

Prevalence and Awareness of Prehypertension and Hypertension among Artisans in Two selected Local Government Areas of Ebonyi State, Nigeria

G.N. Onyeji¹, M.O. Ifeanacho², K.O Ikpemo¹, I.C.Benneth-Ugochukwu¹, O.G. Ufebe¹

¹Department of Medical Biochemistry, Alex Ekwueme Federal University, Ndufu-Alike

²Department of Food, Nutrition and Home Science, Faculty of Agriculture, University of Port Harcourt

*Corresponding author: gnonyeji@yahoo.com

ABSTRACT

Background: Hypertension and its complications constitute a major health challenge worldwide.

Objective: This study therefore investigated the prevalence and awareness of hypertension and prehypertension in two selected local government areas of Ebonyi State, Nigeria.

Materials and Method: A cross-sectional descriptive study was carried out using six hundred and twenty Artisans (300 males and 320 females) aged between 18 and 65 years from two local government areas of Ebonyi State. Structured, validated, pre- tested interviewer administered questionnaire were used to collect data on respondents' socio-demographic characteristics. Anthropometric indices and blood pressure were measured using standard procedures. Data was analyzed using Statistical Package for Social Sciences (SPSS version 16.0).

Result: The mean age (in years) of participants was 30.5 ± 11.5 (males) and 30.5 ± 11.5 (females). The mean body mass index (BMI) was 23.8 ± 2.9 kg/m² (males) and 24.4 ± 3.7 kg/m² (females). Overweight was significantly higher in males (33.7%) than in females (10.3%) ($P < 0.05$) while obesity was significantly higher in females (6.6%) than in males (2.7%) ($P < 0.05$). The prevalence of prehypertension and hypertension on all the participants were 33.1% and 14.8%, respectively. Prevalence of hypertension was significantly higher in women (20.3%) than men (9.0%) ($P < 0.05$). Up to 68.3% of males and 71.6%, of females were not aware of hypertension ($P > 0.05$) while 72.0% male and 90.9% females had not checked their blood pressure before.

Conclusion: High prevalence of prehypertension and hypertension along with poor awareness of hypertension and poor monitoring of blood pressure were observed. Intensive health education is recommended in the communities.

Keywords: Prevalence, Awareness, Hypertension, Artisans

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INTRODUCTION

Nigeria is one of the low- and middle-income countries (LMICs), worst hit with relatively higher number of cases of hypertension with limited awareness, treatment, and control rates, when compared with developed countries (1, 2). Hypertension is the most commonly diagnosed cardiovascular (CVD) risk equivalent in Nigeria, with its associated complications accounting for

approximately 25% of emergency admissions in urban hospitals (3, 4, 5). Hypertension is a chronic medical condition in which the blood pressure in the arteries is elevated (1) and it is one of the resultant features of diabetes; a disease which is a main cause of blindness, kidney failure, heart attacks, stroke and lower limb amputation (6). An elevation of blood pressure

increases the risk of developing chronic heart disease, stroke, coronary heart disease with the attendant complications of heart failure, peripheral vascular disease, renal impairment, retinal hemorrhage, and visual impairment (7). These complications can lead to the impairment of the body organs (7). Most of the time individuals with high blood pressure show no symptoms in the early stages, while the symptoms manifest after end-organ damage like heart attack or chronic kidney disease (8). Globally, about 9.4 million deaths annually were attributed to complications from elevated blood pressure (BP) (1, 9). Worldwide, less than half of all individuals with raised BP were aware of their condition and the rates of awareness, treatment, and control of hypertension differ according to the educational levels, income, sex, and region (10, 11, 12, 13, 14)

The World Health Organization on the global brief on hypertension reported that about 40% of adults had hypertension and that High BP accounts for 45% of all cardiovascular mortalities, and 51% of stroke-related deaths (1).

In Africa, the prevalence of hypertension in adults aged 25 and above was reported to be about 46% (3) while the Prevalence of hypertension in Nigeria according to (15) ranged from 20.9% in the North-Central to 52.8% in the South-East region. More recent studies in Nigeria have reported adults hypertension prevalence between 26.8% and as high as 55.0% (3, 16, 17, 18, 19, 20, 21). According to a systematic review in the six geographical zones, the prevalence of hypertension in Nigeria ranges between 20.9% and 52.8% (15) and 47.2% among adults (22). Hypertension cuts across every social class including Artisans as both low and high income groups may be at a greater risk of developing the disease (23). An artisan is defined as a worker in a skilled trade, highly skilled in manual arts (24).

Adeloye et al., (25) in their study projected that by the year 2030 there would be 39.1 million cases of hypertension among people aged 20 years and above in Nigeria with a prevalence of 30.8% which is a remarkable upsurge from the 20.8 million cases estimated in 2010. Also, nearly 1.6 million cases of diabetes mellitus are projected to be in Nigeria and the figures are expected to at least double by the end of 2040 (26). These suggest that there is a disturbing

increasing drift of the two conditions in the country and therefore, efforts need to be geared towards reducing this drift at all stages. Although, blood pressure (BP) and glucose levels might begin to rise earlier in life, the risk of hypertension and diabetes are higher in middle age.

Mbuya et al., (27) reported that in spite of the increase in hypertension cases in low-income countries, awareness of the problem is poor, both amongst health care workers and in the entire population. Awareness of between 29.4% and 94.4% was reported in Nigeria (15, 28, and 29). Though hypertension, diabetes and obesity are presently controlled through medical interventions, there is need for promotion of proper knowledge of the diseases (27). There is a little information on the prevalence and awareness of hypertension among the subpopulation of Artisans residing in some parts of Ebonyi State Nigeria. This study therefore aims to assess the prevalence and awareness of hypertension and obesity in artisan population with active lifestyle in Izzi and Ezza Local Government Areas of Ebonyi State, South East Nigeria

METHODOLOGY

Study Design

This study was descriptive cross sectional in design carried out in Izzi and Ezza South Local Government Areas in Ebonyi State, Nigeria. The State has a total population of 3,490,383 with farming and petty trading being the major occupation. The two LGAs, Izzi and Ezza South were randomly selected from 13 LGAs in Ebonyi state. Also, communities in the two LGAs were selected using simple random sampling technique.

Study Population

Participants were men and women artisans aged between 18 to 65 years.

Sampling and Sample Size Determination

Izzi and Ezza South Local Government Areas are made up 6 and 11 communities, respectively, Artisans 300 males (Urban :154, rural: 146) and 320 females (urban: 160; rural: 160) between 18 and 65 years were randomly selected from each of the 15 accessible communities.

Subjects and Sample Size

Using the formula for cross-sectional studies (30) the minimum sample size was determined using the formula for cross-sectional studies.

$$n = \frac{Z^2 pq}{d^2}$$

n = minimum sample size when sample frame is more than 10,000.

Z = 1.96 the standard normal deviate (or confidence coefficients), which corresponds to the confidence level adopted.

d = 5% degree of accuracy desired (Tolerance error)

p = the target population estimated to have a particular Characteristic (if there is no reasonable estimate 50% is used).

Q = 1-p (50% unaffected population).

Z = 1.96 (That is table of confidence coefficients for confidence levels in

The estimated proportion of success (of accepting the various null hypotheses) = 50%

Therefore,

$$n = \frac{Z^2 pq}{d^2} = \frac{1.96^2 (0.5) (0.5)}{0.05^2}$$
$$= 384$$

The sample size (n) for the study should therefore be three hundred and eighty four (384) respondents. The sample size was increased to 620 subjects because of attrition.

Sample Selection

Systematic random sampling was used to select each shop/household in all the enumeration areas in each local government area. These were chosen from the list of the number of eligible shops/households identified during house listing exercise in the enumeration areas. The eligible shops/households were those with men and women artisans aged between 18 to 65 years. Any selected shop/ household that was inaccessible during the data collection was replaced with the next eligible shop/household on the list.

Ethical Consideration

Ethical clearance and approval letter with reference number FUNAI/BSC/15/1296 to carry

out the project was given by Ethics Review Committee of Alex Ekwueme Federal University Ndufu Alike. Permission was sought from the authorities of the selected LGAs and communities respectively to carry out the research in the communities. The purpose of the study was explained to the participants and informed consent forms dully filled by the participants. Participants (artisans) were informed of their freedom to withdraw or refuse to take part in the study without prejudice.

Time and duration of the study:

Data collection was carried out from July to August 2019

Data Collection

A semi-structured interviewer administered questionnaire was designed and pre-tested to collect information used for this study

Anthropometry parameters such as the height of respondents were measured in meters using standard procedures and reading taken to the nearest 0.1m. Weights of respondents were measured to the nearest 0.1Kg using a portable bathroom scale (Hana Bathroom scale). Each participant was made to stand erect on the scale with light clothing and without shoes. The scale reading was zeroed after each measurement. Body mass index (BMI) was calculated by dividing the weight in Kilogram with the square of the height in meters ($BMI = \text{Weight} / \text{Height}^2$ (kg/m^2)). The BMI was categorized into Underweight: $< 18.5 \text{ kg}/\text{m}^2$, Normal = $18.5 - 24.9 \text{ kg}/\text{m}^2$, Overweight = $25-29.9 \text{ kg}/\text{m}^2$, Obesity = $30-39.9 \text{ kg}/\text{m}^2$, Morbid Obesity = $> 40 \text{ kg}/\text{m}^2$

Blood Pressure Measurement:

OMRON HEM-7202-E (V) Sphygmomanometer was used for BP measurement. Respondents sat on a chair with their feet flat on the floor and arm resting on a table and hence that their arm cuff was at their heart level. The cuff was securely applied to the upper arm of the participants using the fabric fastener strip. BP was taken from the left arm after at least 15 min of rest using appropriate cuff size. Respondents were told to be calm and not talk while their BP was being measured. The mean of two readings taken at least 5 min apart was determined. Prehypertension was defined as Systolic Blood Pressure (SBP) between 120

mmHg-139 mmHg, or Diastolic Blood Pressure (DBP) between 80 mmHg-89 mmHg and Hypertension was defined as SBP \geq 140 mmHg and DBP of \geq 90 mmHg.

Statistical Analysis:

Statistical analysis was performed using Statistical Package for the Social Science (SPSS version 23.0). Descriptive statistics, T-test and Chi square test were used to describe and summarize the Questionnaire data. Level of significance was judged at $p < 0.05$.

RESULTS

Table 1 shows some demographic and socio-economic variables of the study participants. The household size of 1-3 was the most common (36.8%) followed by those of between 7 to 9 people (30.6%). About 46.1% of the participants were married while 45.5% were single. Majority

(34.1%) had secondary school education, 3.4% had tertiary education, while 91.1% were Christians. A large majority (30.8%) were Tailor/Fashoin designers followed by hair dressers (21.1%)

Table 2 shows that the mean age (in years) of participants was 30.5 ± 11.5 (males) and 34.6 ± 13.4 (females). The mean body mass index (BMI) was 23.8 ± 2.9 kg/m^2 (males) and 24.4 ± 3.7 kg/m^2 (females). The prevalence of prehypertension and hypertension were 33.1% and 14.8%, respectively. The prevalence of hypertension was significantly higher in women (20.3%) than men (9.0%) ($P < 0.05$). Up to 68.3% male and 71.6%, female were not aware of hypertension while 69.3% male and 90.9% females had not checked their blood pressure before.

Table 1: Socio demographic and socio-economic variables of the participant

Variable	Males N (%)	Females N (%)	Total N (%)
Household Size			
1-3	57 (19.0)	171 (53.4)	228 (36.8)
4-6	98 (32.7)	69 (21.6)	167 (27.0)
7-9	126 (42.0)	64 (20.0)	190 (30.6)
10 and above	19 (6.3)	16 (5.0)	35 (5.6)
Total	300 (100.0)	320 (100.0)	620(100.0)
Marital status			
Single	91 (30.3)	191 (59.7)	282 (45.5)
Married	157(52.3)	129 (40.3)	286 (46.1)
Widow/Widower	20 (6.7)	0 (0.0)	20 (3.2)
Divorced	0 (0.0)	0 (0.0)	0 (0.0)
Separated	32 (10.7)	0 (0.0)	32 (5.2)
Total	300(100.0)	320(100.0)	620(100.0)
Level of Education			
No formal education	21 (7.0)	43 (13.4)	64 (10.3)
Primary school not completed	41 (13.7)	45 (14.1)	86 (13.9)
Primary school completed	61 (20.3)	90 (28.1)	151 (24.4)
Secondary school not completed	30 (10.0)	56 (17.5)	86 (13.9)
Secondary school completed	147 (49.0)	65 (20.3)	212 (34.1)
Tertiary education	0 (0.0)	21 (6.6)	21 (3.4)
Total	300(100.0)	320(100.0)	620 (100.0)
Religion			
Christianity	280 (93.3)	285 (89.0)	565 (91.1)
Islam	2(0.7)	12 (3.8)	14 (2.3)
Traditionalist	18 (6.0)	23 (7.2)	41 (6.6)
Total	300(100.0)	320 (100.0)	620(100.0)
Occupation			
Mechanic	44 (14.6)	4 (1.3)	48 (7.7)
Welder	59 (19.7)	0 (0.0)	59 (9.5)
Capenter	25 (8.3)	0 (0.0)	25 (4.0)
Vulcanizer	26 (8.7)	0 (0.0)	26 (4.2)
Tailor/Fashion designing	71 (23.7)	120 (37.5)	191 (30.8)
Panel beater	35 (11.7)	0 (0.0)	35 (5.6)
Hair dresser	40 (13.3)	91 (28.4)	131 (21.1)
Bead making	0 (0.0)	38 (11.9)	38 (6.1)
Bakery and decoration	0 (0.0)	67 (20.9)	67 (11.0)

Table 2: Age, Body Mass Index, Blood Pressure and Awareness of the Participants

Parameters	Males N (%)	Females N (%)	Total N (%)	P-value
Age in years				
18-27	74 (24.6)	181 (56.6)	255 (41.1)	
28-37	71 (23.7)	67(20.9)	138 (22.3)	
38-47	50 (16.7)	43(13.4)	93 (15.0)	
48 and above	105 (35.0)	29 (9.1)	134(21.6)	
Total	300 (100.0)	320 (100.0)	620(100.0)	
Mean Age (Years)	30.3±11.8	34.6±13.4	32.5±1	
Mean Height (m)	1.60±0.1	1.63±0.1	1.62±0.1	
Mean Weight (kg)	65.4±9.6	63.3±1.7	64.4±5.7	
BMI				
Mean BMI (kg/m2)	23.8±2.9	24.4±3.7	24.1±3.3	
Underweight	4 (1.3)	16(5.00)	20(3.2)	
Normal Weight	187 (62.3)	250(78.1)	437 (70.5)	
Overweight	101 (33.7)	33(10.3)	134 (21.6)	0.00
Obese	8 (2.7)	21(6.6)	29 (4.7)	0.02
Total	300 (100)	320(100.0)	620(100.0)	
Blood Pressure level				
Normal	164 (54.7)	159 (49.7)	323(63.6)	
Pre-hypertension	109 (36.3)	96 (30.0)	205(33.1)	
Hypertension	27 (9.0)	65(20.3)	92(14.8)	0.00
Total	300 (100.0)	320 (100.0)	620 (100.0)	
Respondents' knowledge of high blood pressure				
Have you ever heard about hypertension?				
Yes	95 (31.7)	91(28.4)	186(30.0)	0.38
No	205(68.3)	229(71.6)	434(70.0)	0.38
Have you measured your blood pressure before?				
Yes	92(30.7)	29(9.1)	121(19.5)	0.00
No	208(69.3)	291(90.9)	499(80.5)	
How often do you measure Your blood pressure?				
Daily	0(0.00)	0(0.0)	0(0.0)	
Weekly	6(2.0)	6(1.90)	12(1.9)	
Monthly	40(13.3)	44(13.8)	84(13.5)	
Others	254(84.7)	270(84.4)	524(84.5)	
Do you smoke				
Yes	38(12.7)	13(4.1)	51(8.2)	
No	262(87.3)	307(95.9)	569 (91.8)	
Have you ever been advised to lose weight?				
Yes	2(0.7)	9(2.8)	11(1.8)	
No	298(99.3)	311(97.2)	609(98.2)	

DISCUSSION

The highest house hold size was in the 1-3 (36.8%) persons range, there was slightly higher percentage of married persons, the sample had higher secondary school certificate holders followed by primary school certificate holders, the population was predominantly Christians and the greater percentage of the artisans were in the fashion-related businesses. These socio demographic and socio-economic results are in tandem with the nature of the population.

The prevalence of hypertension was 14.8% (males: 9.0% and females: 20.3% $P < 0.05$) and prehypertension was 33.1% (males: 36.3%, female s: 30.3% $P > 0.05$) in this study.

The prevalence of hypertension of 14.8% was lower in comparison with the overall prevalence of 38.1% reported in data from nationwide survey in Nigeria (15). Also, Compared to other community-based hypertension studies in Nigeria, the overall prevalence of hypertension in this study was lower than studies conducted by (3, 19, 31, 32, 33, 34, 35, 36) who reported prevalence of 21.1%, 23.6%, 33.1%, 18.3%, 32.8%, 38.2%, 55.0% and 27.5% in Nsukka, Akwa Ibom and Cross River, Ibadan North Local Government, Kegbara-Dere, Enugu north, Ajegunle and Lagos respectively. The possible reason for low prevalence of hypertension in this study may be because of their age range where about 65% of the participants were between age of 18 and 47 years. This is corroborated with the report of (30) who in their study at Nsukka, South-east Nigeria reported that Blood pressure showed a consistent increase with age in both men and women. Also, another study in Kogi state, Nigeria reported that blood pressures increased with age and body mass index (37)

Compared to community-based studies in other parts of the world, prevalence of hypertension in this study was the same with 15% found among adults residents of Karen ethnic rural community, Thasongyang, Thailand (36) but lower than 27.1%, 29.9%, 33.1%, 30.3%, 33.7%, % found in 45.7% Adansi South, Ghana; Rukungiri district in Uganda, Mozambique, Central India, Ansas-city, Korea and Sichuan Tibetan, China respectively (38, 39, 340, 41, 42, 43).

The prevalence of hypertension was lower in males (9.0%) than in females (20.3%). This is in contrast to some studies by (3, 30, 31, 44, 45, 46) who reported higher prevalence of hypertension in men than women in their studies in South East Nigeria, Eastern Nigeria, Ibadan North local government, Nsukka in Enugu state and Jordan and China respectively but consistent with the findings of (47) who reported that prevalence of hypertension was higher among females compared to males in a survey of hypertension in an older adult population in South Africa. Some other studies in Arab countries was consistent with this finding (48, 49, and 50). The percentage of subjects who measured their blood pressure were about 19.5% (men: 30.7%; women: 9.1% ($p < 0.05$)). One of the possible explanations for low prevalence of hypertension in men could be explained by the fact that in this study, more men were aware of hypertension and also more men checked/measured their blood pressure than women.

Wide-range disparity in prevalence, awareness and treatment of hypertension are recorded in different countries and regions of the world (18, 51). The difference of prevalence detected between the present study and other studies with respect to hypertension and prehypertension could be due to social and cultural differences, sex, age, race, physical activity, dietary and lifestyle factors as well as regional variations (52, 53 and 54). Chadha et al., (52) reported that higher intake of sodium is one of the important contributing factors for high blood pressure in urban population and this could be due to the excessive intake of ready-to-eat foods which are usually rich in sodium.

Mezue (55), in a review of prevalence of hypertension in Nigeria recommends that salt reduction in the diet at the population-wide level as a means of reducing the burden of hypertension in Nigeria.

Awareness of hypertension was 30.0% (males 31.7%, females 28.4% $P < 0.05$). This is higher than the awareness of 17.5% reported by (15) in their study in Nigeria but lower than the awareness of 91.9% and 93.2% reported by (27) in their study in primary care clinic, and referral

clinic respectively but the same with awareness of 29.4% reported by (27) for a community in the same study in Enugu, Southeast Nigeria. Awareness of hypertension is a vital factor in early detection and management of the disease (56, 57). Effective detection, treatment and control of hypertension are vital for prevention of resultant cardiovascular and kidney diseases, and ultimately, in reducing mortality (58).

In this study, Obesity was significantly higher in females (6.6%) than in men (2.7%) ($P < 0.05$). This result is in line with the report of (59, 60, 61) in Nigeria who reported higher obesity in females than males but in contrast to the report of (62) in Delhi who reported that obesity was significantly higher in males than in females. This result also showed that hypertension is significantly higher in females than males. It is possible that the obesity in female in addition to lower awareness of hypertension may have contributed to their increased percentage of hypertension. One of the probable reasons behind this positive relation between obesity and hypertension could be that increased weight could reduce physical activity which leads to obesity and subsequently results in hypertension.

Conclusion: About one third of the population was prehypertensive even though the prevalence of hypertension was low compared to other studies in Nigeria. The result also showed poor awareness of hypertension and poor monitoring of blood pressure. There is an urgent need for intensive health education, community-based blood pressure screening in the communities to scale up awareness, prevention and control of high blood pressure and other non-communicable diseases in Nigeria.

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Authors' Contribution

All the authors made specific contributions to the research work. Author **GNO** conceived the study. Author **MOI** designed the study, Authors **KOI**, **ICB** performed the field work and managed the literature search. Author **GOU** wrote the first draft of the manuscript. Author **GNO** managed the statistical analysis of the study and wrote the final draft of the manuscript. All authors read and approved the final manuscript.

Competing Interest

The authors declare that there is no competing interests.

Consent for Publication

Consent for publication is not necessary because this manuscript does not have personal data like individual details, images or videos.

Ethics Approval and Consent to participate

Ethical clearance was given by Ethics committee of Alex Ekwueme Federal University Ndufu Alike. Permission also was obtained from the Local Government authorities and the community Chiefs. The purpose of the study was explained to the artisans who gave their consents and also dully filled the informed consent forms. Participants (artisans) were informed of their freedom to withdraw, or refuse to take part in the study without prejudice.

REFERENCES

1. World Health Organization. (2013). Global brief on hypertension. : Silent killer, global public health crisis: World Health Day 25 June 2013, Geneva.
2. Forouzanfar M H, Liu P, Roth GA, et al.(2015). Global burden of hypertension and systolic blood pressure of at least 110 to 115 mmHg, 1990–2015. *JAMA*. 2017; 317(2): 165- 182.
3. Ajayi, I.O., Sowemmimo, I., Akpa, O.M and Ossai, N.E. (2016). Prevalence of hypertension and association factors among residents of Ibadan-North Local Government Area of Nigeria. *Nigeria Journal of cardiology* 13:67-7

4. Ekere AU, Yellowe BE, Umune S. (2005). Mortality patterns in the accident and emergency department of an urban hospital in Nigeria. *Niger J Clin Pract.*, 8:14-8.
5. Ogunniyi A, Baiyewu O, Gureje O, Hall KS, Unverzagt F W, Oluwole SA, et al. (2001). Morbidity pattern in a sample of elderly Nigerians resident in Idikan community, Ibadan West. *Afr. J. Med*, 20: 227-31
6. Shatnawi N J, Al-Zoubi N A, Hawamdeh H M, et al. (2018). Predictors of major lower limb amputation in type 2 diabetic patients referred for hospital care with diabetic foot syndrome. *Diabetes Metab. Syndr. Obes.* 11; 313-9.
7. World Health Organization. (2010). *Global Status Report on Non-Communicable Diseases 2010*. Geneva, Switzerland: World Health Organization; 2011
8. Prabakaran J., Vijayalakshmi N., VenkataRao E. (2013). Prevalence of hypertension among urban adult population (25–64 years) of Nellore. *International Journal of Research & Development of Health.* 1(2):42–49.
9. Ivers N, Jamtvedt G, Flottorp S, Young J M, Odgaard-Jensen J et al. (2012). Audit and feedback: effects on professional practice and healthcare outcomes. *Cochrane Database Syst Rev.* 13;(6):CD000259. doi: 10.1001/jama.2013.184182. PMID: 24002282.
10. Chow C K, Teo K K, Rangarajan S, Islam S, Gupta R, et al. (2013). Prevalence, awareness, treatment, and control of hypertension in rural and urban communities in high-, middle-, and low-income countries. *Pubmed.gov. JAMA.* 2013 Sep 4; 310(9):959-68. doi: 10.1097/HJH.0000000000000413. PMID: 24002282.
11. Zhang Y and Moran A E. (2017). Trends in the Prevalence, Awareness, Treatment, and Control of Hypertension among Young Adults in the United States, 1999 to 2014. *Hypertension.* 70:736–742.
12. Li W, Gu H, Teo KK, Bo J, Wang Y, et al. (2016). Hypertension prevalence, awareness, treatment, and control in 115 rural and urban communities involving 47 000 people from China. *J Hypertens.* 2016 Jan; 34(1):39-46. doi: 10.1097/HJH.0000000000000745. PMID: 26630211.
13. Roy A, Praveen P A, Amarchand R, Ramakrishnan L, Gupta R. (2017). Changes in hypertension prevalence, awareness, treatment and control rates over 20 years in National Capital Region of India: results from a repeat cross-sectional study. *BMJ Open.* 2017 Jul 12; 7(7):e015639. doi: 10.1136/bmjopen-2016-015639. PMID: 28706098; PMCID: PMC5734355
14. Guo F, He D, Zhang W, Walton RG. (2012). Trends in prevalence, awareness, management, and control of hypertension among United States adults, 1999 to 2010. *Journal of the American College of Cardiology.* 2012; 60:599–606.
15. Odili AN, Chori BS, Danladi B, Nwakile PC, Okoye IC et al. (2020). Prevalence, Awareness, Treatment and Control of Hypertension in Nigeria: Data from a Nationwide Survey 2017. *Glob Heart.* 2020 Jul 10; 15(1):47. doi: 10.5334/gh.848. PMID: 32923341; PMCID: PMC7427662
16. Moawad, M. A., & Hassan, W. (2005). Update in hypertension: the Seventh Joint National Committee report and beyond. *Annals of Saudi medicine,* 25(6), 453-458.
17. Webster's New World College Dictionary. (2010). 4th Edition. Copyright © 2010 by Houghton Mifflin Harcourt. All rights reserved.
18. Adeloye D, Basquill C, Aderemi A V, Thompson JY, Obi FA. (2015). An estimate of the prevalence of hypertension in Nigeria: a systematic review and meta-analysis. *J Hypertens.* 2015; 33(2): 230–42. DOI: 10.1097/HJH.0000000000000413.
19. Arugu G M and Maduka O. (2017). Risk factors for diabetes mellitus among adult residents of a rural district in southern Nigeria: implications for prevention and control. *Niger. J. Clin. Pract.* 20: 1544-9
20. Ojima Z W, David B O, Temitope D A et al. (2020). Prevalence of hypertension among

- rural adults and availability of management services in Abimbola community, ayedaade local government area, Osun State, Nigeria. *J Hypertens Manag* 2020; 6. doi:10.23937/2474-3690/1510046
21. Ebirim C I C. (2018). Prevalence of hypertension among adults aged 40 years and above in Ahiazu Mbaise, Imo State, Nigeria. *Arch Community Med. Public Health* 2018; 013-16. Doi: 10.17352/2455-5479.000034
 22. Okubadejo, N.U., Ozoh, O.B., Ojo, O.O. et al. (2019). Prevalence of hypertension and blood pressure profile amongst urban-dwelling adults in Nigeria: a comparative analysis based on recent guideline recommendations. *Clin Hypertens* 25, 7. <https://doi.org/10.1186/s40885-019-0112-1>
 23. Ayogu R.N.B, Ezeh G. M, Okafor A.M. (2021). Prevalence and predictors of different patterns of hypertension among adults aged 20–60 years in rural communities of Southeast Nigeria: a cross-sectional study. *J. Archives of Public Health* volume 79, Article number: 210 (2021).
 24. Osunkwo D, Mohammed A, Kamateeka M, et al. (2020). Population-based prevalence and associated risk factors of hypertension among adults in Benue state, Nigeria. *Niger J. Clin. Pract.* 2020; 23: 944. doi:10.4103/njcp.njcp_354_19pmid:<http://www.ncbi.nlm.nih.gov/pubmed/3262072>
 25. Akinlua, J.T., Meakin, R, Umar, A.M. and Freemantle, N. (2015). Current prevalence pattern of hypertension in Nigeria: A systematic review. *PLoS one.* 10 (10): e0140021 Published online 2015 Oct 13. doi: 10.1371/journal.pone.0140021
 26. Mbuya FE, Fredrick F, Kundi B. (2014). Knowledge of diabetes and hypertension among members of teaching staff of higher learning institutions in Dares Salaam, Tanzania. *Tanzania. J Health Res.* 2014; 16:98–103.
 27. Chijioke C, Anakwue R, Okolo T, Ekwe E et al. (2016). Awareness, Treatment, and Control of Hypertension in Primary Health Care and Secondary Referral Medical Outpatient Clinic Settings at Enugu, Southeast Nigeria", *International Journal of Hypertension*, vol. 2016, Article ID 5628453, 5 pages, 2016. <https://doi.org/10.1155/2016/5628453>
 28. Anyanti J, Akuiyibo SM, Fajemisin O, et al. (2021). Assessment of the level of knowledge, awareness and management of hypertension and diabetes among adults in Imo and Kaduna states, Nigeria: a cross-sectional study. *BMJ Open* 2021; 11:e043951. doi: 10.1136/bmjopen-2020-043951
 29. Frankfort-Nachmias, C. and Nachmias, D. (1996). *Research Methods in the Social Sciences*. Fifth Edition, Arnold, London.
 30. Ekwunife, O. I., Udeogaranya, P. O., Nwatu, I. L. (2010). Prevalence, awareness, treatment and control of hypertension in a Nigerian population. *Health*, 2 (7), 731-735.
 31. Onwubere B J, Ejim E C, Okafor C I, Emehel A, Mbah A U, Onyia U, et al. (2011). Pattern of blood pressure indices among the residents of a rural community in South East Nigeria. *Int J Hypertens*; 2011:621074.
 32. Onwuchekwa A C, Mezie-Okoye M M, Babatunde S. (2012). Prevalence of hypertension in Kegbara-Dere, a rural community in the Niger Delta region, Nigeria. *Ethn Dis*; 22:340-6.
 33. Ulasi I I, Ijoma C K, Onodugo O D. (2010). A community-based study of hypertension and cardio-metabolic syndrome in semi-urban and rural communities in Nigeria. *BMC Health Serv Res* 2010; 10:71.
 34. Daniel O J, Adejumo O A, Adejumo E N, Owolabi R S, Braimoh R W. (2013). Prevalence of hypertension among urban slum dwellers in Lagos, Nigeria. *J Urban Health* 2013; 90:1016-25.
 35. Andy J J, Peters E J, Ekrikpo U E, Akpan N A, Unadike B C, Ekott J U. (2012). Prevalence and correlates of hypertension among the Ibibio/Annangs, Efiks and Obolos: A cross sectional community survey in rural South-South Nigeria. *Ethn Dis* 2012; 22:335-9.
 36. Aung M N, Lorga T, Srikrajang J,

- Promtingkran N, Kreuangchai S, Tonpanya W, et al. (2012). Assessing awareness and knowledge of hypertension in an at-risk population in the Karen ethnic rural community, Thasongyang, Thailand. *Int J Gen Med*; 5:553-61.
37. Ejike, C.E.C.C., Ugwu, C.E., Ezeanyika, L.U.S. and Olayemi, A.T. (2008). Blood pressure patterns in relation to geographic area of residence: A cross-sectional study of adolescent in Kogi State, Nigeria. *BMC Public Health* 8 (1), 411
 38. Duah AF, Werts N, Hutton-Rogers L, Amankwa D, Otupiri E. (2013). Prevalence and risk factors for hypertension in Adansi South, Ghana. *Sage J* 2013; Vol.3.4 2158244013515689
 39. Wamala J F, Karyabakabo Z, Ndungutse D, Guwatudde D. (2009). Prevalence factors associated with hypertension in Rukungiri district, Uganda – A community-based study. *Afr Health Sci* 2009;9:153-60
 40. Damasceno A, Azevedo A, Silva-Matos C, Prista A, Diogo D, Lunet N. (2009). Hypertension prevalence, awareness, treatment, and control in Mozambique: Urban/rural gap during epidemiological transition. *Hypertension* 2009; 54:77-83.
 41. Asgary R, Galson S, Shankar H, O'Brien C, Arole S. (2013). Hypertension, pre-hypertension, and associated risk factors in a subsistent farmer community in remote rural central India. *J Public Health*, 21:251-8.
 42. Jo I, Ahn Y, Lee J, Shin K R, Lee H K, Shin C. (2001). Prevalence, awareness, treatment, control and risk factors of hypertension in Korea: The Ansan study. *J Hypertens*, 19:1523-32.
 43. Xiaobo Huang, Zhengyang Zhou, Jianxiong Liu, Weifang Song, Yong Chen, Ya Liu, Mingyu Zhang, Wen Dai, Yanjing Yi & Shuiping Zhao. (2016). Prevalence, awareness, treatment, and control of hypertension among China's Sichuan Tibetan population: A cross-sectional study, *Clinical and Experimental Hypertension*, 38 : 5 , 4 5 7 - 4 6 3 , D O I : 10.3109/10641963.2016.1163369
 44. Ahaneku G I, Osuji C U, Anisiuba B C, Ikeh VO, Oguejiofor O C, Ahaneku J E.(2011). Evaluation of blood pressure and indices of obesity in a typical rural community in eastern Nigeria. *Ann Afr Med*, 10:120-6.
 45. Khader Yousef, Batieha Anwar , Jaddou Hashem , Rawashdeh I Sukaina. , El-Khateeb Mohammed, Hyassat Dana, Khader Albaraa , and Ajlouni Kamel . (2019). Hypertension in Jordan: Prevalence, Awareness, Control, and Its Associated Factors. *Int J Hypertens*, 2019: 3210617. Published online 2019 May 2. doi: 10.1155/2019/3210617
 46. Zhao X, Li S, Ba S, He F, Li N, Ke L, et al.(2012). Prevalence, awareness, treatment, and control of hypertension among herdsmen living at 4,300 m in Tibet. *Am J Hypertens*, 25:583-9
 47. Peltzer K, Phaswana-Mafuya N. (2013). Hypertension and associated factors in older adults in South Africa. *Cardiovasc J Afr*, 24:67-71.
 48. Ibrahim M. M., Rizk H., Appel L. J., et al. (1995). Hypertension prevalence, awareness, treatment, and control in Egypt: Results from the Egyptian National Hypertension Project (NHP) *Hypertension*, 26(6):886–890.
 49. Tazi M. A., Abir-Khalil S., Chaouki N., et al. (2003). Prevalence of the main cardiovascular risk factors in Morocco: results of a National Survey. *Journal of Hypertension*, 21(5):897–903.
 50. Bener A., Al-Suwaidi J., Al-Jaber K., Al-Marri S., Elbagi I. E. A.(2004). Epidemiology of hypertension and its associated risk factors in the Qatari population. *Journal of Human Hypertension*, 18(7):529–530. doi: 10.1038/sj.jhh.1001691.
 51. Mugwano I, Kaddumukasa M, Mugenyi L, Kayima J, Ddumba E, Sajatovic M, et al., (2016). Poor drug adherence and lack of awareness of hypertension among hypertensive stroke patients in Kampala, Uganda: A cross sectional study. *BMC Res Notes*. 2016; 9: 3 DOI: 10.1186/s13104-

- 015-1830-4.
52. Chadha SL, Gopinath N, Shekhawat S. (1997). Urban-rural differences in the prevalence of coronary heart disease and its risk factors in Delhi. *Bull World Health Organ*, 75:31–8.
 53. Levine D A, Lewis C E, Williams O D, Safford M M, Liu K, Calhoun D A, et al., (2011). Geographic and demographic variability in 20-year hypertension incidence: the CARDIA study. *Hypertension*, 57:39–47.
 54. Erceg M, Kern J, Babic-Erceg A, Ivcevic-Uhernik A, Vuletic S. (2009). Regional differences in the prevalence of arterial hypertension in Croatia. *Coll Antropol*, 33:19–23.
 55. Mezue Kenekukwu. (2013). The increasing burden of hypertension in Nigeria - can a dietary salt reduction strategy change the trend? *Perspect Public Health*. 2014 Nov; 134(6):346-52.
 56. Gudina K, Bonsa F, Gudina EK, et al., (2014). Prevalence of hypertension and associated factors in bedele town, southwest ethiopia. *Ethiop J Heal Sci*, 24:21–26.
 57. Njelekela MA, Mpembeni R, Muhihi A, et al., (2009). Gender-related differences in the prevalence of cardiovascular disease risk factors and their correlates in urban Tanzania. *BMC Cardiovasc Disord*. 2009; 9:30.
 58. Pereira M, Lunet N, Azevedo A, Barros H. (2009). Difference in prevalence, awareness, treatment and control of hypertension between developing and developed countries. *J. Hypertens*, 271; 963-975
 59. Oladoyinbo C A, Ekerette N N Ogunbi T I. (2015). Obesity and Hypertension amongst traders in Ijebu Ode, Nigeria. *Afr.J.Biomed. Res*. Vol. 18; 23-27
 60. Eze E.C. and Kadiri S. (2020). Blood pressure, Hypertension and obesity in young adults in a Tertiary Health Institution in South-west Nigeria. *Afri.J.Biomed. Res* Vol.23;81-84
 61. Amole I O, OlaOlorun A D, Odeigha L O, Adesina S A. (2011). The prevalence of abdominal obesity and hypertension among adults in Ogbomosho Nigeria. *African J. of Primary Health care and Family Medicine* 3(1); 118-112.
 62. Garg A, Anand T, Sharma U, Kishore J, Chakraborty M. (2014). Prevalence of Risk Factors for Chronic Non-communicable Diseases Using WHO Steps Approach in an Adult Population in Delhi. *J Family Med Prim Care*, 3(2); 112-8.