RISK FACTORS OF HYPERTENSION AMONG ADULTS IN A SEMI URBAN COMMUNITY IN SOUTH WEST NIGERIA

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ABSTRACT

Recent studies have shown an increasing trend in the prevalence of hypertension in rural communities. This study aimed to investigate the prevalence of risks factors for hypertension among the residents of Likosi town, Sagamu local government area, Ogun state, Nigeria. A descriptive cross-sectional design was used. 350 respondents aged from 20-80 years were recruited. Hypertension was defined as Systolic blood pressure (SBP) 140 and/or Diastolic blood pressure (DBP) 90. statistical analysis was performed using the SPSS package.
The prevalence of hypertension was 23.3% (male 11.2% and female 12.1%). The mean age of the respondents was 37.5years. Mean systolic and diastolic BP were 124.25 ± 15.05 mmHg and 83.45 ± 9.49 mmHg, respectively. Higher odds of being hypertensive were found in 31-40 age group, The prevalence of the various classes of body mass index of the respondents were 18.5%, 45.1%, 15.1% and 24.3% for underweight, normal, overweight and obese respectively. Alcohol and tobacco use were found in 34.5% and 15.4% respectively. Hypertension was significantly associated with age groups 30-49 years (OR 2.258, 95% CI: 1.311 - 3.884),. Tobacco and alcohol consumption, overweight and obesity were also associated with hypertension

Keywords: hypertension, prevalence, risk factors, body mass index

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INTRODUCTION

Hypertension, a major public health problem challenge worldwide usually occurred as a result of environmental influences acting over time on the genetically predisposed individual (George 1967 ,Lopez *et al* 2003). It has become a significant problem in many developing countries, with majority of them experiencing epidemiological transition from communicable to non communicable chronic diseases. The emergence of hypertension as a public health problem in these countries is strongly related to the aging of the populations, urbanization and socioeconomic changes that favors sedentary habits, obesity, alcohol consumption, and salt intake among others(Lopez *et al* 2003).
Risk factors such as smoking, obesity or being overweight, diabetes, sedentary lifestyle, lack of physical activity, high levels of salt intake (sodium sensitivity), insufficient calcium, potassium, and magnesium consumption, vitamin D deficiency, high levels of alcohol consumption, stress, aging, medicines such as birth control pills, genetics and a family history of hypertension, chronic kidney disease, adrenal and thyroid problems or tumours have been highly associated with the condition (Mabuza 2009). Hypertension often coexists with other cardiovascular risk factors, such as diabetes, hyperlipidemia and obesity, which compound the cardiovascular risk attributable to hypertension. Often times, these coexistent risk factors are inadequately addressed in patients with hypertension, resulting in high morbidity and mortality (Klungel *et al.* 1999). It has become increasingly evident that hypertension which is one of the risk factors of stroke, ischemic heart disease

and renal failure are not confined to a subset of the population with particularly high levels of blood pressure, but rather, it is a risk factor even in a continuum moderate level of blood pressure (MacMahon *et al* 1990).
In 2001, chronic diseases contributed approximately 60% of the 56.5 million total reported deaths in the world and approximately 46% of the global burden of disease (World Health Organization 2002). The proportion of the burden of non-communicable diseases is expected to increase to 57% by 2020 (World Health Organization 1998). Hypertension is also recognized as a silent killer due to the damages it causes on the target organs on a continuous and progressive basis until symptoms are manifested (Macmillan *et al* 1990). It increases the chance of an individual's risk of having various cardiovascular diseases by two to three times with devastating consequences (Padwal *et al* 2001).
Recently, the prevalence of predisposing factors to hypertension, is rising in developing countries and the burden is worse in persons with lower socioeconomic status (World Health Organisation, 2002). Hypertension is becoming an increasingly common health problem worldwide because of increasing longevity and prevalence of contributing factors (Yusuf *et al.*2000). The current prevalence in many developing countries particularly in urban societies is already as high as those seen in developed countries (Vorster HH. 2002). There are usually no symptoms associated with high blood pressure, so many people with high blood pressure are unaware they have it (Russell et al 1991). In Nigeria, awareness is poor as only 33.8% of hypertensive are aware of their condition (Familoni *at al* 2002, Akinkugbe *et al* 2003, Kadiri *et al*. 2005). Moreover, the more worrisome situation is the trend of poor blood pressure control worldwide. .A study revealed that slightly more than half of adults with hypertension were aware of their disease, fewer than half were treated for their hypertension with medications; and less than two-thirds were controlled to <140/90 mmHg with medication (Marques-Vidal & Toumilehto 1997). Futhermore, a situation that has been called “the rule of halves” is becoming rampant. In most communities, only about 50% of those who are hypertensive are aware of their condition and less than 50% of those who are aware are receiving adequate treatment (Marques-Vidal & Toumilehto 1997).
In Nigeria, the prevalence of high blood pressure was between ten and fourteen percent based on a national survey conducted over a decade ago (Familoni *et al* 2002, Akinkugbe *et al* 2003). Since that survey, social and demographic changes have taken place which may influence changes in the prevalence and epidemiology (Kadiri *et al.* 2005).. A recent community based study of rural and semi-urban areas in Enugu, Nigeria, put the prevalence of hypertension in Nigeria at 32.8% (Effiong *et al.* 2015), while a meta analytical study published recently estimated the country wide prevalence to be between 12.4% and 34.8%, this means that 20 to 56million Nigerians are hypertensive (Kadiri *et al.* 2005). The aims of the study is therefore, to determine the prevalence of Hypertension and its associated risk factors in the semi urban community. in order to reduce the risk of developing cardiovascular diseases and associated morbidity and mortality.

Methodology

Description of the Study Area

The study was carried out in Likosi town of Ogijo community under the Sagamu Local Government Area of Ogun State. Likosi community is in the North East Area of Sagamu with a geographical coordinate of 6 42' 0" North, 3 31' 0" East.. It has a population of about two hundred and fifty thousand. The study population consisted of adults (males and females) in Likosi area of Ogijo between the ages of twenty (20) and eighty (80) years.

Eligibility Criteria: Inclusion and exclusion criteria

Adults in Likosi community between the ages of twenty (20) and eighty (80) years who were willing to participate in the study were recruited into the study. Those who were less than 20 years as at last birthday were excluded from the study.

Study Design

The study was a cross sectional descriptive survey aimed at determining the prevalence of hypertension risk factors among adults in Likosi Community of Sagamu Local Government area, Ogun State.

Sample Size Determination
The sample size was determined using the formula:
n = z2 p.q
d2 Where,
n = desired sample size
z = the standard normal deviate set at1.96 confidence interval
p = proportion estimated to be obtainable in target population (34.8%)
q = proportion that does not have the characteristic being investigated i.e. q = 1- p
d = degree of accuracy required = 0.05
Therefore,
Approximately 350

Sampling Methodology
A multi-stage random sampling technique was used for the selection of respondents for the questionnaire.

Stage I: The selection of Likosi community was done by random sampling method.

Stage II: Fourteen streets were randomly selected and 25 respondents were randomly selected in each of the selected streets.

Stage III: A total of three hundred and fifty (350) respondents were given questionnaires and their blood pressure measured.
Participants were recruited from the market / work place(s) and from their residences.

Data Collection Instruments
An interviewer administered questionnaire method was used. The questionnaire was developed after a review of the literature. It was pretested in Simawa community in Mowe Local Government Area. The blood pressure was taken using Aneroid sphygmomanometer on the right arm after 10-minute rest in a sitting position. The first and fifth phases of Korotkoff sounds were taken as systolic and diastolic blood pressure, respectively. Average two readings were recorded as the subject blood pressure. Blood pressure measurements were done by the interviewer. Measurements were done between the hours of 9 am and 11 am. The body mass index was determine using standard method. Weight and height were measured using a standard weighing scale and Seca stadiometer respectively. The pre-test was conducted on a sample size of 50 respondents. The Body mass index (BMI) was calculated as weight / (height)^2. Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC 7) classification was used for hypertension (Chobanian *et al* 2003). Hypertension was defined as systolic BP level of ≥ 140 mmHg and/or diastolic BP level of ≥ 90 mmHgl.Hypertension was defined as Systolic blood pressure (SBP) ≥ 140 and/or Diastolic blood pressure (DBP) ≥ 90mm Hg.

Data Collection Techniques Procedures
The survey was conducted among adults between the ages of twenty (20) and eighty (80) years old in the Likosi area of Ogijo community. The study was introduced to the respondents and they were info rmed that questionnaires will be filled following which their blood pressure, weight and height will be measured. They were assured of confidentiality.
Respondents were selected at random from the market, offices and from places of residence.
The method/ instrument used in collecting data was questionnaire (privately filled face to face questionnaire). Face to face interview is preferred to self-administration of questionnaire because field experiences in Nigeria show that the former usually yield better rates of responses and produces good quality data than the latter (Ulasi II *et al* 2010).

Data Analysis
The data collected were collated and statistical analysis was performed using the SPSS 16

Results
A total of 350 subjects participated in the study. Out of these, 193 (55.1%) were male subjects and 157(44.9%) were female. The highest proportion of the respondents (136,38.9%) were found in the age range 31-40yrs. The median age (37.5± 11.6 SD) of the study subjects was 37.0 (±11.9) years and for male and female it was 36.0 (±11.9) years and 38 (±11.8) years, respectively. Majority of the participants 253,72.3% had primary education, while 79(22.5%) and 9(2.5%) had secondary and tertiary education respectively. Majority of the participants were married (215, 61.4%) while 98 (28%) and 37(10.6) were divorced (TABLE 1).

Table 1: Characteristics of respondents

Biodata	Frequency (n = 350)	Percentage (%)
Age in years		
20 – 30	81	23.1
31- 40	136	38.9
41 – 50	75	21.4
51 – 60	40	11.4
61 – 70	15	4.3
71 – 80	3	0.9
Gender		
Males	193	55.1
Females	157	44.9
Educational Level		
None	9	2.5
Primary	9	2.5
Secondary	79	22.5
Tertiary	253	72.3
Religion		
Christianity	176	50.3
Islam	172	49.1
Religion	2	0.6
Marital Status		
Single	98	28
Married	215	61.4
Seperated	37	10.6

The prevalence of hypertension was found to be 23.7% . Mean (±SD) BMI of the study subjects was 24.8±3.82 kg/m2; for men it was23.72±3.81 kg/m2 and for women it was 24.42±3.92kg/m2.The prevalence of BMI (kg/m 2) of the respondents 18.3%,45.1%,15.1%, and 21.4%, were. underweight, normal, overweight, and obese respectively (table 4). More than half (63.4%) of the respondents were either underweight or normal while 36.5% were either overweight or obese.
15.4% of respondents engage in drinking of alcohol{>21 unit of alcohol per week for male and 14 unit of alchol for female), cigarette smoking 34.6%,(at least pack of cigarrette per day) as well as inactivity in 55.1%.

Table 2 depicts blood pressure profile according to the different age groups. The mean values of systolic and diastolic BP according to age **table 3.** The mean systolic and diastolic BP of all the study subjects were 126.2±15.0mmHg and 85.2±10 mmHg, respectively. The highest mean systolic BP and mean diastolic BP were among the 51-60 age group and age group (41–50 years), respectively. With regard to systolic BP, there was significant difference among all the age groups among and the same was with diastolic BP as well.

Table 2: Blood Pressure Profile Within Age Groups

Age groups	Frequency and Percentage	
	Normal	High
20 – 30 years	72 (20.6%)	9 (2.6%)
31 – 40 years	106 (30.3%)	30 (8.6%)
41 – 50 years	57 (16.3%)	18 (5.1%)
51 – 60 years	23 (6.6%)	17 (4.9%)
61 – 70 years	6 (1.7%)	9 (2.6%)
71 – 80 years	3 (0.9%)	–
Total	**267 (76.3%)**	**83 (23.7%)**

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-60 وي	و□ىي□ي□ىو و ى	يد□ووى□ى يد يد
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The prevalence of isolated systolic BP was found to be 3.4.6% and isolated diastolic BP was 19.7%. figure1. However the age range of 31 – 40 years had the highest hypertensive. While the prevalence rate of hypertension for this study was found to be 23.7% . Table 4 shows the associated factors of hypertension, education status, alocohol use, tobacco use, and physical activity were significantly associated with the hypertension status of the study subjects.

The rate of hypertension were higher among female not statistically significant (p =0.378293)... Hypertension was found to be low among illiterate subjects. Tobacco use and alcohol use were found to be risk (fig 2 and 3) factors for being hypertensive in the study subjects. Alcohol use was significantly associated with hypertension status (p=.000241).

FIG 1; ISOLATED SYSTOLIC AND DIASTOLIC BP BY AGE AND GENDER

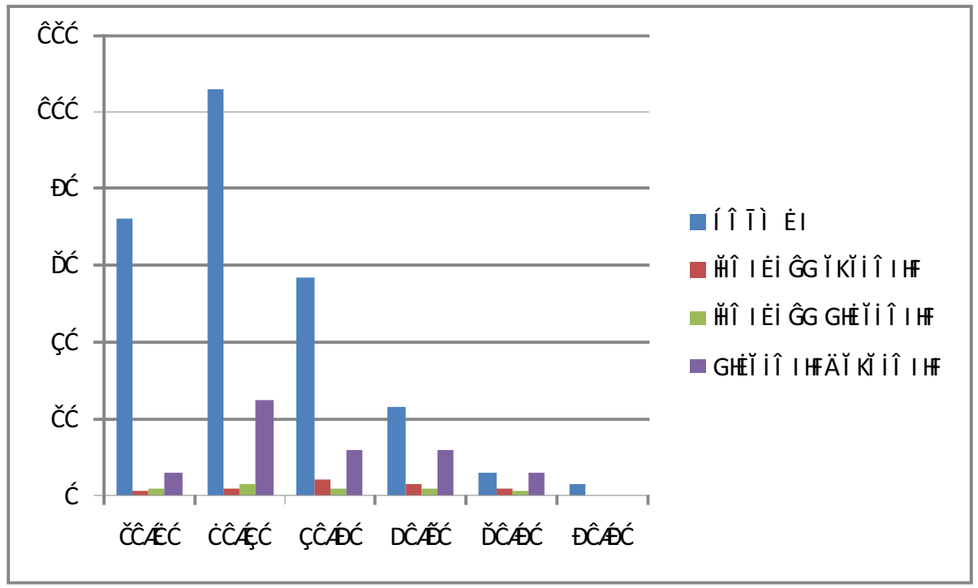

Table 4: Prevalence of hypertension according to behavioral risk factors and sociodemographic characteristics

VARIABLES	HYPERTENSIVES	NONHYPERTENSIVE%	TEST OF SIGNIFICANCE USING X^2, P VALUE ÆÊ BÉDÅ
LEVEL OF EDUCATION			0.037138
NONE	3	6	
PRIMARY	4	5	
SECONDARY	26	53	
TERTIARY	50	203	
TOTAL	**83**	**267**	
FAMILY HISTORY OF HYPERTENSION			< .00001.
POSITIVE FAMILY HISTORY	31	186	
NEGATIVE FAMILY HISTORY	52	81	
TOTAL	83	267	
BODY MASS INDEX			< 0.00001
<25.0	4	60	
25.0-29.9	18	140	
30.0 -34.9	21	32	
>35	40	35	
SEX			0.378293
MALE	40	114	
FEMALE	43	153	
PHYSICAL ACTIVITY MEET WHO PHYSICAL ACTIVITY			0.001997
NO	58	135	
YES	25	132	
TOBACCO USE			< 0.00001
NEVER	23	188	
STOPPED	26	59	
STILL SMOKING	34	20	
ALCOHOL USE			0.000241

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Figure 2. ASSOCIATION BETWEEN ALCOHOL USE AND BLOOD PRESSURE

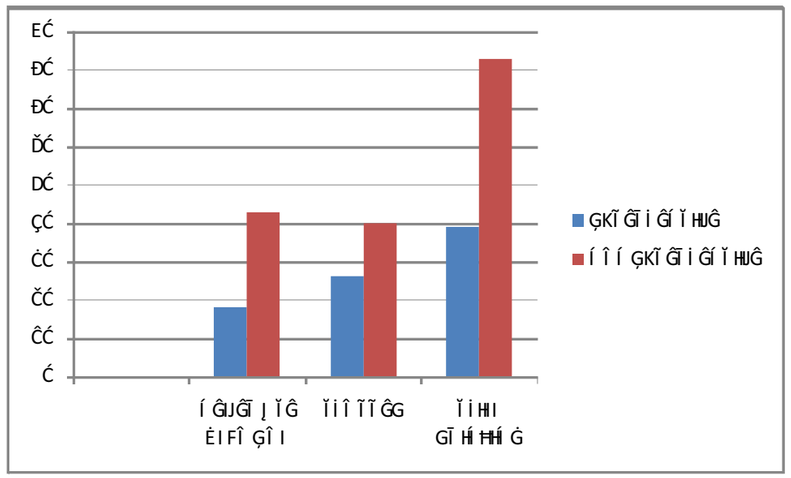
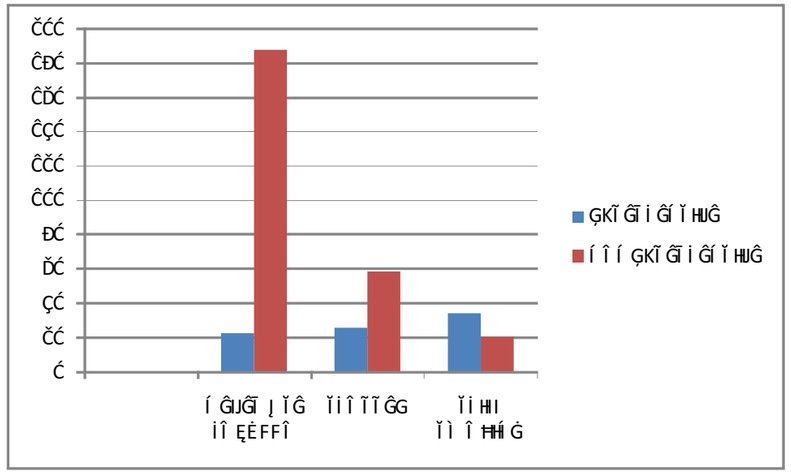


Figure 3 ASSOCIATION BETWEEN TOBACCO USE AND BLOOD PRESSURE



Hypertension was higher among 31-40years age group (8.6%), among respondents with tertiary education compare to those with no education (RR; 0.59, OR: 0.49). With regard to anthropometric risk factors, being overweight (RR:1.82, OR;1.93), being obese (RR: 6.34, OR;9.84), and having morbid obesity (RR;8.53, OR;17.14) had higher odds of hypertension compared to normal BMI. Tobacco use (OR: 6.2080, 95% CI), alcohol use (OR: 3.1788, 95% CI), had higher odds of being hypertensive. Age, BMI, and tobacco and alocohol use were significantly associated with hypertension. Education, socioeconomic status, and alcohol use

were associated with hypertension (table 4). staying away from any kind of addiction could serve as protective factors against hypertension.

Discussion

The total number of respondents in this study was 350. The age range with the highest percentage of respondents was between ages 31-40 years (38.9%) This was similar to 38.02 ± 13.3 years found in a survey of hypertension and its awareness amongst traders and artisans in Ogbete Market, Enugu State (Ulasi *et al.,* 2011). There were more male respondents, 193 (55.1%) as against 157 (44.9%) female respondents. This was similar to the survey in China and the USA where more men were involved (Xia Li, *et al.* 2013, Wyatt *et al.* 2008). This disagrees with the sex distribution of respondents in a survey of hypertension among residents of Ajegunle community, a popular slum in Lagos State, Nigeria: 34.2% (male) and 65.8% (female) (Daniel *et al*. 2013). There was no statistical significant risk of having hypertension between the male and female gender. This was not consistent with previous studies where men were found to be at a greater risk of being hypertensive (Klungel *et al.* 1999, Kadiri *et al.* 2005 & Daniel *et al*. 2013).. However a study by Adediran *et al.* did not also find any statistically significant gender difference in tendency of being hypertensive in their study of hypertension prevalence in an urban and rural area of Nigeria. In our study, more females (12.1%) had hypertension compared to males (11.2%). This was different from the findings in several community-based studies: Survey of hypertension among residents of a rural community in South-East Nigeria, where it was (50.2%) male and (44.8%) female [22]. However a survey of hypertension in a rural community in Eastern Nigeria: Male (49.3%), female (42.3%) [24]; in a survey of hypertension amongst herdsmen living in Tibet, China: Male (66.1%), female (48.3%) [25]. Our finding was similar to prevalence of hypertension was higher among females (79.6%) compared to males (74.4%) in a survey of hypertension in an older adult population in South Africa (Peltzer *et al* 2013).

Normal BP were recorded in 267 (76.3%). The overall prevalence of hypertension in this study was 23.7%, this was lower than what was found in 95 geographical clusters in Mozambique (Damasceno *et al* 2009) as well as 32.8% found in three communities in Enugu North LGA of Enugu State, Nigeria (Ulasi *et al* 2010). The overall of prevalence of hypertension in this study was higher than 18.3% found in Kegbara-Dere; a rural community in the Niger-Delta Region of Nigeria (Onwuchekwa *et al* 2012) and . 9.3% found among urban workers in Ibadan city (Olatunbosun *et al.* 2000) as well as 10.3% found in a civil service population in Ibadan city (Olatunbosun *et al*. 2000). However this is similar to 23.6% found among the inhabitants of three rural communities in Akwa-Ibom and Cross-River (States) Andy *et al*. 2012). This wide margin further confirmed the upsurge of hypertension in communities across Nigeria. The overall prevalence of 23.7% was however lower than 36.6% found among adult residents of Ile-Ife in Osun State, Nigeria (Adedoyin *et al.* 2008) and 38.2% found among adult residents of Ajegunle in Lagos State, both in the same southwestern part of Nigeria (Daniel *et al.* 2013). However, prevalence of hypertension in this study was lower than 46.0%; the estimated prevalence of hypertension for WHO African Region (World Health Organization 2013).

In our study, the age range of 31- 40 years had the highest of hypertensive. prevalence of hypertension increased with age. This was different from findings in most recent community-based studies conducted in Nigeria (Ahaneku *et al.* 2011 Ulasi *et al* 2010; Onwuchekwa *et al* 2012), where Age was the only sociodemographic factor that was significantly associated with hypertension. Our finding was different from the result of a survey of hypertension among adult residents of Ajegunle community, Lagos State, Nigeria (Daniel *et al.* 2013) a survey of hypertension among adults patients attending a Missionary Hospital in Ibadan, Oyo State, Nigeria (Ajayi *et al* 2016) and in a survey of BP gradients and cardiovascular risk factors in urban and rural populations in Abia State, Nigeria (Ajayi *et al* 2016). However our finding was similar to a survey conducted in a rural community in Eastern Nigeria (Ahaneku *et al.* 2011)

Using the BMI (kg/m 2) of the respondents18.3%, 45.1%, 15.1%, and 21.4%,were.underweight, normal, overweight, and obese respectively. More than half (63.4%) of the respondents were either underweight or normal while 36.5% were either overweight or obese. Numerous studies had established the association between BMI and

hypertension (Daniel OJ *et al*. 2013,Ogah OS *et al* 2013, Ogunniyi A *et al* 2001). BMI is one of the most accurate ways to determine when extra body weight translates into health risks (Erhun WO *et al.* 2005).. BMI as a risk factor was significantly associated with hypertension. In our study out of 75 Obese respondents 40 (53.3%) had hypertension. This agreed with the findings in a survey of hypertension among adult patients attending a Missionary Hospital in Ibadan, Nigeria (Ajayi IO *et al* 2016), survey of hypertension among herdsmen living in Tibet, China (Zhao X *et al* 2012). In a survey of hypertension among residents of Ajegunle, Lagos State, Nigeria (Daniel OJ *et al*. 2013). Thus being overweight or obese was a predictor of hypertension. Compared to those with BMI in the normal category, the odds of developing hypertension was 2 times more among those in the overweight/obese category.

The overall prevalence of family history of hypertension in the population was 38.9 % (n =350), irrespective of blood pressure status. A family history of hypertension was present in 37.35% (n = 83) of subjects with hypertension. Presence of a family history increased the risk of hypertension (OR: 0.2596; 95 % CI: p < 0.0001) this was similar to other studies . In this study the prevalence of hypertension was the lowest 3,6%, in subjects with no formal education and the highest, 69.9%, in those with tertiary education, this is different from findings in previous studies but similar to that of cross country studies where educated health workers (nurses) were found to have highest prevalence (David *et al* 2015).

The prevalence of alcohol consumption in the study was 34.6% This was lower than 43.4% found in Delta State (Ajayi IO *et al* 2016). The prevalence of alcohol consumption in Ogijo community was very high; this can be attributable to the fact that in the community alcoholic beverages is a common feature of many social gatherings, also among oil workers and those working in the industries. Heavy alcohol consumption, on the other hand carries adverse health and social consequences due to its intoxicating and addictive properties (Ajayi IO *et al* 2016). Alcohol consumption showed significant association with hypertension prevalence in our study this was similar to another study where consumption showed significant association with hypertension. There were inconclusive evidences of the effect of alcohol on hypertension in most studies in Africa; some show association of regular and moderate alcohol intake and others show no association. The prevalence of cigarette smoking in the study was 15.4%. This is similar to that found in a rural community in Delta State where the prevalence was 15.8% (Ajayi IO *et al* 2016), and Edo State where the prevalence was 16.8% (Onwubere *et al* 2011, Onwuchekwa AC *et al* 2012), as well as that found among U.S adult citizens in 2011, where the prevalence was recorded as 19.0% (Murray CJ 1997). It is not surprising that the prevalence of smoking from studies in Nigeria are close to that of the United States. This can be attributed to modernization and westernization of our culture, where the western culture and style of living are copied and emulated regardless of its negative effect on health. Several studies have acknowledged smoking especially cigarette smoking as one of the major causes of non-communicable and chronic disease (Murray CJ 1997 Kearney PM. 2005). Although it has been reported that regular and long time cigarette smoking is associated with higher blood pressure, this study showed statistically significant difference between smokers and nonsmokers on the risk of developing hypertension. Hypertension was diagnosed more frequently in sedentary subjects (those who did not meet WHO physical activity standards) 58 (69.76%) than in physically active subjects 25 (30.12%) this finding is statistically significant (OR; O,4408, 95%CI, P=0.0023. This study was limited in that it was based on self-reporting of physical activity where the trend to overreport the actual level of physical activity is well known. Physical activity can be assessed subjectively using self-reported questionnaire or objectively (directly measured) using equipment such as pedometers or accelerometers. Self-reported questionnaires are commonly used in primary care centre because they are cheap and easy to use. However, both methods have drawbacks and are subjected to potential bias. Self-reported questionnaires may not be able to capture all types of physical activity, whereas certain devices may not be worn in activities such as swimming to measure physical activity. Previous literature recommended using both objective and subjective measurements to validate the results for better measurements and physical activity recording (Onwubere *et al* 2011 David Guwatudde. *et al* 2015).

Conclusions

A high prevalence of hypertension was recorded in this study. About one-third of the respondents were hypertensive. This finding has public health implication as it puts one in every three adults in the community at-risk of cardiovascular disease (s). It was also found that majority of the hypertensives were not aware of their status prior to the survey. This underscores the need for urgent steps to create awareness and implement interventions for prevention and early detection of hypertension especially among those aged ≥ 30 years and the overweigh, /obese and morbidly obese individuals. Hypertension was significantly associated with age groups 30-49 years.. Tobacco and alcohol consumption, overweight, obesity, and abdominal obesity were also associated with hypertension

Study limitation

The major limitation of this study was the sole reliance on the respondents' reports and the assumption that the questions were well understood by the respondents

References

Akinkugbe OO (2003). Current epidemiology of hypertension in Nigeria. Archives of Ibadan Medicine. 1:3-5.

Adediran Olufemi Sola, Okpara Ihunanya Chinyere, Adeniyi Olasupo Stephen (2013). Hypertension prevalence in an Urban and Rural area of Nigeria. *Journal of Medicine and Medical Sciences*. 4 (4): 149-154.

Andy JJ, Peters EJ, Ekrikpo UE (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*. 22:335-9.

Adedoyin RA, Mbada CE, Balogun MO *et al (*2008). Prevalence and pattern of hypertension in a semiurban community in Nigeria. *Eur J Cardiovasc Prev Rehabil.* 15, 683-7.

Ajayi IO, Sowemimo IO, Akpa OM (2016). Prevalence of hypertension and associated factors among residents of Ibadan-North Local Government Area of Nigeria. *Nig J Cardiol.* 13: 67-75.

Ahaneku GI, Osuji CU, Anisiuba BC(2011). Evaluation of blood Pressure and indices of obesity in a rural community in Eastern Nigeria. *Ann Afr* Med. 10, 120-6.

Chobanian AV, Bakris G L., Black H R. *et al* (2003)., "Seventh report of the Joint National Committee on prevention, detection, evaluation, and treatment of high blood pressure," Hypertension, 42(6):2 1206–1252.

Daniel OJ, Adejumo OA, Adejumo EN(2013). Prevalence of hypertension among urban slum dwellers in Lagos, Nigeria. J Urban Health. 90, 1016-1025

Damasceno A, Azevedo A, Silva-Matos C, (2009). Hypertension prevalence, awareness, treatment, and control in Mozambique: Urban/rural gap during epidemiological transition. Hypertension. 54:77-83.

David Guwatudde. *et al (*2015). BMC Public Health; The burden of hypertension in sub-Saharan Africa: a four-country cross sectional study. 1211: 12889-015

Erhun WO, Olayiwola G, Agbani EO, (2005). Prevalence of hypertension in a university community in South West Nigeria. *Afr J Biomed Res ©Ibadan Biomedical Communications Group.* Available from. ; 8:15-9.

Effiong Ekong Akpan, Udeme E, Ekrikpo, Aniema IA(2015). Prevalence of Hypertension in Akwa Ibom State, South-South Nigeria: Rural versus Urban Communities Study International Journal of Hypertension, , 975819:150-155.

Familoni OB (2002). Hypertension – how much do our patients know? African Health. 24(3), 13.

George Pickering (1967). The Nature of Essential Hypertension, New York: Grune and Straton, 10-21.

Kearney PM, Whelton M, Reynolds K (2005). Global burden of hypertension: analysis of worldwide data; Lancet. 365,217-230.

Klungel OH, Diane BM, Anthonius DB *et al* (1999). Recruitment of participants through community pharmacies for a pharmacogenetic study of antihypertensive drug treatment. *Pharmacy World & Science*. 30: 1312-1318.

Kadiri S (2005). Tackling cardiovascular diseases in Africa. *BMJ West African Edition*. 8(4): 172-173.

Marques-Vidal P, Toumilehto J(1997). Hypertension awareness, treatment, and control in thecommunity. Is the rule of halves still valid? *J. Hum. Hypertension.* 1(1) 213-220.

.Lopez, Mathers, Ezzati et al (2003). Global Burden of Disease and Risk Factors; Measuring the Global Burden of Disease and Risk Factors, Lancet , 362(9380):271-80.

Macmillan S, Peto R, Cutler J (1990). Blood pressure, stroke, and coronary heart disease, part 1. Prolonged differences in blood pressure: prospective observational studies corrected for the regression dilutional bias. *Lancet*. 335:765-774.

Mabuza MN, John VN, Jean-Pierre FL et al 2009.Reasons for non-compliance among patients with hypertension at Vanga Hospital, Bandundu Province, Democratic Republic of Congo: A qualitative study. *African Journal of Primary Health Care & Family Medicine.* 1(1): 107-112

MacMahon, Peto, Cutler et al (1990) Collins, Sorlie, Neaton. Blood pressure, stroke, and coronary heart disease. Part Prolonged differences in blood pressure: prospective observational studies corrected for the regression dilution bias; *Lancet*. 335(8692): 765-74.

Murray CJ, Lopez AD(1997). Global mortality, disability, and the contribution of risk factors Global Burden of Disease Study. *Lancet.*349 (9063):1436-42.

Onwubere BJ, Ejim EC, Okafor CI *et al* (2011). Pattern of blood pressure indices among the residents of a rural community in South East Nigeria. Int J Hypertension. 6(2):104.

Onwuchekwa AC, Mezie-Okoye MM, Babatunde S (2012). Prevalence of hypertension in Kegbara-Dere, a rural community in the Niger Delta region, Nigeria. Ethn Dis. 22: 340-6.

Olatunbosun ST, Kaufman JS, Cooper RS *et al* (2000). Hypertension in a black population: Prevalence and biosocial determinants of high blood pressure in a group of urban Nigerians. *J Hum Hypertens*. 14:249-57.

Ogah OS, Madukwe OO, Chukwuonye II, (2013) *et al*. Prevalence and determinants of hypertension in Abia state Nigeria: Results from the Abia state non-communicable diseases and cardiovascular risk factors survey. *Ethn Dis*.23:161-7.

Ogunniyi A, Baiyewu O, Gureje O. *et al (*2001). Morbidity pattern in a sample of elderly Nigerians resident in Idikan community, Ibadan. *West Afr J Med*. 20,227-31.

Padwal R, Strauss SF, McAlister FA(2001). Cardiovascular risk factors and their effects on the decision to treat hypertension. Evidence based review. BMJ.;322:977-980

Peltzer K, Phaswana-Mafuya N(2013), Hyperetension. associated factors in older adults in South Africa. *Cardiovascular J Afr*: 24:67-71.

Russell D, Wilson N(1991). Life in New Zealand Commission Report, Executive overview. Dunedin: University of Otago, 172-173.

Ulasi II, Ijeoma CK, Onwubere BJ, Ejikeme Arodiwe, Obinna Onadugo, Christian Okafor. High Prevalence of hypertension among market women in Enugu, Nigeria. *Int J Hypertension*, 2011, doi: 10.4061/2011/869675

Ulasi II, Ijoma CK, Onodugo OD(2010). A community-based study of hypertension and cardio-metabolic syndrome in semi-urban and rural communities in Nigeria. *BMC Health Serv Res*. 10:71.

Vorster HH(2002). The emergence of cardiovascular disease during urbanisation of Africans. *Public Health Nutrition*. 5(1:)239-43.

World Health Organisation (2002.); Reducing Risks, Promoting Healthy Life; The world health report, World Health Organization (1998); Life in the 21st century: A vision for all; The World Health Report.

World Health Organization(2013). World Health Day Silent Killer, Global Public Health Crisis. WHO Campaigns;

Wyatt SB, Akylbekova EL, Wofford MR *et al (*2008). Prevalence, awareness, treatment, and control of hypertension in the Jackson Heart Study. Hypertension.51, 65-656.

Xia Li, *et al (*2013). Health Literacy in Rural Areas of China: Hypertension Knowledge Survey. Int. *J. Environ. Res. Public Health,* 10:1125-1138.

Yusuf S1, Reddy S, Ounpuu S et al (2001). Global burden of cardiovascular diseases: part I: general considerations, the epidemiologic transition, risk factors, and impact of urbanization. [PubMed indexed for MEDLINE]. 104 (22): 2746-53.

Zhao X, Li S, Ba S *et al (*2012). Prevalence Awareness, treatment and control of hypertension among herdsmen living at 4300m in Tibet. *Am J Hypertension*. 25: 583-9.