

Cardiovascular risk factors and non-communicable diseases in Abia state, Nigeria: report of a community-based survey

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ABSTRACT

Background: There is limited population based data on the prevalence of cardiovascular risk factors and non-communicable diseases in Nigeria, and Abia state in particular. **Aims:** The purpose of this survey was to determine the burden of non-communicable diseases as well as associated cardiovascular risk factors in the state using the World Health Organization steps approach. It is believed that information obtained will provide the basis for policies, plans and programs as well as evolve strategies in designing, implementing and evaluation of appropriate interventions that are geared towards controlling them. **Methods:** The house to house survey was conducted in randomly selected communities in Abia State of Nigeria. Respondents had their biophysical parameters measured: weight, height, waist circumference, hip circumference, pulse rate blood pressure and some biochemical parameters. **Results:** Women constituted 52.1% of the 2999 participants. The mean age of the participants was 41.7±18.5 years. Three hundred and eighty seven respondents had ever smoked cigarette, 373 men (96.4%) and 14 women (3.6%). Many of the respondents (65.5%) were engaged in work involving sedentary activity. Over eighty percent of the study populations were aware of cancer. Hypertension was present in 31.8% and diabetes mellitus in 3.6%. Obesity was present in 13.8% while low high density lipoprotein-cholesterol was detected in 54.1%. **Conclusions:** A suggestion is made for the establishment and strengthening of non-communicable diseases surveillance systems in the state. Surveillance of non-communicable diseases and associated risk factors using the World Health Organization stepwise surveillance for non-communicable diseases should be ongoing in the state and should be conducted every two years.

Key words: Cardiovascular risk factors, non-communicable disease, hypertension, cholesterol, Abia, Nigeria

INTRODUCTION

Non-communicable diseases (NCDs) are responsible for 60% of all deaths worldwide.^[1] This is so especially in

developing countries NCDs are rapidly emerging with attendant health, social and economic consequences. The major chronic diseases that are attributable to the common risk factors include heart disease, diabetes

mellitus, stroke, cancer and chronic respiratory disease.^[2,3] In 2005 chronic NCDs accounted for 60% of all global mortality and 47% of global morbidity. It is projected that by 2020, these figures will rise to 73% and 60% respectively. Currently 80% of chronic diseases are now occurring in developing economies.^[2,4]

The key to controlling the rising prevalence of NCDs in the world is primary prevention through comprehensive population based programs. To do this identification of major risk factors as well as their prevention and control is imperative.^[1,5]

The changing pattern of disease is already occurring in Nigeria. Recent hospital based reports indicate that NCDs have overtaken communicable diseases as a cause of medical admissions at least in urban areas.^[6,7] Despite the increasing prevalence of risk factors for NCDs, most developing countries including Nigeria do not have current and reliable population based data on the burden of these risk factors to guide programs targeted at control. The last survey on NCDs in Nigeria was in 1997 (15 years ago) and since then little attempt has been made as a form of follow up survey to determine the trends in NCDs and associated risk factors in the country.^[8] In addition, Abia State was not included in the 1997 national survey.

The aim of this survey was, therefore to determine the burden of NCDs as well as associated cardiovascular risk factors in the state using the WHO steps approach. It is believed that information obtained will provide the basis for policies, plans and programs as well as evolve strategies in designing, implementing and evaluation of appropriate interventions that are geared towards controlling them.

METHODOLOGY

Study area

The house to house survey was conducted in randomly selected communities in Abia State of Nigeria. Abia is one of the 36 states in Nigeria with an estimated population of 3,152,691 inhabitants and located in the South Eastern part of the country. (Figure 1)The state is divided into three senatorial zones and 17 local government areas and has 291 political wards. It is largely inhabited by Igbo people (one of the three major ethnic groups in Nigeria). The state's economy depends mainly on agriculture and

commerce; the later contributing about 27% to the state's gross domestic product. In terms of health facilities it has 517 public primary healthcare centres, 17 public secondary healthcare facilities, two public tertiary healthcare centres and two diagnostics centres. This is complimented by many privately owned primary and secondary healthcare facilities.

Target population

These were adult men and women aged 18 years and above who are resident in the state. Pregnant women, temporary visitors to the state and those who refused consent were excluded from the study.

Study design

The study was cross-sectional in design.

Sample size

The calculated minimum sample size was 2,880 using the appropriate sample size formula.^[9] The minimum sample size made allowance for design effect, age-sex estimates as well as non response rate.

Sampling technique

A multistage stratified cluster sampling technique was used to select the study participants. The state is traditionally divided into three senatorial zones: Abia North, Abia Central and Abia South. From each senatorial zone, one rural and one urban LGA were randomly selected. They were Ohafia and Isuikwuato/Bende for Abia North, Umuahia North and Ikwuano for Abia Central and Aba South and Ukwu East for Abia South Senatorial Zones.

In each of the LGAs, four Enumeration Areas (EAs) were randomly selected from the listing of all the EAs. Households in these EAs were further listed and eligible participants were selected. The selection was such that not more than two eligible participants of either sex were selected from each household. Using the EA map and starting from prominent landmark, trained interviewers proceeded from household to household; interviewing eligible listed respondents until a minimum of 120 respondents were interviewed.

Data collection

Questionnaire

A modified WHO-STEPs questionnaire was used for data collection. These were administered by a team of trained health workers comprising of six interviewers and a supervisor. The supervisors were public

health physicians, cardiologist and nephrologist. Information collected included socio-demographic parameters such as gender, age, use of alcohol and tobacco and dietary information on consumption of salt fruits and vegetable. Other data recorded includes personal history and family history of chronic NCDs such as hypertension, diabetes, cancer and asthma and awareness of common NCDs and physical activity.

Anthropometry and blood pressure measurement

Weight was measured with a pre-calibrated weighing scale with measurements recorded to the nearest 0.1kg. Heights were measured with a stadiometer to the nearest 0.1cm. The waist circumference was determined using a tape measure. The mid axillary line midway between the last rib and the superior iliac crest was used as the reference point. Measurement was taken to the nearest 0.1cm. Hip circumference was measured at the point of maximum circumference over the buttocks. Blood pressure was determined with Omron Digital Blood Pressure machine which was battery powered. This was after 5 minutes of rest and the legs uncrossed. Three blood pressure reading at interval were taken but the average of the second and third readings were used for analysis.

Definitions of terms

The definition of the terms used for this study is as contained in Table 1.

Ethics approval

The ethics approval was obtained from the Abia State Ministry of Health research ethics committee. Approval was obtained from the community leaders prior to the study and all the respondents gave informed consent.

Statistical analysis

Data obtained were entered using Epi-Data Software Version 3.1 (Epi-Data Association Odense, Denmark), while analysis was done using SPSS Version 17.0 (SPSS Inc, Chicago Illinois, USA). Relevant means and standard deviation were calculated for continuous variables. Findings were presented using relevant frequency tables and appropriate charts.

RESULTS

A total of 2999 respondents participated in the study. Figure 2 shows the flow chart of the study. Recruitment from the three

traditional zone of the state are as follows: Abia North 956(31.9%), Abia Central 1083(36.1%) and Abia South 960(32.0%). The respondents were evenly distributed in all the urban and rural LGAs.

Socio-demographic characteristics

The socio-demographic characteristics of the subjects are shown in table 1. Women constituted 52.1% and the mean age of the entire population was 41.7±18.5 years with majority in the 20-29 years age group. Fifty eight percent were married, 99% were Christians, 9.4% had no formal education and great majority were Ibos. Many of the respondents belong to the following occupational groups: artisans (19.9%), traders (16.2%), apprentice/student's (13.7%) and farmers (13.6%). Fifteen percent of the subjects were unemployed. In terms of housing the common types of residence were bungalow (34.4%) and single/double apartment. Many do not own means of mobility of their own (78.5%). The current places of domicile of the respondents were equally distributed. Forty percent have lived continuously in the urban area in the last 5 years compared to 49% in the rural area. Ten percent had lived in both areas during the same period (Tables 2, 3).

Cardiovascular risk factors

Awareness of cancer

Over eighty percent of our populations are aware of cancer and 25% had ever lost a relative or friend to cancer such as cancer of the breast (75.2%), cervix (3.2%) and prostate (3.0%) (Table 4).

Tobacco use

Three hundred and eighty seven respondents had ever smoked cigarette, 373 men (96.4%) and 14 women (3.6%). One hundred and eighty seven were current smokers, 178 men (95.2%) and women (4.8%). Majority (97, 84.4%) started smoking before the age of 30 years. The mean duration of smoking was 13.9±12.0 years. The major sources of information on smoking include radio adverts, radio/television programs and from cigarette packs. Many of the respondents were exposed to passive smoking (Table 5).

Alcohol use

Out of the 2,978 subjects who responded to the question on alcohol, 55.8% had ever used alcohol, 84.2% of these did so in the last one year. The commonest alcohol beverages consumed include beer (50.2%), gin (18.3%) and palm wine 9.4%. In a typical

day, 89.4% of them consume three bottles/shots/glass or less. Alcohol drinking was commoner in men (67.9%), urban dwellers, and those within the age group of 20-52 years.

Fruit and vegetable consumption/dietary pattern

Ninety percent of the subjects consume fruits but only 15.9% on a daily basis. Only 175(6.1%) consume uncooked vegetables daily while 1350(47.2%) consume cooked vegetables every day. Consumption of sodas, sweet/chocolate, coffee/tea and fast foods is low in our population (2.0%, 1.8%, 8.3% and 1.3% respectively). About 5% add extra salt to already prepared food on a daily basis. However, the use of bullion salt in prepared food is very high (78.1%). Also, there is low consumption of protein rich diet while the consumption of carbohydrate is high.

Physical activity

Many of the respondents (65.5%) were engaged in work involving sedentary activity. Few were engaged in work involving moderate or vigorous intense activity (35.5% and 18.2% respectively). Only 254 (9.1%) respondent received advice to increase physical activity in the last 12 months.

Personal and family history

Twenty percent of the respondents had past history of hypertension, while 4.1% were known with diabetes mellitus.

Care-seeking behaviour

Thirty five percent had visited a health facility in

the last one year. However the place of primary care for many was patent medicine vendors (Table 6)

Traffic safety practices

Only 10.2% almost always use seat belt as driver or front seat passenger, 20(0.7%) respondents use seatbelts as back seat passengers, while 1.1% always use helmet on a motorcycle. 103 subjects had previously driven a vehicle under the influence of alcohol.

Prevalence of NCDs

Hypertension

Systolic hypertension was present in 30% and diastolic hypertension in 15.3%. Both systolic and diastolic hypertension was present in 31.8%.

Obesity/Overweight

Obesity diagnosed based on BMI was present in 13.8%. 28.2% were overweight, 56% had normal weight while 2.1% were underweight.

Diabetes mellitus

Diabetes diagnosed based on FBS \geq 126/dl or RBS \geq 180mg/dl was present in 3.6% of the population.

Cholesterol

Elevated serum cholesterol and triglycerides was found in 2.4% of the population respectively while 54.2% had low HDL cholesterol.



Figure1: Map of Nigeria showing the location as well as map of Abia state showing the 17 Local Government Areas.

Table1. Definition of terms used in the survey

Term	Definition
1.Overweight/ Obesity	Overweight was defined as a BMI 25 -29.9 kg/m ² and obesity as BMI \geq 30 kg/m ² . Increased CV risk referred to waist circumference \geq 88cm (women) or \geq 102cm (men)
2. Hypertension	Subjects having a systolic blood pressure of 140 mmHg and above, or a diastolic blood pressure of 90mmHg and above or who had been treated pharmacologically for hypertension though had a normal blood pressure were categorized as hypertensive
3. Diabetes Mellitus and Impaired Glucose Tolerance	A previously known diabetic or subject with a fasting plasma glucose of 126mg/dl or more and impaired fasting glucose is defined as fasting plasma glucose of 100 to 125 mg/dl or a random blood glucose of 180mg/dl or higher was classified as diabetes mellitus and impaired glucose tolerance (IGT) was defined as random blood glucose between 140 and 180mg/dl
4. Lipid abnormality	Hypercholesterolemia was defined as a total cholesterol level \geq 200 mg/dl or more, HDL-C 40 mg/dl for men or 50 mg/dl for women, and/or triglyceride concentration of 150 mg/dl or more. Metabolic syndrome was defined using the national cholesterol education programme (NCEP) adult treatment panel (ATP) III criteria. ^[16] According to this criteria a subject has metabolic syndrome if he or she has three or more of the following: waist circumference $>$ 102 cm in men and $>$ 88 cm in women; triglyceride levels \geq 150 mg/dl; HDL cholesterol concentration $<$ 40 mg/dl in men and $<$ 50 mg/dl in women; blood pressure \geq 130/85 mmHg; and fasting plasma glucose value \geq 110 mg/dl. ^[16] Atherogenic index (AI) was calculated as the ratio of HDLc to TC. High risk was defined as HDLc/TC $<$ 0.18, while average and low risk was 0.18 to 0.40 and $>$ 0.40 respectively, according to the European Atherosclerosis society guidelines. ^[16]

Table 2: Distribution of respondents by demographic characteristics

Characteristic	Frequency	%
Gender (n=2983)		
Males	1430	47.9
Females	1553	52.1
Age (in years) (n=2956)		
<20	168	5.7
20-29	864	29.2
30-39	561	19.0
40-49	389	13.2
50-59	380	12.9
60-69	282	9.5
70-79	201	6.8
\geq 80	111	3.8
Mean age \pm SD = 41.7 \pm 18.5		
Marital Status (n=2972)		
Single	1026	34.5
Married	1733	58.3
Others-Widowed, Divorced/Separated	213	7.2
Religion (n=2945)		
Christianity	2917	99.0
Islam	20	0.7
Others-traditional religion	8	0.3
Educational Status attained (n=2975)		
No formal Education	282	9.4
Primary	731	24.6
Secondary	1387	46.6
Tertiary	538	18.1
DNK	37	1.3
Ethnicity (n=2981)		
Ibo	2875	96.4
Yoruba	36	1.2
Hausa	15	0.5
Others	55	1.9

DNK: Did not know

Table 3: Distribution of respondents by Occupation, type of residence, ownership of means of mobility and income

	Frequency	%
Occupation (n=2950)		
Artisans	588	19.9
Traders	479	16.2
Unemployed	430	14.6
Student/Apprentice	403	13.7
Farmers	402	13.6
Unskilled worker	188	6.4
Retirees	139	4.7
Low level skilled worker	124	4.2
Highly skilled worker	99	3.4
Intermediate level skilled worker	68	2.3
Religious/community leader	30	1.0
Type of Residence (n=2928)		
Single hut unit	39	1.3
Multiple hut units	56	1.9
Mud house with cement plastering	186	6.4
Single/double apartment shared with others	745	25.4
Flat shared	426	14.5
Flat self contained	409	14.0
Bungalow	1006	34.4
Storey building/duplex	59	2.0
Ownership of means of mobility (n=2922)		
Bicycle	156	5.3
Motorcycle	237	8.1
Tricycle	26	0.9
Car/Bus	209	7.2
None	2294	78.5
Average Annual Income in Naira* (n=2006)		
<50000	593	29.6
50000-99999	411	20.5
100,000-199999	435	21.7
200,000-499,999	392	19.5
≥500,000	175	8.7

*150 naira = 1 dollar

Table 4: Knowledge of malignancy among the respondents

Awareness of malignancy/cancer (n=963)		
Yes	857	89.0
No	106	11.0
Ever lost a friend or relative to cancer (n=844)		
Yes	209	24.8
No	635	75.3
Type of cancer the person died of (n=209)		
Cancer of the breast	154	73.7
Cancer of the cervix	9	4.3
Cancer of the blood	5	2.4
Cancer of the prostate	4	2.4
Cancer of the lungs	4	2.4
Cancer of the liver	4	2.4
Cancer of the uterus	4	2.4
Cancer of the brain	2	1.2
Cancer of the stomach	2	1.2
Cancer of the breast and kidney	1	0.6
Not specified	18	8.6

Table 5: shows pattern of residence, use of cigarette and alcohol and physical activity status

Variable	Frequency	%
Current place of domicile (n=2959)		
Urban	1458	49.2
Rural	1451	50.8
Duration of continuous stay in urban area in years (n=2957)		
<10	1040	35.2
10-19	499	16.9
20-29	637	21.5
30-39	335	11.5
40-49	173	5.9
50 and above	273	9.2
Mean \pm SD = 18.88 \pm 17.06		
Duration of continuous stay in rural area in years (n=2957)		
<10	1002	33.9
10-19	461	15.6
20-29	527	17.8
30-39	277	9.4
40-49	210	7.1
50 and above	480	16.2
Mean \pm SD = 22.29 \pm 21.27		
Area of residence in the past 5 years (n=2906)		
Urban	1168	40.2
Rural	1437	49.4
Mixed	301	10.7
Ever smoked (n=2986)		
Yes	387	13.0
No	2599	87.0
Male	373	96.4
Female	14	3.7
Timing of Initiation of Smoking in years (n=115)		
<20	45	39.2
20-29	52	45.2
30-39	11	9.6
40-49	4	3.5
\geq 50	3	2.6
Mean \pm SD	23.00 \pm 10.21	
Duration of smoking in years (n=108)		
<10	48	44.4
10-19	35	32.4
20-29	14	13.0
30-39	9	8.3
40-49	2	1.8
Mean \pm SD	13.85 \pm 12.00	
Ever consumed Alcohol (n=2978)	Frequency	%
Yes	1663	55.8
No	1315	44.2
Consumed alcohol in the last 12 months (n=1663)		
Yes	1402	84.2
No	253	15.2
No response	9	0.6
Type of alcohol usually consumed (n=1402)		
Beer	835	50.2
Gin	305	18.3
Palm wine	157	9.4
Wine	57	3.4
Spirit (Brandy)	42	2.5
Any type	12	0.7
No response	255	15.3
Eat Fruits (n=2973)	Frequency	%
Yes	2929	98.5
No	44	1.5
Consumption of fruits in a week/Weekly consumption of fruits (n=2875)		
Everyday	457	15.9
4-6 days	796	27.7
1-3 days	1622	56.4
No response		
Daily consumption of fruits/consumption of fruits in a typical day (n=2855)		
Once	1846	64.7
Twice	791	27.7
More than twice	218	7.6

Consumption of uncooked vegetable in a week (n=2878)		
Everyday	175	6.1
4-6 days	418	14.5
1-3 days	2085	72.5
None	200	6.9
Consumption of cooked vegetable in a week (n=2860)		
Everyday	1350	47.2
4-6 days	677	23.7
1-3 days	826	28.9
None	7	0.2
Engaged in work involving vigorous intense activity (n=2931)		
	Frequency	%
Yes	725	24.7
No	2206	75.3
Engaged in work involving moderate intense activity (n=2939)		
Yes	1503	51.1
No	1436	48.9
Engaged in RSL involving sedentary activity (n=2922)		
Yes	1914	65.5
No	1008	34.5
Engaged in RSL involving vigorous intense activity (n=2905)		
Yes	547	18.2
No	2358	81.8
Engaged in RSL involving moderate intense activity (n=2928)		
Yes	1040	35.5
No	1888	64.5
Received advice in the last one year to increase physical activity (n=2806)		
Yes	254	9.1
No	2552	90.9

Table 6: Care seeking behaviour of respondents

Visited a Doctor in the last one year (n=935)		
Yes	277	29.6
No	658	70.4
Place of primary care (n=957)		
Chemist	714	74.6
Clinic	118	12.1
Health center	48	5.0
Self medication	42	4.4
Laboratory	9	
Prayer house	9	0.8
Invites a (family) care provider – doctor/nurse	10	
Others		
Herbalist	2	
Perception of present state of health (n=957)		
Very good	169	17.7
Good	486	50.8
Average	244	25.5
Bad	56	5.9
Very bad	1	0.1
Use of seat belt as a driver or a front seat passenger (n=945)		
Almost Always	106	11.2
Sometimes	383	40.5
Never	416	44.0
Do not have a seat belt in a car	10	1.1
Never use a car	30	3.2
Use of seat belt as a back seat passenger (n=941)		
Always	6	0.6
Sometimes	110	11.7
Never	712	75.7
Do not have a belt at the back seat	96	10.2
Never travel in the back of a car	17	1.8

DISCUSSION

The main findings in this study include: (i) a third of the population were hypertensive;

high prevalence of overweight/obesity and high prevalence of dyslipidaemia, (ii) high alcohol consumption but relatively low prevalence of cigarette smoking; (iii) low

consumption of uncooked vegetables, relatively high sedentary lifestyle and high cancer awareness and (iv) poor care seeking behavior and traffic safety practices.

The age structure of our study population is a true reflection of the demographic structure of Nigeria and Abia State based on the report of the 2006 National census.^[10-12] According to this data, 54.6% of Nigerians are between 15 and 65 years. Similar age structures have been reported by other workers.^[10,13-16] The high literacy rate in our study corroborates an area report by the Abia State Planning Commission^[11] in 2008 which gave a literacy rate of 85.6%.

Our report also confirmed an earlier report in the state's core welfare indicators document which showed that the predominant occupation of the people of the State were farming, artisan and trading.^[12] The predominant tribes in the State are Ibos who are naturally very mobile, thus the high number of people who have live in urban as well as rural areas in the last first years prior to the study. Rural residents were generally older than their urban counterparts. Most often the younger age groups migrate to urban areas for white collar jobs and other means of livelihood. On the other hand older people generally tend to retire to the rural areas after active service in the urban communities.

The prevalence of cigarette smoking of 6.3% was lower than that previously reported from the 2003 NCDs survey in Southwest Nigeria (9.7%).^[17] The WHO in 2008 estimated about 4.6% (7.6% men and 1.7% women) smoke cigarette daily.^[18] The Nigeria Demographic and Health Survey reported a prevalence of 9% in men and 0.2% in women.^[10] This is far less than the 21.7% reported from Mauritius or 18.7%, 8.7%, 7.1%, and 19.6% reported from Mozambique, Eritrea, Swaziland, and Madagascar respectively.^[19] The proportion of female smokers is also very low (1.5%) compared to what has been reported in most other African countries.^[19] The peak age of smoking in this study was 30-39years. This is similar to a 1997 report in the country.^[20] Twenty five percent of those who currently smoke have done so for less than 10 years compared to 44% reported from Lagos.^[17] Awareness of the warning against smoking is encouragingly high in this population and the commonest source of information was identified as radio advert.

A significant proportion of them initiated smoking due to influence of friends/peers the study revealed. Health-related, personal and religious reasons were the most common reasons for quitting smoking, similar to what was reported in a national NCDs survey in 2003.^[17]

Alcohol consumption was noted to be high in the state especially in urban areas and younger people. In the 1997 report of the National Survey of NCDs in Nigeria, 57.4% of men and 81.1% of women were lifetime abstainers from alcohol consumption. The prevalence of heavy alcohol drinking was 6.8% for men and 1.3% for women.^[20] Sixteen percent (16%) were heavy drinkers, 10% drank at least 4 standard drinks (bottle/shot/glass) in a typical day, and while about 23.4% were binge drinkers (consumed ≥ 4 standard drinks for at least one day).

Almost all the respondents consumed fruits and 16% of them did so, on a daily basis compared to 4.1% reported from Lagos.^[17,21] Only 6.9% did not consume fresh vegetable and almost everybody consumed cooked vegetable at least once a week. Daily consumption of soft drinks (2.0%) was significantly less compared to 16.3% observed in Lagos,^[17] while 4.5% compared to 10% always used extra salt in an already prepared food.^[17]

A greater proportion of the population surveyed always use bullion salt (78.1%) to prepare their meals. Predominant sources of protein was fish (70.0%), beef (32.9%) and beans (24.1%), while commonest sources of carbohydrate was cassava/garri (72.8%), grains (51.1%) and yam (25.6%). Palm oil was found to be the major cooking oil among households in the state. Dietary habit of most people in the state remained unchanged in the last one year. Among the few that made changes, changes made involved mainly consumption less sugar, salt and fat and consumption of more vegetable.

A significant proportion of respondents were engaged in work that was predominantly sedentary in nature, hence more people in the state are becoming less physically active. Average duration of time spent on sedentary activities at workplace was 2.3 ± 2.7 hours, even as more hours were spent on sedentary activities at home 3.0 ± 2.1 hours. About 65% of the respondents spent their recreation, sports and leisure (RSL) time on sedentary

activities, compared to 18.5% and 35.5% who spent theirs on vigorous or moderately intense activities respectively. Most people in the state relax at home and it often involves either watching television or chatting. A quarter and about half of the inhabitants in the state were engaged in vigorous and moderate intense activity respectively in their workplace. More people in the state were engaged in vigorous or moderately intense activity than their counterparts Lagos in 2003 where 20.9% and 27.6% of the population engaged in similar activities in their workplace.^[17] In Mauritius only 16.5% were engaged in either vigorous or moderately intense physical activity in workplace. Similar data was also reported from many other African countries.^[19]

Only few people received advice in the last one year to reduce their weight and majority of the people in the state considered their weight to be normal similar to what was reported among residents in Lagos.^[17] Globally, increasing use of modern means of transport and changing pattern of nature of predominant occupation has been identified as one of the primary reason for increasing physical inactivity.^[2]

Awareness of cancer among residents in Abia State was high, and breast cancer was the most commonly known cause of cancer-related mortality among them. Fewer also lost a loved one to cancer of the prostate, cervix or lungs. The predominance of breast cancer could be probably because of the site involved that makes it easily recognizable, as well as a reflection of intense campaign aimed at preventing the disease compared to other forms of malignancies.

Hypertension and diabetes were the two NCDs often reported in families. Fewer people measured their blood sugar compared the proportion that had their blood pressure measured, and majority of the people did so in the last one year. This is because blood pressure measurement is a routine practice during care seeking in most formal health facilities, while most people only carry out blood sugar measurement either following a doctor's prescription or on suspicion of diabetes. Only about one-third of the respondents had occasion to visit a doctor in the last one year, however the patent medicine vendors enjoyed the most patronage as the first point contact following

onset of illness. The patronage of patent medicine vendors can be attributed to low coverage of health services, low health literacy, poverty and ease of accessibility.

Expectedly, more front seaters used seat belts either as a driver or a passenger than back seaters. Forty four per cent and 79.4% of the subjects compared to 65% and 86.6% in south west Nigeria never used seat belt in the front or back seat respectively.^[17] Driving under the influence of alcohol was not a common practice in the state. However, most people in the state do not own or drive a car/bus. Use of crash helmet in the state was observed to be very low, and the implementation of the law enforcing the use of crash helmet among motorcycle riders or their passengers is weak. However, there is a ban on the use of motorcycle as a means of transport in urban areas of the state.

Prevalence of systolic and diastolic hypertension reported in the survey was 30.0% and 15.3% respectively. Prevalence of systolic hypertension was higher than 22.9%, while prevalence of diastolic hypertension was lower than 29.7% reported in south west Nigeria.^[17] In general, prevalence of hypertension in the state was found to be high (31.8%), similar to various studies in the same region of the country.^[13,15,16] Diabetes prevalence of 3.6% was similar to the report of other workers in the country in recent times.

The prevalence of obesity in the study was 13.8% and is comparable to 16% reported in Mauritius but lower than $\geq 30\%$ reported among the Caucasians. Prevalence of dyslipidemia among the respondents was 46.9%, and the most common form of dyslipidemia was low HDL rather high total cholesterol. This pattern has been observed in many other parts of Nigeria and elsewhere.^[21-30]

In conclusion, the study showed current prevalence of modifiable-risk factors in Abia state Nigeria. Prevalence of current tobacco use in the state was found to be relatively higher than national average and suggests rising trend of tobacco use. Many residents of the state were physically active; however more time was spent at home on sedentary activities. The most common NCDs in the state were hypertension which was observed in about one-third of the population. Prevalence of other NCDs was 13.6% for obesity and 3.6% for diabetes.

Low level HDL- cholesterol was high. The authors recommend the following:

1. An increase in the priority accorded to NCDs and integration of their prevention and control into relevant policies across all tier of government through advocacy to policy makers as well as development of policies, plans and programmes for the prevention and control of NCDs in the state.
2. Development standards for NCDs care and integration of their management into the state health care system as well as reduction in inequality in health services through adoption and expansion of health insurance to include routine screening for NCDs (measurement of blood pressure, blood sugar, lipid profile and BMI).
3. Increase in access to NCDs prevention and control information and services at the primary healthcare levels in the state through; distribution of NCDs-related IEC/BCC materials, training of health care providers, provision of essential medicines and basic technologies and well functioning referral mechanism
4. Creation of awareness on NCDs including self care of patients through media adverts, radio phone-in programmes, bulk SMS and social networks. Mobilization of communities in the state towards reducing modifiable-risk factors of NCDs through advocacy to community leaders/stakeholders and community sensitization meetings. There is also need to develop or adapt relevant policies, plans and strategies for the promotion of healthy diet, physical activity, infant and young child feeding, and control of tobacco use.
5. Establishment of a coordinated agenda for NCDs research to cover the following priority areas – analytical, health systems, operational, economic and behavioral researches aimed at effective programme implementation and evaluation through collaboration with academic and research institutions in the state as well as building research capacity of health care workers.
6. Establishment and strengthening of NCDs surveillance systems in the state and standardization of the collection of data on disease incidence, risk factors, and mortality by cause. Surveillance of NCDs and associated risk factors using the WHO stepwise surveillance for NCDs should be ongoing in the State and should be conducted every two years.

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