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Research Article

Non-communicable diseases: Prevalence and risk factors among adults in a rural community in Plateau State, Nigeria

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Abstract

Non-Communicable Diseases (NCDs) are chronic medical conditions that are non-infectious. Current projections indicate that by 2020, the largest increases in NCD deaths will occur in Africa which currently has a heavy burden of infectious diseases. The aim of this study was determine the risk factors for NCDs and prevalence of hypertension, diabetes mellitus and obesity among adults in a rural community in north-central Nigeria. A cross-sectional study was carried out among adults in Gindiri Community of Plateau State. Multi-stage sampling technique was used to select 195 respondents. A semi-structured, interviewer-administered questionnaire was used to collect quantitative data from the respondents and was then subjected to data analysis using Epi Info version 3.5.3.Among the respondents, 152 (77.9%) were females and 43 (22.1%) males with a mean age of 47.5 $^{+}/_{-}$ 18.8 years. Only 44.9% of respondents engaged in physical activity at least twice a week with a mean duration of 69 minutes per session. Forty-four percent rarely take fruits and vegetables, 18.6% add raw salt to already-prepared meals; 82.1% take sweet/soft drinks with 12.1% who take at least 5 times a week, and 16.9% take snacks daily. Prevalence of hypertension, diabetes mellitus and obesity was found to be 40.2%, 9.7% and 27.2% respectively. Understanding the risk factors for NCDs is vital in tackling the increasing prevalence of NCDs in rural and urban communities. Targeted interventions should also be expanded to include rural communities as well.

Keywords: non-communicable diseases, risk factors, prevalence

1.Introduction

Non Communicable Diseases (NCDs) are chronic medical conditions that are non-infectious.[1] They are usually of long duration and have slow progression. The major non-communicable diseases seen in more recent times include; cardiovascular diseases, cancers, chronic respiratory diseases and diabetes. NCDs already disproportionately affect low and middle income countries where nearly 80% of NCD deaths (29 million) occur.[2][3] They are the leading causes of death in all regions except Africa, but current projections indicate that by 2020, the largest increases in NCD deaths will occur in Africa. In African nations, deaths from NCDs are projected to exceed the combined deaths of communicable nutritional diseases and maternal and perinatal deaths as the most common causes of death by 2030.[4]-[6]

The countries of Sub-Saharan Africa are thus facing a triple burden; with a weak health system, a heavy load of infectious diseases and an increasing health burden due to NCDs. Cardiovascular diseases, diabetes mellitus, cancers, osteoarthritis, mental illness, and injuries are among the major NCDs in this region, resulting in high morbidity and mortality. In addition, these diseases cause pain, disability, loss of income, disruption of family stability, and an impaired quality of life.[7][8]

NCDs are often associated with older age groups but evidence shows that more than nine million of all deaths attributed to NCDs occur before the age of 60. Of these, 90% occurred in low and middle income countries. Children, adults and the elderly are all vulnerable to the risk factors that contribute to NCDs. These risk factors can be classified as modifiable and non-modifiable risk factors. Modifiable risk factors could be identified and prevented much earlier in life and include: exposure to tobacco smoke and use, harmful use of alcohol, physical inactivity and unhealthy diets. They are behavioural factors that can lead to metabolic and physiological changes in the body that increase the risk of NCDs such as; raised blood pressure, overweight/obesity, high blood glucose levels and hyperlipidaemia.[4][9] Non-modifiable risk factors include genetics, age, ethnicity or race, gender and family history. Nigeria makes up a significant proportion of the population of Sub-Saharan Africa and is plagued with an inadequacy and inequitable distribution of resources for sustainable development and her population is thus, often unable to access the education and services required to prevent and treat NCDs.[10]With the lack of adequate resources in Nigeria, the increasing occurrence of NCDs can drain household resources and drive families into poverty. About five million Nigerians may die of NCDs by the end of the year 2015, and diabetes alone is projected to contribute about 52% of the mortality by 2015. In addition, in 2005, about 400 million dollars was estimated to have been lost from premature deaths due to NCDs. This economic cost is estimated to rise to about eight billion dollars by the end of 2015. At present, about eight million Nigerians suffer from hypertension and four million have diabetes. One hundred thousand new cases of cancers are diagnosed each year in Nigeria.[11] These losses are not just at an individual level, but also profoundly affect the family and the country's work force and for the millions struggling with poverty, a vicious cycle ensues.[10] The exorbitant costs of NCDs including often lengthy and expensive treatments are forcing millions of people into poverty annually, stifling development.[4] This study was therefore conducted to assess risk factors and prevalence of NCDs in a rural community in Plateau State.

2. Methodology

2.1 Study Area: The study was conducted in Gindiri, a district in Mangu Local Government Area (LGA), one of the 17 LGAs of Plateau State, Nigeria. It is approximately 14 kilometres from Mangu town and 100 kilometers from Jos, the capital of Plateau State. Gindiri is an old missionary settlement and the headquarters of the Pyem Chiefdom with a population of 40,400.[12] Gindiri town has a number of educational institutions which include five secondary schools, a school for the blind, several primary schools, a college of theology and a college of education. It has two primary health care centres and a comprehensive health centre (which is a rural outpost of the Jos University Teaching Hospital, JUTH), a police station, a market, a post office, an area court, some tarred roads, some churches and mosques. Other basic facilities such as pipe-borne water and electricity supply are also present in the town. The major religions are Islam and Christianity and the major occupation is subsistence farming.

2.2 Study Population: This consisted of adults (males and females), 18 years and above living or working in the study area, who gave verbal consent to be part of the study.

2.3 Inclusion/Exclusion criteria: Any person less than 18 years of age, who refused to consent to the study, was excluded. The migrant herdsmen and visitors were also excluded from the study.

2.4 Study Design: This was a cross-sectional community-based study.

2.5 Sample size determination: Based on the prevalence of risk factor for NCD of 7%[13], the sample size was calculated using the following formula: $\mathbf{n = z^2pq / d^2}$

Where n = minimum sample size; z = standard normal deviate at 95% confidence interval = 1.96; p = prevalence or proportion of NCD = 7% = 0.07; q = conditional probability (1 – p) = 1 – 0.07 = 0.93; d = desired margin of error = 5% = 0.05

Therefore, $\mathbf{n = 1.96^2\ (0.07)\ (0.93) / 0.05^2 = 100.04}$

To give room for non-response, 20% of 100 (which is 20) was added to it, making a total of 120.

2.6 Sampling Technique: A multistage sampling technique was used to select respondents.

1st stage: Gindiri Ward was selected through a simple random sampling technique, by balloting, from the 14 political wards in Mangu LGA.

2nd stage: Using cluster sampling technique, each of the seven communities (Angwar) in Gindiri Ward was considered to be a cluster, and Angwar Galadima Community was selected by balloting.

3rd stage: A systematic sampling technique was used to finally select respondents. The sampling interval was obtained by dividing the total population of Angwar Galadima by the sample size of 120. A sampling interval of two was gotten and respondents in every other household who met the inclusion criteria were interviewed.

2.7 Instruments for data collection: A semi-structured, interviewer-administered questionnaire was used to collect data from the respondents on socio-demographic characteristics, presence of risk factors for NCDs and prevalence of NCDs.The questionnaire was translated in Hausa, which is the main Language of the participants and back translated into English Language.

Other instruments used to collect data included: sphygmomanometers (Accoson®) and stethoscopes were used to measure blood pressure; glucometer (Accuchek®) to measure blood glucose levels, bathroom weighing scale for weight measurements; and tape rule for measurements of waist and hip circumference.

2.8 Data collection: Data was collected from eligible adults in the community after verbal informed consent was sought and obtained and confidentiality assured on all information provided. Trained resident doctors and community health workers assisted the authors in data collection. Data was collected in October 2014.

2.9 Measurements: Two Blood pressure readings were taken for each respondent and the average value was recorded. Systolic and diastolic BP was classified as normal, prehypertension, Stage 1 and

Stage 2 hypertension. BP was classified as follows: normal < 120 mm Hg systolic and < 80 mm Hg diastolic; prehypertension: 120 to 139 mm Hg systolic or 80 to 89 mm Hg diastolic; hypertension if systolic blood pressure was at least 140 mm Hg, diastolic blood pressure was at least 90 mm Hg, or if they were currently on anti-hypertension medication.

Height was measured using a stadiometer in metres to the nearest centimetre with respondents not wearing shoes.

Weight was measured with respondents wearing light clothes and not wearing shoes to the nearest kilogram. Body Mass Index (BMI) was derived from weight (kg) and height (m) using the formula weight divided by square of the height and classified based on the WHO classification.[14]

Waist circumference (WC) was measured using a flexible tape to the nearest 0.5cm with measurement taken at the level of the mid-point between the ribs and iliac crest from the front after exhalation. Hip circumference (HC) was also taken using flexible tape to the nearest 0.5cm with measurement taken at the widest point on the buttocks. Pregnant women and those with bony abnormalities were excluded.

Waist-Hip-Ratio (WHR) was derived from the ratio of WC (cm) to HC (cm).

2.10 Data Analysis: Data obtained was entered and analyzed descriptively using frequencies, tables, graphs and simple percentages. Mean, median, mode and standard deviation were calculated for continuous variables and Chi square was used to test for associations between categorical variables and proportions. Statistical computations were carried out using the Epi info 3.5.4 software. A confidence level of 95% was used and p-values ≤ 0.05 considered statistically significant. Furthermore, multivariate analysis incorporating all possible risk factors was also carried out.

3. Results

Out of 195 respondents who participated in this study, 152 (77.9%) were females and 43 (22.1%) males with a mean age of 47.5±18.8 years; more than half (53.9%) were aged between 31-60 years. More than half of the respondents (53.8%) were illiterates, Pyem by tribe (72.8%) and married (71.8%). Ninety-nine percent of the respondents practiced Islam. Trading, artisanship and farming were the most common occupations; 37.4%, 12.3% and 9.7% respectively. (Table 1)

Table 1: Socio-demographic Data

Variable	Frequency(%) n= 195
Age (years)	
≤20	13 (6.7)
21-30	33 (16.9)
31-40	37 (19.0)
41-50	36 (18.5)
51-60	32 (16.4)
61-70	22 (11.3)
71-80	18 (9.2)
≥81	4 (2.0)
Mean age 47.5±18.8	
Sex	
Males	43 (22.1)
Females	152 (77.9)
Highest Level of Education	
Arabic	28 (14.4)
None	102 (53.8)
Primary	33 (16.9)
Secondary	23 (11.8)
Tertiary	6 (3.1)
Ethnicity	
Pyem	142 (72.8)
Others*	53 (27.2)
Religion	
Christianity	1 (0.5)
Islam	194 (99.5)
Marital Status	
Married	140 (71.8)
Widowed	41 (21.0)
Single	10 (5.1)
Divorced/Separated	4 (2.1)
Family Type	
Monogamous	78 (40.0)
Polygamous	117 (60.0)
Occupation	
Trading/Business	73 (37.4)
Artisans	24 (12.3)
Farmers	19 (9.7)
Civil Servants	8 (4.1)
Others	17 (8.7)
None	54 (27.8)

* Hausa/Fulani, Berom, Yorubaetc.

Table 2 shows the prevalence of various risk factors for NCD; 62.1% had a family history of NCD out of which 81.8% had a history among first degree relatives with mothers constituting 24.1% of the first degree relatives. Almost half (46.7%) of the respondents admitted to inadequate physical activity. Seventy-nine percent rarely ate fruits and vegetables, 18.9% added raw salt to already-prepared meals (27.9% and 15.9% males and females respectively, p = 0.07) and 32.8% admitted to excessive salt intake (males statistically significantly higher than females, p = 0.03); 82.1% took sweet/soft drinks with 12.1% who take at least 5 times a week, and 16.9% took snacks daily. Only 6 (3.1%) of the respondents admitted to taking alcohol while 7 (3.6%) had a history of smoking. More than half (112, 57.7%) of the respondents do not go for regular medical checkup.

Table 2: Reported Risk Factors by Sex

Risk Factor	Total (%) N = 195	Sex: Male (%) n = 43 (22.1)	Female (%) N = 152 (77.9)	p-value
Inadequate physical activity	91 (46.7)	23 (53.5)	68 (44.7)	0.31
Excessive alcohol intake	6 (3.1)	2 (4.6)	4 (2.6)	0.50
Inadequate fruit intake	154 (79.0)	35 (81.4)	119 (77.9)	0.67
High salt intake	64 (32.8)	20 (46.5)	44 (28.9)	0.03
Use added salt	36 (18.9)	12 (27.9)	24 (15.9)	0.07
Consumes fast foods	165 (85.9)	31 (73.8)	134 (89.3)	0.01
Consumption of sweet drinks	160 (82.1)	34 (79.1)	126 (82.9)	0.56
Has smoked before	7 (3.6)	7 (16.2)	0 (0.0)	
Family history of NCD	121 (62.1)	25 (58.1)	96 (63.2)	0.55
Father	39 (20.0)	10 (23.3)	29 (19.1)	0.55
Mother	47 (24.1)	10 (23.3)	37 (24.3)	0.88
Sibling	10 (5.1)	3 (7.0)	7 (4.6)	0.38*
No regular medical check up	112 (57.7)	22 (51.2)	90 (59.6)	0.32

*Fisher's Exact Test

One hundred and nine respondents (54.4%) recorded a personal history of NCDs (54.6% of females and 53.5% of males). Among these, 41% of them had a history of hypertension (41.4% of females and 39.5% of males), 5.1% had a history of diabetes mellitus with the men having a statistically significantly higher prevalence than women (3.3% of females and 11.6% of males, p = 0.04). Respondents in this study also reported presence of arthritis in 27 (13.8%) of them (11.6% males and 14.5% in females). See Table 3.

Table 3: Self-reported prevalence of NCD among respondents

NCD	Frequency (%) (n = 195)	Sex: Males (%) (n = 43)	Females (%) (n = 152)	p-value
Hypertension	80 (41.0)	17 (39.5)	63 (41.4)	0.82
Type 2 Diabetes	10 (5.1)	5 (11.6)	5 (3.3)	0.04
Arthritis	27 (13.8)	5 (11.6)	22 (14.5)	0.63
Cancer	1 (0.5)	0 (0.0)	1 (0.7)	0.77*
Low back pain	11 (5.6)	0 (0.0)	11 (7.2)	0.06*
Other Diseasesł	8 (4.1)	0 (0.0)	8 (5.3)	0.15*

*Fisher's exact test
łOther diseases – respiratory disease, asthma, etc.

Table 4 shows that prevalence of obesity was 27.2% (30.9% of females and 13.9% of males). About a quarter had acceptable WC (18.4% of females and 58.1% of males, p <0.01). Similarly, only 50 (25.6%) respondents had normal BMI and 92 (47.2%) were overweight. Forty percent however, had acceptable WHR (34.9% of females and 58.1% of males, p = 0.06). Mean FBG was found to be 5.95±5.1mmol/L with no significant difference between males and females but 9.7% of the respondents had unacceptable FBG levels > 7mmol/L (8.6% of females and 14.0% of males). Only about a third (35.9%)and 43.6% of the respondents had normal SBP and DBP respectively while 33.8% and 38.5% had SBP ≥ 140mmHg and DBP ≥ 90mmHg respectively.

Table 4: Distribution of physical characteristics of respondents

Variable	Frequency (%) n = 195	Sex Male (%) n = 43	Female (%) N = 152	p-value
BMI (kg/m^2)				
Normal weight (18.5-24.9)	50 (25.6)	15 (34.9)	35 (23.0)	0.16
Overweight (25-29.9)	92 (47.2)	22 (51.2)	70 (46.1)	
Mild obesity (30-34.9)	32 (16.4)	5 (11.6)	27 (17.8)	
Severe obesity (35-39.9)	12 (6.2)	1 (2.3)	11 (7.2)	
Morbid obesity (>40)	9 (4.6)	0 (0.0)	9 (5.9)	
Mean	27.9±5.9	26.2±4.0	28.3±6.2	0.03
Waist Circumference (cm)				
Acceptable (<94, men) (<80, women)	53 (27.2)142 (72.8)	25 (58.1)	28 (18.4)	<0.01
Unacceptable (>94, men) (>80, women)	93.4±12.9	18 (41.9)	124 (81.6)	
Mean		91.7±12.3	93.8±13.1	0.34
Waist/Hip Ratio				
Acceptable (<0.95, men) (<0.85, women)	78 (40.0)	25 (58.1)	53 (34.9)	0.06
Unacceptable (>0.95, men) (>0.85, women)	117 (60.0)	18 (41.9)	99 (65.1)	
Mean	0.9±0.1	0.99±0.2	0.88±0.1	<0.01
Fasting blood glucose				
Acceptable (<7mmol/L)	176 (90.3)	37 (86.0)	139 (91.4)	0.29
Unacceptable (>7mmol/L)	19 (9.7)	6 (14.0)	13 (8.6)	
Mean	5.95±5.1	5.68±1.6	6.03±5.7	0.69
Systolic Blood Pressure				
Normal systolic BP <120mmHg	88 (35.9)	16 (37.2)	72 (47.4)	0.04
Prehypertension 120-139mmHg	41 (21.0)	15 (34.9)	26 (17.1)	
Hypertension ≥140mmHg	66 (33.8)	12 (27.9)	54 (35.5)	
Mean	136±27.6	135±20.9	136±29.2	0.81
Diastolic Blood Pressure				
Normal diastolic BP <80mmHg	85 (43.6)	20 (46.5)	65 (42.8)	0.86
Prehypertension 80-89mmHg	35 (17.9)	8 (18.6)	27 (17.8)	
Hypertension ≥90mmHg	75 (38.5)	15 (34.9)	60 (39.5)	
Mean	90±15.6	87±15.3	91±15.6	0.07

Table 5 is Logistic regression showing that age is a major predictor of NCD in this study.

Table 5: Logistic Regression of risk factors for NCD

Term	Odds Ratio	95%	C.I.	Coefficient	S. E.	Z-Statistic	P-Value
Age	1.0472	1.0266	1.0683	0.0462	0.0102	4.5410	0.0000
Smoking (Yes/No)	0.0000	0.0000	>1.0E12	-13.0109	274.9867	-0.0473	0.9623
Added salt to diet (Yes/No)	0.4271	0.1681	1.0852	-0.8507	0.4758	-1.7880	0.0738
High salt intake (Yes/No)	0.7735	0.3758	1.5918	-0.2569	0.3683	-0.6976	0.4854
Inadequate physical activity(Yes/No)	0.5498	0.2492	1.2132	-0.5982	0.4038	-1.4813	0.1385
Sex (M/F)	0.7777	0.3378	1.7903	-0.2514	0.4254	-0.5910	0.5545

4. Discussion

This study was carried out to assess the risk factors for NCD in a rural population. There were a significantly higher number of females (78%) than males (22%) in this study. This could be due to rural-urban migration as well as the fact that more females than males were found at home at the time of the survey since more men than women go out for formal work in many rural communities. It could also be as a result of the practice of polygamy which was found to be relatively high in this population. This finding is similar to that of a study on cardiovascular epidemiological transition carried out within this same community some years ago where females made up 72.5% of the population studied.[15] As a result of this finding, the resulting data was subjected to stratified analysis by sex to remove its effect as a possible confounder. Mean age among respondents was 47.5 ± 18.8 years and this is also similar to the findings of the study on cardiovascular epidemiological transition carried out within this same community some years ago where mean age was found to be 45.5 ± 18.2.[15] This mean is higher than that of other surveys in the country and may indicate an ageing population undergoing epidemiologic transition.

The World Health Report of 2002identified eight risk factors which can easily be measured in populations that contribute the most to mortality and morbidity associated with NCDs, but these can be reduced through primary preventive measures. These risk factors include tobacco use, alcohol use, physical inactivity, low fruit/vegetable intake, obesity, raised blood pressure and raised cholesterol.[16] This study revealed the presence of several of these risk factors for NCDs among the respondents. More than half of the population studied had at least one risk factor for NCD and this finding is similar to findings in Egypt and other parts of Nigeria where 60-80% of the population had at least one risk factor and 8% had up to six risk factors for NCD.[13][17]-[19]

Globally, low fruit and vegetable intake is estimated to contribute to the development of approximately 31% of coronary heart disease and 11% of ischaemic stroke. Unhealthy diet constituted the most predominant risk factor in our study. Most respondents admitted to inadequate intake of fruits and vegetables as well as consumption of snacks rich in undesirable fatty acids and this is consistent with findings from other studies carried out in Ibadan and Abia State, Nigeria where most respondents admitted to inadequate consumption of fresh fruits and vegetables.[18][19] A high proportion of respondents (18.9%) admitted to adding raw salt to already-prepared meals compared to 4.5% Eastern Nigeria.[19]and a third admitted to excessive salt intake (males statistically significantly higher than females, $p = 0.03$). These high figures reflect poor knowledge of the dangers associated with high fat and salt consumption and calls for more educational interventions for rural populations.

Only 3.1% of the respondents admitted to taking alcohol and this low prevalence may be due to religious reasons since almost all the respondents are moslems. Previous studies in this population and in other parts of northern Nigeria also confirm this.[13][15]Surprisingly, women had a higher prevalence of alcohol consumption than the men. Tobacco smoking was also found to be low in this population and this compares favourably with the study in Ibadan where only 1.9% was smokers.[18]

An almost equal proportion of the men and women in this study considered their level of physical activity inadequate. This is not surprising since majority of the respondents were engaged in sedentary jobs and this is similar to findings in Zaria, northern Nigeria and Ibadan.[13][18]

Recent studies from rural areas in SSA suggest that the prevalence of non-communicable diseases is increasing in rural populations.[15]Over a third of the respondents in this study had a personal history of NCD with hypertension being the highest at 41%, arthritis 13.8%, diabetes mellitus 5.1%, and cancer 0.5%. Hypertension is higher in this population than in other studies in Nigeria with various rates of 31.8% and 32.8% in Abia and Enugu, Eastern Nigeria respectively[19][20], 31.2% in Zaria, North-western Nigeria[13], 21.5% in Ibadan, South-western Nigeria[18], and 20.9% in Mangu, North-central Nigeria.[15] This may be due to the higher mean age of the population studied since there is a correlation between increasing age and hypertension. It was however comparable to the findings of studies conducted among a mixed population of rural and urban dwellers in Enugu, south-Eastern Nigeria which got a prevalence of 42% and another in the south-south with a prevalence of 42.8%.[21][22]

Prevalence of diabetes mellitus as defined by a FBG $\geq$ 7mmol/L in this study was 9.7% and it was higher than the self-reported prevalence of 5.1% which means that a lot of the respondents were not aware of their health status. This prevalence is however higher than findings from other regional studies, 3.6% in Abia[19] but lower than findings from Ibadan and Calabar, with 11.1% and 14.7% respectively.[18][22] Men were also found to have significantly higher prevalence than women.

Obesity was present in 27.2% of the respondents and this may also be due to the ageing nature of the population studied since obesity has been shown to increase with age.[23] Other studies around the country reported prevalence of 7%, 13.8%, and 18% in Zaria, Abia and Ota respectively.[13][19][23] A significantly higher proportion of women than men were found to be obese.

5. Study limitations

Some limitations of this study include the relatively small sample size, and the use of a questionnaire in assessing some of the risk factors, a form of assessment that could be subjected to recall bias. In addition, this study was done in a rural area and this may limit it's generalize ability. It is recommended that longitudinal studies on larger samples of both rural and urban population in Plateau State be carried out to further document risk factors for NCD.

6. Conclusion

Results of the study revealed that risk factors were present in relatively high levels and were associated with increasing age. Targeted educational and behavioural change communication intervention will go a long way in reducing the burden of NCD among our population.

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