting the probability of developing CHD showed that it is possible to predict to about 49% accuracy the probability of individuals developing CHD. This study has established high blood pressure, tobacco smoking, high lipid profile, physical Inactivity, obesity and diabetes as prevalent risk factors of CHD in healthy adults in Nigeria.

**Keywords:** Coronary heart diseases; Healthy; Risk factors; Nigeria

## Introduction

Coronary Heart Disease (CHD) remains a major cause of morbidity and a leading contributor to mortality worldwide. The World Health Report [1] estimated that in 1998, 78% of the burden of non-communicable diseases (NCDs) and 85% of the CHD burden emanated from the low and middle income countries. This CHD burden afflicts both men and women, with CHD deaths accounting for 34% of all deaths in women and 28% in men in 1998. Nigeria has witnessed tremendous socio-economic changes and rural-urban migration which have led to emergence of non-communicable diseases [2]. The nature of the illnesses that beset the Nigerian population has in recent years undergone a transition from predominance of infectious diseases to the present dominance of degenerative diseases [3]. CHD and other Cardio-Vascular Diseases (CVD) were virtually unknown in Black people in Africa, and prevalence of risk factors was low. Reports from several studies indicate that the incidence of CHD is increasing in various parts of Africa [4,5]. This increase in hospital reported cases may be partly due to increased awareness of the disease [6,7]. Experience from comparative studies in America shows that blacks manifest CHD risk factors more than whites [5]. Observations from India have also reported a high prevalence of CHD among Indians living in the rural areas [8]. Hypertension studies in Kenya by Trowel et al. [9] and Poulter et al. [10] also showed rapid increase in risk factors including hypertension when rural Kenyans migrated to urban settings. A survey among the rural and sub-urban population in the south western part of Nigeria revealed that although the prevalence of most of the individual risk factor was low, there was high prevalence of multiple risk factors which was as high as 20% [11]. Another study on prevalence of risk factors of CHD among the rural Nigerian population indicated that the prevalence of diabetes seemed to be on the increase even among rural dwellers, hypertension and obesity varied from one rural community to the other while a high prevalence of hypertension (30%) and obesity were reported from southern Nigeria [12]. There have been series of campaigns on the risk of developing CHD but despite this, the death toll from CHD continues to increase. Based on this, the study is aimed at assessing the prevalence of risk factors of CHD in apparently healthy adult's population living in Nigeria's largest urban city.

## Subjects and Methods

### Survey area

Lagos State which is the Nigeria's largest urban city and is also the administrative division of Nigeria is located in the south-western part of the country. The smallest in area of Nigeria's states, Lagos State is the second most populous state and arguably the most economically important state of the country.

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## Subjects

The subjects for the study were members of the public and apparently healthy (asymptomatic), that is had no physical disability and believed to be in a good state of health and between the ages of 30-59 years.

## Sample size

The sampling frame covers members of the public in four local governments were randomly selected for the study. The sample size was calculated using the formula:

$$n = \frac{t^2 \times p(1-p)}{m^2}$$

Where n = the minimum sample size

t = 1.96 Confidence interval

P= 20% of all form of coronary heart related diseases

m = level of precision (5%)

n = 246

5% was added for contingencies = 248

The minimum number of subjects required for this work was calculated to be 248 but the number was increased to 500 apparently healthy individuals.

## Sampling procedure

The twenty local government areas in Lagos state are stratified into urban and rural. Two local governments were randomly selected from the urban (Ikeja and Mushin) and two from the rural (Alimosho and Ojo) local government. Purposive sampling method was used to select 50% of the wards in each local government considering the population of each local government. Since total of 500 apparently healthy subjects were to be considered, systematic random sampling was used to select 33 households in each wards and for a household to be eligible, a subject must be between 30-59 years and apparently healthy but where many subjects were eligible in a house, simple random sampling was used to select the subject after adequate information and consent of each household and participant was sought.

## Method of data collection

The data was collected using a structured sectionalized questionnaire. The questionnaire has information on personal data, demographic data, anthropometric measurements, blood pressure measurements, dietary assessment (24-hour dietary recall and food frequency). The following blood tests were carried out, determination of total plasma cholesterol, determination of total plasma triacylglycerols, determination of HDL cholesterol, and estimation of LDL cholesterol.

## Data analysis

Descriptive statistics such as mean, frequency and percentages as well as charts were used to describe and summarize the data from the socio-economic characteristics of the subjects. It was also used to describe the health behaviour and habits of both the apparently healthy subjects and patients. Pearson Product Moment Correlation (PPMC) was also used to test for significant relationship between nutritional status and the CHD risk factors as well as the lipid profile and the risk factors. The significance was tested at 5% and 1% probability level.

## Results

Socio-economic and demographic characteristics of the respondents are presented in Table 1. The highest percentage of respondents (60.8%) was within the age range of 30-40 years, 27.6% were within 41-50 years while 11.6% were within 51-59years. Sixty percent (60.0%) of the respondents were male and 40.0% were females. The percentage of the respondents with post secondary education was 53.4% while those with secondary education and primary education were 32.8% and 12.2%, respectively. Almost half of the respondents (49.0%) were civil servant and 38.2% engaged in trading while 12.8% were artisan. Two third of the respondents (66.0%) earned less than ₦100, 000 as monthly income and 19.6% earns between ₦100, 000 and ₦199, 000 monthly income.

Table 2 shows the nutritional knowledge of respondents towards salt consumption. Majority of the respondents were aware of the association of salt consumption to heart conditions while 19.8% were of the opinion that salt consumption do not affect the functioning of the heart. Majority of the respondents were aware of any heart disease related to sugar consumption while 24.2% were not aware of any heart disease related to sugar consumption. Respondents were aware of the possible harmful effects of excessive sugar consumption, related it to diabetes.

Table 3 shows the relationship between anthropometric, biochemical parameters and some selected cardiovascular risk factors among subjects. Age correlated negatively with BMI in both sexes and also BMI and alcohol consumption in both subjects were negatively correlated. BMI and cigarette smoking were negatively correlated for both sexes while waist/hip ratio was positively correlated with BMI in women only. The diastolic and systolic values show a positive

| Variable | Frequency | Percentage (%) |
|---|---|---|
| **Age-distribution** | | |
| 30 – 40 | 304 | 60.8 |
| 41 – 50 | 138 | 27.6 |
| 51 – 60 | 58 | 11.6 |
| **Total** | 500 | 100.0 |
| **Sex of the subjects** | | |
| Male | 300 | 60.0 |
| Female | 200 | 40.0 |
| **Total** | 500 | 100.0 |
| **Educational status** | | |
| No education | 2 | 1.6 |
| Primary education | 61 | 12.2 |
| Secondary education | 164 | 32.8 |
| Post secondary | 267 | 53.4 |
| **Total** | 500 | 100.0 |
| **Occupation** | | |
| Trading | 191 | 38.2 |
| Civil servant | 245 | 49.0 |
| Artisan | 64 | 12.8 |
| **Total** | 500 | 100.0 |
| **Subject's monthly income (₦)** | | |
| < 100,000 | 330 | 66.0 |
| 100,000 – 199,000 | 98 | 19.6 |
| 200,000 – 299,000 | 43 | 8.6 |
| 300,000 – 399,000 | 12 | 2.4 |
| 400,000 above | 17 | 3.4 |
| **Total** | 500 | 100.0 |

**Table 1:** Socio-demographic characteristics of the healthy subjects.

| Question | Frequency | Percentages (%) |
|---|---|---|
| **Relationship of heart disease and salt consumption** | | |
| Yes | 288 | 57.6 |
| No | 99 | 19.8 |
| Unsure | 113 | 22.6 |
| **Total** | 500 | 100.0 |
| **Heart disease related to sugar consumption** | | |
| Yes | 301 | 60.2 |
| No | 121 | 24.2 |
| Unsure | 78 | 15.6 |
| **Total** | 500 | 100.0 |
| **Type of Disease** | | |
| Diabetes | 280 | 56.0 |
| Obesity | 21 | 4.2 |
| None | 199 | 39.8 |
| **Total** | 500 | 100.0 |
| **Alcohol consumption/day** | | |
| Once | 91 | 18.2 |
| Twice | 45 | 9.0 |
| Thrice | 26 | 5.2 |
| >3times | 1 | 0.6 |
| None | 335 | 67.0 |
| **Total** | 500 | 100.0 |
| **Alcohol Type** | | |
| Cigar | 13 | 3.6 |
| Pipe | 6 | 1.2 |
| None | 372 | 74.4 |
| **Total** | 500 | 100.0 |
| **Number of cigarettes/day** | | |
| 1 -3 sticks | 60 | 12.0 |
| 4 – 6 sticks | 54 | 10.8 |
| >6 sticks | 14 | 2.8 |
| None smokers | 372 | 74.4 |
| **Total** | 500 | 100.0 |
| **Commencement of smoking** | | |
| 1-4yrs | 53 | 10.6 |
| 5-8yrs | 59 | 11.8 |
| >8yrs | 16 | 3.2 |
| None smokers | 372 | 74.4 |
| **Total** | 500 | 100.0 |

**Table 2:** Awareness of respondents on risk factors of CHD.

relationship with BMI for both sexes. It also shows that systolic blood pressure has a lot to do with age, and alcohol consumption because they are positively related among the subjects. Total Cholesterol (TC) and cigarette smoking were negatively correlated in both sexes but diastolic blood pressure and cigarette smoking were positively correlated in male subjects. Table 4 shows the results of the logic regression fitted to explain the factors that influences the development of CHD conditions. The factors that significantly influence the development of CHD condition were alcohol intake, physical activity, BMI, systolic blood pressure and the ratio of BMI to BSI.

## Discussion

The burden of coronary heart disease (CHD) in the world is enormous and growing, and the majority of those affected are in developing countries [13]. In 2002 it was estimated that 29 percent of deaths worldwide (16.7 million deaths) were due to CHD and that 43 percent of global morbidity and mortality, measured in disability-adjusted life years (DALYs), and was caused by CHD [14]. The present study was carried out to determine the prevalence of selected risk factors of coronary heart diseases in healthy individuals (30-59 years). Socio-demographic information collected on the respondents revealed that majority of respondents had risk factors of heart diseases, with larger number within the age range 30-40 years who constitute the major working force of the country. This call for proper nutrition education as this is also the productive age of the population of any nation. In Nigeria, CVD is causing hundreds of thousands of deaths each year in young people of productive age. This is far greater than has previously been understood, disrupting families and the work force in many developing countries. The high proportion of the respondents that earned less than hundred thousand naira ($63) in a month suggests low standard of living in the study area which may therefore be expected to affect their nutritional status. Studies have shown associated low economic status with heart disease [15]. A recent UC Davies study reported that people with lower socioeconomic status are much more likely to develop heart disease than those who are wealthier or better educated. It was concluded in this study that people with lower socioeconomic status had a 50 percent greater risk of developing heart disease than other study participants, the reason is often attributed to reduced health-care access or poor adherence to treatments such as smoking cessation or medication. Previous studies could help explain the link between low socioeconomic status and increased heart-disease risk. Social disadvantages and adversity in childhood may result

| Parameter | Correlation coefficient (r) | |
|---|---|---|
| | Male | Female |
| BMI and Age | 0.006** | 0.154** |
| BMI and Quantity of alcohol consumed | 0.017** | 0.032* |
| BMI and Smoking | -0.024* | -0.032* |
| BMI and Waist/Hip ratio | 0.109** | 0.136* |
| BMI and Systolic | 0.024* | 0.345* |
| BMI and Diastolic | 0.122* | 0.213* |
| Systolic and Nature of job | 0.033* | 0.543 |
| Systolic and Quantity of alcohol consumed | 0.021* | 0.156* |
| Total Cholesterol and Smoking | -0.103** | 0.423 |
| Total Cholesterol and BMI | 0.023** | 0.123* |
| Total Cholesterol and Processed and fast food | 0.211** | 0.003** |
| Diastolic and Smoking | 0.183** | 0.127** |
| Total cholesterol and Smoking | -0.074** | -0.056** |

**p<0.01 *P<0.05

**Table 3:** Correlation between Anthropometric, Biochemical parameters and some selected cardiovascular risk factors established among respondents.

| Variables | Coefficient | Sign |
|---|---|---|
| Constant | 1.939 | 0.637 |
| Sex | 0.026 | 0.934 |
| Alcohol | 0.587 | 0.053** |
| Physical activity | -0.021 | 0.014** |
| Age | 0.004 | 0.822 |
| BMI | 0.014 | 0.015** |
| BSI | 1.225 | 0.799 |
| Systolic | 0.021 | 0.010** |
| Diastolic | 0.015 | 0.268 |
| BMI/BSI | 0.014 | 0.014** |
| Smoke | 0.048 | 0.862 |

Cox and Snell's $R^2$ = 0.494

**Table 4:** Effects of some risk factors on CHD.

in lasting adaptations to stress that take a bigger toll on the heart. Cumulative effects of social disadvantage throughout the lifespan could also cause more "wear and tear" on the cardiovascular system. Our study also shows that majority of the respondents in the rural areas were traders (51.2%) but the majority of urban respondents were civil servants. Expectantly the nature of the respondents' job should have a lot of implication on the educational level of the respondents. Indeed this study shows that majority of the traders were primary school certificate holders (54.2%) while most of the civil servants in urban LGA had further education. This might affect their choice of food because nutrition education is believed to have a lot to do with formal education [15].

The findings revealed that majority of the respondents in both urban and rural LGAs know that salt consumption is related to heart diseases with more of the subjects believing that hypertension is the consequence of too much salt consumption [16]. According to a report, raised blood pressure is a major cause of cardiovascular disease, responsible for 62% of stroke and 49% of coronary heart disease. Importantly, the risk is not limited to those with hypertension (i.e. systolic BP ≥140 or diastolic ≥90 mmHg), but throughout the range of blood pressure, starting at 115/75 mmHg. It has been shown by Conlin et al., [17,18] that a high salt intake, a low consumption of fruits and vegetables (i.e. low potassium intake), obesity, excess alcohol intake, and lack of physical exercise all contribute to the development of high blood pressure. However, the diversity and strength of the evidence is much greater for salt than for other factors. The evidence for salt comes from studies in animals, human genetics, epidemiology, migration, population-based intervention, and treatment trials. These studies have consistently shown that dietary salt intake is a major cause of raised blood pressure [16].

The study revealed that after the establishment of heart disease in the subjects, some of them continued smoking and drinking alcohol. It shows that 26% and 20% of urban and rural respondents still engages in drinking of alcohol while 14% and 24% of the respondents in urban and rural LGAs smoke cigarette. However, out of all the subjects that continue drinking alcohol, 6.2% and 5.3% were female subjects in both urban and rural LGAs. Also 1.4% and 3.2% female subjects in urban and rural LGAs respectively still smoked. Research has shown conclusively that smoking accelerates arteriosclerosis (hardening of the arteries) and atherosclerosis (a type of arteriosclerosis characterized by fatty deposits in the artery walls), increasing the risk of heart disease, stroke, and peripheral vascular disease [19]. Consequently, smokers have a higher risk of cardiovascular disease in general, and heart attacks in particular, than non-smokers. Cigarettes may promote atherosclerosis by a variety of mechanisms. Smoking increases the levels of carbon monoxide, a poisonous gas that is inhaled in smoke. Over the long term, this increased level of carbon monoxide from the inhaled smoke itself contributes to damaging the lining of the blood vessels and accelerates the process of atherosclerosis [20]. Smoking also affects serum cholesterol. Smokers tend to have decreased levels of high-density lipoproteins (HDL-the "good cholesterol) and increased levels of low-density lipoproteins (LDL-the "bad' cholesterol) and triglycerides (a blood fat), thereby raising the risk and severity of atherosclerosis [20]. According to a report by Heart and Stroke Foundation, smoking contributes to more than 37,000 deaths a year in Canada, of which almost 11,000 are heart disease and stroke-related (29% of all smoking-related deaths are heart disease and stroke-related). After smoking, excess alcohol consumption is the second most common cause of preventable death [21-24]. Alcohol is toxic to virtually every organ in the human body, but when consumed in moderate amounts, it is detoxified by the liver and does little or no harm. Alcoholic beverages contain ethyl alcohol (ethanol), which is metabolized in the body to acetaldehyde. In large amounts, both ethanol and acetaldehyde interfere with normal functions of organs throughout the body, including the heart [20].

Our study shows that majority of risk factors have a strong relationship with the anthropometric indices that help in determining the individuals that are at the risk of CHD. Positive relationships exist between CHD and BMI which implies that increase in body mass index increases the risks of developing CHD. The relationship between CHD and systolic blood pressure was positive which means that the higher the systolic blood pressure, the higher the risk of developing CHD risk. The BMI/BSI ratio was positively correlated with CHD. That is, the higher the ratio, the higher the probability of developing CHD condition. The higher the BMI relative to the BSI, the greater the risk of developing CHD. The implications of all the correlations, is to attempt to establish relationship of some of these risk factors in a way that can be utilized for predicting heart disease.

The factors that significantly influence the development of CHD condition were alcohol intake, physical activity, BMI, Systolic blood pressure and the ratio of BMI to BSI. The relationship between CHD and physical activity was negative, which means as physical activity increases (a less sedentary lifestyle) the probability of developing CHD reduces.

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