Burden of Hypertension and Associated Risk Factors in Rural Communities of Abuja

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Abstract

Introduction: Hypertension have become of medical and public health concern globally. It is a known major risk factor for stroke, coronary artery disease and heart failure. Important risk factors contributing to hypertension are lifestyle and genetic factors. With rapid urbanization and increasing sedentary lifestyle of our rural populace, an explosion in the prevalence of hypertension becomes inevitable. Therefore, the importance of this study to assess the burden and risk factors of hypertension in these rural communities cannot be over emphasized. **Objectives**: *1. To determine the prevalence of diabetes in rural communities in Abuja FCT Nigeria. 2. To determine the prevalence of and associated risk factors of hypertension in rural communities in Abuja.* **Methodology**: *A descriptive cross-sectional design was employed in this study which was conducted between July and December 2017. A multi-stage sampling technique was used to recruit 420 willing adult participants from rural communities, in four political wards, selected from three area councils of FCT Abuja. Data were collected using an interviewer administered questionnaire while measurements were done with standardized instruments for blood pressure and blood sugar as well as weight and height measurements following recommended techniques and guidelines. Data were analyzed using SPSS 20.0 version. Univariate analyses were performed to evaluate the distribution for each variable. Binomial test was used to test the hypothesis. Multivariate analyses were done to identify the risk factors of hypertension. Results were considered significant at p-value < 0.05.* **Results**: *The prevalence of 38.3% and 25.2% were reported for hypertension and obesity in rural communities in Abuja respectively. Risk factors such as female sex, age 45 years and above, overweight/Obesity, physical inactivity, family history of hypertension and family history of diabetes were independent predictors of hypertension.* **Conclusion**: *This study has highlighted the fact that hypertension in addition to obesity is on the increase in the rural communities of Abuja, Nigeria. Therefore, concerted and coordinated effort from all stakeholders is urgently required to tame and reverse this ugly trend in view of the debilitating morbidity and mortality associated with hypertension.*

Keywords: Hypertension, prevalence, risk factors, obesity, rural communities, Abuja.

Abbreviations

ACEI	Angiotensin Converting Enzyme Inhibitors
AHA	American Heart Association
AIDS	Acquired Immune Deficiency Syndrome
AMAC	Abuja Municipal Area Councils
APA	American Psychological Association
BMI	Body Mass Index
BP:	Blood Pressure
CI	Confidence interval
CVD	Cardio-Vascular Diseases
CAD	Coronary Artery Disease
DALY	Disease Adjusted Life Years
DNA	Deoxyribonucleic Acid

EASD	European Association for the Study of Diabetes
FCT	Federal Capital Territory
FMOH	Federal ministry of Health
HDL	High Density Lipoprotein
HT	Hypertension
IHD	Ischemic Heart Disease
ISH	International Society of Hypertension
LDL	Low-Density-Lipoprotein
LMIC	Low and Middle Income Countries
NCD	Non communicable Diseases
NGO	Non-Governmental Organization
NPC	Nigeria population Commission
OR	Odd Ratio
SES	Socio-Economic Status
SMOH	State Ministries of Health
SPSS	Statistical Package for Social Science
US	United States of America
WHO	World Health Organization

Introduction

Background of the study

Hypertension have become of medical and public health concern worldwide. Hypertension is a known major risk factor for stroke, coronary artery disease and heart failure. Hypertension is a disease condition which results from increased pressure of the blood exerted against the wall of artery leading to health problems including heart diseases. The volume of blood that is pumped by the heart and the level of resistance to blood flow in the arteries determines the blood pressure. This could be explained further to mean that the more the heart pumps blood, and the tighter the arteries are, the higher the blood pressure. High blood pressure can exist in individuals causing damage to the blood vessels and heart without symptoms. If not detected and controlled, high blood pressure increases the risk of heart attack and stroke. Important factors contributing to diabetes and hypertension are lifestyle and genetic factors. Longstanding Hypertension also contributes to retinopathy, which is the leading cause of diagnosed blindness in the United States (Epstein & Sowers, 1992).

Problem statement

According to the 2012 World Health Statistics report, 1 in every 3 adults worldwide has high blood pressure (WHO, 2012a). Hypertension in Nigeria is no doubt one of the commonest cardiovascular diseases (Mukadas and Misbau, 2009). Analysis of the prevalence of hypertension between 1990 and 2009 from population-based studies in south western Nigeria showed a prevalence increasing from 12.4% to 34.8%. In the analysis, higher prevalence was reported in men than in women as well as in urban areas than rural areas (Ekwunife and Aguwa, 2011). Moreover, similar meta-analysis of prevalence studies conducted over more than a five-year reported, a prevalence of hypertension increasing from 8% to 46.45%, with comparable prevalence in both sexes but higher prevalence in rural than in urban setting (Ogah et.al, 2012). Mortality and morbidity rates in most adults result from the high prevalence of hypertension as a significant factor. Individuals with high blood pressure are identified to be twice at higher risk of developing coronary artery disease (CAD), four times at a higher risk of having congestive heart failure, and seven times higher risk of developing cerebro-vascular disease and stroke when compared with those with normal blood pressure. Globally, it is estimated that 62% of stroke, 49% of CAD, and 14% of other non-fatal cardiovascular disease (CVD) events are attributed to hypertension (Lawes et.al, 2006).

My background as a primary healthcare physician, consulting and coordinating the clinical activities of several primary healthcare centers as well as the FCT integrated PHC services to rural communities, facilitated my observing what seems like an increasing case of hypertension among rural dwellers. Thus, the interest was ignited in me to undertake this study, looking at the burden of these conditions as regards the prevalence of hypertension, as well as their relationship to selected risk factors. It is imperative to note that an increased burden of hypertension calls for urgent integrated approach for addressing this menace. Hence this study tends to survey the burden of hypertension in rural communities in Abuja which will form a benchmark for a more specific and comprehensive intervention.

Objectives

1. To determine the prevalence of hypertension in rural communities in Abuja, FCT Nigeria.
2. To determine the prevalence of and associated risk factors of hypertension in rural communities in Abuja FCT, Nigeria.

Research questions

1. What is the prevalence of hypertension in rural communities in Abuja FCT Nigeria?
2. Concerning hypertension, what are the risk factors and the prevalence of these risk factors among the rural populations of FCT?

Justification

There is still a dearth of available studies describing the burden of hypertension in rural communities in many states of the federation including FCT Abuja. The use of clinic-based studies has limitations as it cannot be used to generalize the burden of these diseases in the rural communities of the states. Therefore, there is need for a better epidemiological data that depicts the burden of hypertension in rural communities of Abuja, the Federal Capital Territory (FCT) Nigeria, which is required for appropriate health intervention program.

Review of literature

Hypertension

Hypertension was recognized by the early Chinese in the period 2600BC who palpated (felt) the peripheral pulses to determine the 'pressure' in the vessels and treated hard-to-palpate vessels by bleeding and leeches. High blood pressure was then called "hard pulse disease". Hypertension, defined as blood pressure equal to or greater than 140/90 mmHg, is one of the most common diseases afflicting humans. Because of its associated morbidity, mortality and cost to society, hypertension is an important public health challenge (Cook-Huynh, 2012).

An estimated 20% of the world's adults have hypertension and its prevalence dramatically increases in patients older than aged 60 years. Research from several countries has shown a high prevalence of poorly controlled hypertension. Prevalence of hypertension is 22% in Canada, of which 6% is controlled; 26.3% in Egypt, of which 8% is controlled; and 13.6% in China, of which 3% is controlled. Until fairly recently however, hypertension was thought to be rare in rural Africa. Hypertension is now being widely reported in Africa and is the most common cause of cardiovascular disease on the continent (Cook-Huynh, 2012).

Hypertension refers to a continual rise in the blood pressure of a person beyond what is recognized as normal for the person's socio demographic characteristics such as sex, race and age as well as anthropometric variable like body size etc. The implications of this definition is that there has to be a reference value for a person which is arbitrarily established based on the biosocial indices mentioned above. Thus, there are various classifications for hypertension diagnosis which are products of different research studies conducted by diverse research groups that were adopted by the World Health Organization. The American Heart Association, for instance, graded hypertension as follows; normal, high normal, grade 1, grade 2 & grade 3 as presented in table 2.1. However, the 1999 World Health Organization grading of

hypertension was adopted for this study as presented in table 2.2 (WHO 2003). Awareness of hypertension refers to having been informed of one's hypertensive status and/or health education on hypertension by a health professional.

When the heart beats, the blood flow through the arteries exerts a force against the wall of the arteries producing the systolic blood pressure while the force exerted when the heart rest gives rise to the diastolic blood pressure. The blood pressure is measured in millimeters of mercury (mmHg) and is generally represented as two numbers in the form of fraction. The numerator represents the systolic pressure while the denominator represents the diastolic pressure. It gives a clue as to how much resistance, the small arteries is putting up to the flow of blood (American Heart Association, 2008).

Blood pressure of a particular person may vary depending on situations like physical activities, the emotional conditions and time of the day or night. Nevertheless, the two most important factors which determine the blood pressure of a person are the amount of blood that the heart pumps and the diameter of the arteries receiving blood from the heart. The smaller the diameter of the arteries, the higher the resistance to blood flow. Hence the increased resistance from the small diameter arteries, combined with increased force from more blood pumped by the heart will result to

High blood pressure which is called Hypertension.

Table 1. The american heart association categorization of blood pressure

Blood Pressure Category	Systolic (mmHg) (numerator)	Diastolic(mmHg) (denominator)
Normal	< 120	< 80
Pre-hypertension	120 -139	80 – 89
High blood pressure(hypertension) stage 1	140 – 159	90 – 99
High blood pressure(hypertension) stage 2	≥ 160	≥ 100
Hypertensive crisis (Emergency care needed) stage 3	≥ 180	≥ 110

(Source: American Heart Association, 2008)

Table 2. WHO categorization of blood pressure

Categories	SBP (mmHg)	DBP (mmHg)
Optimal	<120	<80
Normal	120 – 129	80-84
High normal	130-139	85-89
Mild (grade 1)	140-159	90-99
Moderate (grade 2)	160-179	100-109
Severe (grade 3)	≥180	≥110
Isolated systolic hypertension	≥140	<90

Source: WHO &International Society for Hypertension (1999)

Symptoms and signs of hypertension

There are no physiological symptoms of blood pressure. Many people falsely believe that high blood pressure has to do with being tense, nervous or hyperactive. One can be calm or relaxed and still have blood pressure. Therefore, it is important for everyone to have his/her blood pressure measured or checked (American Heart Association, 2008).

WHO (2013a) further stressed that Hypertension usually is not associated with symptoms especially at earlier stages? It is frequently identified through screening that s by blood pressure check). The authors went on to report that some patients may complain of some symptoms (commonly at later stages), like

headache, dizziness, tinnitus, fainting attacks, altered vision. Certain signs may be seen on examination of the eyes using an ophthalmoscope referred to as hypertensive retinopathy.

Types and causes of hypertension

The causes of hypertension are not fully explicable by cardiologists. Several factors and conditions may play a role in its development, including: smoking, lack of physical activity, being overweight, too much salt in the diet, too much alcohol consumption, stress, old age, genetics, family history of high blood pressure, chronic kidney disease, adrenal & thyroid disorders. There is no clear cause that can be identified for nearly 95% of the cases of hypertension. This type of high blood pressure is known as **essential hypertension**, and scientists suspect that genetic factors may play a role in its development. In about 5% of cases, high blood pressure develops as a result of other medical disorders, such as kidney or liver disease, or as side effect of certain medications. This type of high blood pressure is known as **secondary hypertension**. The kidneys play a major role in the regulation of blood pressure. It secretes the hormone rennin, which causes arteries to contract, thereby raising blood pressure. The kidneys also control the fluid volume of blood, either by retaining salt or excreting salt into urine. When kidneys retain salt in the bloodstream, the salt absorbs water, increasing the fluid volume of blood. As higher volume of blood passes through arteries, the blood pressure increases (WHO 2013b).

Management of hypertension

Diet and change of lifestyle are recommended by physicians prevent increase in blood pressure in people with pre-hypertension and hypertension such Dietary and lifestyle changes includes Weight loss in the overweight (maintain body mass index: 20–25 kg/m^2), Increased physical activity, Moderation of alcohol intake, Dietary changes (more fruit, vegetables, and low saturated fat) and Reduction of dietary sodium intake with increased dietary potassium. This is regarded as the first line action. (Mayo clinic 2017). For those with stage 1 and stage 2 Hypertension, a physician may prescribe diet and lifestyle changes, as well as one or more drugs known as antihypertensive drugs. Diuretics are antihypertensive that promote excess salt and water excretion, reducing the amount of fluid in the bloodstream and relieving pressure on the walls of blood vessel. Beta blockers reduce heart rate and amount of blood the heart pumps. ACE inhibitors prevent the narrowing the walls of blood vessel to control blood pressure. Calcium channel blockers slow heart rate and relax blood vessels. Studies show that two drugs are more effective than one drug at lowering blood pressure to less than 140/90 mmHg. Furthermore, a number of laboratory investigations (the cardiac work-up profile tests) are recommended at the beginning of management for a baseline assessment and then at recommended intervals- at least once yearly for follow-up. (Mayo clinic 2017).

Hypertension in developing countries

Developing country is a self-explanatory term that is used to describe most countries with low level standard of living. The WHO (2013c) global report stated that the African region has the highest prevalence of hypertension estimated at 46% of adults aged 25 and above, and that death as a result to non-communicable diseases like hypertension will increase by 17% over the next decade, with the greatest increase in the African region (about 27%). However, primary prevention has been proposed as the most cost-effective approach to this emerging epidemic (Maher et al., 2010). The cross-sectional study conducted in Ghana by Amoah et al. (2003), reported a high prevalence of hypertension among females (29.5%) compared to males (27.6%) as well as low level of awareness of hypertension among the populace. Similarly, in Nigeria, Ulasi et.al, (2010 recorded a 25.1% prevalence in Enugu State while Isara & Okundia, (2015) reported an increased prevalence of 37.4% in southern Nigeria.

More than 500,000 women between the ages of 19 and 49 have been estimated to have died in developing countries each year due to hypertensive-related causes. Research reveals that women with pre-existing or chronic high blood pressure are more likely to have complications during pregnancy than those with normal blood pressure (Ashutosh et al. 2008). Previous studies have shown hypertension as one of the major causes of maternal death in Ghana (Ghana Maternal Health Survey 2007). Notwithstanding, to a considerable

extent, the effectiveness of reducing maternal death by means of prevention and treatment of hypertension has not been effective even though it can be prevented. It is therefore extremely important to investigate on the knowledge and attitude of this target group about the preventive measures of hypertension, close any identified gaps, in order to achieve significant reduction in maternal mortality (Danso et al, 2010).

In addition, a research conducted in Uganda concluded that approximately one in every three adult aged 20 years or older was hypertensive. The study recorded a prevalence of 30.5%, with females having a higher prevalence than their male counterpart, in addition to advancing age being a risk factor due to exposure to lifestyle risk factors of hypertension. (Wamala et al, 2009).

Socioeconomic status and hypertension

Socio-Economic Status (SES) is defined as the social standing or class of an individual or group which is often measured as a combination of their education, occupation and income (APA 2017). According to Winkleby et al (1992). There's less correlation between education and income but strong correlation between education and the type of occupation as many types of jobs needed certain special skills from their employee. There are differing views about the effect of SES on hypertension among researchers. For instance, Dutta and Ray (2012) found a positive association between hypertension and higher SES in Low- & Middle-Income Countries. However, in developed countries higher SES was found to be associated with improved health and lower blood pressure (Lam 2011). With respect to education the study by Brummett et al (2011) found an increased risk for cardiovascular diseases and hypertension among the less educated population in the USA. Lack of education is found to increase the risk for cardiovascular diseases and hypertension. This is supported by research in East Asia reported a higher prevalence of hypertension among the less educated group of individuals (Razak and Subramanian 2014). Furthermore, some researchers have demonstrated a link with the type of work and hypertension for instance Kaur et al (2012) found a higher prevalence among males working as private employee, compared to those engaged in manual labor and higher prevalence among female homemakers compared to those doing manual labor work.

Risk factors

Obesity

The global prevalence of obesity in 2016 is thrice when compared with 1975 prevalence. This has translated to 39% of adults aged 18 years and above being overweight and 13% of the world's adult population being obese (WHO 2017a). This trend may have far-reaching consequence, as obesity plays important etiologic role in variety of diseases, including hypertension, cardiovascular diseases (mainly heart disease and stroke), and diabetes (WHO 2017a Overweight and obesity are defined as abnormal or excessive fat accumulation that may harm the health of an individual. Obesity can be classified as mild, moderate or severe depending on the person's Body Mass Index (BMI). BMI is one of the most commonly used indicators of obesity, which is the weight in kilograms divided by the square of the height in metres (kg/m^2). By definition, Underweight is BMI < $18.5kg/m^2$, normal weight is BMI 18.5 -$24.9kg/m^2$ and overweight is BMI ≥ 25 – $29.9kg/m^2$ while obesity is a BMI ≥ $30kg/m^2$ (WHO 2017a). Obesity and overweight have been shown to be a major risk factor for CVDs and has been strongly linked with insulin resistance. Insulin resistance may be a mechanism by which obesity leads to CVD, whereas weight loss can improve cardiovascular risk and decrease insulin resistance. Obesity and insulin resistance have also been associated with other risk factors, such as high blood pressure. Exercising and weight loss can prevent or delay the onset of type 2 diabetes, reduce blood pressure and help to reduce the risk for heart attack and stroke. (WHO, 2017a)

Dyslipidemia

Dyslipidemia can be defined as the unhealthy levels of one or more kinds of blood lipid (fat). It means high levels of LDL or triglycerides or low levels of HDL (Healthline 2017). Diabetes mellitus tends to lower HDL (the 'good' cholesterol) and raise triglyceride and LDL (the 'bad' cholesterol) levels, which

increases the risk of heart diseases and stroke. This type of dyslipidemia is characterized by high levels of triglycerides (hypertriglyceridemia), high level of low-density-lipoprotein (LDL) particles and low levels of high-density-lipoprotein (HDL). This lipid triad frequently occurs in patient with premature CHD. They lead to the development of atherosclerosis and is a risk factor to heart diseases and CVD (Healthline 2017).

Physical inactivity

Physical inactivity is a major modifiable risk factor for insulin resistance as well as Cardiovascular Diseases. It is a well-known fact that various types of physical activity ranging from gardening, household chores, work-related physical activity and sports are beneficial to the health of the individual. There is a wide consensus among scholars that physical activity is essential for varying cardiovascular and metabolic benefits even though that the amount, intensity, frequency and duration has been a subject of serious debate. WHO (2017b) recommended that all patients be advised to practice regular daily physical activity appropriate for their physical capabilities (e.g. walking)? It has been shown that Physical activity can slow the commencement and progression of diabetes mellitus and consequent Cardiovascular Diseases. This is possible through the effect on weight reduction, improving insulin sensitivity, good blood sugar control, and reduction in blood pressure, endothelial function, fibrinolysis and inflammatory defense systems (WHO 2017b).

Physical inactivity poses an increased risk of development of chronic diseases such as colon cancer, breast cancer, type 2 diabetes, hypertension, stroke, coronary artery disease or osteoporosis. For the prevention or treatment of type 2 diabetes, aerobic exercises and resistance activities are highly recommended and weight bearing and impact exercise are suggested to prevent osteoporosis (WHO 2017b).

Family history

Family History is a recognized risk factor for Cardiovascular Disease which represents genetic, environmental and behavioral elements, in addition to the interaction among them. This is a useful public health tool for the prevention of diseases because it reflects susceptibility to target genes and other risk factors (Harrison, 2003). The American Diabetes Association (ADA), the American Heart Association (AHA) and the International Cholesterol Education Programs (ICEP) has considered family history as a factor to be assessed and made decision about during treatment and therefore included it in their guidelines.

Smoking

Smoking cause type 2 diabetes to progress rapidly because it increases the risk of developing insulin resistance, a condition in which the body does not efficiently use the insulin it produces. Insulin resistance is a predisposing factor to both CVD and diabetes mellitus. It may also increase the LDL and decrease high-density-lipoprotein (HDL) cholesterol in the blood, raising the risk of a heart attack. Smoking also increases the risk of renal and eye diseases (Healthline 2017a).

Alcohol consumption

Moreover, alcohol consumption has been reported to be increasing in developing countries (Jernigan et al 2000). Alcohol is harmful to the health and it is directly associated with higher blood pressure regardless of geographical location (Ezzati et al .2002). In Nepal, alcohol consumption is associated with low SES and a higher prevalence of hypertension (Shrestha 2016). Concerning alcohol and diabetes there have been several conflicting studies, some reported an increased risk in high consumers while others reported no risk, yet others reported a protective effect primarily at moderate levels of consumption in addition to some who reported lack of association between alcohol and type 2 diabetes (Carlsson 2003).

Salt consumption

Excessive consumption of salty foods is associated directly with increased blood pressure (WHO 2002). The main source for salt intake is salt added while cooking, and also processed food and the increasing availability of such salt sources in LMICs can have a bad effect on health (WHO 2014). In South Asia,

where the general salt consumption is high, it is thought to be a major cause of increased blood pressure (Mohan et al 2013). The WHO recommendation for salt intake is set to less than 5g per day and less than 2g per day of salt to reduce blood pressure.

Unhealthy diet

Junk foods are high in calories but low in nutritional value and the excess sugars and fats in these foods contribute to weight gain and the excess weight is associated with diabetes (Healthline 2017b). According to the study conducted by Shin et al 2013 Western diet has been associated with increased risk of hypertension. However high-level consumptions of fruits, vegetables, potassium, and vitamin C are associated with a significantly lower risk of hypertension. Furthermore, WHO has advised that fruits and vegetables are components of the diet that are associated with better health, and their consumption prevents major diseases such as cardiovascular diseases (WHO 2002)**.**

Age

Age has been proven to be a known risk factor for hypertension across both genders. This fact was also reported in the works of Kearney et al (2005). Age is a non-modifiable risk factor for hypertension and there is an increased risk of hypertension with increasing age. Similarly, age is also a risk factor for type 2 diabetes mellitus. The risk increases as the person get older. This may be because older persons tend to exercise less, and gain more weight (mayo clinic 2017).

Gender

Gender s a non-modifiable risk factor for hypertension. The global prevalence of hypertension according to WHO (2013c) revealed that men are more prone to hypertension than women. Similarly, in the South East Asia region generally men are have higher prevalence of hypertension than women. Ghosh et al, in 2016 study conducted in India, found that women were less likely to be hypertensive or pre-hypertensive. In the African region as well the prevalence of hypertension was higher in men than women and in fact in all the regions of the world though the difference is only statistically significant n the EURO region and the Americas (WHO 2017b).

Materials and methods

Study design

This is a descriptive cross-sectional study employed to assess the burden and risk factors of hypertension and diabetes in rural communities of Abuja, FCT Nigeria.

Study area

The study area is Federal Capital Territory (FCT), Abuja Nigeria. The FCT, Abuja is located in the North Central Geo-Political Zone of Nigeria and is the capital of Nigeria. Abuja is situated between latitudes 8° 25' and 9° 25' North of the Equator and longitudes 6° 45' and 7° 45' East of the Greenwich Meridian (Mallo and Obasanya 2012). It occupies a land area of about 7,753.9 Square Kilometer and home to more than 2.4 Million people according to the 2015 estimated population. The Territory shares boundaries with Kaduna, Kogi, Nassarawa and Niger States (NPC 2015).The indigenous inhabitants of Abuja are the Gbagyi (Gwari) as the major language, Bassa, Gwandara, Gade, Ganagana, Koro etc. whose major occupation is farming. However, being the capital of Nigeria all the other ethnic groups in Nigeria are somewhat represented both within the urban as well as the rural communities of Abuja. For administrative purpose the FCT is divided into six area councils which are equivalent of local government councils in Nigeria. These are Abaji, AMAC, Bwari, Gwagwalada, Kuje and Kwali area councils. AMAC has 12 political wards while the rest has 10 political wards each.

Study population

The study population comprised of adult men and women from 18 years of age and living in these rural communities with exclusion of pregnant women.

Sample size

Sample size for this study was calculated using the formula below:

n= $\underline{z^2pq}$
 e^2

n = sample size

z = standard normal deviate at 95% confidence interval = 1.96

P= best guess about the value of the proportion of interest = 0.5

q =1-p

e = margin of error set at P = 0.05

n = $\underline{1.96^2 \times 0.5 \times (1- 0.5)}$ = 384.16
       0.05^2

n = 384

To make room for improperly filled questionnaires, attrition, non-responses and generalization of findings, the sample size (N) was adjusted at the rate of 10% to approximately 420.

Sampling technique

A four-stage, multi-stage sampling technique was adopted in the study as described below:

1. FCT Abuja has six Area Councils (AC) of which three were randomly selected, namely: Abuja Municipal AC (AMAC), Bwari AC (BwAC) and Gwagwalada AC (GwAC) at the first stage.
2. In the second stage, one ward each was randomly selected in Bwari and Gwagwalada Area councils while two wards were randomly selected in AMAC Area council, (AMAC Area council is twice the population of the other Area Councils) getting a total of four wards. Gwagwa and Jiwa wards in AMAC, Kubwa ward in BwAC, and Dobi ward in GwAC.
3. In the third stage one community was randomly selected in each of the four wards getting a total of four communities. These are Kagini and its environs in Gwagwa ward, Tunga Dalhatu and its environs in Jiwa ward both in AMAC. Further, Shagari village and its environs in Kubwa ward, BwAC as well as Kaidasabo and its environs in Dobi ward, GwAC.
4. In each community 105 willing adult participants (males and females excluding pregnant women) were randomly selected giving a total of 420 participants ($4 \times 105 = 420$).

Data collection method

Data were collected using a structured questionnaire which was interviewer-administered to respondents and pre-tested prior to use. The questionnaire consists of three sections. Section one provided information on the socio-demographic profile of the respondents, section two provided information on the prevalence of hypertension in the communities. Section three generated data on the prevalence of risk factors of hypertension in rural communities. The questionnaire is written in English language.

Data collection process

The validated semi-structured questionnaires was administered with the help of four female research assistants who are trained nurses and are familiar with the native language of the people for easy translation where needed. The nurses helped in checking the weight and height (for calculation of Body Mass Index) and blood pressure of the respondents.

Measurement of blood pressure

A validated semiautomatic oscillometric device (Omron blood Pressure monitor, Model M3, HEM 7131, Omron Corp, Tokyo, Japan) was used for all blood pressure measurement. The Blood pressure measurements were taken in the morning at a designated area within the communities by a trained nurse practitioner, in agreement with the recommendations of European Society of Cardiology and European Society of Hypertension (Mancia et al. 2007). Respondents were asked to seat in comfortable chair with their backs supported and arms bared and supported at heart level and rested for five minutes before measurement. An appropriately sized cuff was used to ensure accurate measurement. The systolic and diastolic blood pressure were read and recorded. Blood pressure was measured thrice at three-minute intervals and the average of the last two readings was taken. Hypertension was diagnosed based on the laid down criteria by the World Health Organization -International Society for Hypertension (1999). A Patient was labeled hypertensive if an average of the last two readings showed the systolic blood pressure to be 140 mmHg or greater and the diastolic blood pressure to be 90 mmHg or greater (World Health Organization -International Society for Hypertension, 1999).

Table 3. Blood pressure measurement/category

Categories	SBP (mmHg)	DBP (mmHg)
Optimal	<120	<80
Normal	120 – 129	80-84
High normal	130-139	85-89
Mild (grade 1)	140-159	90-99
Moderate (grade 2)	160-179	100-109
Severe (grade 3)	≥180	≥110
Isolated systolic hypertension	≥140	<90

Source: WHO &International Society for Hypertension (1999)

Body mass index measurement

The Body Mass Index of the respondents were calculated by dividing the weight of the respondents by their height in meters squared; Weight (kg) / Height(m)^2 = BMI (Kg/m^2).

Measurement of the Height: The height was measured with a Standiometer (Isara & Okuudia, 2015), the subject standing erect without shoes, leg forming a V-shape and the back against a wall. This was recorded in meters to one decimal point. Parallax effect in height measurement was avoided by fitting the measuring meter with a sliding head-piece at right angles to the upright, which were lowered onto the subject's head.

Weight measurement: The body weight was measured using a known-weight standardized weighing scale; the participant stood on the scale without shoes and the weight was recorded in kilogram to one decimal point. During the weighing process, the weighing Scale adjustment error was eradicated by adjusting the pointer to zero before weighing each participant. At the beginning of each day's activities, the calibration of the weighing scale was assessed by reference to an object of known weight. Also, the scale was placed on a firm horizontal surface.

Data analysis

The completed questionnaires were manually sorted out, checked for completeness, coded and analyzed using Statistical Package for Social Science (SPSS, version 20.0, International Business Machines [IBM] Corp, USA.). Data were summarized using frequency tables, percentages, charts, means and standard deviations. Univariate analyses were performed initially for all variables to evaluate the distribution for each variable. The primary outcome variables were systolic BP, diastolic BP and Blood Sugar level while the socio-demographic characteristics, Body Mass Index (BMI), Family history, physical exercise, alcohol

consumption and cigarette smoking make up the independent variables. Bivariate analyses were done with chi-square to test the association between hypertension and diabetes and binomial test was used to test the hypotheses. Multivariate analyses were done to identify the risk factors of hypertension and diabetes. Results were considered significant at p-value of less than or equal to 0.05.

Ethical consideration

Ethical approval was obtained from The Research and Ethics Committee of Abuja Municipal Area Council Health Department, Federal Capital Territory, Nigeria. Verbal informed consent was duly sought and obtained from research participant who volunteered to take part in the study. The research participants were assured of confidentiality of their information/data.

Results and discussion

Socio demographic characteristics of participants

Table 4 shows the socio-demographic characteristics of the interviewed respondents. Overall, a total of 408 study participants were enrolled into the study, out of which 273 (66.9%) were females. About 181 (44.4%) were found to be from the North Central while North East reported the least number of the respondents interviewed (11 persons; 2.7%). The overall mean age and the standard deviation of the respondents were calculated to be 37.86 ± 11.53 (Male: 38.15 ± 12.91; Female: 37.73 ± 10.85). We had approximately 46% respondents' age ranging from 18 to 34 years which was followed by those between the ages of 45 to 54 years (24%), then (20.3%) for age 35-44 years, 6.9% for ages of 55 to 64 years but only 2.4% of them belonged to the age category of 65 to 79 years. For the education category, secondary school leavers, recorded the highest number of participants (127 persons; 40.9%) while about 31.1% of them were reported to have tertiary education, 16.9% had primary education and just 11% had no formal education. More than half of the respondents were married (330 persons; 80.9%), while 62 (5.2%) and 14 (3.4%) were found to be single and widowed respectively. The most common occupation among the people interviewed was farming, followed by public servants, then, those who were into businesses, then, artisans but only 0.2% of the total respondents were reported to engage in transportation.

Prevalence of hypertension n rural communities of abuja

Table 5 below shows that most of the respondents reported their blood pressure screening result to be optimal (109 persons; 26.7%), which was followed by those whose results were normal (92 persons; 22.5%), while high normal was 12.5%. The overall prevalence of hypertension was 38.3% (figure 2), which was distributed in the proportion of 15.0%, 16.4% and 6.9% for grade 1 Hypertension (mild), grade 2 Hypertension (moderate) and grade 3 Hypertension (severe) respectively (table 4.3). A high percentage of them said that they had checked blood pressure prior to the time of data collection (81.4%), of which just 2.2% of them had checked it in less than a week ago, but 40.9% had checked it over a year ago. The most common place where the blood pressure was regularly checked by the respondents was primary healthcare center. Of the total respondents, 20.8% of them agreed that the result of the blood pressure was relatively high, but majority of them could not remember the figure of the blood pressure (87.5%) except only the 12.5% of the respondents who remembered the figure. This was distributed as follows: normal (9.8%), grade 1 HT (2.5%) and grade 2 HT (0.2%).

Prevalence of selected risk factors of hypertension and diabetes in rural communities in abuja

Table 6 below shows that almost half of the respondent had their body mass index to be normal (196 persons; 48.0%), while 0.5%, 26% 25.2% of them was measured to be under-nourished, overweight and obsessed respectively. Just 9.8% of the respondent reported to be smokers and usually smoke up to three sticks of cigarettes per day. Only 22.3% of the respondents was reported with family history of diabetes but 72.5% of them was reported to have family history of hypertension. About 81.9% of the respondents do not

consume alcohol, while 17.4% of the respondents consume alcoholic drinks (16.9% and 0.5% of them were found to usually consume between 1-3 and 4-6 bottles per week respectively). About 44% of the respondent engage in physical exercise activity while more than half, approximately 56% live a sedentary lifestyle.

Multiple logistic regression on the risk factors of hypertension in rural communities of abuja

Results for multivariate analyses in table 7 revealed that there was no statistically significant association between respondents reported with hypertension and factors such as: geopolitical zones, marital status, education, alcohol and tobacco use. However, there was a statistically significant positive association between hypertension and factors such as: sex, age, Body Mass Index, family history of hypertension and family history of diabetes.

Female respondents were 3 times more likely to have hypertension compared to male respondents (OR = 2.93; CI: 1.133 - 7.602). Respondents within the ages of 45 and 54 years were 6 times at higher risk of having hypertension compared to those between the ages of 18 and 34 years (OR = 6.11; CI: 2.48 - 15.08), while those between the ages of 55 years and above were 21 times more likely to have hypertension unlike those within the ages of 18 and 34 years (OR=20.62; CI: 4.39 – 96.79). In the same manner, respondents who were reported to be overweight/Obsessed were found to be 23 times more likely to have hypertension compared to those who were normal weight (OR = 22.75; CI: 12.66 – 40.88). Respondents with no physical activities were 4 times more likely to report hypertension compared to those who engaged in physical activities (OR = 3.8; CI: 1.27 – 1.43). Respondents with no family history of diabetes were 4 times (OR = 0.40; CI: 0.24 – 0.65) less likely to have hypertension and those with no family history of hypertension were 3 times (OR = 0.32; CI: 0.19 – 0.56) less likely to have hypertension, compared to those who were reported with family history of diabetes and hypertension respectively.

Discussion

Socio – demographic characteristics

The socio – demographic characteristics of the respondents were divided into gender, geo-political zone, marital status, occupation, education and age group. Overall the results did not show any direct or uniform trend between the various characteristics.

The gender distribution revealed that 2/3rd of the participants were female, whereas 1/3rd were male (Table 4). This can be explained by the general out–going nature of the men folk in Nigeria while the women folk tend to be homemakers who were seen in their numbers more than the men in these communities during the study period. This is similar to the findings of Isara and Okundia (2015) in rural communities in Southern Nigeria.

The geopolitical zones of the participants showed that North Central Zone which is the host geopolitical zone where Abuja the study area is located, had the highest number of participants (almost half), followed by South East Zone, while the North East Zone had the lowest participants. Furthermore, the married people had the highest participants while divorced people had the least participants in the marital status category (Table 4). In terms of occupation, farmers had the highest number of participants, which is expected in a rural setting in Nigeria as was also recorded in the works of Isara and Okundia (2015). This was followed closely by public servants which is likely due to the proximity of some of the communities to the Abuja Township, thus, they are playing host to most of public servants who took advantage of the cheap accommodation available in theses rural communities.

For educational status, secondary education had the highest participants while, the group with no formal education had the least. Moreover, the age group between 18 – 34 years had the highest number of participants, while the age group 55 years and above had the least participants which is dissimilar to the findings of Isara and Okundia (2015). The overall mean age of 37.86 years ± 11.53 standard deviation was recorded in this study (Table 4) while Murthy G. V. S. et.al (2013) reported a much higher age of was 55.9 years ± 12.4 standard deviation in their study.

Prevalence of hypertension in rural communities of abuja, fct nigeria

This study reported a high prevalence of hypertension in the rural communities of Abuja with overall prevalence of 38.3% (figure 1), which was distributed in the proportion of 15.0%, 16.4% and 6.9% for grade 1 Hypertension (mild), grade 2 Hypertension (moderate) and grade 3 Hypertension (severe) respectively (table 5). The findings showed that the prevalence of hypertension is on the increase in these rural communities, given that a previous studies conducted in other rural communities in mid-western Nigeria by Oviasu in 1978 reported a prevalence of 5.9% and in 1992, Akinkugbe recorded 8-10% prevalence in rural communities in Africa while Kuti in 1993, reported a prevalence of 11.0% in Aiyetoro a rural community in Ondo State Nigeria, Omuemu et.al in Edo State Nigeria reported prevalence of 20% in 2008, besides 30% prevalence reported by Ekwunife et.al in 2010. Also worthy of note is the fact that this findings of 38.3% is considerably higher than the National prevalence of 34.8% (WHO 2013). However, the finding of 38.3% prevalence for hypertension reported in our study is still lower than studies conducted in rural communities in South East Nigeria by Onwubere et al (2011) 46.4%, Ulasi et al (2011) 44.5% and Ahaneku et al (2011) 42.0%. This points to the fact that hypertension is rising to an epidemic level in rural communities in Nigeria, and is a cause for serious concern because of the impending impact of hypertension-related illness which is associated with high financial cost and burden to the individuals, families and our society. Thus, there is need for adequate health education, community surveillance and treatment intervention programs for raised blood pressure in our rural communities.

Prevalence of and associated risk factors of hypertension in rural communities of abuja

Prevalence of risk factors

Concerning the prevalence of selected risk factors, the study revealed a combined prevalence of 51.2% for overweight/obesity (overweight= 26% obesity= 25.2%) as reported in table 6. The obesity prevalence of 25.2% found in this study is far higher than the National prevalence of 6.5% (WHO 2013a) and global prevalence of 13% (WHO 2017b). Furthermore, the hypothesis tested revealed that the prevalence of hypertension is on the increase in rural communities of Abuja (table 6). This finding of over 51% of the participants being overweight/obese has a serous consequence on the overall health of the rural population of Abuja as it concerns increased risk of diabetes, hypertension, heart diseases and stroke (WHO 2017b).

Another risk factor of concern is physical inactivity as the study reported that approximately 56% of the respondents live a sedentary lifestyle (table 6). This portends great danger to these rural populaces whose lifestyle is changing to sedentary type as obtained in urban settlements due to increased risk of non-communicable diseases (breast cancer, colon cancer, hypertension, coronary artery disease, type 2 diabetes and stroke) associated with sedentary lifestyle (WHO 2017b). This shift to sedentary lifestyle may be as result of the influence of city life on some of the rural.

For non-modifiable risk factor such as family history of the disease condition, the study revealed that 72.5% of the respondents had family history of hypertension and 22.3% of the participants had family history of diabetes (table 6). Family History as a recognized risk factor for Cardiovascular Disease can be a helpful public health tool for the prevention of these diseases as it can reflect genes susceptibility and other risk factors (Harrison, 2003). Therefore, health education on reduction of modifiable risk factors and adopting of healthy lifestyle is urgently needed these communities to forestall imminent epidemic of hypertension and diabetes in the near future.

Tobacco smoking prevalence of 9.8% was recorded in the study (table 6). This figure is almost the same as National prevalence of 10% (WHO 2013a) even though one would have expected a much lower figure since the study was among rural community dwellers. However, the infiltration of some of our rural communities by urban lifestyle may have accounted for the increased prevalence of smoking. On consumption of alcoholic drinks by the participants, a 17.4% prevalence was recorded (table 6). This is far above the National prevalence of 10.1%. This may have been caused by the changing lifestyle of our rural dwellers to urban life.

Risk factors associated with hypertension

Regarding the risk factors of hypertension, the results in table 7 revealed that the socio – demographic characteristics such as geopolitical zones, marital status and education independently, were not predictors of hypertension. However, in relation to the North–central geopolitical zone, respondents of North–east geopolitical zone extraction had higher odds ratio of hypertension, while those from South–south geopolitical zone recorded the lowest odds ratio of hypertension. This is similar to the findings of Murthy G. V. S. et.al (2013). Also, table 7 showed that in this study, risk factors such as alcohol and tobacco use though their prevalence were up to the National rate had no statistically significant association with hypertension. Note that according to WHO (2014), tobacco use and harmful use of alcohol are two of the four main risk factors for major Non-communicable diseases.

Furthermore, risk factors such as female sex, age 45 years and above, overweight/Obesity, physical inactivity, family history of hypertension and family history of diabetes were independent predictors of hypertension as reported in this study. This is similar to the works of Murthy G. V. S. et.al (2013) which reported that the prevalence of hypertension was higher with risk factors such as increasing age and overweight/Obesity as well as female sex. The findings were also the same for Isara and Okundia (2015) except that the prevalence was more among male participants than female counterparts in their study. The fact that females were twice the number of males in this study and that they live more sedentary lifestyle as well as are more overweight/Obese, may have contributed to the higher prevalence of hypertension among females recorded in this study.

Conclusion

This study has highlighted the fact that hypertension in addition to obesity is on the increase the rural communities of Abuja, Nigeria, with reported prevalence that are higher than the National average. For hypertension, increasing age, obesity/overweight, female sex, family history of hypertension and family history of diabetes were predictive risk factors. From the foregoing it is a glaring fact that this non-communicable disease condition has reached a level where it can be regarded as a public health emergency in our environment. Therefore, concerted and coordinated effort from all stakeholders is urgently required to tame and reverse this ugly trend in view of the debilitating morbidity and increasing global mortality associated with hypertension.

Recommendations

The following recommendations are rendered to address the findings of this research
1. The Federal ministry of Health (FMOH) Nigeria/National Council on Health should declare Hypertension as a Health Emergency in Nigeria to give the fight against this scourge the seriousness it deserves.
2. The above body should facilitate through the State ministries of Health (SMOH) and Local Government Health Authorities the following;
A. Scaling up of awareness campaign and health education on the benefits of adherence to medication in addition to risk factors for Hypertension to all the nooks and crannies of the country. Modifiable risk factors such as exercise, weight loss, good nutrition, cessation of smoking/alcohol intake and their role in the management, control and prevention of Hypertension should be emphasized.
B. Periodic free screening for Hypertension in all the Government health facilities (tertiary, secondary and Primary health centres) across the country for all eligible adults.

Subsidized treatment cost for indigent Hypertension patients as well as subsidized self-monitoring devices for blood pressure check, through collaboration with manufacturing companies, NGOs, Donor Agencies as well as Hypertension societies in Nigeria

Acknowledgement

Tables and figures

Table 4. Socio-demographic characteristics of respondents

S/N	Variable	Number of Respondents (n)	Percentage (%)
1.	**Gender**		
	Male	135	33.1
	Female	273	66.9
2.	**Geopolitical Zone**		
	North Central	181	44.4
	North East	11	2.7
	North West	35	8.6
	South East	104	25.5
	South South	44	10.8
	South West	33	8.1
3.	**Marital Status**		
	Single	62	15.2
	Married	330	80.9
	Divorced	2	0.5
	Widow	14	3.4
	Single	62	15.2
4.	**Occupation**		
	Farming	116	28.4
	House wife	28	6.9
	Cattle rearing	9	2.2
	Public servant	114	27.9
	Business	47	11.5
	Student	39	9.6
	Clergy	10	2.5
	Artisan	44	10.8
	Transporter	1	.2
5.	**Education**		
	No formal education	45	11.0
	Primary education	69	16.9
	Secondary education	167	40.9
	Tertiary education	127	31.1

6.	**Age Group frequency %** 18-34 189 46.3		
	35-44 83 20.3 45-54 98 24.0 55-64 28 6.9 65 and above 10 2.4		

Table 5. Prevalence of hypertension in rural communities in abuja

S/N	Variable	Number of Respondents (n)	Percentage (%)
1.	**BP Screening Result Category**		
	Optimal (<120/<80 mmHg)	109	26.7
	Normal (120-129 / 80-84mmHg)	92	22.5
	High normal (130-139/85/89mm/Hg	51	12.5
	Grade 1 HT (140-159/90-99mmHg)	61	15.0
	Grade 2 HT (160-179/100-109mmHg)	67	16.4
	Grade 3 HT (>=180/>=110nnHg)	28	6.9
2.	**Ever Checked BP**		
	Yes	340	83.3
	No	68	16.7
3.	**When BP Was Checked**		
	Less than a week	9	2.2
	More than a week	47	11.5
	More than a month	117	28.7
	More than a year	167	40.9
	Not applicable	68	16.7
4.	**Where BP Was Checked**		
	private hospital/clinic	87	21.3
	primary healthcare center	148	36.3
	at home using personal device	3	0.7
	gen./specialist hospitals	96	23.5
	medical outreach	7	1.7
	Not Applicable	67	16.4
5.	**Result of BP was high**		
	Yes	85	20.8
	No	254	62.3
	Not applicable	67	16.4
	No response	2	0.5
6.	**Figure of BP**		

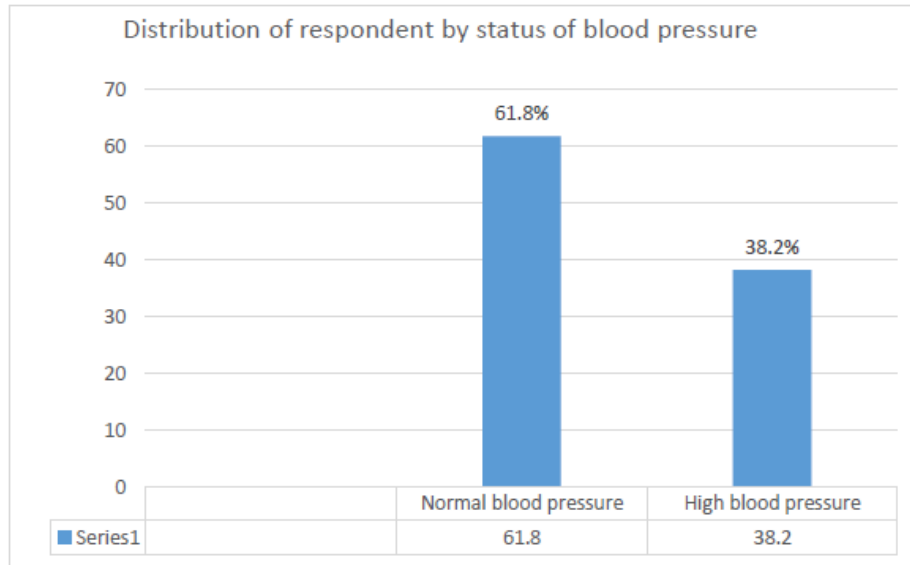|	Cannot remember/not applicable	357	87.5
=	Normal (120-129 / 80-84mmHg)	40	9.8
	Grade 1 HT (140-159/90-99mmHg)	10	2.5
	Grade 2 HT (160-179/100-109mmHg)	1	0.2
*BP: Blood Pressure, HT:			

Figure 1. Status of blood pressure in percentage/hypertension prevalence.

Table 6. Prevalence of selected risk factors of hypertension in rural communities in abuja

S/N	Variable	Number of respondents (n)	Percentage (%)
1.	**Body Mass Index (KG/M2)**		
	Undernourished (<18.5kg/m2)	2	0.5
	Normal (18.5 -24.9kg/m2)	196	48.0
	Overweight (25 - 29.9kg/m2)	107	26.2
	Obsessed (30kg/m2 and above)	103	25.2
2.	**Cigarette Sticks Consumed / DAY**		
	Up to 3 sticks	40	9.8
	None	368	90.2
	4 sticks and above	0	0
3.	**Family History of Diabetes**		
	Yes	91	22.3
	No	317	77.7
4.	**Family Member Ever Died from Diabetes or Diabetic Complications**		
	Yes	9	2.2
	No	398	97.5
	None response	1	0.2
5.	**Family History of Hypertension**		
	Yes	296	72.5
	No	112	27.5

6.	**Family Member Ever Died from Hypertension or Hypertension Complications**		
	Yes	67	16.4
	No	341	83.6
7.	**Alcohol Consumption (**Bottles/day		
	1-3 bottles	69	16.9
8.	Bottles 4 – 6	2	0.5
	None	334	81.9
	None response	3	0.7
	Above 6 bottles	0	0
9.	**Exercise/Week**		
	1-2times	72	17.6
	Times 3 – 5	83	20.3
	6 and more times	25	6.1
	None	227	55.6
	None response	1	0.2
*BP: Blood Pressure			

Table 7. Multiple logistic regression on the risk factors of hypertension in rural communities in abuja

S/N	Variable	Odd Ratio	P-value	95% CI for Odd Ratio
1.	**Sex**			
	Male	**Reference**		
	Female	2.93	0.027	(1.133 - 7.602)*
2.	**Age**			
	18-34	**Reference**		
	35-44	2.29	0.076	(0.92 - 5.71)
	45-54	6.11	0.001	(2.48 – 15.08)*
	≥ 55	20.62	0.001	(4.39 – 96.79)*
3.	**Geopolitical Zone**			
	North Central	**Reference**		
	North East	3.75	0.45	(0.13-112.26)
	North West	0.74	0.73	(0.14 - 4.10)
	South East	0.81	0.62	(0.36 – 1.85)
	South South	0.41	0.73	(0.15 – 1.09)
	South West	1.06	0.93	(0.33 – 3.36)
4.	**Marital Status**			
	Single	**Reference**		
	Married	1.60	0.04	(1.12 - 2.84)
5.	**Education**			
	No formal education	**Reference**		
	Primary	0.800	0.78	(0.16 – 3.90)
	Secondary	1.498	0.58	(0.36 – 6.32)
	Tertiary	1.201	0.80	(0.28 – 5.13)
6.	**Body Mass Index**			
	Normal weight	**Reference**		
	Overweight/Obese	22.75	0.01	(12.66 – 0.88)*

7.	Physical Activity			
	Yes	Reference		
	No	3.8	0.02	(1.27 - 1.43)*
8.	Family History of Diabetes			
	Yes	Reference		
	No	0.40	0.001	(0.24 – 0.65)*
9.	Family History of Hypertension			
	Yes	Reference		
	No	0.32	0.001	(0.19 – 0.56)*
10.	Alcohol Use			
	Yes	Reference		
	No	0.59	0.06	(0.35 – 1.01)
	Tobacco Use			
	Yes	Reference		
	No	0.59	0.11	(0.31 – 1.13)
*Significant at 5% level of significance, CI: Confidence interval				

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