

**PREVALENCE OF HYPERTENSION AND ASSOCIATED RISK
FACTORS AMONG ADULTS IN IBADAN-SOUTH WEST LOCAL
GOVERNMENT AREA OF OYO STATE, NIGERIA**

BY

VIVIAN OGECHUKWU MOMAH

(BSc. Anatomy, University of Benin, Edo State)

MATRIC NO 173616

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CERTIFICATION

I certify that this research work was carried out by VIVIAN OGECHUKWU, MOMAH of the Department of Epidemiology and Medical Statistics, Faculty of Public Health, College of Medicine, University of Ibadan, Ibadan.

Adedokun 19/5/15

Supervisor

Dr Adedokun B. O.

M.B.B.S. (Ib), M.Sc (Ib.)

Onoja

Supervisor

Dr Onoja M.Akpa

B.Sc., M.Sc., Ph.D. Statistics (Ilorin)

DEDICATION

To the Glory of God, My Helper!

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ACKNOWLEDGEMENTS

To the Glory of God who has been my help in Ages past and my sure hope for years to come.

To my Supervisors Dr Adedokun B. O. and Dr Akpa M. O for your guidance, encouragements, admonishments and support through this period, I thank you.

To all my lecturers in the Department of Epidemiology and Medical Statistics, I appreciate you all for your toils in helping to bring out the best in me.

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ABSTRACT

Background: Hypertension is a highly prevalent risk factor for cardiovascular disease in our world today. Approximately 4.5% of the current global disease burden has been shown to be caused by hypertension. Hypertension is becoming an increasing public health problem because of increasing dietary habits, lifestyle modification practices and other contributory risk factors and thus a source of concern to the global community. This study is thus aimed at determining the prevalence of hypertension in the given community with its associated risk factors.

Method: A community based cross-sectional study was carried out among adults in Ibadan South-west Local Government Area of Oyo State. Systematic random sampling was used to select 566 people. An interviewer administered semi-structured questionnaire was used to obtain data on socio-demographic characteristics, knowledge and history of hypertension and its associated risk factors, knowledge and history of life-style modification practices and dietary intake of the Respondents. Blood measurements and anthropometric measurements were also taken. The data was analyzed using SPSS version 15. Chi square test and logistic regression were employed to determine risk factors affecting hypertension.

Result: The results of the study showed that the overall prevalence of hypertension was 19% with females having a higher prevalence of 21.6% compared to males with 18.8%. The mean ages of Respondents was 37.54 years with average systolic blood pressure of 126.26 mmHg. There was variation in blood pressure levels for the waist circumference, Body Mass Index, Age, Gender, educational level, occupation, marital status, number of Children, Diabetic status, fruit and vegetable consumption and family history of hypertension of the Respondents at the bivariate level. Physical activity, salt intake and ethnic group did not influence blood pressure levels. After adjustment for risk factors for hypertension. Predictors of hypertension were those aged 55 years and above: [OR=2.77 (95% CI 1.08 – 7.13)], Respondents whose waist circumference was at “High risk” [OR=3.34 (95% CI 1.55 – 7.27)] and female Respondents [OR=0.54 (95% CI 0.29 – 1.01)]. Those whose waist circumference was at “High risk” were found to be consistently associated with high blood pressure at P=0.000 level of significance.

Conclusion: There is a high prevalence of hypertension in Ibadan South-west LGA of Oyo State, Nigeria. Effective intervention strategies aimed at reducing the prevalence of hypertension should be targeted towards public health education on “modifiable risk factors” with emphasis on

“regression factors” which are the most important predictors of hypertension in the community of study.

Keywords: Hypertension, Prevalence, Cardiovascular disease, risk factors, blood pressure.

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ACRONYMS

BMI	Body Mass Index
BP	Blood Pressure
CHD	Coronary Heart disease
CVD	Cardiovascular disease
DALYs	Disability adjusted life years
DASH	Dietary approaches to stop hypertension
DBP	Diastolic Blood Pressure
EA	Enumeration Area
ECG	Electrocardiograph
ISH	International Society of Hypertension
JNC VII	The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation and Treatment of High Blood Pressure
JNC VIII	The Eight Report of the Joint National Committee on Prevention, Detection, Evaluation and Treatment of High Blood Pressure
LGA	Local Government Area
NCD	Non Communicable disease
PHC	Primary health centre
SBP	Systolic blood Pressure
SSA	Sub Saharan Africa
WHO	World Health Organization

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Globally, hypertension is an issue of public health concern. It has been known to be singularly the leading cause of stroke, cardiovascular diseases, heart attack and renal failure among others. Over 26.4% of adults globally are hypertensive (Kearney et al., 2005) with the prevalence highest in Africa at 46% (WHO 2013). Ekwunife and Aguwa (2011) estimated the prevalence of hypertension in Nigeria to be between 12.4-34.8% and (Dalal et al., 2011) while other cardiovascular risk factors such as obesity and alcohol consumption prevalence was given as 6-48% and 0.4-71% respectively.

Hypertension has been defined as “A chronic medical condition characterized by sustained elevation of the arterial blood pressure”. It can also be defined as a systolic blood pressure (SBP) equal to or above 140 mm Hg and/or diastolic blood pressure (DBP) equal to or above 90 mm Hg.

Although, there are several classification of hypertension, this study classified hypertension based on JNC8 classification in which systolic BP >140Hg and diastolic BP>90mmHg is considered hypertensive.

Due to demographic, epidemiological and lifestyle changes, there has been an increase in the trend of hypertension globally with prevalence rate estimated to increase by 9% for males and 13% for females between the years 2000-2025. While the number of people with hypertension in developed countries was projected to increase by 24% by the year 2025, the number of those with

hypertension in developing countries was estimated to increase by 80% (Kearney et al., 2005) with Sub-Saharan Africa SSA, showing a prevalence rate occurring in 46% of adults aged 25 years and above. (WHO, 2009).

Nigeria, as the sixth largest population in the world with a population of over 167 million people and an annual growth rate of 3.2%, is not left out in this burden. It is estimated that by 2020, the population of Nigeria will be about 220 million (National Population Census 2014). This exponential population increase could have dire consequences in the country if this burden is not addressed.

Presently, hypertension prevalence in the country has been estimated to be 12.4%-34.8%, with males having a higher prevalence than females, (Obinna et al., 2011). It is however noteworthy to comment on the fact that the given estimates were gotten from limited available data on the burden of the disease (Dalal et al., 2011; Ogah et al., 2012., Oladapo et al., 2010).

Risk factors that have been identified from previous studies include Age, Gender, family history of hypertension, diabetes, Physical inactivity, poor diet, overweight/obesity, excessive alcohol intake among others. Due to changes in lifestyle, this study proposes to determine current prevalence of hypertension and locally important risk factors of hypertension in Ibadan South-West Local Government area LGA of Oyo state.

1.2 Problem Statement

Data shows that while developed countries are overcoming the challenge of management and control of hypertension, there is still a lot of work to be done in developing countries (WHO 2013).

This increasing prevalence is attributed to population growth, ageing and behavioral risk factors

such as smoking, lack of physical activity, unhealthy diet, excessive alcohol consumption and exposure to persistent stress. These main behavioral factors are also major behavioral factors for all major non-communicable diseases (NCDs) such as diabetes mellitus, respiratory disease and cancer.

According to the World Health Organization WHO, hypertension accounts for about 7.1 million premature deaths and 64 million disability adjusted life years {DALYs} (WHO/ISH 2003). It has been estimated by the WHO that treating hypertension can reduce the risk of stroke by up to 40%. (WHO/ISH 2003).

It was stated by Kearney et al., 2005 that three-quarters of the world hypertensive population will come from economically developing countries by the year 2025 and Nigeria being the country with the largest population in Africa is thus likely to be most affected. This increasing incidence will lead to increased cost of care for patients and their families and also greater dependency unless public health measures to prevent this trend are intensified.

Inadequate community-based studies (Dalal et al., 2011), lack of surveillance data (Ogah et al., 2012), inadequate health education, poor health policies rank among the top reasons for the gap in the burden of the diseases. A holistic approach is thus needed to address this burden.

1.3 Justification

Presently in the world today, there is an epidemiologic transition from communicable to non-communicable diseases. Nigeria however shares the double burden of both diseases. Hypertension is quite important because it is a major modifiable risk factor for cardiovascular disease cerebrovascular and kidney diseases.

Although previous studies have identified the prevalence and some risk factors for hypertension, this information have been few and far between especially in Nigeria and other parts of Sub-Saharan Africa. (Dalal et al., 2011) with most of the data comprising of hospital- based studies rather than community-based ones. In addition, information on knowledge on the causes, complication and management of hypertension has been limited. (Oladapo et al., 2010). The prevalence of hypertension globally has been predicted to increase (Kearney et al., 2005) due to environmental factors related to urbanization, industrialization, among others. Previous studies have indicated differences in hypertension prevalence for rural and urban communities (Lawoyin et al., 2002), this study will thus determine if this differences presently exist or not. Furthermore, it will be determined if the above changes indicated have had an adverse effect in the communities of study.

This study will thus provide useful baseline information about the burden of this emerging epidemic disease. Oyo State is the sixth most populous state in Nigeria and Ibadan South-west Local Government Area (LGA) being the third most populated LGA in the state will serve as an appropriate background for the study while characterizing the impact of hypertension in the communities of focus. Determining the prevalence of the disease will thus help in providing evidence-based reasons for implementing health policies and stemming the growing tide which if unchecked, could cause ravaging effect on health and socio-economic development. It will also serve as a guide in developing cost-effective strategies for the growing public health challenge of hypertension and other NCD's management.

1.4 Research Questions

- 1. What is the prevalence of hypertension in Ibadan South-west LGA?**
- 2. Are there any risk factors associated with hypertension?**

3. What is the level of awareness of hypertension in the community?

4. What are the locally important risk factors for hypertension?

1.5 OBJECTIVES

1.5.1 General Objectives:

To determine the prevalence of hypertension and associated risk factors in Ibadan- South LGA, Ibadan, Oyo State Nigeria.

1.5.2 Specific Objectives

1. To determine the prevalence of hypertension in Ibadan South-West LGA.
2. To determine the association between socio-demographic factors and hypertension in Ibadan South-West LGA.
3. To determine the risk factors associated with hypertension in Ibadan South-West LGA.
4. To estimate the prevalence of modifiable risk factors associated with hypertension.
5. To determine the level of awareness of hypertension in the community of study.

CHAPTER TWO

LITERATURE REVIEW

2.1 Background

Blood is carried from the heart to all parts of the body in blood vessels. Each time the heart beats, it pumps blood into the vessels. Blood pressure is created by the force of blood pushing against the walls of blood vessels (arteries) as it is pumped by the heart. This pressure is highest when the heart beats to push blood out into the arteries. When the heart relaxes to fill with blood again, the pressure is at its lowest point. Blood pressure when the heart beats is called systolic pressure while it is called the diastolic pressure when the heart is at rest.

Blood pressure is measured in millimeters of mercury (mm Hg) and is recorded as two numbers usually written one above the other. The upper number is the systolic blood pressure SBP- the highest pressure in blood vessels and happens when the heart contracts, or beats. The lower number is the diastolic blood pressure DBP- the lowest pressure in blood vessels in between heartbeats when the heart muscle relaxes. Normal adult blood pressure is defined as a systolic blood pressure of less than 120 mm Hg and a diastolic blood pressure of 80mmHg (JNC8, 2014).

Hypertension, also known as high or raised blood pressure, is a condition in which the blood vessels have persistently raised pressure thus it can therefore defined as “A chronic medical condition characterized by sustained elevation of the arterial blood pressure”. It can also be defined as a systolic blood pressure equal to or above 140 mm Hg and/or diastolic blood pressure equal to or above 90 mm Hg.

The higher the pressure in blood vessels, the harder the heart has to work in order to pump blood. If left uncontrolled, hypertension can lead to a heart attack, an enlargement of the heart and

eventually heart failure. Blood vessels may develop bulges (aneurysms) and weak spots due to high pressure, making them more likely to clog and burst. The pressure in the blood vessels can also cause blood to leak out into the brain. This can cause a stroke. Hypertension can also lead to kidney failure, blindness, rupture of blood vessels and cognitive impairment thus the normal systolic and diastolic blood pressure levels are particularly important for the efficient function of vital organs such as the heart, brain and kidneys and for overall health and well-being of the body. Blood pressure have been shown to increase considerably with aging with older people being at higher risk. Males have also be shown to be at higher risk than females in coming down with hypertension (Obinna and Aguwa 2011). The number of adults with hypertension have been predicted to rise by 60% by the year 2025. (Kearney et al., 2005).

This could have dire consequences in the working population thus affecting the economy of the nation if the tide is not stemmed thus Integrated non-communicable disease programmes implemented through a primary health care approach which should include sensitization of the population on reduction in risk factors of hypertension among others are an affordable and sustainable way for tackling hypertension in Nigeria. (WHO 2013).

2.2. Types/Classification of Hypertension

Hypertension can be classified into:

2.2.1 Primary Hypertension: This is also known as essential hypertension can be defined as high blood pressure with no obvious medical cause. It occurs in 90-95% of all hypertension cases. (Carretero, 2000).

Many factors dispose Individuals to be at risk of primary hypertension. Such factors include: obesity, diet, environment, stress, and sedentary lifestyle. High sodium and family history of hypertension have also been identified as risk factors for this condition.

This type of hypertension is diagnosed after a doctor notices a persistent blood pressure rise on three or more visits and eliminates all other causes of hypertension.

2.2.2 Secondary Hypertension: This can be defined as high blood pressure occurring as a result of associated conditions in the kidneys, arteries, endocrine system among others. Approximately 5-10% of all hypertensive patients fall into this category.

The most common cause of secondary hypertension is an abnormality in the arteries supplying blood to the kidneys. Other causes include airway obstruction during sleep (Sleep apnea), other problems with the kidneys, diseases and tumors of the adrenal glands, hormone abnormalities, thyroid disease or Cushing's syndrome, and too much salt or alcohol in the diet. Drugs can cause secondary hypertension, including over-the-counter medications such as ibuprofen (Motrin, Advil, and others) and pseudoephedrine (Afrin, Sudafed, and others). Some conditions during pregnancy can also cause secondary hypertension. On diagnosis of the cause, hypertension can most often times be controlled.

Secondary hypertension accounts for a small number of hypertension causes, and without other symptoms, diagnosis might prove difficult.

Additional Hypertension Types include: Isolated Systolic, Malignant, Resistant, Pre-hypertension and "White-coat" hypertension. Isolated systolic hypertension, malignant hypertension, and resistant hypertension are all recognized hypertension types with specific diagnostic criteria.

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2.2.3 Isolated systolic hypertension: Blood pressure is recorded in two numbers: The upper, or first, number is the systolic pressure, which is the pressure exerted during the heartbeat. The lower, or second, number is the diastolic pressure, which is the pressure as the heart is resting between beats. Normal blood pressure is considered under 120/80. With isolated systolic hypertension, the systolic pressure rises above 140, while the lower number stays near the normal range, below 90. This type of hypertension is most common in people over the age of 65 and is caused by the loss of elasticity in the arteries. The systolic pressure is much more important than the diastolic pressure when it comes to the risk of cardiovascular disease for an older person.

This type of hypertension is a result of old age and a poor diet. The arteries become stiff, resulting in a high systolic number with a normal diastolic number. Isolated systolic hypertension does not have an identifiable cause. Risk factors include old age, obesity, using tobacco products, and having diabetes. Caucasian and black men are the groups that are highest at risk for developing this type of hypertension

2.2.4 Malignant hypertension: This hypertension type occurs in only about 1 percent of people with hypertension. It is more common in younger adults, African-American men, and women who have pregnancy toxemia. Malignant hypertension occurs when your blood pressure rises extremely quickly. If your diastolic pressure goes over 130, you may have malignant hypertension. This is a medical emergency and should be treated in a hospital. Symptoms include numbness in the arms and legs, blurred vision, confusion, chest pain, and headache.

With malignant hypertension, high blood pressure occurs suddenly and drastically. A person might experience numbness in the body as well as vision problems, extreme fatigue, confusion, anxiety, and seizures. Malignant hypertension is reversible when the underlying condition is cured.

Malignant hypertension is very rare and affects both children and adults. Pregnant women are also at risk. Heart damage is a possibility with this type of hypertension.

2.2.5 Resistant hypertension: This occurs when there is persistent high blood pressure even after three different types of antihypertensive medications have been prescribed and used.

Resistant hypertension may occur in 20 to 30 percent of high blood pressure cases. Resistant hypertension may have a genetic component and is more common in people who are older, obese, female, African American, or have an underlying illness, such as diabetes or kidney disease.

This type of hypertension is unresponsive to strong medications. In any case, treatments for resistant hypertension have been developed to keep the condition under control. Hypertension is called resistant if three medications fail to successfully treat the condition. At least four medications may be necessary to treat resistant hypertension.

2.2.6 Prehypertension: Prehypertension is slightly elevated blood pressure that isn't yet high enough to be considered high blood pressure. About 25 percent of adults in the United States have blood pressure in this range. If prehypertension isn't addressed by changing the lifestyle factors mentioned above, blood pressure is likely to keep rising.

2.2.7 "White coat hypertension"/ labile hypertension: These are terms that have been used interchangeably to describe hypertension types that come and go. These forms could indicate a higher risk for developing hypertension, or they could just be a normal response. The term "labile" means blood pressure that changes over time — a pretty common occurrence for almost everyone.

The term "white coat hypertension" comes from the well-studied phenomena that patients may have high blood pressure when taken at their doctor's office or a clinic but have normal blood pressure when taken at home. Studies show this type of high blood pressure may affect as many as 30 percent of the population. Due to variations in blood pressure, the American Heart

Association recommends that you have your blood pressure documented at least three different times to accurately diagnose hypertension. Another suggestion is to repeat high blood pressure readings after 5 to 10 minutes.

While high blood pressure affects over one billion people globally (WHO, Global Status on NCD, 2011) most of it is very treatable. Regular visits to the Physicians is recommended to determine ones blood pressure levels. The Physician in turn can determine the type of hypertension.

Another classification given by JNC VIII, 2014 further groups an individual BP into:

Table 2.2 showing JNC VIII classification of hypertension

BP Classification	SBP MmHg	DBP mmHg	Lifestyle Modification
Normal	<120	<80	Encourage
Prehypertension	120-139	80-89	Yes
Stage 1 Hypertension	140-159	90-99	Yes
Stage 2 Hypertension	≥160	≥100	Yes

(JNC VIII, 2014)

2.3 Causes of Hypertension

Behavioral Risk factors: There are many behavioral risk factors for hypertension which are treated in subsequent sub-sections.

Metabolic factors: This include diabetes, high cholesterol and being overweight or obese.

Tobacco and hypertension interact to further raise the likelihood of cardiovascular disease.

Other causes include: Renal causes, environmental causes, genetic causes, vascular causes, endogenous hormonal causes, neurogenic causes, drugs and toxins, hyperthyroidism, hypothyroidism, hyperkalemia, hyperparathyroidism, acromegaly, obstructive sleep apnea and pregnancy-induced hypertension. "white-coat" hypertension can also occur sometimes where-in the patient has a temporary elevated blood pressure as a result of anxiety over visiting the Doctor. In some cases however, the cause of hypertension can be relatively unknown.

2.4. Pathophysiology: Signs and Symptoms

There is a common misconception that people with hypertension always experience symptoms, but the reality is that most hypertensive people have no symptoms at all. Sometimes hypertension causes symptoms such as headache, shortness of breath, dizziness, chest pain, palpitations of the heart and nose bleeds. It can be dangerous to ignore such symptoms, but neither can they be relied upon to signify hypertension. Hypertension is a serious warning sign that significant lifestyle changes are required. The condition can be a silent killer and it is important for everybody to know their blood pressure reading (WHO, 2013).

2.5 Complications of hypertension

It is dangerous to ignore high blood pressure because this increases the chances of life-threatening complications. The higher the blood pressure, the higher the harmful consequences to the heart and blood vessels in major organs such as the brain and kidneys.

Untreated or uncontrolled hypertension can lead to the following medical conditions:

Atherosclerosis, heart attack, stroke, renal failure, enlarged heart, kidney damage, heart failure and cerebrovascular disease.

People with mild hypertension in combination with other risk factors e.g. lack of physical activity, socioeconomic factors, could also have these conditions.

The above conditions could give rise to increased morbidity and mortality thus affecting the quality of life of the affected individual, their families, their environment and the nation's economy at large.

2.6. Diagnosis of hypertension

Although hypertension most often appears symptomless in the early stages, it is recommended that the blood pressure of an individual be monitored regularly. There are electronic, mercury and aneroid devices that can be used to measure blood pressure (WHO 2003). Blood pressure measurements need to be recorded for several days before a diagnosis of hypertension can be made. Blood pressure is recorded twice daily, ideally in the morning and evening. Two consecutive measurements are taken, at least a minute apart and with the person seated. Measurements taken on the first day are discarded and the average value of all the remaining measurements is taken to confirm a diagnosis of hypertension. (World Health Report 2013).

A typical examination to evaluate hypertension includes: Medical and family history, physical examination, height and weight measurement to calculate BMI, Peripheral pulses, ophthalmoscopy: Examination of the blood vessels in the eye, chest x-ray, electrocardiograph (ECG), blood and urine tests.

In a study carried out by Benetos et al., 2002, the systolic blood pressure was shown to be a good predictor of cardiovascular disease CVD and coronary heart disease CHD risk and should be taken into account in evaluation of cardiovascular risks. This was also echoed by Kannel, 1999, who also stated that the most important component of arterial pressure in predicting cardiovascular disease and stroke is the systolic blood pressure.

2.7 Prevalence of Hypertension

According to the WHO Global status report on non-communicable diseases 2011, the prevalence of hypertension was given as 40% for adults aged 25 and above in 2008. This having risen from 600 million in 1980 to 1 billion in 2008. This prevalence is highest in Africa at 46% and in America at 35 %.(WHO, 2011). Kearney et al 2005 gave the global prevalence of hypertension to be 26.4% with males as 26.6% and females as 26.1%.

It has been shown that high-income countries have a lower prevalence of hypertension - 35% - than other countries at 40% (WHO 2011, 2008). Gillespie et al., 2011 stated the overall prevalence of hypertension among adults in the US as 30.9% with it being highest among those within the age group of ≥ 65 years at 69.7% and lowest among those aged 18-39 years at 31%. (Gillespie et al., 2011). Females also had a higher prevalence (31.7%) compared to men (30.0%).

A study done in a university community in South-west Nigeria gave the overall prevalence of hypertension as 21% with it being highest (32%) in those who had more than 3 children. (Erhun, 2005) while another study gave the prevalence of hypertension in a community based study of market women as 42% with more males than females being hypertensive and this increased across the age group. (Ijeoma et al., 2011).

In a rural community in South-Eastern Nigeria, the prevalence of hypertension for individuals aged 40-70 years was given as 46.4% and it was significantly higher in men than women. (Ejim et al., 2011).

However, Olatunbosun et al., 2000 gave the prevalence of hypertension in Ibadan to be 10.8% with it being 13.9% in males and 5.3% in women while Kadiri et. al., 1999 gave the overall prevalence among urban workers in Ibadan to be 9.3%.

The number of people with hypertension who are undiagnosed, untreated and uncontrolled however, have been shown to be higher in low- and middle-income countries compared to high-income. (WHO Report, 2013)

2.8 Factors Associated with hypertension

There are many factors associated with hypertension. They include behavioral, socio-economic, metabolic and cardiovascular factors. They can also be further subdivided into:

2.8.1 Modifiable risk factors

These factors are behavioral in nature and are highly influenced by Individual's working and living conditions. They include:

Poor diet

A poor diet often is built around high calorie foods low in essential nutrients, including ones containing saturated fat, trans fat, and added sugar. This type of diet is detrimental to overall health.

It also makes it easier to become overweight. Beyond that, for some individuals, eating too much salt (sodium) can cause the body to retain fluid, which drives up blood pressure. Getting too little potassium, a mineral that helps balance the amount of sodium in cells, adds to the risk.

Physical inactivity

Lack of physical activity increases the risk of blood vessel disease, heart disease, and stroke. It also makes it easier to put on unwanted pounds. In addition, when you are out of shape, it takes more effort for your heart to pump blood. This increases the force exerted on arteries, which can lead to high blood pressure. According to the World Heart Federation Fact-Sheet, 2002, Physical inactivity increases the risk of hypertension by 30%.

Overweight or obesity

The Body Mass Index BMI is a simple index of weight –for-height that is commonly used to classify overweight and obesity in adults. It is defined as a person's weight in kilograms divided by the square of his height in metres (kg/m^2). The BMI provides the most useful population level measure of overweight and obesity as it is the same for both sexes and for all ages of adults. (WHO 2015). It is usually classified into the following categories:

Table 2.8.1 showing the various classifications of BMI in (kg/m^2)

S/N	Status	Values (kg/m^2)
1	Underweight	<18.5
2	Normal	18.5-24.9
3	Overweight	25-29.9
4	Obese	30 and above

(WHO 2015)

Overweight is classified as a BMI of 25-30 kg/m while obesity refers to a BMI of over 30kg/m². Excess weight places added strain on the heart and raises cholesterol and triglyceride levels. In addition, the more you weigh, the more blood is needed to supply oxygen and nutrients to your body. The extra blood volume puts increased pressure on artery walls.

Generally, overweight and obesity are known as established risk factors for cardiovascular disease Colditz et al., 1990 and Witteman et al., 1990. Other chronic condition such as osteoarthritis Carman, 1994, diabetes, dyslipidemia, musculoskeletal problem and certain cancers have also been linked to excess weight Huang et al., 1997, Shoff and Newcomb, 1998. According to a 10-year follow-up study done by Alison E. Field 2001, the risk of developing diabetes, gallstones, hypertension, heart disease, and stroke increased with severity of overweight for both sexes. This was re-echoed in another study by Colditz et al., 1990.

Eventually, the above conditions give rise to increased morbidity and mortality in the society (Willett G. A. et al 1999).

Waist Circumference

This is a measure of the distance around the abdomen. The measurement of waist circumference (cm) provides information about the distribution of body fat and a measure of risk for conditions such as coronary heart disease. It compares closely with the BMI and is often seen as a better way of checking one's risk of developing a chronic disease. Increased waist circumference is also associated with the "Metabolic syndrome". It has been established that those who carry their excess fat centrally are more likely to suffer the consequences of being overweight (National obesity forum 2015).

The ranges for the waist circumference are given below:

Table 2.8.2 showing the various classifications of waist circumference in (cm)

	Normal (cm)	At Risk (cm)	At high Risk (cm)
Men	<94	≥94	≥102
Women	<80	≥80	≥88

(National obesity forum 2015).

A waist measurement of above 94cm for men and 80cm for women is an indicator of the level of internal fat deposits which coat the heart, kidneys, liver and pancreas, and increase the risk of chronic disease .(Heart foundation 2015)

Excessive alcohol

Long-term heavy drinking can lead to irregular heartbeats, heart failure and stroke. It can also contribute to high triglycerides. In addition, having more than two or three drinks at a time triggers the release of hormones that increase blood flow and heart rate. This, in turn, can raise blood pressure as well as reduce the effectiveness of high blood pressure medication

A prospective study of registered Nurses who were free of diagnosed systemic hypertension and other major diseases was carried out in the US to show the relationship between alcohol consumption and the risk of development of hypertension was carried out. At the end of the study data suggested a progressive increase in the risk of hypertension development on consumption alcohol greater than 20g/day compared to non-drinkers. (Jacqueline and Wittenman, 1990).

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Smoking

Smoking is one of the leading causes of preventable death in the United States, and it increases the risk of having a heart attack or stroke. With each cigarette smoked, there is a geometric increase in blood pressure levels which persists for more than an hour. High amounts of secondhand smoke, environmental smoke, and passive smoking can also contribute to high blood pressure thus smoking should be avoided as much as possible.

Poor stress management

Severe stress can lead to a temporary but dramatic spike in blood pressure. Over time, this might contribute to high blood pressure, although that has never been conclusively proved. In addition, some people cope with stress by overeating, drinking too much, or smoking.

Although stress is not a confirmed risk factor for either high blood pressure or heart disease, and has not been proven to cause heart disease, scientists continue to study how stress relates to our health. And while blood pressure may increase temporarily when you're stressed, stress has not been proven to cause chronic high blood pressure.

Poor consumption of fruits and vegetables

Fruits and vegetables are an important component of a healthy diet and their sufficient daily consumption could help prevent major diseases such as cardiovascular diseases. Components in fruits such as phytochemicals, fibres, minerals, folates, potassium and antioxidant content of fruits and vegetables have been shown to be responsible for this function. (Bazzano, 2004).

Approximately 16.0 million (1.0%) disability adjusted life years (DALYs, a measure of the potential life lost due to premature mortality and the years of productive life lost due to disability)

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Approximately 16.0 million (1.0%) disability adjusted life years (DALYs, a measure of the potential life lost due to premature mortality and the years of productive life lost due to disability)

and 1.7 million (2.8%) of deaths worldwide are attributable to low fruit and vegetable consumption (WHO, Global strategy on diet, 2015),

Moreover, insufficient intake of fruit and vegetables has been identified as a major cause of non-communicable disease (Yusuf S. et al 2001.) It is estimated to cause around 14% of gastrointestinal cancer deaths, about 11% of ischaemic heart disease deaths and about 9% of stroke deaths globally (WHO, Global strategy on diet, 2015) and in another study, it causes as much as 31% of ischaemic heart disease deaths and about 11% of stroke deaths world-wide (Mathers et al., 2002).

WHO/FAO recommends a minimum daily of 400g of fruit and vegetables per day (excluding potatoes and other starchy tubers) for the prevention of chronic diseases such as heart diseases, cancer, diabetes and obesity, as well as for the prevention and alleviation of several micronutrient deficiencies, especially in less developed countries. (The World health Report, 2002).

Socioeconomic factors

Social determinants of health, e.g. Globalization, urbanization, income, education and housing, have an adverse impact on behavioural risk factors and in this way influence the development of hypertension. For example, unemployment or fear of unemployment may have an impact on stress levels that in turn influences high blood pressure. Living and working conditions can also delay timely detection and treatment due to lack of access to diagnostics and treatment and may also impede prevention of complications. Rapid unplanned urbanization also tends to promote the development of hypertension as a result of unhealthy environments that encourage consumption of fast food, sedentary behavior, tobacco use and the harmful use of alcohol.

2.8.2 Non-modifiable risk factors

These factors are factors that cannot be controlled for. Knowledge of these risk factors are however beneficial as if determined to be “at high risk” of coming down with hypertension, monitoring of the blood pressure can be done regularly and treatment commenced at the earliest possible signs of trouble.

Age

High blood pressure can occur in people of all ages, including teenagers, children, and even babies. However, the risk of developing hypertension increases with age due to stiffening of blood vessels which makes it less flexible. This can be slowed through healthy living, including healthy eating and reducing the salt intake in the diet.

Gender

Men and women are about equally likely to develop high blood pressure at some point in their lives. However, the comparative risk varies by age. For those under age 45 men are more likely to have high blood pressure than women. The proportion evens out in middle age. By age 60 and older, women are just as likely as men to have the condition.

Ethnicity

High blood pressure affects people from all ethnic groups. However, African Americans develop high blood pressure more often and at an earlier age, on average, than their white or Mexican American counterparts. In addition, compared to white Americans, African Americans are more likely to die prematurely from high-blood-pressure-related diseases, such as coronary heart disease, stroke, and kidney failure.

Family history

Like height and eye color, a tendency toward high blood pressure can run in families. If your parents or siblings have high blood pressure, you're more likely to develop it, too.

2.9 Awareness/Knowledge of Hypertension

Depending on the communities of study, knowledge of hypertension and its risk factors have been classified as "Adequate/Optimal", "Marginal" and "Inadequate/ Suboptimal". A study done by Mark et al., 2003 rated the patients' awareness of blood pressure targets and current hypertension control status particularly with respect to SBP as suboptimal in the particular community of study.

Patient's knowledge about basic concept on hypertension was however rated to be good.

In contrast however, another study stated that Adults had a high knowledge of hypertension and its risk factors and that it was also dependent on their level of education. (Onyekwere et al., 2013, Mark et al., 1998). In that study, high proportions of patients with inadequate functional health literacy also lacked knowledge about the effect of lifestyle such as losing weight and dietary factors such as eating canned vegetables high in salt on blood pressure. (Mark et al., 1998).

It was thus shown from the above studies that poor/suboptimal awareness of modifiable risk factors for hypertension could affect the probability of reducing or eliminating the risk factors. Advocacy programmes aimed at sensitization at the community levels was therefore encouraged.

2.9.2. Knowledge of Risk factors for hypertension

Patients with hypertension are advised to lower their blood pressure to <140/90 mm Hg through sustained lifestyle modification and/or pharmacotherapy.

In a study to describe the use of lifestyle changes for blood pressure control and to identify the barriers to these behaviors, the data from 6,142 Canadians with hypertension who responded to

the 2009 survey on living with chronic diseases in Canada were analyzed. Most Canadians with diagnosed hypertension reported limiting salt consumption, having changed the types of food they eat, engaging in physical activity, trying to control or lose weight if overweight, quitting smoking if currently smoking, and reducing alcohol intake if currently drinking more than the recommended levels at least some of the time to control their blood pressure. Men, those aged 20 to 44 years, and those with lower educational attainment and lower income were, in general, less likely to report engaging in lifestyle behaviors for blood pressure control. A low desire, interest, or awareness were commonly reported barriers to salt restriction, changes in diet, weight loss, smoking cessation, and alcohol reduction. In contrast, the most common barrier to engaging in physical activity to regulate blood pressure was the self-reported challenge of managing a coexisting physical condition or time constraints. (Marianne et al., 2012)

2.10 Management of Hypertension:

This involves lifestyle modifications habits as well as treatment when the individual blood pressure is above 140/90mmHg. Previous studies have not seen any clear cut advantage of initiating treating below this blood pressure. (JNC8, 2014).

Early detection, treatment and care of primary hypertension has been shown to control blood pressure levels significantly.

For secondary hypertension, the disease causing the hypertension is treated alongside the hypertension. Successful treatment of the disease may cure the secondary hypertension.

Lifestyle modifications which have been shown to reduce high blood pressure include: reduction in salt intake, reduction in fat intake, healthy diet, regular physical exercise, stopping of smoking, reduction in alcohol consumption, proper management of stress, eating lots of fruits and vegetables, promotion of a normal body weight and maintaining a healthy lifestyle.

Maintain a healthy weight. People who are overweight should try to lose weight, and people of normal weight should avoid adding weight.

Eat a balanced diet. Eating healthful foods can help keep your blood pressure under control. Get plenty of fruits and vegetables, especially those rich in potassium, and limiting intake of excess calories, fat, and sugar. The Dietary Approaches to Stop Hypertension, or DASH diet, has been shown to help manage blood pressure.

Reduction in salt intake. For many people, eating a low-sodium diet can help keep blood pressure normal. Studies have shown that the higher the sodium intake, the higher the blood pressure. Total salt intake can also be reduced by avoiding high-sodium packaged and processed foods and not adding extra salt to one's meal.

Exercise regularly. Physical activity have been said to be crucial in hypertension management. The more exercise you get, the better, but even a little bit can help control blood pressure. Moderate exercise for about 30 minutes three times a week has been recommended as a good start in hypertension management.

Limit the alcohol. Drinking too much alcohol can lead to high blood pressure. For women, that means no more than one drink a day, and for men just a little more.

Monitor your blood pressure. Blood pressure should be measured regularly, either at the clinic or at home. Since high blood pressure often occurs with no symptoms, only blood pressure readings can tell if one's blood pressure is on the rise.

Adopting these lifestyle changes stated above can help prevent high blood pressure if your blood pressure is currently under control or lead to lowering of blood pressure levels if the numbers are already elevated.

Medications

Patients whose blood pressure falls into the Stage 1 hypertension range may be advised to take antihypertensive medication. Numerous drugs have been developed to treat hypertension. These drugs may be given singly or as combinations. The choice of medication however depends on the stage of hypertension, side effects, other medical conditions the patient may have, and other medicines the patient is taking.

Elderly Patients

JNC8 recommends that for those aged 65 years and above, goal blood pressure should be <150/90.

CHAPTER THREE

METHODOLOGY

3.1. Study Area

The study was conducted in Ibadan, the capital of Oyo State, Nigeria. Oyo State is located in the South-West geopolitical zone of Nigeria. It consists of 33 Local Government Areas (6 urban, 15 peri-urban and 12 rural LGA). It is also grouped into 3 senatorial districts (Oyo South, Oyo North and Oyo Central senatorial district). (National Population Commission, 2014).

In 2006 the population of the state was estimated at 5,591,589 with a projection of 7,306,335 in the year 2014 based on an annual growth of 3.4% (National Population Commission, 2014).

Ibadan South-West LGA is located in the urban area located in Oyo South senatorial district. It has a population of over 369,244 inhabitants and is divided into 12 wards. Residents are majorly private business owners and civil servants. (Oyo State Health Facility Directory, 2007).

3.2 Study Design

The design method utilized in this study involved quantitative research methods which employed a comparative community-based cross-sectional descriptive design.

3.3 Study Population

Oyo State consists of over 7 million people. The study population will consist of Adults of both Sexes aged 18 years and above living in Ibadan South-West local Government Area of Oyo State.

3.3.1 Inclusion/Exclusion Criteria

Inclusion criteria:

Healthy consenting adults aged 18 years and above who have been resident in the geographical location of the sample area for more than 2 years.

Exclusion criteria:

Subjects below the age of 18, those with other debilitating illness and subjects that were pregnant as this group could give a false impression of the extent of hypertension and its associated factors.

3.4 Sample size determination

The statistical formula for calculating sample size for single proportions was used for the sample size calculation.

$$n = (Z_{\alpha})^2 P(1-P)/d^2 \quad (\text{Kirkwood BR, 1988})$$

Where n = minimum sample size

Z_{α} = confidence level of 95% (1.96)

p = prevalence of hypertension given as 22% [0.22 (Ekwunife and Aguwa 2011)]

1-p = 0.78

d = estimate of tolerance (0.05)

$$= \frac{(1.96)^2 \times 0.22(1-0.22)}{0.05^2}$$

$$= \frac{3.8416 \times 0.22(0.78)}{0.0025}$$

$$= \frac{3.8416 \times 0.22(0.78)}{0.0025}$$

$$= 332.16$$

$$= \frac{0.65921856}{0.0025}$$

$$= 263.6874$$

$$= 263.6874$$

Loss to follow-up $n_2 = \frac{1}{1-f} \times n$

$$1-f$$

$$= \frac{1}{1-0.1} \times 263.6874$$

$$1-0.1$$

$$n_2 = 292.986$$

Design effect given as 2.0

$$\text{Hence } n_3 = 2 \times 292.986 = 585.97$$

Hence Sample size ≈ 586 persons.

3.5 Sampling Technique

This involved a multi stage sampling method to select a representative sample which would consist of at least 586 consenting eligible Individuals.

Stage 1: Five (5) Enumeration areas was selected from the list of the enumeration areas (EA) provided by the National Population Census commission using simple random sampling.

Stage 2: From each EA, one household was randomly selected by balloting in all the stratas.

Stage 3: The random walk and quota sampling method was thereafter employed in which the randomly selected household served as the starting point and subsequent houses were visited in odd numbers.

Stage 4: Each consenting eligible individual in consecutive households in each of the strata were interviewed for the survey until the predetermined quota has been reached.

3.6 Study Instruments

A semi-structured interviewer-administered questionnaire was used. This questionnaire was administered to every consenting study participant and was made up of six sections. This include:

- Section A: This section assessed individual characteristics like socio-demographic characteristics, religiosity, socioeconomic status, occupation and level of education.
- Section B: This section accessed respondent's knowledge and history of hypertension and diabetes.
- Section C: This section assessed the respondent's knowledge of associated risk factors.
- Section D: This section assessed the respondent's knowledge and history of lifestyle modification practices.
- Section E: Respondents dietary assessment
- Section F: Anthropometric measurements of the respondents.

3.7 Data Collection Method and Tool:

The questionnaire was translated to Yoruba and back translated to English to ensure consistency in meaning.

Nine research assistants who were young adults consisting of seven males and two females were trained on the use of the data collection instrument. Some of the research assistants were undergraduate students of the University of Ibadan while others were graduates. They filled the questionnaires on behalf of the respondents who answered the questions. They were trained on maintenance of ethical standards.

Tools used to collect data from them include:

1. Blood pressure which was taken once on the left arm with the use of a digital sphygmomanometer (Omron-SON Approved).
2. Weight and height was taken using the standard scales and their BMI determined.
3. Waist circumference was taken using a standard measuring tape.

3.8.2 Description of Variables (Independent and Dependent Variables)

Dependent variables: Presence or absence of hypertension. Hypertension was defined as “An increase in the systolic pressure above 140 and diastolic pressure above 90 millimeters of mercury (mmHg)” (JNC VIII, 2014).

Independent variables. This include:

The socio-demographic characteristics of the population which include:

Age: This was grouped into 3 categories: 18-34, 35-54 and 55 and above years.

Occupation: This was grouped into Civil Servants, Traders, Artisans and Students.

Level of Education was grouped into primary, secondary, tertiary and no formal education. Others such as quaranic education was recoded as no formal education.

Gender, residence, weight (measured in kg) and height (measured in meters).

Economic factors such as Income

Number of Children was grouped into “3 children and Less than 3 children” and “More than 3 children”

Religiosity to determine influence of religion was assessed. This was grouped into Christians, Muslims and traditional. Traditional and others were recoded as others.

Marital Status was grouped into 3 groups. "never married" was classified as single, "currently married" and "living with a sexual partner" was recoded as currently married and "separated", "divorced" and "widowed" were recoded as previously married.

Risk factors: Factors that predisposes an Individual chance of coming down with a disease.

Physical Activity: Sustained physical activity of at least 30mins on 5 or more days per week whether in leisure time or invigorated.

Cigarette Smoking: Smoking one cigarette per day for at least one year

Salt Intake: Taking Salt of <1,500mg/day. It was defined in this study as taking extra salt at table.

Family history of hypertension: This was defined as the "first relations" being hypertensive and was grouped into Yes or No.

Diabetes Status was described as presence or absence of diabetes and was grouped into Yes or No.

Vegetable Intake was defined as at least three servings of fruits and or vegetables daily (Oladapo et al, 2013)

Waist circumference (cm): was defined as a measure of the distance around the abdomen in centimeters and was grouped into: "Normal", "At Risk" and "At High Risk".

Body mass Index (BMI) defined as a person's weight in kilograms divided by the square of his height in metres (kg/m^2) and was grouped into "Underweight", "Normal", "Overweight" and "Obese".

Knowledge of the causes of hypertension, its complications and Management was grouped into "Inadequate/ Suboptimal", "Adequate/Optimal" and "Marginal".

3.8. Data analysis and Management

Continuous variables such as age, weight, height, blood pressure, waist circumference, etc was presented as mean values and standard deviation while categorical variables such as sex, level of education, exercise, alcohol, salt intake etc was presented as frequencies.

Data was entered using Statistical Package for Social Sciences version 15 software (SPSS) after editing the questionnaires on a daily basis during data collection. Cleaning of the data was done by removing implausible entries. After completing the above exercise, suitable questionnaire records were entered and analyzed.

Associations between categorical variables such as sex, level of education, exercise, alcohol, salt intake, vegetable consumption and family history of hypertension etc. was tested by the use of chi-square test. The statistical level of significance was set at 5%.

Independent variables from bivariate analysis were entered into regression model at 5% level of significance.

3.9 Ethical Considerations

3.9.1 Ethical Review Committee

Ethical clearance for this study was sought and received from the ethical review committee of Ministry of Health, State Secretariat, Ibadan, Oyo state (see appendix D). Individual consent was sought from each of the participants and confidentiality.

3.9.2 Confidentiality

Respondent were assured of maximum confidentiality during and after the collection of the data. There was no identifiers such as names, address or mobile numbers of the participants, the information gathered have been safely stored in the computer for analysis and all the completed

questionnaires will be kept for maximum of ten years or until the purpose of the study have been accomplished.

3.9.3 Voluntary informed consent

The details of the study was stated in clear terms explained to the participants, only the individuals who showed interest and complete willingness signed the informed consent form to confirm them of their voluntary and willing participation in the study. And in the case in which the study participants cannot read or write, a verbal consent form was sought from the respondents and they were asked to thumb print on the form.

3.9.4 Beneficence

This study offered necessary benefits to the study participants as diagnosis of hypertension was made for members of the community. Also those who are at risk of coming down with other cardiovascular events associated with hypertension were identified.

In addition, health education was offered to participants on how to avoid risk factors pre-disposing them to coming down with hypertension. The result of the findings will also be useful for appropriate authorities and agencies in regulation and formulation of policies that will be of help to the study participants.

3.9.5 Non-Maleficence

This study is relatively risk free since no intervention means, process or procedures are involved that could cause any form of harm to the study participants.

3.9.6 Right to decline

It was clearly stated also to the respondents that they had the right to quit and withdraw their participation at any given time during the study period.

3.9.7 Intervention

There was health education for those who were newly diagnosed with hypertension with emphasis on modifiable risk factors. They were also be encouraged to visit the nearest PHC for follow-up.

3.9.8 Translation of protocol to local language: To avoid lack of communication/understanding of the terms involved in the research, the protocol was translated to Yoruba language, which is the predominant language in the area. A research assistant who could write and speak Yoruba fluently was used during the interview to aid proper communication.

CHAPTER FOUR

RESULTS

4.1 Socio-demographic characteristics of respondents

Table 4.1 shows the distribution of socio-demographic characteristics of respondents. A total of 660 respondents were analyzed of which 250 (37.9%) were males and 410 (62.1%) were females aged 18 years and above. From table 4.1, Over 50% of the respondents were above thirty-five years of age. Most of the respondents had some form of education (93.4%) while the others had either quaranic education or no formal education. Yoruba was the largest ethnic group (91%) followed by Ibo's (4.3%) while the others were from other tribes. A good number of the respondents were Christians (68.8%) while about 3 in every 10 respondents were Muslims.

In Table 4.1.2 Overall, there were 171 respondents who are single, 7 in 10 respondents are married and about 5.5% of the respondents are no longer married this comprised those who had been widowed separated or divorced. A good number of the respondents were Artisans (47.4%), about 22.7% were Traders, 17.7% were Civil Servants and the rest were Students. Those who had lived in the area for more than four years formed the greater part of the respondents (72.4%).

Table 4.1: Distribution of socio-demographic characteristics of respondents (N=660)

Variables	Frequency(n)	Percentage
Gender	250	37.9
Male	410	62.1
Female		
Age (Years)		
18-24	143	22.6
25-34	151	23.9
35-44	145	22.9
45-54	113	17.9
55-64	47	7.4
≥65	34	5.4
Education		
No formal Education	45	6.8
Primary	144	21.9
Secondary	295	44.8
Tertiary	170	25.8
Others	5	0.8
Ethnicity		
Yoruba	596	91
Igbo	28	4.3
Hausa	6	0.9
Others	25	3.8
Religion		
Christianity	452	68.8
Islam	202	30.70
Others	3	0.5

4.1.2: Socio-demographic characteristics of respondents continued

Table 4.1.2: Continuation of the distribution of the socio-demographic characteristics of respondents (N=660)

Variables	Frequency (n)	Percentage (%)
Marital Status		
Single	171	26.6
Currently married	436	67.9
Previously married	35	5.5
Occupation		
Civil Servant	109	17.7
Trader	140	22.7
Artisan	292	47.4
Student	75	12.2
Years of Residence		
< 4	176	28.6
5-9	130	21.1
10-14	107	17.4
15-19	61	9.9
≥20	142	23.1

4.1.3 Distribution of selected cardiovascular risk factors

The table below shows the frequencies of some factors affecting hypertension. The mean age of the respondents is 37 years with blood pressure of 126mmHg. On the whole, their average waist circumference was 82cm which is normal and their blood pressure is 126mmHg with their BMI given as 25.2 kg/ m².

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Table 4.1.3: Distribution of some selected cardiovascular risk factors

Variables	Frequency(n)	Mean ± SD
Age (years)	635	37.54 ±14.794
Waist circumference (cm)	646	82.13± 15.317
Systolic BP (mmHg)	650	126.26±19.916
Body Mass Index (kg/m²)	646	25.17±5.903

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4.2. Prevalence of hypertension

Table 4.2. shows the results for the prevalence of hypertension across of the respondents.

While the overall prevalence of hypertension in Ibadan South-west LGA was shown to be 19.3%.

It was discovered that 42.3% of the female respondents have their blood pressure within the normal range as compared to the males (36.1%). However, a greater number of females (21.6%) than the males (15.8%) were hypertensive ($p=0.001$).

Table 4.2.1: Prevalence of hypertension among the respondents in the population

Variables	Male N=241 n (%)	Female N=404 n (%)	Total N=645 n (%)	χ^2	p-value
Normal	87(36.1)	171(42.3)	258(40.0)	16.569	0.001*
Pre-hypertension	116(48.1)	146(36.1)	262(40.6)		
Stage I Hypertension	31(12.9)	48(11.9)	79 (12.2)		
Stage II Hypertension	7(2.9)	39(9.7)	46 (7.1)		

* Statistically significant

Marital Status

The highest proportion of those whose blood pressure was in the normal range were those who were single (60%) and this decreased as they got married. On the other-hand, those who had been previously married i.e separated, divorced and widowed respondents were the largest number of those that presented with hypertension on evaluation (40%) while a good number of those who are presently married are in the pre-hypertensive stage. This pattern is statistically significant at $p < 0.000^*$.

Occupation

While Civil Servants have the highest prevalence of hypertension (26.7%), it is closely followed by Traders (22.9%), then Artisans (16.0) before finally Students (9.6%). However, of the total number of respondents with normal blood pressure, Students have the highest proportion of 58.9% and it decreases across the group. This pattern was seen to be statistically significant at $p = 0.003$.

Education

Out of the 50 respondents with no form of education or other forms of education such as Quranic education, 42.0% of them were hypertensive while 40% of them were in their pre-hypertensive stage. Equal number of respondents who attained primary education are in their normal and pre-hypertensive stage (39.3%). Those who completed secondary education had the highest number of respondents in their normal and pre-hypertensive stage, this was followed by those with primary education. However a good number of respondents irrespective of their level of education were in the pre-hypertensive stage. This pattern of education distribution is statistically significant at $p < 0.000^*$.

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Religion

There was no significant association in the blood pressure levels across the various religious groups. Of the 261 respondents with normal BP, the Muslims had the lowest number of 38%.

Christians however had the highest proportions of those with Stage I and II hypertension (21.3%.

$p=0.198$).

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Table 4.2.2: Association between hypertension and socio-demographic characteristics of respondents

Variables	Normal n (%)	Pre- hypertension n (%)	Hypertension n (%)	Total n (%)	χ^2	p-value
Marital status (N=605)						
Single	99(60.0)	54(32.7)	12(7.3)	165(100)	48.995	<0.000*
Currently married	146(34.2)	186(43.6)	95(22.2)	427(100)		
Previously married	7(20.0)	14(40.0)	14(40.0)	35(100)		
Occupation (N=605)						
Civil Servant	35(33.3)	42(40.0)	28(26.7)	105(100)	19.712	0.003*
Trader	50(35.7)	58(41.4)	32(22.9)	140(100)		
Artisan	115(40.1)	126(43.9)	46(16.0)	287(100)		
Student	43(58.9)	23(31.5)	7(9.6)	73(100)		
Education (N=645)						
No formal education	9(18.0)	20(40.0)	21(42.0)	50(100)	26.143	<0.000*
Primary education	55(39.3)	55(39.3)	30(21.4)	140(100)		
Secondary education	133(45.7)	117(40.2)	41(14.1)	291(100)		
Tertiary education	64(39.0)	67(40.9)	33(20.1)	164(100)		
Religion (N= 642)						
Christian	184(41.6)	164(37.1)	94(21.3)	442(100)	7.249	0.123
Muslim	75(38.1)	92(46.7)	30(15.2)	197(100)		
Others	2(66.7)	1(33.3)	0(0)	3(100)		

*statistically significant

Table 4.2.2: Association between hypertension and socio-demographic characteristics of respondents

Variables	Normal n (%)	Pre- hypertension n (%)	Hypertension n (%)	Total n (%)	χ^2	p-value
Marital status (N=605)						
Single	99(60.0)	54(32.7)	12(7.3)	165(100)	48.995	<0.000*
Currently married	146(34.2)	186(43.6)	95(22.2)	427(100)		
Previously married	7(20.0)	14(40.0)	14(40.0)	35(100)		
Occupation (N=605)						
Civil Servant	35(33.3)	42(40.0)	28(26.7)	105(100)	19.712	0.003*
Trader	50(35.7)	58 (41.4)	32(22.9)	140(100)		
Artisan	115(40.1)	126(43.9)	46(16.0)	287(100)		
Student	43(58.9)	23(31.5)	7(9.6)	73(100)		
Education (N=645)						
No formal education	9(18.0)	20(40.0)	21(42.0)	50(100)	26.143	<0.000*
Primary education	55(39.3)	55(39.3)	30(21.4)	140(100)		
Secondary education	133(45.7)	117(40.2)	41(14.1)	291(100)		
Tertiary education	64(39.0)	67(40.9)	33(20.1)	164(100)		
Religion (N= 642)						
Christian	184(41.6)	164(37.1)	94(21.3)	442(100)	7.249	0.123
Muslim	75(38.1)	92(46.7)	30(15.2)	197(100)		
Others	2(66.7)	1(33.3)	0(0)	3(100)		

*statistically significant

4.3 Risk factors associated with hypertension

4.3.1 Modifiable risk factors

Body Mass Index (BMI in kg/m²):

There is a significant increase in the blood pressure of the respondents as their BMI increases. ($X^2=18.340.$, $p=0.001$). With those who are underweight having the highest range of normal blood pressure (51.7%) followed closely by those whose blood-pressure is normal. A good number of respondents who are overweight or obese have their blood pressure within the hypertensive ranges.

Waist circumference (cm):

Of the 168 respondents who have their waist circumference to be at "high risk" of developing chronic diseases, 35.7% of them are hypertensive, 32.7% are pre-hypertensive and 31.7% of them are normal. 11.4% of the 376 respondents with normal waist circumference are hypertensive, about the same number of the rest have their blood pressure to be either in the normal ranges or in the pre-hypertensive ranges. Hence there is a significant association between the waist circumference of the respondents and their blood pressure. ($X^2= 44.287.$, $p<0.000$).

Diabetic status:

All those with history of diabetes had their blood pressure above normal with 57.1% of them being in their hypertensive stage and the others being in their pre-hypertensive stage. Of the 609 respondents who are not diabetic, 40.2% of them have normal blood pressure, 40.7% are pre-hypertensive while the remaining 19.2% of them are hypertensive. Generally, a higher proportion of those who are diabetic have their blood pressure either within the pre-hypertensive or hypertensive stages. ($X^2= 7.908.$, $p= 0.019^*$)

Salt at table:

Of the 102 respondents who take extra salt at table, 44.1% of them had normal blood pressure. 40.7% of them were in their pre-hypertensive stage and 19.2% of them were hypertensive. While a higher proportion of those who did not use extra salt at table had their blood pressure within the normal range. ($p=0.680$) This was however not statistically significant.

Physical Activity

A higher proportion of those who currently exercise have their blood pressure within the normal ranges. 20.2% of those who do not exercise presently were hypertensive as compared to those who presently exercise which was 19.1%.

Number of children

A higher proportion of respondents who had more than three children had stage I and II hypertension compared to those who those who had less and this was statistically significant ($X^2=55.030.$, $p<0.000$). 88.4% of those who had less than three children had their blood pressure within the normal or pre-hypertensive range

Fruit and vegetable intake

42.4% of the 578 respondents who ate less than three servings of fruits and vegetables daily had their blood pressure within the normal range. 90.5% of those who ate three servings of fruits and vegetables daily were not hypertensive ($X^2=11.039.$, $p=0.004$) but rather majority of their blood pressure fell in the pre-hypertensive range.

Table 4.3: Association between hypertension and modifiable risk factors of respondents

Variables	Normal n(%)	Pre- hypertension n (%)	Hypertension n (%)	Total n(%)	χ^2	p-value
BMI (kg/m²) (N=632)						
Underweight	15(51.7)	10(34.5)	4(13.8)	29(100)	18.340	0.005*
Normal	151(46.2)	127(38.8)	49(15.0)	327(100)		
Overweight	60(33.9)	74(41.8)	43(24.3)	177(100)		
Obese	29(29.3)	43(43.4)	27(27.3)	99(100)		
Waist circumference(cm) (N=640)						
Normal	166(44.1)	167(44.4)	43(11.4)	376(100)	44.287	<0.000*
At Risk	37(38.5)	38(39.6)	21(21.9)	96(100)		
At High Risk	53(31.5)	55(32.7)	60(35.7)	168(100)		
Diabetes status (N=612)						
Yes	0(0)	3(42.9)	4(57.1)	7(100)	7.908	0.019*
No	243(40.2)	246(40.7)	116(19.2)	605(100)		
Salt at table(N=621)						
Yes	45(44.1)	38(37.3)	19(18.6)	102(100)	0.771	0.680
No	205(39.5)	212(40.8)	102(19.7)	519(100)		

*statistically significant

Table 4.3.1 Association between hypertension and some other modifiable risk factors of respondents

Variables	Normal n (%)	Pre- hypertension n (%)	Hypertension N (%)	Total n (%)	χ^2	p-value
Physical activity (N=608)						
Yes	93(37.8)	106(43.1)	47(19.1)	246(100)	1.203	0.548
No	149(41.2)	140(38.7)	73(20.2)	362(100)		
No of children(N=595)						
≤ 3	183(47.3)	159(41.1)	45(11.6)	387(100)	55.030	<0.000*
> 3	50(24.0)	86(41.3)	72(34.6)	208(100)		
Fruit and vegetable consumption(N=650)						
< 3 Servings	245(42.4)	222(38.4)	111(19.2)	578(100.0)	11.039	0.004*
≥ 3 Servings	17(23.6)	41(56.9)	14(19.4)	72(100)		

4.3.2. Non-modifiable risk factors

Association between hypertension and the non-modifiable risk factors of respondents

Table 4.3.2 showing the association between hypertension and the non-modifiable risk factors of hypertension of the respondents

Age

The older the respondents, the higher their blood pressure for those with Stage I and II hypertension and this was statistically significant. ($\chi^2=101.896$, $p<0.000$). Majority of those within the age-group of 18-34 had their blood pressure within the normal range (57.7%). Respondents who were 55 years and above were those with the highest risk of coming down with hypertension (46.9%).

Ethnic group: Half of the total Ibo respondents had normal blood pressure compared to 39.9% of the Yoruba's. This was however not statistically significant.

Family history of hypertension: 41.5% of respondents whose family members did not have a history of hypertension had normal blood pressure as compared to those whose family members had a history of hypertension which was just 19.6%. Respondents whose family had a positive history of hypertension were those whose blood pressure was highest. ($\chi^2=18.099$, $p<0.000$)

Table 4.3.2: Association between hypertension and the non-modifiable risk factors of hypertension of the respondents

Variables	Normal n(%)	Pre- hypertension n (%)	Hypertension n(%)	Total n(%)	χ^2	p-value
Age (Years) (N=618)						
18-34	164(57.7)	96(33.8)	24(8.5)	284(100)	101.896	<0.000*
35-54	69(27.3)	124(49.0)	60(23.7)	253(100)		
≥ 55	14(17.3)	29(35.8)	38(46.9)	81(100)		
Ethnic group (N=640)						
Yoruba	232(39.9)	238(40.9)	112(19.2)	582(100)	3.271	0.774
Ibo	14(50.0)	11(39.3)	3(10.7)	28(100)		
Hausa	2(33.3)	2(33.3)	2(33.3)	6(100)		
Others	10(41.7)	8(33.3)	6(25.0)	24(100)		
Family history of hypertension (N=625)						
Yes	9(19.6)	18(39.1)	19(41.3)	46(100)	18.099	<0.000*
No	240(41.5)	239(41.3)	100(17.3)	579(100)		

* Statistically significant

4.4. Level of knowledge of hypertension and its risk factors in the community

Table 4.4.1 shows the results of the bi-variate (chi square analysis) of hypertension and the respondent's level of knowledge on the causes, complications and management of hypertension and its risk factors.

Across the groups, respondents who had adequate knowledge on the causes, complications and management of hypertension and its risk factors were the least among those whose blood pressure was normal. Of the 50.9% of those in the pre-hypertensive stage had marginal knowledge on the cause of hypertension while those who had marginal knowledge on the complications of hypertension were the least hypertensive but was not statistically significant.

Overall, majority of those who were hypertensive (Stage I or II) were those who had adequate knowledge of the causes and complications of hypertension although this was not statistically significant. (23.8%, 21.4%). However, those who had adequate knowledge on the management of hypertension had the least prevalence at 15.4%.

Table 4.4.1 Association between hypertension and the respondent's level of knowledge on the causes of hypertension and its accompanying risk factors

Variables	Normal n (%)	Pre- hypertension n (%)	Hypertension n (%)	Total n(%)	χ^2	p- value
Knowledge of the causes of hypertension (N=371)						
Inadequate	114(44.7)	95(37.3)	46(18.0)	255(100)	7.625	0.106
Marginal	16(30.2)	27(50.9)	10(18.9)	53(100)		
Adequate	19(30.2)	29(46.0)	15(23.8)	63(100)		
Knowledge of complications of hypertension (N=390)						
Inadequate	78(39.6)	79(40.1)	40(20.3)	197(100)	5.805	0.214
Marginal	43(47.8)	32(35.6)	15(16.7)	90(100)		
Adequate	32(31.1)	49(47.6)	22(21.4)	103(100)		
Level of knowledge of management of hypertension (N=365)						
Inadequate	107(42.5)	99(39.3)	46(18.3)	252(100)	1.699	0.791
Marginal	23(37.7)	27(44.3)	11(18.0)	61(100)		
Adequate	19(36.5)	25(48.1)	8(15.4)	52(100)		

4.5. Logistic regression

Table 4.5 and 4.5.2 shows the results for the adjusted odds ratio and 95% confidence intervals from the regression of hypertension and various factors.

After controlling for other variables, the odds of developing hypertension in females was less likely in this situation compared to their male counterparts. (95% CI = 0.29 –1.01).

Respondents who were aged 55 years and above were over two times more likely to be hypertensive than those aged 18-34 years (95% CI 1.08-7.13). The odds of the respondents being hypertensive increases per unit arithmetically as they age. i.e the older they are, the more likely they are to be hypertensive.

Those whose waist circumference were at “high risk” were over three times more likely to be hypertensive compared to those whose waist circumference was normal. (95% CI 1.55-7.27) and this was found to be the strongest independent predictor of hypertension in this study (P=0.00).

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Those whose waist circumference were at "high risk" were over three times more likely to be hypertensive compared to those whose waist circumference was normal. (95% CI 1.55-7.27) and this was found to be the strongest independent predictor of hypertension in this study ($P=0.00$).

Table 4.5.1 Adjusted odds ratio for risk factors for hypertension

Variables	Odds Ratio	95% CI of OR		P- value
		Lower	Upper	
Gender				
Male	1	0.29-1.01		0.05*
Female	0.54			
Occupation				
Civil servant	1	0.41-2.16		0.88
Trader	0.94	0.44-2.13		0.94
Artisan	0.97	0.24-5.79		0.83
Student	1.19			
Marital status				
Single	1	0.683-7.54		0.18
Currently married	2.27	0.76-15.30		0.11
Previously married	3.41			
Educational level				
No formal education	1	0.19-1.45		0.213
Primary education	0.53	0.19-1.42		0.202
Secondary education	0.52	0.21-2.01		0.45
Tertiary education	0.65			
Optimal vegetable & fruit consumption				
< 3 servings of fruits/veg daily *	1	0.26-1.42		0.25
At least 3 servings of fruits and veg daily	0.61			

*Statistically significant

Table 4.5.2 Predictors for the prevalence of hypertension and its associated risk factors of respondents in Ibadan South-West Local Government Area of Oyo State

Variables	Odds Ratio	95% CI of OR		P- Value
		Lower	Upper	
Family History Of Hypertensionⁱ				
No	1	0.92-5.38		0.08
Yes	2.22			
Diabetes Status				
No	1	0.25-15.32		0.52
Yes	1.97			
Body Mass Index (BMI (Kg/m²))				
Normal	1	0.34-7.02		0.57
Underweight	1.55	0.48-1.68		0.74
Overweight	0.99	0.29-1.45		0.29
Obese	0.64			
Age Groups (Years)				
18-34	1	0.86-3.90		0.12
35-54	1.83	1.08-7.13		0.03*
≥ 55	2.77			
No of Children				
≤ 3	1	0.99-3.17		0.06
> 3	1.77			
Waist Circumference (Cm)				
Normal	1	0.70-3.21		0.30
At Risk	1.50	1.55-7.27		0.00*
At High Risk	3.34			

*Statistically significant

CHAPTER FIVE

DISCUSSION, CONCLUSION AND RECOMMENDATIONS

Discussion

This Study aimed to determine the prevalence of hypertension and its associated risk factors in an Adult population in Ibadan South-west LGA of Oyo State, Nigeria providing information on the modifiable and non-modifiable risk factors of hypertension.

5.1 Prevalence of hypertension

The overall crude prevalence of hypertension was relatively high in this study with females having a higher prevalence than males. This observation was in agreement with similar studies carried out among adults in various parts of the country. (Ogah et al., 2012; Oladapo et al., 2010 and Erhun et al., 2005). Similarly, much higher prevalence of hypertension have also been reported globally by Gillespie et al., 2011 and Kearney et al., 2005 compared to that stated in this country. It is also noteworthy to mention that this prevalence is similar to the prevalence of hypertension in a study carried out in a rural community (Oladapo et al., 2010) in the state thus indicating that there is no significant difference in hypertension across both communities. This could be due to the lifestyle and habits of developed countries which have placed them at higher risk of chronic diseases. The study is however in contrast to some other studies carried out in South-western Nigeria which showed a lower prevalence of hypertension. (Olatunbosun et al., 2000 and Kadiri et al., 1999). This decline in prevalence of hypertension may be because the mean age of the respondents of the study population was 37.54 as age has been indicated to be a risk factor for hypertension and also because the benchmark for diagnosis of hypertension was 160/95mmHg as opposed to 140/90mmHg used in this study. It could also be as a result of rapid urbanization and demographic

transition occurring in developing countries in which Nigeria is not left out of. It is therefore recommended that public health education and policies targeted at educating the public on the need and importance of maintaining healthy lifestyles and habits be adopted.

This is quite important because if health education is targeted in this community, the long term effect projected to increase to about 60% in 2025 (Kearney et al., 2005) could significantly reduce thus reducing morbidity and mortality in our country.

5.2 Socio demographic characteristics

The findings from this study indicated that the prevalence of hypertension in females was higher than their male counterpart. This is contrary to reports given from previous studies (Kearney et al., 2005; Ijeoma et al., 2011 and Olatunbosun et al., 2000) which stated that males have a higher prevalence of hypertension than females, this study showed that there was a relatively higher prevalence in women than men ($P=0.05$) and this remained statistically significant even after controlling for other variables. It is however in line with Gillespie et al., 2011 who gave the prevalence of hypertension in the US to be higher in females (31.7%) than Males (30.0%).

This may be an indicator that socio-economic factors, lifestyles, urbanization, environmental and behavioural changes are beginning to take its toll on women as "more and more" women now have to work, tend their families as well as take care of the home. There is thus decreased time for exercise and an increase in fat consumption.

Prevalence of hypertension was also found to be high among civil servants. This is higher than previous studies done which showed the prevalence of hypertension among civil servants to be lower (Erhun et al., 2005). The increase could be as a result of increased poor environmental and working conditions. In addition, the prevalence of hypertension among traders in this study was

found to be lower when compared to similar studies among the same occupational group. (Ijeoma et al., 2011; Odugbemi et al., 2012). This could be associated with an increased awareness in the west on the need to avoid sedentary lifestyle as it puts them at higher risk of cardiovascular diseases.

Similarly, in independent studies carried out by Onwucheka et al., 2012 and Olatunbosun et al., 2000, single persons were less likely to be hypertensive than married people. This was in line with this study as there was a reduced prevalence of hypertension among single respondents compared to those who were currently married. However, those who were no longer married had the highest prevalence of hypertension. This could have arisen as a result of increased socioeconomic and behavioural factors attributed to those who are no longer married.

In this study, those who were not educated had the highest prevalence of hypertension, followed by those who had only primary level of education. This is quite similar to a National Health and Nutrition Examination Survey Data reported in the US by Gillespie et al., 2011 which reported that those who had "less than high school education" had the highest prevalence of hypertension. This disparity could be as a result of poor health education, reduced access to preventive health care services and funds as by those who had little or no education

Although more Christians were hypertensive than Muslims in this study, there was no significant association between their religious affiliation and their hypertensive levels.

5.3 Factors associated with Hypertension

It was observed that the blood pressure of the respondents increased as their BMI increased with obese respondents having the highest prevalence of hypertension. This agrees with previous studies which states that obese and overweight patients are at a higher risk of developing cardiovascular diseases than those whose weight was normal. (Colditz et al., 1990 and

Olatunbosun et al., 2000). In a previous study by JoAnn et al., 1995, it was shown that those who had "above normal" body weight were at increased risk of mortality in adulthood than those whose body weight was normal. This is particularly worrisome if one considers that over 50% of the respondents of study had their body weight to be above normal thus more efforts should be put in place to educate those in the community of maintaining a healthy body weight as has been emphasized in another study by Walter et al., 1999.

Type II diabetes have been shown to be associated with hypertension with a prevalence of about 24-80%. (Dalal et al., 2011). This study is in line with the given range as the prevalence of hypertension for those who were diabetic fell within the stated range. However, the overall prevalence of type II diabetes was 1.1%. This is much lower than a study done by Oladapo et al., 2010 which gave a prevalence of 2.5% for a similar study which was also carried out in South-western Nigeria and the national crude prevalence rate of diabetes given as 2.8% (Akinkugbe, 1997). It could however be as a result of the fact that those who were diabetic were assessed based on their positive affirmation to the question "Are you diabetic" and not because a test to determine their glucose levels was performed.

The prevalence of hypertension for those who had over three children was higher than those who had three children or less at 11.6%. This observed increase in prevalence was observed in a previous study carried out by Erhun et al., 2004 which gave the prevalence of hypertension of those who had over three children as 32%. Although the basis of this increase is not well known, it could however be likened to an increase in psychological stress as respondents have to work more sometimes to be able to meet the need of their families.

There was an association between those who had a family history of hypertension and their blood pressure levels when it was compared independently. The prevalence for those who had a positive

family history of hypertension was over two times as high as opposed to those who had a negative history of hypertension. This has been supported by similar studies carried out by Steven et al., 1986 and Rose et al., 1979 thus nutritional and healthy lifestyle measures are highly recommended for those who have a positive family history of hypertension.

Most of the respondents in this study admitted eating fruits and vegetables some days of the week but it was less than the daily recommended intake. This had some level of influence on their blood pressure levels. This is similar to previous studies carried out in Egbeda LGA, a rural community in Oyo state (Oladapo et al., 2010)

In this study, there was no significant association between physical activity and hypertension, this is in contrast to previous studies which showed some level of association between physical activity and hypertension as shown by World Heart Federation Fact-Sheet, 2002 and WHO WHD Report 2013 which stated that physical activity had an effect on the blood pressure level of individuals by up to 30%.

In addition intake of salt "at table" had no effect on the respondent's blood pressure level. There was also no association between ethnic groups and hypertension even though Hausa's had the highest prevalence (33.3%) followed by those from other tribes (25.0%). This is in line with previous studies which support the notion that there is generally increased blood pressure associated with "blacks" as a whole (Okosun et al., 1999) thus there is a need for increased awareness through public health education on prevention strategies for reducing the prevalence of hypertension.

5.4 Locally important risk factors of hypertension

In this study, hypertension prevalence was found to be highest among respondents aged 55 years and above. This result is consistent with other findings which indicate that age is an important

factor that affects hypertension (Onwucheka et al., 2012; Ogah et al., 2013; Bosu 2010 and WHO, WHD Report 2013). Gillespie et al., 2011 further stated hypertension prevalence to be highest among those aged ≥ 65 years at 69.7%. The high prevalence associated with increased age could be likened to the fact that as one ages, so do the blood vessels stiffen, becoming less flexible thus increasing the pressure needed to pump blood to all the parts of the body which invariably leads to an increased blood pressure. This can be slowed through healthy living which includes healthy dietary intake thus appropriate strategies aimed at the above practices should be adopted.

In addition, the waist circumference was found to be an important predictor for hypertension with respondents who were "at high risk" being over three times more likely to be hypertensive than those whose waist circumference was normal. This is in line with a study reported by Alphonso et al., 2002 which showed that waist circumference was an important indicator of hypertension and Oladapo et al., 2010 who recommended that abdominal obesity rather than overall obesity be used in determining CVD risk.

The waist circumference is a known marker of "checking one's risk of developing a chronic disease" and provides information about the distribution of body fat and a measure of risk for conditions such as coronary heart disease (National obesity forum 2015). This result is thus important as it provides supportive evidence on the need to reduce the waist circumference so as to prevent cardiovascular risks associated with the burden.

Early detection and treatment of hypertension and other risk factors, as well as public health policies that reduce exposure to behavioural risk factors, have contributed to the gradual decline in mortality due to heart disease and stroke in high-income countries over the last three decades (WHO, 2013), these efforts if adopted in Nigeria could go a long way in reducing the morbidity and mortality associated with hypertension and other associated risk factors.

5.5 Level of awareness of hypertension

Respondents who had “adequate knowledge” on the causes and complications of hypertension had the highest prevalence of hypertension while those who had “Inadequate knowledge” on the management of hypertension had the highest prevalence. The trend noticed in this study is that knowledge on the causes and complications of hypertension by the respondents did not reflect on their actual blood pressure levels. This is quite worrisome as it would have been expected that those who had adequate knowledge on the above subject would have carried out preventive measures so as to avoid coming down with high blood pressure. However those that had adequate knowledge on the management of high blood pressure had the lowest prevalence. It is thus recommended that in enlightening members of the community on public health measures, emphasis should be placed not just on preventive measures but also on best management practices.

5.6 Limitations

A major limitation to this study was that the prevalence of hypertension was determined by taking the blood pressure at a sitting but this was minimized by ensuring that the blood pressure was taken after a 5-minutes sitting rest.

Some of the participants in this study whose blood pressure levels were measured as normal might have been treated and successfully controlled with life-style modifications or pharmacologic drugs thus, they would therefore not have been classified as having hypertension.

Another major limitation is that the prevalence of hypertension in the population of study might be underestimated because older persons, who have a higher prevalence of age-related hypertension were not readily available for the study. This might be because the Local Government

Area where the study was done is classified as an urban community and most elderly people prefer to stay in less noisy environment away from city life.

Conclusion

This study has shown that there is a high prevalence of hypertension in Ibadan South-west LGA of Oyo State Nigeria. In addition, female respondents, civil servants and those who are no longer married are among the groups with the highest prevalence.

Respondents over 55 years of age, female respondents and most importantly those who have their waist circumference being "At high risk" have been shown by this study to be at increased risk of hypertension. Generally, respondent's knowledge on the causes and complications of hypertension had little influence on the prevalence of hypertension. Modifiable risk factors associated with hypertension include: Those whose BMI are overweight/obese, those who have a positive family history of hypertension, those who eat less than three servings of fruits/vegetables and those who have more than three children.

Lifestyle and environmental strategies to reduce blood pressure might benefit not only those who are hypertensive but also those whose blood pressure is below 140/90 mmHg, but not necessarily optimal. Progress in hypertension control however cannot be achieved without improvements in health-care quality thus in evaluation methods, measurement of successes and shortfalls should be considered.

Recommendations

In view of the findings in this study, the following recommendations are made:

1. Better control of blood pressure is needed through an integrated network of systems, comprising not only of Government parastatals at all levels but also of employers, non-government organizations, restaurants, pharmaceutical industries and health care service providers.
2. Public health policies aimed at addressing hypertension must be made. Interventions must be affordable, sustainable and effective. As such, vertical programmes that focus solely on hypertension are not recommended but rather programmes that address total cardiovascular risk need to be an integrated as part of the national strategy for prevention and control of non-communicable diseases.
3. Public health education aimed at reducing modifiable risk factors such as: abdominal obesity, generalized obesity, overweight respondents, among others should also be adopted in the population.
4. Other programmes targeted at encouraging healthy living and diet should be considered as well for those who are pre-disposed to non-modifiable risks of hypertension as they will stand to benefit from such programmes.
5. Introduction of wellness programmes at workplaces and development of programs for special groups e.g Artisans, Traders, should be developed.
6. Government must ensure that all people have equitable access to the preventive, curative and rehabilitative health services they need to prevent them from developing hypertension and structures should be put in place to monitor progress.

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APPENDIX A

PREVALENCE OF HYPERTENSION & ASSOCIATED RISK FACTORS AMONG ADULTS IN IBADAN-SOUTH WEST LOCAL GOVERNMENT AREA OF OYO STATE, SOUTH-WESTERN NIGERIA

Dear Respondent,

I am **MOMAH, Vivian Ogechukwu (Miss)**, a postgraduate Student of the Department of Epidemiology and Medical Statistics, Faculty of Public Health, College of Medicine, University of Ibadan. As part of the requirements for the partial fulfillment for the award of the Degree of Masters in Public Health, I am carrying out a research on the prevalence of hypertension & associated risk factors among Adults in Ibadan-South West Local Government Area of Oyo State, South-Western Nigeria

This questionnaire is intended for research purposes only and will help diagnose if you have hypertension. It will also help you identify risk factors associated with hypertension.

Your response will be treated with utmost confidentiality and your sincere cooperation will be needed in completing the questionnaire.

Thank you for your cooperation.

Respondent Signature & Date.....

Interviewer Signature & Date.....

APPENDIX B

QUESTIONNAIRE

PREVALENCE OF HYPERTENSION & ASSOCIATED RISK FACTORS AMONG ADULTS IN IBADAN-SOUTH WEST LOCAL GOVERNMENT AREA OF OYO STATE, SOUTH-WESTERN NIGERIA

Dear Respondent,

I am **MOMAH, Vivian Ogechukwu (Miss)**, a postgraduate Student of the Department of Epidemiology and Medical Statistics, Faculty of Public Health, College of Medicine, University of Ibadan. As part of the requirements for the partial fulfillment for the award of the Degree of Masters in Public Health, I am carrying out a research on the prevalence of hypertension & associated risk factors among Adults in Ibadan-South West Local Government Area of Oyo State, South-Western Nigeria

This questionnaire is intended for research purposes only and will help diagnose if you have hypertension. It will also help you identify risk factors associated with hypertension.

Your response will be treated with utmost confidentiality and your sincere cooperation will be needed in completing the questionnaire.

Thank you for your cooperation.

Respondent Signature & Date.....

Interviewer Signature & Date.....

SERIAL No.....

Please tick in the appropriate box or fill in the gap where necessary

SECTION A

SOCIO-DEMOGRAPHIC INFORMATION

1. Gender: 1. Male 2. Female
2. Age in years at last birthday
3. Educational level: 1. No formal Education 2. Primary Education 3. Secondary Education 4. Tertiary education 5. Others (Please Specify)
4. Occupation:
5. Tribe: 1. Yoruba 2. Ibo 3. Hausa 4. Others
6. Religion: 1. Christian 2. Islam 3. Traditional 4. Others
7. How long have you been living in this Area
8. What is your marital Status? 1. Currently married 2. Living with a Sexual partner 3. Never married 4. Separated 5. Divorced 6. Widowed 9. No response
9. How many children do you have?
10. On the average, how much do you earn monthly?

SECTION B

KNOWLEDGE & HISTORY OF HYPERTENSION AND DIABETES

11. Are you a known hypertensive? 1. Yes 2. No
12. If Yes to Q11, for how many years have you had high blood pressure? 1. Less than 5 years. 2. 5-9 years. 3. 10-14 years. 4. 15-19 years. 5. 20 years and above
13. If Yes to Q11, are you currently on medication? 1. Yes 2. No
14. Are/were your Parents hypertensive? 1. Yes 2. No
15. Can Hypertension be managed? 1. Yes 2. No

SECTION A

SOCIO-DEMOGRAPHIC INFORMATION

1. Gender: 1. Male [] 2. Female []
2. Age in years at last birthday.....
3. Educational level: 1.No formal Education [], 2.Primary Education [], 3. Secondary Education [], 4.Tertiary education [], 5.Others (Please Specify).....
4. Occupation:
5. Tribe: 1.Yoruba [] 2 .Ibo [] 3. Hausa [] 4. Others[]
6. Religion: 1. Christian [] 2. Islam [] 3. Traditional. [] 4. Others []
7. How long have you been living in this Area.....
8. What is your marital Status? 1. Currently married [] 2. Living with a Sexual partner [] 3. Never married [] 4. Separated [] 5. Divorced [] 6. Widowed [] 9. No response []
9. How many children do you have?
10. On the average, how much do you earn monthly?

SECTION B

KNOWLEDGE & HISTORY OF HYPERTENSION AND DIABETES

11. Are you a known hypertensive? 1. Yes [] 2. No []
12. If Yes to Q11, for how many years have you had high blood pressure? 1. Less than 5years. [] 2. 5-9years. [] 3. 10-14years. [] 4. 15-19years. [] 5. 20years and above []
13. If Yes to Q11, are you currently on medication? 1. Yes [] 2. No []
14. Are/were your Parents hypertensive? 1. Yes [] 2. No []
15. Can Hypertension be managed? 1. Yes [] 2. No []

16. Hypertension can be caused by (More than one answer allowed): 1. Stress 2. Food
3. Family 6. Others (Please Specify).....
17. Do you have any relatives with hypertension? 1. Yes [] 2. No []
18. If Yes to Q17, how many of your Relatives are hypertensive?
19. If Yes to Q17, what is your relationship with the person?
20. Are you diabetic? 1. Yes [] 2. No []
21. If Yes to Q20, are you currently on medication? 1. Yes [] 2. No []
22. Are/were your Parents diabetic? 1. Yes [] 2. No []
23. Do you have any relatives with diabetes? 1. Yes [] 2. No []
24. If yes, what is your relationship with the person?
25. How often do you check your blood pressure? 1. Once in a week 2. Once in a month
3. Once in a year 4. Others (Please Specify).....

SECTION C

KNOWLEDGE OF ASSOCIATED RISK FACTORS

26. Causes of hypertension include: (More than one answer allowed) 1. Excessive salt intake 2. Lack of physical exercise 3. Excessive alcohol consumption. 4. Obesity. 5. Smoking. 6. Unhealthy diet. 7. Stress 8. Diabetes. 9. Others (Please specify).....
27. Can exercise help to manage hypertension? 1. Yes [] 2. No [] 3 I don't know []
28. Does excessive fat around your waistline increase the risk of hypertension? 1. Yes [] 2. No. [] 3 I don't know []

16. Hypertension can be caused by (More than one answer allowed): 1. Stress 2. Food 3. Family 6. Others (Please Specify).....
17. Do you have any relatives with hypertension? 1. Yes [] 2. No []
18. If Yes to Q17, how many of your Relatives are hypertensive?
19. If Yes to Q17, what is your relationship with the person?
20. Are you diabetic? 1. Yes [] 2. No []
21. If Yes to Q20, are you currently on medication? 1. Yes [] 2. No []
22. Are/were your Parents diabetic? 1. Yes [] 2. No []
23. Do you have any relatives with diabetes? 1. Yes [] 2. No []
24. If yes, what is your relationship with the person?
25. How often do you check your blood pressure? 1. Once in a week 2. Once in a month 3. Once in a year 4. Others (Please Specify).....

SECTION C

KNOWLEDGE OF ASSOCIATED RISK FACTORS

26. Causes of hypertension include: (More than one answer allowed) 1. Excessive salt intake 2. Lack of physical exercise 3. Excessive alcohol consumption. 4. Obesity. 5. Smoking. 6. Unhealthy diet. 7. Stress 8. Diabetes. 9. Others (Please specify).....
27. Can exercise help to manage hypertension? 1. Yes [] 2. No [] 3 I don't know []
28. Does excessive fat around your waistline increase the risk of hypertension? 1. Yes [] 2. No. [] 3 I don't know []

29. Hypertension can cause any of the following: (More than one answer allowed) 1. Heart failure [] 2. Kidney damage [] 3. Stroke [] 4. Heart attack [] 5. Death [] 6. Others (Please Specify).....
30. Being overweight increases the risk of hypertension? 1. Yes [] 2. No. [] 3 I don't know[]
31. Can Stress increase the risk of hypertension? 1. Yes [] 2. No. [] 3 I don't know[]
32. How can hypertension be managed? (More than one answer allowed) 1. Drugs 2. Diet 3. Quitting smoking 4. Regular exercise 5. Reduction in alcohol consumption. 6. Normal weight 7. Reduction in fat intake 8. Reduction in salt intake 9. Others (Please specify).....

SECTION D

KNOWLEDGE & HISTORY OF LIFESTYLE MODIFICATION PRACTICES

33. Have you ever smoked cigarettes or tobacco? 1. Yes [] 2. No []
34. Do you currently smoke cigarettes or tobacco? (More than one answer allowed)
1. Yes, tobacco [] 2. Yes, pipe [] 3. Yes, Other tobacco [] 4. No []
35. In the last 24 hours, how many cigarettes have you smoked?
36. Have you ever drunk an alcohol beverage? 1. Yes [] 2. No []
37. In the last 3 months, how many days did you drink an alcohol containing beverage?.....
38. If Yes to Q39, how many occasions did you get drunk in the past 3 months?
39. Have you ever exercised? 1. Yes [] 2. No []
40. Are you currently on regular exercise? 1. Yes [] 2. No []
41. If Yes to Q42, in the past one week, how many times did you exercise?.....

42. Are you involved in any sporting activity? 1. Yes [] 2. No []
43. If Yes, how many times in the past 3 months were you involved in this activity?
.....
44. On how many days of the week do you go to work?
45. How many hours on the average daily, do you spend outside your home?

SECTION E

DIETARY ASSESMENT

46. How many days during the last 7 days did you drink any of the following?
1. Sachet water.....
 2. Bottled water.....
 3. Fruit juice.....
 4. Herbal drink.....
 5. Drinks like Coke, Fanta.....
 6. Others (Please Specify).....
47. How often have you eaten each of the following foods separately or combined with other food?

Food group	Never	Occasionally	Daily			Weekly			Monthly			
			1x	2x	≥3x	1x	2x	≥3x	1x	2x	≥3x	
Fruit(banana, orange, mango, pawpaw)												
Vegetable {green, pumpkin}												
Cereal/ grains and products(rice, wheat, maize)												
Legumes (beans, peas)												
Roots and tubers(yam, potato, cassava)												
Oils, fat and butter												
Nuts and products(groundnut, cashew)												

Poultry, fish, meat and its products e.g eggs																				
Milk and dairy products(yoghurt, cheese)																				
Pastries (cakes, meat-pie, ice-cream, gala)																				
Soft drinks, Carbonated drinks and Processed juice																				

48. What quantity of Salt do you use?

1. Sparingly.....2.Little.....3. A lot.....

49. Do you add extra salt when eating your food for taste? 1. Yes [] 2. No []

SECTION F

50. Blood pressure as at the time of filling the questionnaire.....

Anthropometric Measures

51. Height [In Meters].....

52. Weight [In kg].....

53. Waist Circumference.....

54. BMI: (Kg/m²) Category: A) Normal B) Underweight C) Overweight

Thank you for participating in this Study.

Signature/Date.....

APPENDIX C

YORUBA TRANSLATION

(AKOJOPO IBERE)

(ABALA A)

IBERE NIPA ORO ARA ENI

Ejowo, e fala si aye ti oye

1. Gender:

1. Okunrin [] 2. Obinrin []

2. Ojo ori yin ni ojo ibi tie se kehin.....

3. Iwe melo ni e ka:

1. Ko kawe rara [] 2. Iwe mefa [] 3. Iwe mewa []

4. Iwe giga [] 5. Iyoku [] Jo so nipato

4. Ise ti e nse.....

5. Eya: 1. Yoruba [] 2. Ibo [] 3. Hausa [] 4. Omiran []

6. Esin: 1. Omo leyin Kristi [] 2. Musulumi [] 3. Esin alalaye [] 4. Iyoku []

7. Otito igbawo ti e ti ngbe ni adugbo yi.....

8. Ipo wo lewa nipa oro igbeyawo? 1. Moni oko/aya asijo ngbe [] 2. Mo ngbe pelu eni ti mo nba ni ibalopo [] 3. Mi o ti niyawo/oko [] 4. Moti ko aya/oko mi [] 6. Opo []

9. ko si idahun []

9. Kini ojo ori yin ni igba ti e feyawo/ni oko.....

10. Awon okunrin: Iyawo melo ni eni?.....

Awon obinrin: Oko melo ni eni?.....

11. Omo melo ni Olorun fun yin?.....

12. Elo ni o ma nwole si yin lososu?.....

(ABALA B)

IMO ATI BI EJE RIRU SE NFARAHANSI

13. Nje eni eje riru? 1. Beeni [] 2. Beeko []

14. Ti o ba je beeni, odun melo ni etini eje riru? 1. Odun kan si marun []

2. Odun mefa si mewa [] 3. Odun mokaṅla si meedogun [] 4. Odun merindinlogun si ogun odun 5. Odun mokaṅlelogun ati jubelo []

15. Ti o ba je beeni, nje e nlo ogun lowolowo? 1. Beeni [] 2. Beeko []

16. Nje awon obi yin ni eje riru? 1. Beeni [] 2. Beeko []

17. Nje eje riru se toju? 1. Beeni [] 2. Beeko []

18. Awon nkan to le fa eje riru ni? (Ele mu ju eyokan lo): 1. Wahala hila hilo 2. Imele sise 3.

Ounje 4. Ohun ti a nmu 5. Ebi 6. Omiran (Jowo so nipato)

19. Nje ohun ti eniyan nje lee fa eje riru? 1. Beeni [] 2. Beeko []

20. Nje eni ibatan toni eje riru? 1. Beeni [] 2. Beeko []

21. Ti o ba je beeru, bawo ni e se je si eni na?.....

22. Igba melo ni e ma nse ayewo ifunpa yin? 1. Ekan lose 2. Ekan losu 3. Ekan lodun 4.

Omiran (Jo so nipato).....

(ABALA C)

IMO ATI BI AWON NKAN TO SOMO OHUN TO LE FA EJE RIRU SE NFARAHANSI

23. Nje eti mu siga tabi taba ri? 1. Beeni [] 2. Beeko []

24. Nje esi nmu siga tabi taba lowolowo? (Ele mu ju idahun eyokan lo)

1. Beeni, taba [] 2. Beeni, koko [] 3. Beeni, awon taba miran [] 4. Rara []

25. Ni wakati merinlelogun to koja, oye siga melo leti mu?.....

26. Nje eti mu ohun mimu oloti ri? 1. Beeni [] 2. Beeko []
27. Ni osu meta to koja, ojo melo ni e mu ohun mimu oloti?.....
28. Kini awon nkan to ma nfa eje riru?.....
29. Nje eti mu oti/ohun mimu oloti yo ri? 1. Beeni [] 2. Beeko []
30. Ti o ba je beeni si ibere 29, emelo ni eti moti yo ni osu meta to koja?.....
31. Nje eti se ere idaraya ti a npe ni esasaisi ri? 1. Beeni [] 2. Beeko []
32. Nje lowolowo, se e ma nse ere idaraya ti a npe ni esasaisi lorekore? 1. Beeni [] 2. Beeko []
33. Ti o ba je beeni si ibere 32, ni ose kan to koja, emelo ni eti se ere idaraya esasaisi?.....
34. Ojo melo ninu ose le ma nlo si ibise?.....
35. Wakati melo lojumo leman lo ni ita (awon ibomi ti kii se ile yin)?.....
36. Eje ema nkopa ninu ere idaraya? 1. Beeni [] 2. Beeko []
37. Ti o ba je beeni, emelo ni osu meta to koja ni ekopa ninu ere idaraya?.....

(ABALA D)

IWUWASI NIPA ORO ILERA

38. Ti e ba saisan, nibo ni ema nsaba lo fun itoju? (Mu eyokan)
1. Ile iwosan ijoba 2. Ile iwosan ti ibise yin 3. Ile iwosan tie sin yin 4. Ile iwosan aladani
5. Ile itaogun akosemose 6. Ile tewetegbo 7. Ile itaogun ti amosi kemisti 8. Iyoku (Jowo,
so nipato).....
39. Bawo ni ile iwosan ti edaruko se jinasi si ile yin?.....

(ABALA E)

ODINWON OUNJE

40. Ni ojo meje to koja, ojo melo ni cinu awon nkan wonyi?

1. Omi niu ora (pure water)..... 2. Omi inu botu.....
 3. Ohun mimu elerindodo..... 4. Agbo.....
 5. Awon ohun mimu bi kooki, fanta..... 6. Iyoku (So nipato).....

41. Bawo ni ese ma nlo iyo to?

Ko tie to nkan rara..... 2. Die..... 3. Pupo.....

42. Nje etun ma nfi iyo si onje ti e ban je? 1. Beeni [] 2. Beeko []

43. Ni ojo meje to koja, ojo melo ni e je awon ipanu bi gala, meat pie, sausage rolls ati bebelo?

.....

(ABALA F)

44. Ifunpa ni asiko ti won dahun ibere wonyi.....

Awon iwon ti ara

45. Iwon giga (ni mita).....

46. Igbewon (ni kilo).....

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TELEGRAMS.....

TELEPHONE.....



MINISTRY OF HEALTH
DEPARTMENT OF PLANNING, RESEARCH & STATISTICS DIVISION
PRIVATE MAIL BAG NO. 5027, OYO STATE OF NIGERIA

Your Ref. No.

All communications should be addressed to

the Honorable Commissioner quoting

Our Ref. No. AD 13/ 479/ 812

February, 2015

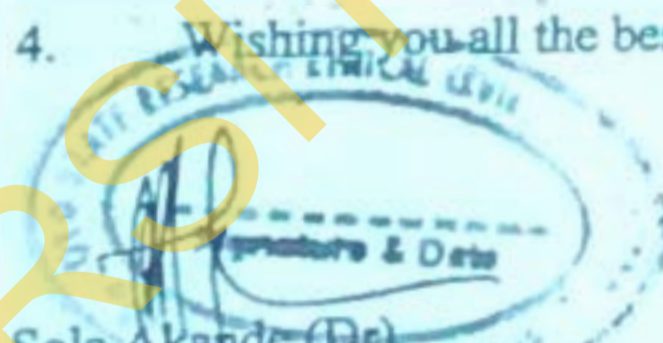
The Principal Investigator,
Department of Epidemiology and Medical Statistics,
Faculty of Public Health,
University of Ibadan,
Ibadan.

Attention: Momah Vivian

Ethical Approval for the Implementation of your Research Proposal in Oyo State

This acknowledges the receipt of the corrected version of your Research Proposal titled: "Prevalence of Hypertension and Associated Risks factors among Adults in Ibadan South Local Government Area of Oyo State, South-Western Nigeria."

2. The committee has noted your compliance with all the ethical concerns raised in the initial review of the proposal. In the light of this, I am pleased to convey to you the approval of committee for the implementation of the Research Proposal in Oyo State, Nigeria.
3. Please note that the committee will monitor closely and follow up the implementation of the research study. However, the Ministry of Health would like to have a copy of the results and conclusions of the findings as this will help in policy making in the health sector.
4. Wishing you all the best.


Sola Akande (Dr)
Director, Planning, Research & Statistics
Secretary, Oyo State, Research Ethical Review Committee