I TESTIFY THAT THIS THESIS WAS ACCEPTED IN PARTIAL FULFILLMENT OF THE REQUIEMENTS FOR THE AWARD OF THE DEGREE OF MASTER IN PUBLIC HEALTH (FIELD EPIDEMIOLOGY PRACTICE)

BY

THE DEPARTMENT OF EPIDEMIOLOGY AND MEDICAL STATISTICS
UNIVERSITY OF IBADAN

ON

22 MARCH, 2014

SECRETARY, POSTGRADUATE SCHOOL,
UNIVERSITY OF IBADAN.

PREVALENCE OF HYPERTENSION AND OBESITY AND ASSOCIATED RISK FACTORS AMONG CIVIL SERVANTS IN KADUNA, NIGERIA

BY

OLADIMEJI, ABISOLA MONISOLA

MB; BS (IBADAN)

MATRIC. NO: 86292

A THESIS IN THE DEPARTMENT OF EPIDEMIOLOGY AND MEDICAL STATISTICS,

SUBMITTED IN THE FACULTY OF PUBLIC HEALTH

IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF

MASTERS IN PUBLIC HEALTH (FIELD EPIDEMIOLOGY PRACTICE)

OF

THE UNIVERSITY OF IBADAN

FEBRUARY 2014

DEDICATION

This work is dedicated to the memory of a woman of substance and faith. my mother.

Mrs. Omobolanle Modupe Akinbolagbe.

CERTIFICATION

We certify that this work was carried out by Abisola Monisola Oladimeji in the Department of Epidemiology and Medical Statistics, Faculty of Public Health, University of Ibadan. Ibadan, Nigeria. under our supervision.

Dr Olufunmilayo I. Fawole

MBBS, MSc (Wits, SA), FNMCPH, FWACP

15/04/2014

Dr M. D. Dairo

MBBS, M.Sc (Epid. & Med. Stat.), FMCPH

ACKNOWLEDGEMENT

Profound thanks goes to my supervisors and contributors, Drs. Olufunmilayo Fawole, Magbagbeola Dairo, Patrick Nguku, Peter Nsubuga and Richard Dicker for sharing their knowledge, expertise, and wisdom. Dr. Patrick, thank you for your positive reinforcement and belief that this work is extremely valuable, especially through the tedious times. I am grateful for the support shown by the staff and my fellow residents at the Nigeria Field Epidemiology and Laboratory Training Program, (NFELTP) Abuja. Special thanks goes to the previous and current Heads, Department of Epidemiology and Medical Statistics, academic and administrative staff of the department, for their immeasurable support.

This work would not have seen the light of day without the support of the good people of Kaduna State. Many thanks go to the staff of the Kaduna State Ministry of Health, Dr. Mohammed Ado Zakari (Director of Primary Health Care), Mrs. Kurah (member, State Ethical Review Board) and all the Commissioners, Directors of Administration and staff of the various ministries recruited for the study. Time and space would not permit me to thank all my research assistants individually, for their tireless hard-work, and commitment to seeing that the field phase of the study followed the written protocol to the letters (Emmanuel Duniya, Samuel Monday, Samuel Abio, Maureen Nwaokoro, Fabian Tukmen, Martha Joseph, Amos Isuwa, Geoffrey Okafor, Sanchez Sambo, Ibrahim Abubakar, Jane Obiekea, Sarah Obaje, Solomon Tanko, Rebecca Ayuba, and Joy Suku). Thanks to each and every one of you.

I gratefully acknowledge the financial support I received from the African Field Epidemiology Network (AFENET), United States Agency for International Development (USAID), and the Centers for Disease Prevention and Control, CDC Atlanta to execute this project.

I conclude by appreciating my husband and son, 'Seun and Tolunimi, for their unwavering love, encouragement, patience and support during the undertaking of this project. I would also want to thank my family and friends for their encouragement and support throughout this project. Heartfelt gratitude goes to Kehinde, for undertaking the numerous Abuja program office trips on my behalf.

ABSTRACT

Hypertension has become a major public health problem, being documented as a threat to the health of people in sub-Saharan Africa (sSA), including Nigeria. Obesity has been associated with hypertension and other non-communicable diseases, (NCDs). Public servants by virtue of their work and possible sedentary lifestyle may be at risk of hypertension and obesity. Despite the fact that probability of death from hypertension and other chronic diseases is higher in sSA than in the developed world, significant knowledge gaps exist on the risk factors of specific population groups due to a lack of adequate data on the burden of risk factors related to these NCDs. This study was therefore designed to determine the prevalence of hypertension and obesity and their risk factors among public servants in Kaduna.

The study is a cross-sectional survey of 801 civil servants selected by two-stage sampling of ten out of 22 ministries within the state secretariat. All consenting workers in the selected ministries were interviewed using a structured interviewer-administered questionnaire. Information collected includes respondents' socio-demographics, behavioural factors, physical activity, dietary habit, tobacco-use and alcohol consumption. Respondents' blood pressure (mmHg) was measured using the mercury sphygmomanometer. Body weight (kg) and height (m) were also measured and Body Mass Index (BMI) was calculated. Behavioural risk factors were assessed using the Centers for Disease Prevention and Control chronic disease indicators, while overweight and obesity were defined as BMI of 25.0-29.9 kg/m^2 and ≥30 kg/m^2, respectively. Unhealthy diets were defined as absence of fruits and vegetables in daily diet, while hypertension was defined as Blood Pressure (BP) ≥140/90 mmHg. Data was analysed using descriptive statistics and logistic regression, with level of significance set at $p \leq 0.05$.

Respondents' age was 43.2±9.0 years, and males were 62.2%. Majority (80.0%) were married, and 72.0% were senior staff. Prevalence of hypertension, overweight and obesity were 29.2%, 35.3% and 27.0% respectively. Prevalent risk factors for hypertension and obesity were physical inactivity (76.9 and 73.4%), unhealthy diet (89.3 and 90.2%), and cigarette smoking (3.4 and 3.4%), respectively. Prevalence of overweight and obesity was higher among the senior cadre than the junior cadre (68.6% versus 54.4%), also among the physically inactive than active (65.0% versus 53.5%). Female respondents were four times more likely to be overweight or obese than males [AOR=3.7 CI (2.5-5.4)]. A higher proportion of older respondents (≥40 years) had elevated BP compared with the younger respondents (38.6% versus 11.3%). Civil servants

aged 40-49 years and those within 50-59 years were at significantly higher risk of elevated BP compared with those aged 20-29 years [AOR = 5.6 CI (1.8-17.2) and AOR = 7.4 CI (2.4-22.9) respectively]. Hypertension was twice more prevalent among the overweight and obese (37.3% versus 16.0%) compared with those with normal range BMI (18.5-24.9 kg/m^2).

Hypertension and obesity with their behavioural risk factors were prevalent among civil servants in Kaduna. Awareness campaigns on benefits of regular physical exercise, healthy eating and cessation of cigarette smoking should be conducted Provision of accessible sporting facilities at the work place should be instituted by the government.

Keywords: Hypertension, Overweight, Obesity, Civil servants, Behavioural Risk Factors
Word count: 498

TABLE OF CONTENTS

TABLE OF CONTENTS

LIST OF TABLES

PAGE

LIST OF FIGURES

LIST OF ACRONYMS

AOR – Adjusted Odds Ratio

BMI – Body Mass Index

BP – Blood Pressure

BRFSS – Behavioural Risk Factors Surveillance System

CDC – Centers for Disease Control and Prevention

CDI – Chronic Disease Indicators

CI – Confidence Interval

CVD – Cardiovascular Disease

DBP – Diastolic Blood Pressure

JNC – Joint National Committee (*on Prevention, Detection, Evaluation and Treatment of High Blood Pressure*)

LMIC – Low and Middle Income Countries

NCCDPHP – National Center for Chronic Disease Prevention and Health Promotion

NCD – Non-Communicable Diseases

OR – Odds Ratio

SBP – Systolic Blood Pressure

SPSS – Statistical Package for Social Sciences

SSA – Sub-Saharan Africa

WHO – World Health Organization

UN – United Nations

χ^2 - Chi-square

CHAPTER 1

INTRODUCTION

Background

Developing countries are currently undergoing an epidemiological transition that has been previously observed in developed countries. As a result of this, African populations now suffer the dual burden of infectious diseases and emerging chronic diseases.(Lawoyin, Asuzu et al. 2002; Beluc, Okoror et al. 2009; Njelekela 2009; Oladapo, Salako et al. 2010; Wagner and Brath 2012; Van De Vijver, Oti et al. 2013). These chronic diseases otherwise known as non-communicable diseases (NCDs) are the leading cause of adult mortality globally, accounting for 36 million, 63% of all deaths in 2008. Nearly 80% of these deaths occurred in low- and middle-income countries, with the highest proportion of deaths among those aged <70 years. (Magnusson 2009; W.H.O.-N.C.D.-Report 2009; Who-Ncd-Report 2009; Mittal and Singh 2010; Arima, Barzi et al. 2011; Joshi, Mohan et al. 2012). Over the coming decades the burden from NCDs is projected to rise particularly fast in the developing world. For Nigeria as a country, the major NCDs which contribute to increased mortality in adults are hypertension, diabetes, cancers, chronic respiratory disease, and obesity.(Ogah, Okpechi et al. 2012).

Hypertension, a common non-communicable disease, is a major public health problem. (Sani, Wahab et al. 2010; Ulasi, Ijoma et al. 2010; Ahaneku, Osuji et al. 2011; Andy, Peters et al. 2012; Hendriks, Wit et al. 2012; Marvar and Harrison 2012; Onwuchekwa, Mezie-Okoye et al. 2012; Segura and Ruilope 2012). Its prevalence has been found to be 44% in Western Europe and 28% in North America. It has been documented as a threat to the health of people in sub- Saharan Africa and a major contributor to morbidity and mortality in the sub-region. In Nigeria for example, hypertension is the number one risk factor for stroke, heart failure, ischemic heart disease, and kidney failure.(Ogah, Okpechi et al. 2012) With an increasing adult

CHAPTER 1

INTRODUCTION

Background

Developing countries are currently undergoing an epidemiological transition that has been previously observed in developed countries. As a result of this, African populations now suffer the dual burden of infectious diseases and emerging chronic diseases.(Lawoyin, Asuzu et al. 2002; Beluc, Okoror et al. 2009; Njelekela 2009; Oladapo, Salako et al. 2010; Wagner and Brath 2012; Van De Vijver, Oti et al. 2013). These chronic diseases otherwise known as non-communicable diseases (NCDs) are the leading cause of adult mortality globally; accounting for 36 million, 63% of all deaths in 2008. Nearly 80% of these deaths occurred in low- and middle-income countries, with the highest proportion of deaths among those aged <70 years. (Magnusson 2009; W.H.O.-N.C.D.-Report 2009; Who-Ncd-Report 2009; Mittal and Singh 2010; Arima, Barzi et al. 2011; Joshi, Mohan et al. 2012). Over the coming decades the burden from NCDs is projected to rise particularly fast in the developing world. For Nigeria as a country, the major NCDs which contribute to increased mortality in adults are hypertension, diabetes, cancers, chronic respiratory disease, and obesity.(Ogah, Okpechi et al. 2012) .

Hypertension, a common non-communicable disease, is a major public health problem. (Sani, Wahab et al. 2010; Ulasi, Ijoma et al. 2010; Ahaneku, Osuji et al. 2011; Andy, Peters et al. 2012; Hendriks, Wit et al. 2012; Marvar and Harrison 2012; Onwuchekwa, Mezie-Okoye et al. 2012; Segura and Ruilope 2012). Its prevalence has been found to be 44% in Western Europe and 28% in North America. It has been documented as a threat to the health of people in sub- Saharan Africa and a major contributor to morbidity and mortality in the sub-region. In Nigeria for example, hypertension is the number one risk factor for stroke, heart failure, ischemic heart disease, and kidney failure.(Ogah, Okpechi et al. 2012) With an increasing adult

population as well as rising prevalence of hypertension, Nigeria will experience economic and health challenges due to the disease if the tide is not arrested. (Lawes, Vander Hoorn et al. 2008; Mittal and Singh 2010; Ogah, Okpechi et al. 2012).

Obesity on the hand is not yet classified as a disease, although certain genetic variations have been observed in its actiology and prevention. (Yang, Kelly et al. 2007; James 2008). It is however a major risk factor for hypertension, other cardiovascular disease, diabetes and certain cancers. (Zinman 2011; Bahia, Coutinho et al. 2012). Once considered 'rich man's disease', obesity is now one of the biggest public health challenges of the 21st century. It is caused by an interaction of environmental factors, genetic predisposition, and human behaviour, and is associated with an increased risk of numerous chronic diseases. (Nguyen and El-Serag 2010). A number of authors have however documented association of the global epidemic of obesity with the increasing adoption of a low-cost, westernised diet that is rich in fat and sugar and a more sedentary lifestyle. (Popkin 2006; Schonfeldt and Gibson 2008; Summerbell, Cameron et al. 2008; Vadera, Yadav et al. 2010; Heal, Gosden et al. 2012). It is associated with increased morbidity, disability, and premature mortality from cardiovascular disease, diabetes, cancers, and musculoskeletal disorders. (Renchan, Soetjomataram et al. 2010; Santos, De Oliveira et al. 2010; Jankun, Al-Senaidy et al. 2012; Nguyen and Lau 2012).

Literatures have however shown that most NCDs are strongly associated and causally linked with four particular behaviours, namely: tobacco use, physical inactivity, unhealthy diet and the harmful use of alcohol. (W.H.O.-N.C.D.-Report. 2009; Aikins, Boynton et al. 2010). These behaviours lead to four key metabolic/physiological changes: raised blood pressure, overweight/obesity, hyperglycaemia and hyperlipidaemia. (W.H.O.-N.C.D.-Report. 2009).

Non-communicable chronic diseases, such as cardiovascular disease, diabetes, and cancer, are currently responsible for 65% of all deaths worldwide and are projected to cause

over 75% of all deaths by 2030. A substantial accumulation of epidemiological and experimental evidence has established a causal relationship between NCDs and well-known yet preventable risk factors (e.g., physical inactivity and obesity). Given that physical activity has both direct and indirect effects on the mortality and morbidity of NCDs via other risk factors (e.g., obesity, diabetes, and hypertension), it is now undeniable that sedentary lifestyles are one of the most significant public health problems of the 21st century. (Blair, Sallis et al. 2012).

Evidence has however been documented that the morbidity and mortality from NCDs can be reduced by eliminating high-risk behaviours and this can be achieved by increasing awareness of these risk behaviours and by timely use of preventive health services. A three-pronged solution consisting of epidemiological surveillance, primary prevention and secondary prevention have been proposed by experts. However, epidemiological surveillance of risk behaviours has been prioritized over primary and secondary prevention (Aikins, Boynton et al. 2010). This study therefore assesses the prevalence of hypertension and obesity among civil servants in Kaduna, Kaduna State and their associated predisposing/behavioural factors.

Problem statement

Non communicable diseases (NCDs) are now the major cause of death and disability worldwide. It increasingly affects people from developing as well as developed countries. Over the coming decades the burden from NCDs is projected to rise particularly fast in the developing world. Nigeria inclusive (Joshi, Mohan et al. 2012).

An increasing burden of cardiovascular disease (CVD) is occurring in low- and middle-income countries (LMICs) as a result of urbanisation and globalisation. Low rates of awareness and treatment of risk factors worsen the prognosis in these countries (Van De Vijver, Oti et al. 2013). About half of the global burden of cardiovascular disease has been attributed to high blood pressure (BP). Worldwide, 7.6 million premature deaths (about 13.5% of the global total), 54% of strokes, and 47% of cases of ischemic heart disease were caused by high BP in 2001. (Marvar and Harrison 2012; Mohd. Mateti et al. 2012; Segura and Ruilope 2012). In Nigeria, awareness, treatment and control of hypertension are generally low with attendant high burden of the disease and its related complications (Ogah, Okpechi et al. 2012). Despite cardiovascular disease (CVD) being the leading cause of adult mortality in low-income countries, data on the prevalence of its risk factors such as hypertension are scarce, especially in sub-Saharan Africa (SSA) (Hendriks, Wit et al. 2012).

Obesity is the most common metabolic disease in the world and its prevalence has been increasing over several decades in both developed and emerging countries with little signs of slowing down (Nguyen and Lau 2012). The World Health Organization (WHO) predicts that, by 2015, around 700 million adults will be obese (at least 10% of the projected global population). Obesity is associated with increased morbidity, disability, and premature mortality from hypertension, cardiovascular disease, diabetes, cancers, and musculoskeletal disorders. The personal and societal health and economic burden of this preventable disease pose a

serious threat to our societies with associated increases in diabetes, cardiovascular and musculoskeletal disease, and malignancy (Meelean, Kee et al. 2008; Nguyen and Lau 2012).

The deteriorating health of the general population and the increasing prevalence of these chronic diseases combine to present a problem of global proportions whose causes are both multifactorial and complex. The consumer society we live in does not encourage healthy living, and the consequences are even most devastating when social inequalities, the economic situation and the population explosion in recent decades are taken into account. The growth of poor eating habits, obesity, and hypertension are relentlessly contributing to the development of an epidemic of cardiovascular disease (Fuster 2012).

Evidently, NCDs are becoming significant public threats in adult population of both developed and developing countries, thus studies to determine their prevalence and risk factors are of great importance especially in low and middle-income countries like Nigeria.

Justification of the study

As populations age and urbanization progresses, medical care and public health interventions improve, prevalence of chronic non-communicable diseases increase. Thus, investing into the prevention of NCDs in low and middle-income countries becomes essential. Research has shown that NCDs will remain a predominant health problem for the adult populations in sub-Saharan Africa in the next 10 to 20 years; therefore ignoring the risk factors for these NCDs would lead to an increasing disease and economic burden. Although greater than 80% of the global burden of NCDs occurs in developing countries, the knowledge of the risk factors is largely derived from developed countries. Despite the fact that probability of death from a NCD is higher in sub-Saharan Africa than in the developed world, significant knowledge gaps exist on the risk profile of specific population groups due to a lack of optimal data collection

about the burden of risk factors related to NCDs especially in this part of the world. (Joshi, Mohan et al. 2012).

Civil servants form a characteristic population drawn from heterogeneous group of urban dwellers at a significant risk of NCDs like other urban dwellers. They are characterized by a sedentary lifestyle as they constitute the white collar office workers, with access to motorized transportation and fast foods; conditions favouring emergence of NCDs. A previous study among civil servants in Nigeria revealed that civil servants with higher socio-economic status appear to be more often in a cultural transition towards a more westernized lifestyle (Yeh, Kuller et al. 1996).

Obesity is a major risk factor for hypertension and cardiovascular disease. Weight loss, through health behaviour modification and dietary sodium restriction, is the cornerstone in the treatment of obesity-related hypertension (Nguyen and Lau 2012).

Prevention of CVD is proven to be cost effective and should be the main intervention (Van De Vijver, Oti et al. 2013). Addressing risk behaviours have been shown to be an effective means of reducing the burden of NCDs and targeted lifestyle modification programmes have been shown to be effective in the secondary prevention of NCDs. (Mccarthy W. A. Yancey et al. 2007). In order to effectively reduce or control the lifestyle risk factors in a population, the distinct risk-factor profile for that specific community need to be identified.

Due to paucity of recent population-based studies investigating the prevalence of these chronic diseases and their risk factors especially among civil servants in Nigeria, this study investigates the prevalence and behavioural risk factors of hypertension and obesity, their association with socio-demographic determinants using a diversified population of civil servants with different socioeconomic and educational status, cadre and lifestyles.

Research questions

1) What is the prevalence of hypertension amongcivil servants in Kaduna?

2) What is the prevalence of overweight and obesity among civil servants in Kaduna?

3) What are the demographic and behavioural factors associated with hypertension among the civil servants in Kaduna?

4) What are the demographic and behavioural factors associated with overweight and obesity among civil servants in Kaduna?

Study Objectives

General objective

This study set out to determine the prevalence and factors associated with hypertension and obesity among civil servants in Kaduna, Kaduna State

Specific objectives

The specific objectives are to:

1) Determine the prevalence of hypertension among civil servants in Kaduna

2) Determine the prevalence of overweight and obesity among civil servants in Kaduna

3) Assess the factors associated with hypertension among civil servants in Kaduna

4) Evaluate factors associated with overweight and obesity among the civil servants

CHAPTER 2

LITERATURE REVIEW

Epidemiology of Hypertension

Hypertension otherwise known as sustained elevated blood pressure belongs to a group of disorders called cardiovascular diseases. Hypertension is a major public health problem and a leading cause of death and disability in developing countries. One-quarter of the world's adult population has hypertension, and this is likely to increase to 29% by 2025. Modeled projections indicate an increase to 1.15 billion hypertensive patients by 2025 in developing countries (Mittal and Singh 2010). While CVD was once largely confined to high-income countries, it is now the number one cause of death globally including the low- and middle-income countries, where 80% of the world's 13 million annual CVD deaths occur. Hypertension is estimated to cause 4.5% of current global disease burden and is as prevalent in many developing countries, as in the developed world (Whitworth 2003).

This high prevalence of CVD is also evident in sub-Sahara Africa (Belue, Okoror et al. 2009). In a cross-sectional survey conducted in a West African urban environment, Niakara et al found a high incidence of hypertension (40.2%, in a sample of 2,087 participants all over 35 years old) in different urban areas of Ouagadougou, Burkina Faso (Niakara, F. Fournet et al. 2007).

Raised blood pressure (BP) has been documented to be responsible for 7.6 million deaths per annum worldwide (13.5% of the total), this is more than any other risk factors. Around 54% of stroke and 47% of coronary heart disease are attributable to high BP. Over 80% of this burden occurs in low and middle income countries (LMIC), BP and cardiovascular mortality are rising rapidly in LMIC (Arima, Barzi et al. 2011). Young, J. B. in 2004 documented that the high prevalence of hypertension and atherosclerotic disease in aging patients relates to this

epidemic. as does the ever increasing problem of obesity and diabetes. Early identification of patients at risk for HF and asymptomatic patients with structural heart disease is critical if the human morbidity and mortality toll and the economic burden that heart failure causes is to be decreased (Young 2004).

In Nigeria. Akinkugbe is generally regarded as the father and doyen of blood pressure and hypertension research, because of his seminal work in this field in the late 60s and 70s (Akinkugbe, Brown et al. 1966; Akinkugbe, Brown et al. 1966; Akinkugbe and Jaiyesimi 1968; Akinkugbe and Ojo 1968; Akinkugbe 1969; Ojo and Akinkugbe 1969; Oyediran and Akinkugbe 1970; Akinkugbe 1976; Akinkugbe, Akinwolere et al. 1999; Kadiri, Walker et al. 1999). Most of these studies were however conducted three to four decades ago, with the cut-off point for hypertension at ≥160/90mmHg.

In a review of studies on hypertension-related researches conducted in Nigeria over a period of five decades 1950-2011. Ogah et al revealed that the overall prevalence of hypertension in both sexes ranged from 8% to 46.4%; with male and female ranges of 7.9% to 50.2% and 3.5% to 68.8% respectively. Also the rural – urban prevalence differed. Reported prevalence in the rural areas ranged from 13.5% to 46.4%, while the urban studies revealed a range of 8.1% to 42.0% in both sexes. In general, their study concluded that hypertension prevalence was higher in urbun than rural areas (Oguh, Okpechi et al. 2012). Kadiri et al in their study on blood pressure, hypertension and correlates in urbanised workers in Ibadan, Nigeria recruited 608 men and 309 women, age range 18-64 years. From the study, they concluded that hypertension prevalence rates are not too different from figures obtained in the last four decades, which generally have not exceeded 15%; in spite of the apparent influence of the modernisation indices of education and income (Kadiri, Walker et al. 1999).

epidemic, as does the ever increasing problem of obesity and diabetes. Early identification of patients at risk for HF and asymptomatic patients with structural heart disease is critical if the human morbidity and mortality toll and the economic burden that heart failure causes is to be decreased (Young 2004).

In Nigeria, Akinkugbe is generally regarded as the father and doyen of blood pressure and hypertension research, because of his seminal work in this field in the late 60s and 70s (Akinkugbe, Brown et al. 1966; Akinkugbe, Brown et al. 1966; Akinkugbe and Jaiyesimi 1968; Akinkugbe and Ojo 1968; Akinkugbe 1969; Ojo and Akinkugbe 1969; Oyediran and Akinkugbe 1970; Akinkugbe 1976; Akinkugbe, Akinwolere et al. 1999; Kadiri, Walker et al. 1999). Most of these studies were however conducted three to four decades ago, with the cut-off point for hypertension at ≥160/90mmHg.

In a review of studies on hypertension-related researches conducted in Nigeria over a period of five decades 1950-2011, Ogah et al revealed that the overall prevalence of hypertension in both sexes ranged from 8% to 46.4%; with male and female ranges of 7.9% to 50.2% and 3.5% to 68.8% respectively. Also the rural – urban prevalence differed. Reported prevalence in the rural areas ranged from 13.5% to 46.4%, while the urban studies revealed a range of 8.1% to 42.0% in both sexes. In general, their study concluded that hypertension prevalence was higher in urban than rural areas (Ogah, Okpechi et al. 2012). Kadiri et al in their study on blood pressure, hypertension and correlates in urbanised workers in Ibadan, Nigeria recruited 608 men and 309 women, age range 18-64 years. From the study, they concluded that hypertension prevalence rates are not too different from figures obtained in the last four decades, which generally have not exceeded 15%; in spite of the apparent influence of the modernisation indices of education and income (Kadiri, Walker et al. 1999).

Lawoyin et al in their study on prevalence of cardiovascular risk factors in an African, urban inner city community in 2002, set the cut off point for hypertension at BP > 160/95mmHg. They found a prevalence of 12.4% with an age-adjusted rate of 7.4%. The prevalence rates showed rural - urban disparity, the figures were however much lower than what was generally observed in industrialized countries (Lawoyin et al., 2002).

In a more recent study involving 964 adults (male 330 and female 634) all aged 20-81 years residing in the urban slum of Ajegunle in Lagos State, Daniel et al in 2013 found an overall prevalence of hypertension of 38.2% among them. Of those diagnosed, with hypertension, only 13.6% were aware of their hypertensive status. Majority (96%) of these residents who were aware of their hypertensive status had a poor BP control. The study concluded a high prevalence of hypertension among urban slums dwellers in Lagos and recommended the need for government to develop policies for the control of hypertension, improve access to early diagnosis and provide an enabling socioeconomic environment while promoting healthy living (Daniel et al., 2013).

Epidemiology of Obesity

Obesity has long been acknowledged as a significant contributing factor in the development of various chronic diseases such as cardiovascular disease, hypertension, type 2 diabetes mellitus, stroke, osteoarthritis and certain cancers (Asfaw A. 2006; Adeboye B., Bermano G. et al. October 2012). As a risk factor for non-communicable diseases, obesity has become a global public health concern with more than one billion adults estimated to be overweight and over 400 million of them obese (W.H.O. Technical Report Series. 2000). Recent global figures from the World Health Organisation (WHO) indicate that the prevalence of obesity is not just a problem of the developed countries but is also on the increase in the

developing world, with over 115 million people suffering from obesity-related problems (W.H.O. Technical Report Series. 2000). This significant acceleration in the incidence of obesity also indicates that low-income countries are now confronted with a double burden where both communicable and chronic non-communicable diseases co-exist (Boutayeb A 2005).

Obesity is a serious global health problem (Badr, Shah et al. 2012); contributing to the global epidemic and increasing burden of type 2 diabetes, cardiovascular disease, stroke, some types of cancer, and premature death worldwide. It has received considerable attention as a major health hazard because of the increase in the prevalence of obesity not only in the United States but also in several other countries -worldwide. Obesity is highly heritable and arises from the interactions of multiple genes, environmental factors, and behaviour (Yang, Kelly et al. 2007; Essop, Anna Chan et al. 2009; Santos, De Oliveira et al. 2010; Bahia, Coutinho et al. 2012). It is caused by an interaction of environmental factors, genetic predisposition, and human behaviour, and is associated with an increased risk of numerous chronic diseases, from diabetes and cancers to many digestive diseases. The obesity epidemic exerts a heavy toll on the economy with its massive health care costs (Nguyen and El-Serag 2010).

Obesity has reached epidemic proportions globally and is a major contributor to the global burden of chronic diseases. According to (Vadera, Yadav et al. 2010), dietary factors are the major modifiable factors through which many of the external forces promoting weight gain act. Obesity is a documented major risk factor for hypertension and cardiovascular disease (Nguyen and Lau 2012), and contributes to the increasing burden of type 2 diabetes, cardiovascular disease, stroke, some types of cancer, and premature death worldwide. Obesity is highly heritable and arises from the interactions of multiple genes, environmental factors, and behaviour (Yang, Kelly et al. 2007). Other authors have also documented obesity has a

main risk factor in metabolic syndrome, with gender influencing the risk of obesity and other cardiovascular risk factors (Wakabayashi 2012).

Socio-demographic factors influencing overweight, obesity, hypertension and their risk factors

Socio-demographic factors such as age, sex, marital status, income, place of residence have been documented to influence the weight and cardio-metabolic risk factors in an individual (Sá and Moura 2011; Wakabayashi 2012). In a study on age-dependent influence of gender on the association between obesity and a cluster of cardio-metabolic risk factors in 2012, Wakabayashi found that among the younger age-group, multiple cardio-metabolic risk factors in obese versus non-obese were significantly higher in women than men. He concluded that the association between obesity and a cluster of cardio-metabolic risk factors is stronger in women than in men, and this gender-specific difference exists in younger (35-40 years) but not in older (60-70 years) individuals (Wakabayashi 2012). In another study among Brazilian adults, Sá NN and Moura found that apart from age and marital status, higher and lower schooling in men and women respectively were associated with overweight. They also discovered that behavioural determinants of overweight differed between men and women, indicating the need for diverse gender-specific strategies among the Brazilian adults (Sá and Moura 2011).

Researches have reported a higher prevalence of overweight and obesity with the female sex (Vadera, Yadav et al. 2010). In the urban population of Jamnagar city in India, prevalence of overweight and obesity was found to be four times higher among women than men, 22.4% and 5.2% respectively (Vadera, Yadav et al. 2010).

Di Cesare et al in their own study on the inequalities in non-communicable diseases and effective responses (Di Cesare et al., 2013), argued that in most countries, people who have a low socioeconomic status and those who live in poor or marginalised communities have a higher risk of dying from non-communicable diseases (NCDs) than do more advantaged groups and communities. They further argued that smoking rates, blood pressure, and several other NCD risk factors are often higher in groups with low socioeconomic status than in those with high socioeconomic status; the social gradient also depends on the country's stage of economic development, cultural factors, and social and health policies(Di Cesare, Khang et al. 2013). Social inequalities in risk factors account for more than half of inequalities in major NCDs, especially for cardiovascular diseases and lung cancer. People in low-income countries and those with low socioeconomic status also have worse access to health care for timely diagnosis and treatment of NCDs than do those in high-income countries or those with higher socioeconomic status (Di Cesare, Khang et al. 2013).

Hosseinpoor et al in their study involving self-reported data from over 200,000 adults in 48 countries, documented that disaggregated analysis of the prevalence of non-communicable disease risk factors demonstrated different patterns and varying degrees of socioeconomic inequalities across low- and middle-income settings (Hosseinpoor, Bergen et al. 2012). They found that smoking and low fruit and vegetable consumption were significantly higher among lower socioeconomic groups and physical inactivity was less prevalent in populations of low socioeconomic status, especially in low-income countries (Hosseinpoor, Bergen et al. 2012).

In a local study by Kadiri et al among urban workers in Ibadan in 1999, it was reported that the prevalence of hypertension increased with age in both sexes, with body mass index correlating to both systolic and diastolic blood pressure in men and women. Blood Pressure

(BP) also correlated with years of education and income in men, but not in women (Kadiri, Walker et al. 1999).

The study among urban slum dwellers in Lagos, identified age, sex, education, religion, BMI, and marital status as having statistically significant association with hypertensions (Daniel, Adejumo et al. 2013).

Olatunbosun et al in 2011, conducted a study among civil servants in Ibadan with similar findings with that of Vadera et al 2010 in India. The former surveyed a randomly selected 998 civil servants, 581 men and 417 women; and reported a 17.3% prevalence rate of obesity among women and 2.8% among men (Olatunbosun, Kaufman et al. 2011). The study among workers in Ilorin by Oghagbon et al also revealed a higher prevalence of obesity among females than males 7.8% versus 5.3%, but a higher prevalence of hypertension among the male workers. The prevalence of hypertension was found to increase with age and BMI (Oghagbon, Okesina et al. 2008). The sex difference in the prevalence of obesity documented by Oghagbon et al among these Ilorin workers was not as high as what was documented by Olatunbosun et al, 2011. In the study by Lawoyin et al in 2002, there was no significant difference in the proportion of men and women with hypertension, but generally, more women than men, were obese (Lawoyin et al., 2002).

Family History of Non-Communicable Diseases

Risk factors for NCDs are known to be classified into modifiable and non-modifiable risks. Under the non-modifiable factors is genetics: family history. An increased risk of NCDs for family members of NCD patients has been found in many studies among different populations (Hunt, Heiss et al. 2000; Olatunbosun, Kaufman et al. 2000; Van Der Sande, Waal-en et al. 2001; Qiu, Williams et al. 2003; Pomara, Russo et al. 2005; Nelson, Perez et

al- 2007; Mendez-Chacon. Santamaria-Ulloa et al. 2008; Yokoyama. Kawai et al. 2008; Patel, Patel et al. 2012).

In a study by Patel et al assessing factors associated with consumption of diabetic diet among type 2 diabetic subjects from Western India, 399 type 2 diabetes mellitus individuals with mean age 53.2 ± 8.0 years were recruited. Majority of the respondents 75% had a positive family history of diabetes. The final multivariate model showed that visit to dietician, level of education, intake of low fat, and family history of diabetes were independent predictors for diabetic diet consumption among the type 2 diabetes mellitus subjects (Patel, Patel et al. 2012).

In another study conducted among Costa Rican elderly, assessing factors associated with hypertension prevalence, unawareness and treatment, the percentage of women who reported a family history of hypertension was higher as compared to men (Mendez-Chacon, Santamaria-Ulloa et al. 2008). A case-control study conducted to investigate the association between family history of obesity, hypertension, and diabetes and the co-occurrence of metabolic disorders associated with the multiple metabolic syndrome (MMS) found that majority of cases were obese (76.3%). family history of obesity was associated only weakly with the MMS, while family history of diabetes, or hypertension was associated significantly with the MMS after controlling for age, race, gender, and sampling group (Hunt, Heiss et al. 2000).

In a large-scale multicenter-based diabetic population, clinical parameters including conventional cardiovascular risk factors and first-degree family history (FH) of diabetes, hypertension, coronary heart disease (CHD) and stroke were investigated in association with presence of CHD and stroke. Among 3611 diabetic patients, 181 (5.0%) had CHD and 118 (3.3%) had stroke. After adjustment for conventional risk factors, FH of CHD (OR 2.32, $p<0.0001$) and of diabetes (OR 1.44, $p<0.05$) were associated with CHD, and FH of stroke

(OR 1.86, p<0.01) was associated with stroke. FH of hypertension was significantly associated with presence of hypertension and obesity. Synergistic effect of FH of CHD in combination with hypertension or aging on increasing CHD, and that of FH of stroke in combination with micro-albuminuria on increasing stroke were found. FH of diabetes, of hypertension, of CHD and of stroke were significantly associated with FH of each disease, indicating clustering of FH. In diabetic population, FH of CHD and FH of stroke doubled the risk of CHD and stroke, respectively, and had synergistic effect in combination with other risk factors. Clustering of FH may indicate interrelation of genetic predisposition (Yokoyama et al., 2008).

Pomara et al in their cross-sectional study on familiar history and predictive risk factors to type 2 diabetes, recruited 680 young healthy Sicilian subjects. Degree of family history of DM was defined as presence in the family of at least one sibling of first degree or a parent with documented diabetes mellitus, or at least one family member of second degree with documented diabetes mellitus. They found that in both sexes, respondents with first degree sibling or a parent with documented diabetes mellitus showed the highest values of body weight, body mass index and, waist hip ratio and triceps skinfold, with consequently higher proportion of obesity and overweight in the group with second degree relative with diabetes. Subjects with positive second degree family were closer to control subject without family history of DM. Having first degree siblings and parents with diabetes was also associated with tendency to higher diastolic and systolic blood pressure values in both sexes. The study concluded that young subjects with familiar history of type 2 diabetes have a higher prevalence of overweight and central obesity compared to other groups, suggesting that obesity in adolescents and young adults may be a strong pathophysiologic mechanism predictive of higher degree of future development of type 2 diabetes and hypertension (Pomara et al., 2005). In a similar study on family history of diabetes, acculturation and the metabolic syndrome

(OR 1.86, p<0.01) was associated with stroke. FH of hypertension was significantly associated with presence of hypertension and obesity. Synergistic effect of FH of CHD in combination with hypertension or aging on increasing CHD, and that of FH of stroke in combination with micro-albuminuria on increasing stroke were found. FH of diabetes, of hypertension, of CHD and of stroke were significantly associated with FH of each disease, indicating clustering of FH. In diabetic population, FH of CHD and FH of stroke doubled the risk of CHD and stroke, respectively, and had synergistic effect in combination with other risk factors. Clustering of FH may indicate interrelation of genetic predisposition (Yokoyama et al., 2008).

Pomara et al in their cross-sectional study on familiar history and predictive risk factors to type 2 diabetes, recruited 680 young healthy Sicilican subjects. Degree of family history of DM was defined as presence in the family of at least one sibling of first degree or a parent with documented diabetes mellitus, or at least one family member of second degree with documented diabetes mellitus. They found that in both sexes, respondents with first degree sibling or a parent with documented diabetes mellitus showed the highest values of body weight, body mass index and, waist hip ratio and triceps skinfold, with consequently higher proportion of obesity and overweight in the group with second degree relative with diabetes. Subjects with positive second degree family were closer to control subject without family history of DM. Having first degree siblings and parents with diabetes was also associated with tendency to higher diastolic and systolic blood pressure values in both sexes. The study concluded that young subjects with familiar history of type 2 diabetes have a higher prevalence of overweight and central obesity compared to other groups, suggesting that obesity in adolescents and young adults may be a strong pathophysiologic mechanism predictive of higher degree of future development of type 2 diabetes and hypertension (Pomara et al., 2005). In a similar study on family history of diabetes, acculturation and the metabolic syndrome

among Mexican Americans in 2007. Nelson at al reported a possible interplay of gene and environment in the development of metabolic syndrome (Nelson et al., 2007).

In 2003, Qui et al established a relationship between family history of chronic hypertension and risk of development of pre-eclampsia in a case-control study involving 190 pre-eclamptic patients and 373 control subjects. The women were required to provide information on first-degree family history of hypertension and diabetes. Compared with women with no parental history of hypertension, women with maternal only, paternal only or both maternal and paternal history of hypertension had 1.9, 1.8 and 2.6 odds of developing pre-eclampsia. The odds ratio for women with at least one hypertensive parent and a hypertensive sibling was 4.7. For women with at least one hypertensive parent and at least one diabetic parent, relative to those with parents with neither diagnosis, the odds ratio for preeclampsia was 3.2. These findings are consistent with the thesis that family history of hypertension and diabetes reflects genetic and behavioural factors whereby women may be predisposed to an increased pre-eclampsia risk (Qiu et al., 2003).

Behavioural Risk factors for NCDs

In 2008, two-thirds of the annual global death toll was attributable to non-communicable diseases (NCDs) (W.H.O 2009). Defined as chronic conditions often caused or exacerbated by non-obligated lifestyle behaviours, the NCD epidemic has been fuelled by a combination of risk factors, including tobacco use, an unhealthy diet combined with lack of physical activity and overweight-obesity, and harmful alcohol use. The health consequences are mainly seen as cardiovascular diseases, diabetes, cancers and chronic respiratory problems. Generally associated with the West, they are now recognized as a global threat to public health.

They are also an unsupportable global health economic burden (Heymann and Goldsmith 2012).

Cardiovascular disease (CVD) today is responsible for approximately one-third of deaths worldwide, and that figure will surely increase in both developing and developed countries as risk factors for the disease--primarily dyslipidemia, hypertension, obesity, diabetes, physical inactivity, poor diet, and smoking--continue to increase. Although these risk factors are modifiable, to date there is a relative paucity of measures to prevent or control them, particularly in developing countries. A population strategy combined with a high-risk strategy for CVD prevention could greatly reduce the burden of disease in the coming decades. Many initiatives are working, but many more are needed (Deaton, Froelicher et al. 2011)

Health and well-being are affected by a number of factors such as behavioural, environmental, genetics, biomedical and demographic; in reality, these factors often co-exist and interact with one another. All the NCDs have a common association with certain risk factors related to lifestyle such as tobacco use, excessive alcohol consumption, poor diet and nutrition and physical inactivity (Australian-Institute-of-Health-and-Welfare 2005). These behavioural risk factors are most amenable to modification and are often the first step in the control of NCDs (Khatib 2004). Most of these risk factors emerge during middle age as a result of an unhealthy lifestyle that has been adopted for several decades. In Nigeria, it was found that NCD patients may have as many as five chronic disease risk factors (W.H.O. Technical Report Series, 2000).

Niakara et al in their study in 2007 on hypertension, urbanization, social and spatial disparities in Ouagadougou, Burkina Faso identified BMI, protein-rich diet and absence of physical activity as risk factors for hypertension. They also documented absence of community

integration and living in a residential area for over 20 years as risk factors (Niakara, F. Fournet et al. 2007).

These multiple risk behaviours have a synergistic effect on the total chronic disease risk and efforts are now geared towards control of multiple chronic disease risk factors (Steyn, Levitt et al. 2004). Prevention of CVD is proven to be cost effective and should be the main intervention. Insight into prevention programmes in Low and Middle Income Countries (LMIC) is important in addressing the rising levels of these diseases (Van De Vijver, Oti et al. 2013).

Unhealthy diet

Nutrition has been identified as a major modifiable determinant of non-communicable diseases (Lambrinoudaki, Ceasu et al. 2013; Lenoir-Wijnkoop, Jones et al. 2013). A healthy diet is essential for the prevention of all major chronic non-communicable diseases in midlife and beyond, both directly, through the effect of individual macro- and micronutrients and indirectly, through the control of body weight. Type 2 diabetes mellitus is best prevented or managed by restricting the total amount of carbohydrate in the diet and by deriving carbohydrate energy from whole-grain cereals, fruits and vegetables. The substitution of saturated and trans-fatty acids by mono-unsaturated and omega-3 fatty acids is the most important dietary intervention for the prevention of cardiovascular disease (Lambrinoudaki, Ceasu et al. 2013).

Dietary changes appear to be shifting universally toward a diet dominated by higher intakes of animal and partially hydrogenated fats and lower intakes of fiber (Popkin, 2006). This shift towards a high fat, particularly saturated fat diet, low in carbohydrate, fruits and vegetables, along with a high salt intake, leads to the emergence of chronic diseases(Popkin, 2006). As low-income countries move towards economic development and industrialization,

there are similar pressures towards high caloric intake (Toft U, L. Kristoffersen et al. 2007). There is a notable nutritional transition especially in urban areas from the traditional diets which are low in fat and high in unrefined carbohydrate to high fat and sugar, marked increases in animal products, and a decline in unrefined cereals and thus in fibre intakes.

Africa is said to be undergoing nutrition, epidemiological and demographic transition. In an ecological study on dietary trends in the Middle East and North Africa over a period of 47 years (1961 to 2007), the authors examined the availability of energy and different food items in 15 countries within the regions. The Food and Agriculture Organization (FAO) food balance sheet from the organization's database for nine countries from the Middle East and six from North Africa was used. It was found that over the studied 47 years, energy and food availability (apart from animal fats and alcoholic beverages) increased in the two regions. The proportion of energy derived from meat and vegetable oils increased significantly while that from cereals decreased significantly. Energy proportion from milk, dairy products and vegetables ascended in North Africa while a decline in energy from fruits in the Middle East was observed. A summary of their findings was the unfavourable trend towards a Westernized diet in both regions; more in the Middle East (Golzarand, Mirmiran et al. 2012). In another study by Zhao W and Chen J on the implications from and for food cultures for cardiovascular disease, diet, nutrition and cardiovascular diseases in China, information from their review showed that diet and nutrition play important roles in the occurrence of CVD and hypertension in the Chinese population (Zhao and Chen 2001).

In a Nigerian survey conducted among staff of the Federal Airport Authority of Nigeria in 2000, their food consumption pattern revealed that 23.2% consumed cereals daily while only 5.6% of the respondents consumed fruits and only 10.9% affirmed to consuming vegetables

daily. Most of the respondents (84.3%) had snacks which was majorly pastries and carbonated soft drinks as their lunch (Abidoye. Maducke et al. 2002).

Physical exercise

Over the past decades. it has become evident that lifestyle factors. such as physical activity, are related to the development of non-communicable diseases, particularly cardiovascular disease, in Westernized countries. Physical activity has been reported to be inversely associated with blood pressure, lipid profiles. obesity. and insulin sensitivity. As non-communicable diseases are rapidly emerging to replace communicable diseases in developing countries, few studies have described physical activity and its relationship to cardiovascular disease and its risk factors in these countries (Kimberly, Forrest et al. 2001).

Traditionally, it has been thought that a high level of physical exercise could in part explain the low levels of chronic diseases found in SSA countries. However. the amount of physical exercise has been decreasing as a result of the high degree of urbanization that has been occurring across the sub-continent. In urban settings, public transport replaces the traditional pattern of walking long distances. Furthermore, urban employment usually entails for less physical labour than rural employment or other activities of daily living (Sobngwi, Mbanya et al. 2002). In the same study by Sobngwi et al, lower rate of physical activity was documented in urban settings.

A study conducted by in 2001, Kimberly et al on physical activity and cardiovascular risk factors among civil servants in Benin City of Nigeria revealed that physical activity was attributed to occupational activities than leisure activities. And that compared with women, men had a higher activity level. Male senior staff had a lower physical activity level than male junior staff; physical activity was inversely correlated with weight, BMI, waist-hip ratio, blood pressure, insulin, total cholesterol, low density lipoprotein and high density lipoprotein

cholesterol in men, while correlations were not consistent in women (Kimberly, Forrest et al. 2001).

Tobacco Use

Tobacco smoking and second-hand smoke constitute overwhelmingly the most significant risk factor for premature preventable deaths from cancer and across the board for chronic diseases in Nigeria (Adejuwon 2009). In his study among adolescents in Cross River State, Adejuwon found that 22.6% males and 11.2% females of Nigerian adolescents (13-15 years old) were smokers while 18.1% of both sexes smoked cigarette. He also reported that 34.8% of adolescents live in homes where others smoke while 49.1% are around others that smoke in places outside their homes. This shows the epidemic of tobacco smoking and exposure to second hand smoking (Adejuwon 2009).

Tobacco use (usually smoking) is causally linked with a number of chronic diseases including several cancers, Chronic Obstructive Pulmonary Disease (COPD) and cardiovascular diseases. It has been estimated that there are more than 1.3 billion smokers world- wide, with around 82% residing in low and middle-income countries. In people over age 30, smoking accounts for one in every five deaths among men and one in every 20 deaths among women globally. The World Health Organization (WHO) has estimated that approximately 5.4 million people died worldwide from tobacco-related illnesses in 2006 and says that " unless urgent action is taken, tobacco's annual death toll will rise to more than eight million" by the year 2030, with over 80% of those deaths occurring in low-income countries (Tobacco-and-the-Developing-World 2009). Almost 6 million people die from tobacco use and exposure each year, accounting for 6% of all female and 12% of all male deaths in the world (Who-Ned-Report 2009). In a survey of 400 patients attending the University of Benin Teaching Hospital dental clinic, in Nigeria, in 2012, tobacco use prevalence was 4.25%, of which 94% of cases

consumed it in the form of cigarette in 94% of cases (Ehizele, Azodo et al 2012). In another population-based survey in Yola, north-east Nigeria a prevalence of 32% was documented with a male to female ratio of 3:1 (Desalu, A. et al. 2008). In a study among teachers in Oyo State, in 2011, a prevalence of current cigarette smoking of 12.3% was documented among them (Familoni and Familoni 2011).

Alcohol intake

Alcoholic beverages, and the problems they engender, have been familiar fixtures in human societies since the beginning of recorded history. Research has contributed substantially to the understanding of the relation of drinking to specific disorders, and has shown that the relation between alcohol consumption and health outcomes is complex and multidimensional. Alcohol is causally related to more than 60 different medical conditions. Overall, 4% of the global burden of disease is attributable to alcohol, which accounts for about as much death and disability globally as tobacco and hypertension (Room, Babor et al. 2005). Treatment research shows that early intervention in primary care is feasible and effective, and a variety of behavioural and pharmacological interventions are available to treat alcohol dependence. This evidence suggests that treatment of alcohol-related problems should be incorporated into a public health response to alcohol problems. Additionally, evidence-based preventive measures are available at both the individual and population levels, with alcohol taxes, restrictions on alcohol availability, and drinking-driving countermeasures among the most effective policy options. Despite the scientific advances, alcohol problems continue to present a major challenge to medicine and public health, in part because population-based public health approaches have been neglected in favour of approaches oriented to the individual that tend to be more palliative than preventative (Room, Babor et al. 2005).

There is a direct relationship between higher levels of alcohol consumption and rising risk of some cancers, liver diseases and cardiovascular diseases. The relationship between alcohol consumption and ischaemic heart and cerebrovascular diseases is complex. It depends on both the amount and the pattern of alcohol consumption (Who-Ned-Report 2009). Some epidemiological data, generated mainly in high-income countries, suggest that low-risk patterns of alcohol consumption may have a beneficial effect on selected disease outcomes and in some segments of populations, but these effects tend to disappear if the patterns of drinking are characterized by heavy episodic drinking.

In a study on pattern of alcohol consumption among commercial road transport workers in a semi-urban community in south western Nigeria, prevalence rate of alcohol use was 67.2%. Forty seven percent were 'heavy' users; 15.3% 'moderate' users and 37.7% were occasional or 'mild' users. All the users were engaged in the use of commonly available alcoholic beverages in the vicinity of the motor parks. Majority of the respondents (74.5%) reported drinking after work; 13.5% in the mornings; 10.1% when off-duty and 1.9%, during work (Abiona, Aloba et al. 2006). Research by Kadiri et al among urban workers in Ibadan revealed regular and moderate alcohol consumption was associated with hypertension (chi2 = 4.8, $P < 0.05$) (Kadiri, Walker et al. 1999).

Prevention and Control of Hypertension, Obesity and other NCDs

The prevention. control and management of hypertension are major public health challenges. It has been well established that if the rise in blood pressure with age could be prevented or diminished, much of hypertension, cardiovascular and renal disease, and stroke might be prevented. With the identification of the causal factors for hypertension (excess body weight, excess dietary sodium intake. reduced physical activity, inadequate intake of fruits. vegetables, and potassium, and excess alcohol intake). the control of the disease has been documented not only to be individual-based but also population-based (J.N.C. 2003).

To prevent BP levels from rising, primary prevention measures should be introduced. This will reduce or minimize these identified causal factors in the population, particularly in individuals with prehypertension. A population approach that decreases the BP level in the general population by even modest amounts has the potential to substantially reduce morbidity and mortality or at least delay the onset of hypertension. For example, it has been estimated that a 5mmHg reduction of systolic blood pressure (SBP) in the population would result in a 14% overall reduction in mortality due to stroke. a 9% reduction in mortality due to CHD, and a 7% decrease in all-cause mortality (J.N.C. 2003).

Experience from high-income countries that have been able to control NCDs shows that responses must be comprehensive and multi-sectoral, integrating health promotion. prevention and treatment strategies, and involving the community as well as the health sector (Hogerzeil, Liberman et al. 2013). Access to medicines to prevent and treat non-communicable diseases (NCDs) such as hypertension and diabetes have however been documented unacceptably low worldwide (Hogerzeil, Liberman et al. 2013).

With the understanding of the morbidity and mortality associated globally with NCDs, the United Nations UN General Assembly had a high-level meeting on the prevention and control of NCDs. The focus of the meeting was to develop a global strategy for the four most prominent non-communicable diseases, namely, cardiovascular diseases, chronic respiratory diseases, diabetes and cancers. The meeting resulted in a political declaration to reduce avoidable mortality associated with NCDs by 25% come year 2025. An endorsement of the 25 by 25 goal was done at the 65th World Health Assembly in 2012 (Alleyne, Binagwaho et al. 2013; Bonita, Magnusson et al. 2013). Member states of the World Health Organization (WHO), subsequently agreed on a global monitoring framework consisting of nine global targets and 25 measurement indicators. The nine targets are as follows:

1) A 25% reduction in overall premature mortality from non-communicable diseases.

2) A 10% reduction in the harmful use of alcohol.

3) A 10% reduction in current figures associated with insufficient physical activity.

4) A reduced growth in the incidence rate of those with raised blood glucose/diabetes and obesity.

5) A 25% reduction in raised blood pressure prevalence.

6) A 30% reduction in the population intake of salt/sodium.

7) A 30% reduction in tobacco use.

8) At least a 50% coverage of drug therapy to prevent heart attacks and strokes

9) Essential non-communicable diseases medicines and basic technologies to treat major NCDs to be made available and affordable.

Blood Pressure Measurement

Accurate measurement of blood pressure is essential to classify individuals, to ascertain blood pressure-related risk, and to guide management. The auscultatory technique with a trained observer and mercury sphygmomanometer continues to be the method of choice for measurement in the office, using the first and fifth phases of the Korotkoff sounds (J.N.C. 2003; Pickering, Hall et al. 2005). The first phase of the Korotkoff sound corresponds to the start of clear, repetitive, tapping sounds, while the 5th phase corresponds to the complete disappearance of the sounds. The following techniques are recommended for accurate measurement of blood pressure in the general population:

1) Patients should be seated quietly for at least 5 minutes in a chair (rather than on an exam table) with their backs supported and their arms bared and supported at heart level. Patients should refrain from smoking or ingesting caffeine during the 30 minutes preceding the measurement. Each patient should be provided, verbally and in writing, with their specific blood pressure numbers and blood pressure goals.

2) Correct measurement of blood pressure requires the use of a cuff that is appropriate to the size of the upper right arm. The right arm is preferred for consistency and comparison with the standard tables. A technique to establish an appropriate cuff size is to choose a cuff having a bladder width that is approximately 40% of the arm circumference midway between the olecranon and the acromion. Issues of cuff size are especially important in children and obese adults. With the increasing prevalence of obesity, many adults require a large adult cuff. Those with large, conical arms >41 cm in circumference may require the blood pressure to be measured on their forearms.

3) Too small an inflatable bladder can lead to false readings of elevated blood pressure in the range of 3.2/2.4 mm Hg to 12/8 mm Hg with as much as 30 mm Hg in the obese. An excessively large bladder may lead to falsely low readings in the range of 10 to 30 mm Hg. The bladder within the cuff should encircle at least 80% of the arm.

4) The bell of the stethoscope should be lightly placed over the brachial artery pulse, proximal and medial to the cubital fossa, and below the bottom edge of the cuff (i.e., about 2 cm above the cubital fossa).

5) The cuff should be inflated to 30 mm Hg above palpated SBP and deflated at a rate of 2 to 3 mm Hg/second. Both SBP and DBP should be recorded. The first appearance of sound (phase 1) is used to define SBP. The disappearance of sound (phase 5) is used to define DBP in adults. It has been suggested that a detailed accounting of blood pressure on the initial visit include position of individual; arm selected; blood pressure monitor used; blood pressure measured on both arms; arm circumference and cuff used; if auscultatory—Korotkoff sounds IV and V, presence of auscultatory gap; emotional state of individual; and time of drug ingestions.

6) Two or more readings separated by 2 minutes should be averaged. If the first two readings differ by more than 5 mm Hg, additional readings should be obtained and averaged.

7) Elevated blood pressure must be confirmed on repeated visits before characterizing an individual as having hypertension. Blood pressure at the high levels tends to fall on subsequent measurement as the result of (1) an accommodation effect (i.e., reduction of anxiety by the patient from one visit to the next) and (2) regression to the mean, a non-biological phenomenon that derives, in part, from mathematical considerations. Blood pressure level is not static but varies even under standard resting conditions. Therefore, a more precise

characterization of an individual's blood pressure level is an average of multiple blood pressure measurements taken repeatedly over several weeks to months (The-J.N.C.-7-Report 2003).

CHAPTER 3

METHODOLOGY

Study area

The study was carried out in Kaduna, the capital of Kaduna State. The State is the home of well-established ancient cultures of Nigeria - the Nok Culture. The State is situated on the southern part of the High Plains of the northern parts of Nigeria. It lies between parallels 9°03 N. and 11°32 N. and extends from the upper River Mariga on 6°05 E to 8°48 E on the foot slopes of the scarp of Jos Plateau. The total land area of the State is 48,473.2km^2. To the South-west, the State shares a border with the Federal Capital Territory, Abuja, Nassarawa State is to its south, Bauchi and Plateau States to the east, Niger to the west, while Zamfara, Katsina and Kano States take up its northern boundaries positioning.

Based on the average annual growth rate of 3%, the State has an estimated population of 7,374,292 and public servant strength of about 150,000. The state has 22 ministries namely- Education, Chieftaincy title, Commerce and Industry, Economic Planning, Culture and Tourism, Information, Justice, Health, Lands, Local Government, Rural and Community Development, Science and Technology, Water Resources, Works, Housing and Transport, Youth and Sports, Environment and Natural Resources, Finance, Agriculture, Inter-Government Affairs, Special Duties, Internal Revenue Board, Women Affairs and Social Development.

The ministries have various departments or units with all cadres of staff in each of the units. The administrative head of a ministry is the commissioner who receives support from directors heading various departments/units.

Study Design

An analytical cross-sectional study design was used in determining the prevalence of the hypertension, overweight and obesity alongside their associated predisposing and behavioural factors.

Study population

Study respondents were civil servants in Kaduna. This group of people are adults representing the workforce of the state. They are employed under different ministries and agencies, cutting across salary grade levels one to seventeen of the Nigeria Civil Service Salary Scale.

Inclusion criteria - All consenting civil servants on the payroll of the selected ministries were recruited

Exclusion criteria - Non-consenting members of staff, all pregnant women and chronically ill civil servants were excluded from the study

Sample size determination

The Leslie and Kish formula was used in estimating the sample size for the cross-sectional survey

$$n = \frac{p * (Z^2 pq)}{d^2}$$

where: n= Minimum sample size

Z_α at 5% significant level put together = 1.96

p = prevalence of hypertension at 27.1%

[Using the highest documented prevalence of hypertension among paid workers in Nigeria – Ogbiagbon, Okesina, et al. (2008)]

d = level of precision (5%)

q = 1- p

and g = 2 (design effect for a cluster sample)

$$n = \frac{2 \times (1.96^2 \times 0.27 \times 0.73)}{0.05^2}$$

n= 605.74

Adjusting for non-response rate of 10%

$$= \frac{nr}{(r-1)}$$

Where n = calculated sample size and r = 10

$$= \frac{605.74 \times 10}{(10-1)}$$

= 673.05

Estimated Sample Size = 673

Sampling technique

A two-stage cluster sampling technique was used:

Stage 1: Ten of the 22 ministries were selected using simple random sampling. This represents close to 50% of the existing ministries in the state. The selected ministries are: Ministry of Health, Education, Women Affairs and Social Development, Agriculture, Environment, Youth and Sports Development, Economic Planning, Water Resources, Internal Revenue, and Justice.

Stage 2: Due to unavailability of sampling frame for the various ministries, cluster sampling of each of the selected ministries was done; recruiting all available ministry staff at the time of study.

Study instruments

The World Health Organization (WHO) STEPwise approach was employed, adopting the Centers for Disease Prevention and Control (CDC) Behavioural Risk Factor Surveillance System (BRFSS)/ Chronic Disease Indicators (CDI) [(C.D.C. 2001; Who STEPwise approach (STEPS) www.who.int/chp/steps)]. The WHO STEPwise approach to chronic disease risk factor surveillance (STEPS) focuses on obtaining core data on established risk factors that determine major disease burden. The instrument covers three different levels of "steps" of risk factor assessment, that is, questionnaire on socio-demographics, physical measurements and biochemical profiles. The Chronic Disease Indicators (CDI) on the other hand is a set of indicators developed to allow for uniform definition, collection, and reporting of chronic disease data that are important in public health. The CDI represent a wide spectrum of conditions and risk factors such as physical activity and nutrition, tobacco and alcohol use, cancers, cardiovascular disease, and diabetes.

For the purpose of the study, the first two WHO steps were used. The first part of our study instrument collected data on respondents' demographic, socioeconomic, behavioural and medical history. The second part measured respondents' physical body parameters (anthropometry).

Data collection methods

Data was collected using semi-structured interviewer administered questionnaire. Questions were adapted from the CDC Behavioural Risk Factor Surveillance System (BRFSS) questionnaire and the Health and Lifestyle questionnaire for cancer survey. The questions covered aspects stated under the specific objectives

- Interviewer administered structured questionnaire (with open and closed questions)

Questionnaire outline

Section A: Socio-demographic characteristics

This section consists of questions eliciting the age, sex, job cadre, marital status, educational status, current ministry of employment, religion of the respondents.

Section B: Assessment of behavioural factors

Assessment of dietary habit

Dietary habit was assessed by the frequency of intake of certain foods; these food items include vegetables, fruits, dairy products, foods containing refined sugar, fries and so on. The respondents were asked if they eat the food on daily basis; if not, how often in a week do they eat such food item.

Assessment of physical activity/exercise

Physical activity was assessed by asking if the civil servants engaged in leisure or occupational related physical activities 30 days prior to the study. Their job description was also determined; whether mostly sitting, standing or walking around. The type of physical activities engaged in by the civil servants, 30 days prior to the study, duration and intensity were assessed. The assessment was based on:

a) Exercise intensity: Physical activity intensity was categorized as either moderate or vigorous. Examples of moderate intensity physical activities include walking, gardening and so on, while the vigorous ones include jogging, swimming, football and so on.

b) Frequency of exercise per week: This determines the number of days in a week the respondents engage in the identified physical activity

c) Duration of each exercise performance: The time measured in minutes spent on each session of exercise was also determined.

Thus a physically active civil servant was one who reported moderate physical activity for ≥ 30 minutes, ≥ 5 times/week or one who reports vigorous physical activity for ≥ 20 minutes ≥ 3times/week.

Alcohol Consumption

Alcohol consumption was assessed by asking questions on whether the civil servants take alcohol at all or not, what quantity was taken at each sitting, the maximum quantity taken at a sitting, 30 days prior to the study.

Tobacco use

Tobacco use assessment was restricted to cigarette smoking. Questions on whether the respondent takes cigarette now or ever was asked, the estimated number of sticks consumed in a life time so far, and current frequency of smoking; daily or sometime in a week.

Section C: Individual medical and family history

The civil servants were asked if they have first degree siblings or parent(s) with diagnosed hypertension, diabetes, obesity and so on. They were also asked if as individuals, they have been diagnosed with hypertension prior to the study or were on anti-hypertensive drugs.

Step 2: Blood pressure and anthroponetry

Blood Pressure Measurement

The blood pressure of the respondents was taken only after they had completed the part one of the questionnaire. This was to allow room for a period of at least 10 minutes of rest them before taking the BP. A mercury sphygmomanometer was used in measuring the BP. This was measured with the respondent in a sitting position with the sphygmomanometer on a flat/levelled surface preferably a table at approximately the same level as the heart of the study participant. The cuff of the sphygmomanometer was wound around the respondents' upper arm, covering two-thirds of the arm. Both palpatory and auscultatory measurement was taken, with the systolic blood pressure (SBP) taken at the second Korothkov sound and the diastolic blood pressure (DBP) taken when the sound muffles. The figures derived were recorded immediately, after which the research assistant proceeds to take the weight of the study participant.

Weight measurement

In order to obtain an accurate weight measurement of the respondents:

1. The research assistant at every time of taking anthropometry, introduced the examination to the respondents. The study participants were asked to remove their shoes, "baba riga", caps, headtie/gear or "ijab" – a veil worn by muslim women to cover their head alongside their head-scarf. Each respondent was also asked to empty his or her pocket in order to avoid objects within the pocket constituting additional weight to that of the respondents.

2. The weighing scale was positioned on the floor in front of the study participant. Before each study participant mounted the weighing scale, the research assistant ensured the weighing scale

pointer was on zero. This, the research assistant viewed by standing in front of the scale and bending down to avoid error due to parallax.

3. Positioning the study participant: The respondents stood with their two feet on the sides of the scale platform facing the recorder, with their hands at the sides, and looking straight ahead.

4. Capture the result: After the study participant had been correctly positioned and the pointer on the measurement device becomes stable, the recorder/research assistant took the measurement to the nearest 1 kg.

5. An object of known weight was placed on the weighing scale after every five respondent to ensure the scale calibration was still in order.

Standing Height

The standing height assessed the maximum vertical size of the respondents. Standing height was measured using a modified stadiometer with a fixed vertical backboard.

1. Positioning the study participants

Each study participant was directed to the stadiometer platform. He or she was asked to remove any hair ornaments, jewelry, buns, or head-tie/gear braids or caps from the top of the head. The study participant then stood up straight against the backboard with the body weight evenly distributed and both feet flat on the floor. He/she was then instructed by the research assistant to stand with the heels together and toes apart. The toes should point slightly outward at approximately a 60°angle. The research assistant checked at every time that the back of the head, shoulder blades, buttocks, and heels of the study participant made contact with the backboard.

NOTE: Depending on the overall body conformation of the respoodent/study participant. all four contact points – head. shoulders. buttocks, and heels – sometimes did not touch the stadiometer backboard. In situations where some overweight respondents could not stand straight while touching all four contact points to the backboard. the best measurement possible was obtained.

The study participant's head was aligned in the Frankfort horizontal plane. The head is in the Frankfort plane when the horizontal line from the ear canal to the lower border of the orbit of the eye is parallel to the floor and perpendicular to the vertical backboard. Many people naturally assume this position, but for some respondents, the research assistant needed to gently tilt the head up or down to achieve the proper alignment, instructing the study participant to look straight ahead.

3. Next, the head piece was put in a horizontal position so that it rested firmly on top of the participant's head, with sufficient pressure to compress the hair. The study participants were instructed to stand as tall as possible, take a deep breath, and hold this position. The act of taking a deep breath helps straighten the spine to yield a more consistent and reproducible stature measurement.

Training of research assistants

Fifteen research assistants with a minimum of Ordinary National Diploma were trained over two days; to administer the questionnaire and those with health-care background took the blood pressure measurement and anthropometry. Performance of research assistants was assessed for questionnaire administration and accuracy in measurement taking, before they went to field to commence data collection. Only the research assistants with health technology

background took the blood pressure measurement and anthropometry in order to ensure consistency and avoid inter-observer errors.

Pre-testing and reliability of data collection instrument

The questionnaire was pre-tested among 50 civil servants in a ministry outside the state secretariat. Questions with vague and incomplete meanings were edited and reframed before commencing the main study.

Data management

Study variables:

The study variables comprised of independent and dependent variables.

Dependent variables: The major outcome variables were presence or absence of hypertension, overweight and obesity.

Independent variables: Some of the independent variables were age, sex, job cadre, education status, behavioural factors (e.g. unhealthy diet, physical inactivity, harmful alcohol use and cigarette smoking).

Definitions of study variables

The Chronic Disease Indicators (CDI) of the National Center for Chronic Disease Prevention and Health Promotion was adapted (C.D.C. 2004):

1) **Job cadres:** Civil servants between salary grade levels 1 - 7 were classified as junior staff, while those with ≥ 8 were senior staff according the Federal Government Civil Service Salary Scale

2) **Physical Inactivity:** - This was defined as civil servants who 30 days prior to the survey had no form of physically demanding activity, or engaged in moderate activities less than 30 minutes 5 times in a week, or had vigorous physical activity less than 20 minutes 3

times a week. This was assessed based on the reported exercise intensity, frequency and duration (C.D.C. 2001).

a) Exercise intensity – Classified as either moderate or vigorous. Moderate exercise included walking, gardening etc. while vigorous exercise entails jogging, football, swimming and so on.

b) Duration of each exercise performance

c) Frequency of exercise per week and

3) Binge drinking: - Any male civil servant who reported having ≥ 5 drinks or female with ≥ 4 drinks on one or more occasion within 30 days prior to the study. A drink is defined as a bottle of beer or one glass of wine or a shot of any of the spirits e.g. gin, scotch etc.

4) Unhealthy diet: - Absence of vegetables and fresh fruits in the daily meals of the civil servants.

5) Cigarette smoking: - Civil servants who reported having smoked ≥100 cigarettes in their lifetime would be classified as "Ever smoked" and those who currently smoke on every day or some days would be classified as "Current smokers".

6) Hypertension: - Defined as one measurement of systolic blood pressure of ≥140 mmHg systolic and/or diastolic blood pressure of ≥90 mmHg or self-reported use of drug treatment for hypertension in two weeks prior to the study irrespective of measured blood pressure (The-J.N.C.-7-Report 2003).

7) Body Mass Index BMI was defined based on the WHO BMI Classification (W.H.O. 2004)

Underweight <18.5kg/m^2

Normal range BMI (healthy weight) = 18.5-24.9kg/m^2

Overweight = 25.0 – 29.9kg/m^2

Obesity ≥ 30.0kg/m^2

Statistical analysis

Data were entered, cleaned and edited for inconsistencies before analysing with SPSS version 19 and Epi info version 3.5.3. Questionnaires with insufficient data were excluded from analysis. Descriptive and analytical statistics were used in summarizing the data. Descriptive statistics involved the use of frequencies, proportions and tables. Analytical statistics through bivariate analysis and multivariate logistic regression were performed to identify factors associated with the occurrence of hypertension, overweight and obesity. The chi square test was used in determining statistically significant associations while factors with p values <0.05 were included in the logistic regression model. Adjusted odds ratios (AORs) were determined with 95% confidence interval (CI) to identify statistically significant independent factors.

Ethical Consideration

Ethical Approval: Approval for the study was obtained from the Kaduna State Ministry of Health Ethical Review board (attached as appendix 1)

Consent: Informed consent was taken from individual respondent before administering questionnaire or anthropometry.

Confidentiality: Serial number and not names of participants were used to maintain confidentiality. They were assured that their responses will be kept confidential. Information on the system was password-protected and accessible to members of the research team only.

Beneficence: Participants had the opportunity of a brief one-to-one discussion on health implications of risk behaviours and measures to reduce the risk of NCDs. Respondents with elevated blood pressure and positive family and past medical histories were referred to

nearby hospitals for further review and management.

CHAPTER 4

RESULTS

Socio-demographics

Eight hundred and one civil servants participated in the study, 62.2% were male while 526 (69.2%) were aged 40 years and above. Six hundred and twenty-four (77.9%) were currently married at the time of study, 13.7% were single (never married), 6.7% were widowed, 1.0% were separated from their spouses and 5 (0.6%) were divorced. Two-thirds of the civil servants (61.7%) were Christians, while 72.0% had a minimum of tertiary education. Five hundred and seventy-seven (72.0%) of the civil servants belonged to the senior staff cadre, salary grade level 8 and above, of the Nigerian salary scale which ranges from grade 1 to 17.

Table I: Socio-demographic characteristics respoudents

VARIABLE	FREQUENCY (N=801)	%
Age		
20-29	16	2.0
30-39	198	24.7
40-49	340	42.4
50-59	169	21.1
≥60	78	9.7
Sex		
Male	498	62.2
Female	303	37.8
Marital Status		
Single (never married)	110	13.7
Currently married	624	77.9
Separated	8	1.0
Divorced	5	0.6
Widowed	54	6.7
Education status		
No formal education	14	1.7
Arabic (Qu ránic)school	6	0.7
Primary school completed	53	6.6
Secondary school completed	106	13.2
Tertiary	504	62.9
Post-graduate	118	14.7
Religion		
Christianity	494	61.7
Islam	307	38.3
Ethnicity		
Hausa	719	89.8
Yoruba	14	1.7
Ibo	6	0.7
Others*	62	7.7
Job cadre (N=765)		
Junior staff	188	24.6
Senior staff	577	75.4

Others* - - Esan. Delta, Itsekiri. Warri, etc.

Prevalence of hypertension

The mean systolic blood pressure (SBP) of the respondents was 125.0 ± 21.0 mmHg, while the mean diastolic blood pressure (DBP) was 80.0 ± 13.5mmHg. One hundred and ninety-three (24.1%) had a blood pressure of ≥140/90mmHg while 41 (5.1%) had a blood pressure within normal limits but were on antihypertensive medications. Therefore the prevalence of hypertension among the civil servants was 29.2%. Forty-seven percent of the 234 hypertensive civil servants were aware of their hypertensive status while a little more than half 124 (53%) were newly diagnosed. The prevalence of hypertension was higher among females than males, 136(32.3%) and 98 (27.3%) respectively. A third of the married civil servants (31.4%) were hypertensive. A higher prevalence of hypertension was also seen among the senior staff cadre compared with the junior staff (31.0% and 25.0%, respectively).

Table 2: Prevalence of Hypertension among the Civil Servants

VARIABLE	FREQUENCY	%
Age		
20-29	4	5.1
30-39	18	10.7
40-49	119	35.0
50-59	88	44.4
≥ 60	5	31.3
Sex		
Male	136	27.3
Female	98	32.3
Marital Status		
Single (never married)	11	10.0
Currently married	196	31.4
Separated	2	25.0
Divorced	0	0.0
Widowed	25	46.3
Education status		
No formal education	4	28.6
Arabic (Qu ánanic)school	3	50.0
Primary school completed	25	47.2
Secondary school completed	27	25.5
Tertiary	13.1	26.6
Post-graduate	41	34.7
Religion		
Christianity	158	32.0
Islam	76	24.8
Job cadre		
Junior staff	47	25.0
Senior staff	179	31.0

Prevalence of overweight and obesity

Using the measurement of the individual weight and height and calculation of the body mass index (BMI), 283 (35.3%) of the respondents were overweight. 216 (27%) were obese giving a total of 499 (62.3%) overweight and obese respondents. A small proportion 21 (2.6%) of the civil servants were underweight (BMI <18.5kg/m^2) while 281 (35.1%) had healthy weight (BMI 18.5-24.9 kg/m^2) (Figure 1). Across age-group categories, prevalence of overweight and obesity was highest among those aged 40–49 years (45.6% and 50.0%) respectively. Obesity was higher among the female sex, 69.4%, and the senior cadre 75.8% (Table 3)

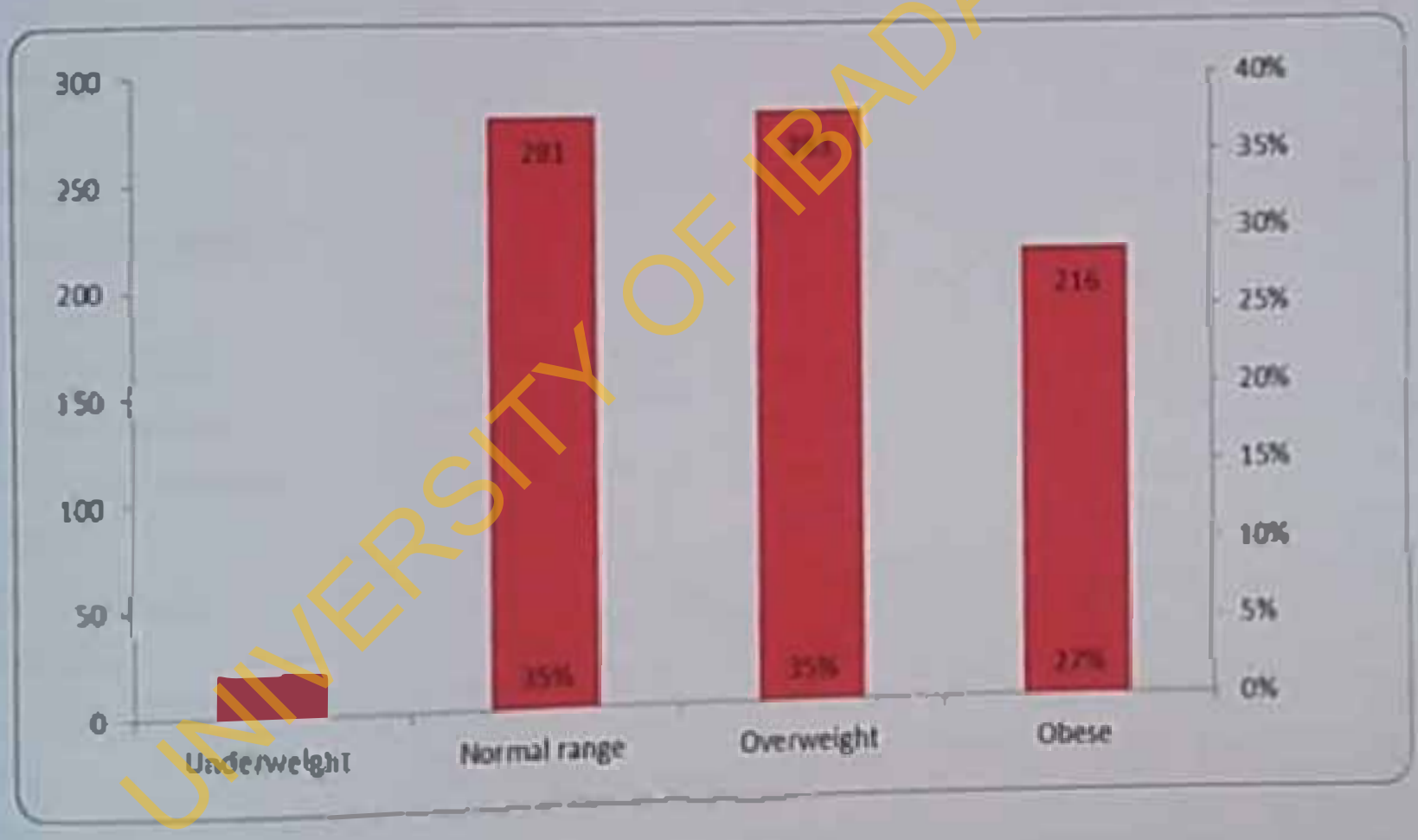

Figure 1: Body Mass Index (BMI) Distribution of Civil Servants in Kaduna, Kaduna State, 2012

Table 3: Distribution of the Body Mass Index (BMI) of the respondents

VARIABLE	HEALTHY WEIGHT (N=281)	UNDER-WEIGHT (N=21)	OVER-WEIGHT (N=283)	OBESE (N=216)
Age				
20-29	46 (59.0)	3 (3.8)	20 (25.6)	9 (11.5)
30-39	80 (47.3)	5 (3.0)	52 (30.8)	32 (18.9)
40-49	94 (27.6)	9 (2.6)	129 (37.9)	108 (31.8)
50-59	54 (27.3)	3 (1.5)	78 (39.4)	63 (31.8)
≥ 60	7 (43.8)	1 (6.3)	4 (25.0)	4 (25.0)
Sex				
Male	227 (45.6)	17(3.4)	188 (37.8)	66 (13.3)
Female	54 (18.1)	4 (1.3)	95 (31.8)	150 (49.5)
Marital Status				
Single (never)	59 (53.6)	4 (3.6)	34 (30.9)	13 (11.8)
Currently married	207 (33.2)	17 (2.7)	228 (36.5)	172 (27.6)
Separated	3 (37.5)	0 (0.0)	4 (50.0)	1 (12.5)
Divorced	1 (20.0)	0 (0.0)	2 (40.0)	2 (40.0)
Widowed	11 (20.4)	0 (0.0)	15 (27.8)	28 (51.9)
Education status				
No formal	7 (50.0)	1 (7.1)	4 (28.6)	2 (14.3)
Arabic school	1 (16.7)	0 (0.0)	3 (50.0)	2 (33.3)
Primary school	20 (37.7)	2 (3.8)	21 (39.6)	10 (18.9)
Secondary school	45 (42.5)	3 (3.8)	34 (32.1)	24 (22.6)
Tertiary	174 (34.5)	13 (2.6)	166 (32.9)	151 (30.0)
Post-graduate	34 (28.8)	2 (1.7)	55 (46.6)	27 (22.9)
Religion				
Christianity	157 (31.8)	6 (1.2)	175 (35.4)	156 (31.6)
Islam	124 (40.4)	15 (4.9)	108 (35.2)	60 (19.5)
Job cadre (n=765)				
Junior staff	82 (43.6)	8 (4.3)	62 (33.0)	36 (19.1)
Senior staff	177 (30.7)	13 (2.3)	213 (36.9)	174 (30.2)

Prevalence of behavioural factors

Physical inactivity

When asked what best describes their activities at work each day, 536 (66.9%), of the civil servants reported their jobs were done mostly sitting down or standing up. Of the 801 respondents, 431 (53.8%) reported having been engaged in one form of physical activity or the other 30 days prior to the study. Of the 431reporting one form of physical activity or the other 30 days prior to the study, 232 (29%) fell under the vigorous physical activities such as brisk walking, jogging, or football. Based on the CDI definition for physical activity, only 71 (8.9%) of the total respondents were physically active. Physical inactivity thus accounted for the most prevalent behavioural factor 730 (91.1%).

Table 4: Description of Work-related Physical Activity and Recreation/Leisure Physical Activity among the Civil Servants

DESCRIPTION OF PHYSICAL ACTIVITY WHILE AT WORK	ENGAGEMENT IN OTHER NON-OCCUPATION RELATED PHYSICAL ACTIVITIES		TOTAL
	Yes	No	
Mostly sitting or standing	290 (54.1)	246 (45.9)	536
Mostly walking	122 (53.3)	107 (46.7)	229
Mostly heavy labour/physically demanding job	19 (52.8)	17 (47.2)	36
TOTAL	431 (53.8)	370 (46.2)	801

The major recreational activities reported by the respondents included: aerobics, walking/brisk walking, farming/gardening, football (soccer) with and without other physical activities.

biking/cycling, yoga, other field activities such as badminton, basketball, table tennis, and lawn tennis). Table 5a shows the types of recreational activities engaged in by the respondents 30 days prior to the study.

Table 5a: Reported recreational activities distributed based on exercise intensity (vigorous or moderate)

VIGOROUS RECREATIONAL	FREQUENCY
Jogging ± other activities	124
Football with and without other games	61
Aerobics	37
Other game activities (badminton, basketball, golf, table and lawn tennis)	15
Cycling/biking	5
TOTAL	232

Table 5b: Reported recreational activities distributed based on exercise intensity as vigorous or moderate

MODERATE RECREATIONAL ACTIVITIES	FREQUENCY
Walking	145
Brisk walking	27
Farming/gardening	23
Yoga	4
TOTAL	199

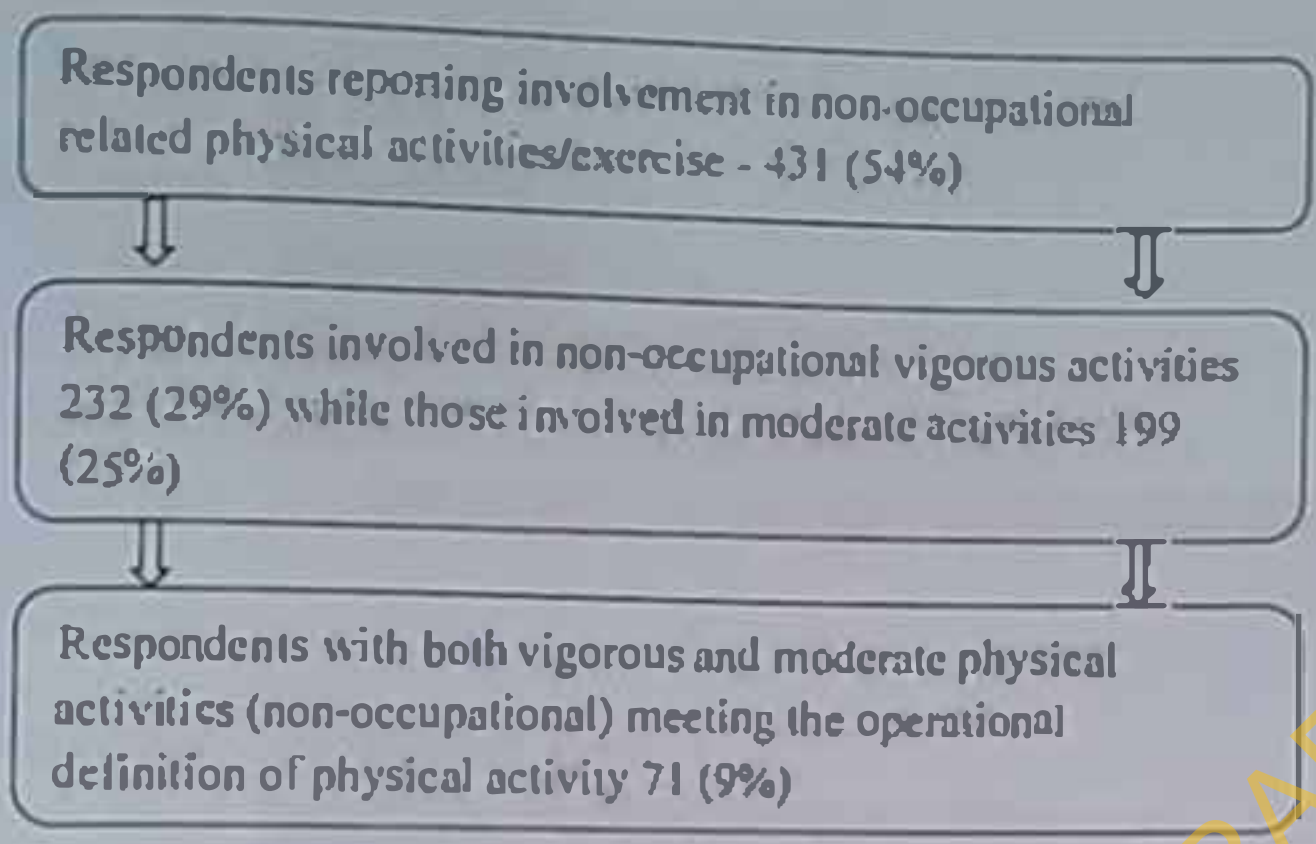

Figure 2: Physical activities as reported by the civil servants.

Unhealthy diet

Figure 3 below shows the daily consumption of certain foods, as reported by the respondents. Forty-two percent of the civil servants daily consumed red meat, about a quarter (26.8%) daily took soft drinks, and one-fifth (21.8%) daily took fried foods. Consumption of raw vegetables was not a common practice among the civil servants as barely one out of every ten civil servants 8.6% report daily eating of raw vegetables. Despite the fact that 218 (27.2%) and 215 (26.8%) reported daily eating of cooked vegetables and fresh fruits respectively, when daily consumption of both vegetables and fresh fruits was analysed, just 77 (9.6%) reported eating both. This brought the prevalence of unhealthy diet to 90.4% with 724 of the 801 civil servants lacking vegetable and fruits in their daily diet.

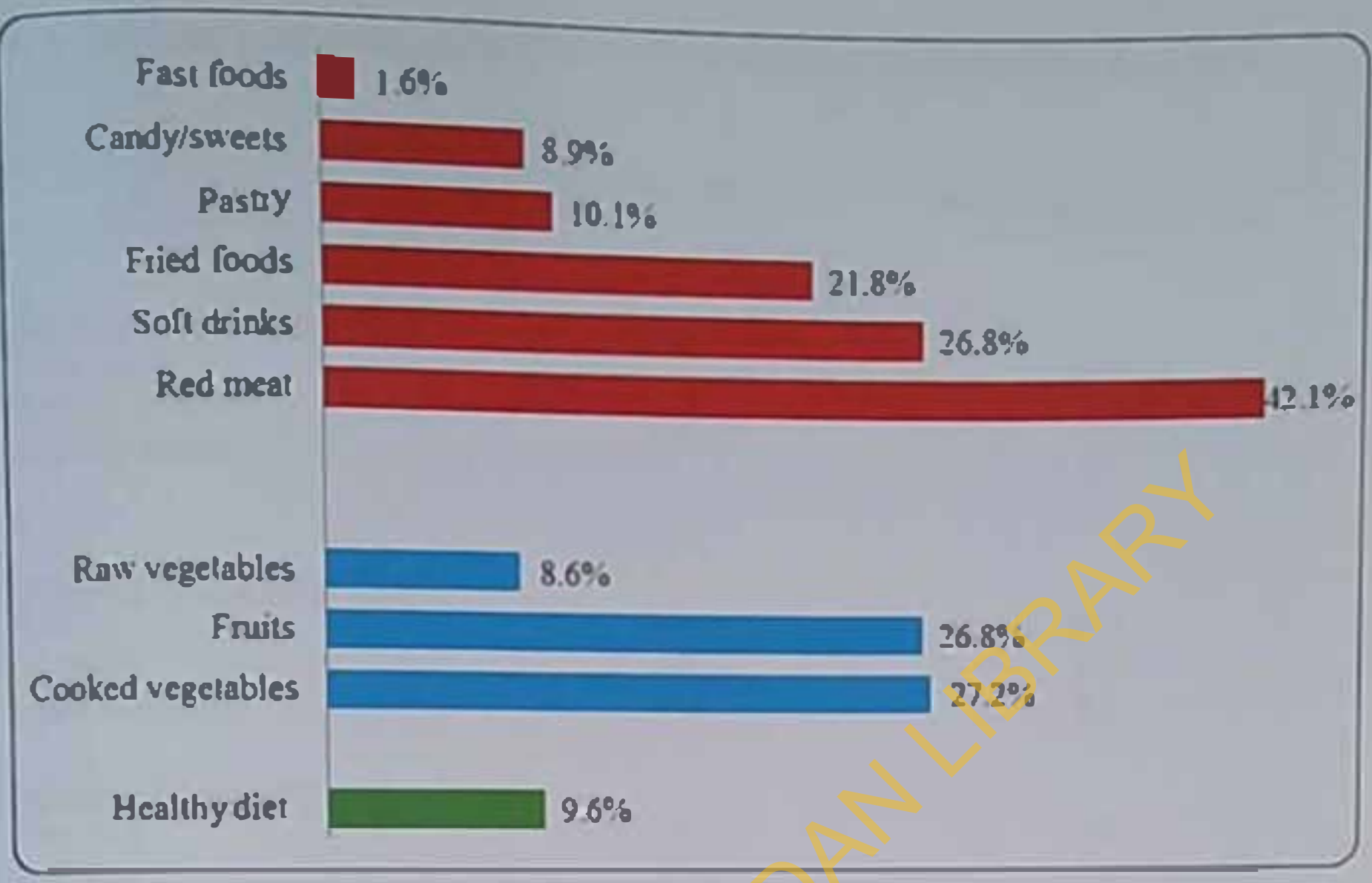

Figure 3: Daily intake of foods by the respondents

Cigarette smoking

One hundred and one of the civil servants (12.6%) had one time or the other, smoked cigarettes, 73 (9.1%) had consumed five or more packs in their life time. Forty-seven (5.9%) were current cigarette smokers

Table 6: Smoking pattern among civil servants in Kaduna, Kaduna State, June 2012

	FREQUENCY	PERCENTAGE (%)
Cigarette smoking history		
Never smoked	700	87.4
Previous smoker	54	6.7
Current smoker	47	5.9
Cigarette Sticks Ever Taken		
None	700	87.4
1-4 packs	28	3.5
5 packs or more	73	9.1
Smoking Frequency		
Everyday	26	3.2
Someday	21	2.6
Non-current	754	94.1
Total	801	100%

There was no current female cigarette smoker. Higher percentage of current cigarette smoking was seen among civil servants older than 40 years, senior staff, and those with a minimum of tertiary education. (Table 7)

Table 7: Respondents' socio-demographic characteristics and cigarette smoking habit

VARIABLE	CIGARETTE SMOKING STATUS				
	CURRENT SMOKER N=47 n (%)	NEVER SMOKED N=700 n (%)	X^2 VALUE	P-VALUE	
Age (in years)					
<40	16 (34.0)	221 (31.6)	0.73	0.74	
≥40	31 (66.0)	479 (68.4)			
Sex					
Male	47 (100.0)	400 (57.1)	33.66	<0.01	
Female	0 (0.0)	300 (42.9)			
Educational status					
Below tertiary	10 (21.3)	161 (23.0)	0.07	0.86	
Tertiary and above	37 (78.7)	539 (77.0)			
Job cadre					
Junior staff	15 (32.6)	160 (24.0)	1.71	0.22	
Senior staff	31 (67.4)	506 (76.0)			
Marital status					
Currently married	13 (27.7)	159 (22.7)	0.61	0.47	
Not currently married	34 (72.3)	541 (77.3)			
Religion					
Christianity	20 (42.6)	447 (63.9)	8.53	0.01	
Islam	27 (57.4)	253 (36.1)			

Table 7: Respondents' socio-demographic characteristics and cigarette smoking habit

VARIABLE	CIGARETTE SMOKING STATUS				
	CURRENT SMOKER N=47 n (%)	NEVER SMOKED N=700 n (%)	X^2 VALUE	P-VALUE	
Age (in years)					
<40	16 (34.0)	221 (31.6)	0.73	0.74	
≥40	31 (66.0)	479 (68.4)			
Sex					
Male	47 (100.0)	400 (57.1)	33.66	<0.01	
Female	0 (0.0)	300 (42.9)			
Educational status					
Below tertiary	10 (21.3)	161 (23.0)	0.07	0.86	
Tertiary and above	37 (78.7)	539 (77.0)			
Job cadre					
Junior staff	15 (32.6)	160 (24.0)	1.71	0.22	
Senior staff	31 (67.4)	506 (76.0)			
Marital status					
Currently married	13 (27.7)	159 (22.7)	0.61	0.47	
Not currently married	34 (72.3)	541 (77.3)			
Religion					
Christianity	20 (42.6)	447 (63.9)	8.53	0.01	
Islam	27 (57.4)	253 (36.1)			

Harmful alcohol use (Binge drinking)

Fifteen (1.9%) civil servants reported binge drinking. 30 days prior to the study. Thirteen of the 15 (86.7%) respondents who binge drank were males.

Table 8: Respondents' socio-demographic characteristics and harmful alcohol use

VARIABLE	BINGE DRINKING		X^2 VALUE	P-VALUE
	YES N=15 n (%)	NO N=786 n (%)		
Age (in years)				
<40	9 (60.0)	238 (30.3)	6.10	0.01
≥40	6 (40.0)	548 (69.7)		
Sex				
Male	13 (86.7)	485 (61.7)		0.06 Fisher's
Female	2 (13.3)	301 (38.3)		
Educational status				
Below tertiary	5 (33.3)	174 (22.1)	1.06	0.30
Tertiary and above	10 (66.7)	612 (77.9)		
Job cadre				
Junior staff	7 (46.7)	181 (24.1)	4.03	0.05
Senior staff	8 (53.3)	569 (75.9)		
Marital status				
Currently married	8 (53.3)	616 (78.4)	5.36	0.21
Not currently married	7 (46.7)	170 (21.6)		
Religion				
Christianity	14 (93.3)	480 (61.1)	6.48	0.01
Islam	1 (6.7)	306 (38.9)		

Results of Tests of Associations

Associations between the Socio-demographic Characteristics of the Civil servants and their Blood Pressure Status

Table 9 shows the association between the civil servants' socio-demographic and hypertensive status. There were statistically significant associations between the hypertensive status and age, marital status and religion. A significantly higher proportion of civil servants aged 40 years and above were hypertensive compared with those below 40 years (38.3% vs. 8.9%, p=0.01). Also 31.4% of the married respondents were hypertensive compared with 21.5% of those not married at the time of study (p=0.01). A higher percentage of Christians were hypertensive compared with the Muslims (32.0% vs. 24.8%, p=0.03).

Table 9-Association between the socio-demographic and hypertensive status of the Kaduna civil servants, 2012

VARIABLE	BLOOD PRESSURE STATUS			
	HYPERTENSIVE N=234 n (%)	NON-HYPERTENSIVE N=567 n (%)	X^2 VALUE	P-VALUE
Age (in years)				
<40	22 (8.9)	225 (91.1)	71.2	<0.01
≥40	212 (38.3)	342 (61.7)		
Sex				
Male	136 (27.3)	362 (72.7)	2.31	0.15
Female	98 (32.3)	205 (67.7)		
Educational status				
Below tertiary	59 (33.0)	120 (67.0)	1.57	0.23
Tertiary and above	175 (28.1)	447 (71.9)		
Job cadre				
Junior staff	47 (25.0)	141 (75.0)	2.47	0.12
Senior staff	179 (31.0)	398 (69.0)		
Marital status				
Currently married	196 (31.4)	428 (68.6)	6.59	0.01
Not currently married	38 (21.5)	139 (78.5)		
Religion				
Christianity	158 (32.0)	336 (68.0)	4.78	0.03
Islam	76 (24.8)	231 (75.2)		

Associations between the Behavioural Factors of the Civil Servants and their Blood Pressure Status

There were no statistically significant association between the civil servants' behavioural factors and blood pressure status.

Table 10: Respondents' behavioural factors and blood pressure status

VARIABLE	BLOOD PRESSURE STATUS		X^2 VALUE	P-VALUE
	HYPERTENSIVE N=234 n (%)	NON-HYPERTENSIVE N=567 n (%)		
Physical activity				
Physically inactive	18 (25.4)	53 (74.6)	0.56	0.49
Physically active	216 (29.6)	514 (70.4)		
Unhealthy diet				
Yes	209 (28.7)	519 (71.3)	0.98	0.32
No	25 (34.2)	48 (65.8)		
Binge drinking				
Yes	6 (40.0)	9 (60.0)	0.86	0.35
No	228 (29.0)	558 (71.0)		
Current cigarette smoking	(n=217)	(n=530)		
Yes	12 (25.5)	35 (74.5)	0.30	0.58
Never	205 (29.3)	495 (70.7)		

Associations between the Socio-demographic Characteristics of the Civil Servants and their Body Mass Index

Civil servants aged ≥40 years had a statistically significant higher prevalence of overweight and obesity compared with their younger colleagues i.e. those below age 40 years (71.3% vs. 47.3%, p-value <0.01). There was also a statistically significant association between sex and overweight/obesity, with the female sex having a higher proportion (81.9% vs. 52.8%, p-value <0.01). The senior staff and currently married respondents had a significantly higher proportion of overweight and obesity compared with the junior staff and those not currently married (68.6% vs. 54.4%, p-value < 0.01) and (65.9% vs. 52.7%, p-value = 0.04). Respondents with a medical history of hypertension had a higher prevalence of overweight and obesity compared with respondents without hypertension (87.3% vs. 58.8%, p-value < 0.01).

Table 11- Respondents' socio-demographic status and body mass index

VARIABLE	BODY MASS INDEX: OVERWEIGHT AND OBESE N=499 n (%)	BODY MASS INDEX: NORMAL RANGE BMI N=281 n (%)	X^2 VALUE	P-VALUE
Age (in years)				
<40	113 (47.3)	126 (52.7)	41.7	<0.01
≥40	386 (71.3)	155 (28.7)		
Sex				
Male	254 (52.8)	227 (47.2)	67.9	<0.01
Female	245 (81.9)	54 (18.1)		
Educational status				
Below tertiary	100 (57.8)	73 (42.2)	3.67	0.06
Tertiary and above	399 (65.7)	208 (34.3)		
Job cadre				
Junior staff	98 (54.4)	82 (45.6)	12.08	<0.01
Senior staff	387 (68.6)	177 (31.4)		
Marital status				
Currently married	400 (65.9)	207 (34.1)	4.39	0.04
Not currently married	99 (57.2)	74 (42.8)		
Religion				
Christianity	331 (67.8)	157 (32.2)	8.40	<0.01
Islam	168 (57.5)	124 (42.5)		
Medical history of hypertension				
Yes	124 (87.3)	18 (12.7)	41.07	<0.01
No	375 (58.8)	263 (41.2)		

Associations between the Behavioural Factors of the Civil Servants and their Body Mass Index

Table 12 shows the relationship between the behavioural risk factors and the respondents' Body Mass Index (BMI). Though not statistically significant, a higher percentage of physically inactive respondents were overweight and obese compared with the physically active (65.0% vs. 53.5%, p-value = 0.05). Forty-nine (69.0%) of respondents on healthy diet (daily intake of fruits and vegetables) were overweight and obese compared with 63.5% of those on unhealthy diet. Of note is the significantly higher proportion of overweight and obesity among respondents who had never smoked compared with current cigarette smokers (66.1% vs. 37.0%, p-value <0.01). There was no statistically significant association between binge drinking and overweight/obese.

Associations between the Behavioural Factors of the Civil Servants and their Body Mass Index

Table 12 shows the relationship between the behavioural risk factors and the respondents' Body Mass Index (BMI). Though not statistically significant, a higher percentage of physically inactive respondents were overweight and obese compared with the physically active (65.0% vs. 53.5%, p-value = 0.05). Forty-nine (69.0%) of respondents on healthy diet (daily intake of fruits and vegetables) were overweight and obese compared with 63.5% of those on unhealthy diet. Of note is the significantly higher proportion of overweight and obesity among respondents who had never smoked compared with current cigarette smokers (66.1% vs. 37.0%, p-value <0.01). There was no statistically significant association between binge drinking and overweight/obese.

Table 12: Respondents' Behavioural Factors and Body Mass Index

VARIABLE	BODY MASS INDEX OVERWEIGHT AND OBESE N=499 n (%)	NORMAL RANGE BMI N=281 n (%)	X^2 VALUE	P-VALUE
Physical inactivity				
Yes	461 (65.0)	248 (35.0)	3.70	0.05
No	38 (53.5)	33 (46.5)		
Unhealthy diet				
Yes	450 (63.5)	259 (36.5)	0.86	0.35
No	49 (69.0)	22 (31)		
Binge drinking				
Yes	9 (64.3)	5 (35.7)	0.01	0.98
No	490 (64.0)	276 (36.0)		
Current cigarette smoking	(n=468)	(n=260)		
Yes	17 (37.0)	29 (63.0)	15.97	<0.01
Never	451 (66.1)	231 (33.9)		

Multivariate Analysis of Socio-demogruphic and Bebavioural Predictors of Hypertension, Overweight and Obesity among the Civil Servants

Multivariate Analysis to Determine Predictors of Hypertension among the Civil servants

Table 13 shows the predictors of hypertension among the civil servants. The model included age, marital status and body mass index. After adjusting for confounders, age and obesity were found to be significant predictors of hypertension. Civil servants aged 40-49 years and those 50-59 years were about six and seven times respectively more likely to be hypertensive compared with those aged 20 -29 years (OR = 5.62, 95% CI = 1.84-17.16) and (OR = 7.39, 95% CI = 2.38-22.92) respectively. Civil servants that were not currently married i.e. single, separated, divorced or widowed were less likely to be hypertensive compared with their married counterparts (OR = 0.98, 95% CI 0.59-1.67). Obese civil servants were twice likely to be hypertensive compared with their counterparts who were with a normal range/healthy BMI (OR = 2.39, 95% CI 1.48-3.87).

Table 13: Adjusted odds ratio of predictors of hypertension

VARIABLES	OR	95% CI	P-VALUE
Age group (in years)			
≥60	3.59	0.69-18.70	0.13
50-59	7.39	2.38-22.92	<0.01
40-49	5.62	1.84-17.16	<0.01
30-39	1.59	0.49-5.19	0.44
20-29	1.00	Ref.	
Marital status			
Not currently married	0.98	0.59-1.67	0.99
Currently married	1.00	Ref.	
Body mass index			
Obesity	2.39	1.48-3.87	<0.01
Overweight	1.33	0.84-2.13	0.22
Healthy weight	1.00	Ref.	

OR Odds Ratio

CI Confidence Interval

Multivariate Analysis to Determine Predictors of Overweight and Obesity among the Civil servants

Table 14 shows predictors of overweight and obesity. The model included age, sex, marital status, job cadre, physical activity, and medical history of hypertension. After adjusting for confounders, age, sex and medical history of hypertension were independent predictors of overweight and obesity. Respondents aged 40-49 years and 50-59 years were thrice likely to be overweight and obese compared with those aged 20-29 years, (OR = 2.87, 95% CI 1.47-5.61) and (OR = 3.09, 95% CI 1.53-6.26) respectively. Female civil servants were found to be four times likely to be overweight and obese compared with their male counterparts (OR = 3.72, 95% CI 2.54-5.44). From the model, junior staff civil servants were less likely to be overweight or obese compared with the senior staff cadre (OR = 0.74, 95% CI 0.05-1.09). Physically active respondents were less likely to be overweight and obese compared with the physically inactive (OR = 0.84, 95% CI 0.48-1.47). Civil servants with medical history of hypertensive were found three times more likely to be overweight and obese compared with the non-hypertensive respondents (OR = 2.99, 95% CI 1.70-5.29).

Table 14: Adjusted odds ratio of predictors of overweight and obesity

VARIABLES	OR	95% CI	P-VALUE
Age group (in years)			
≥60	1.90	0.49-7.46	0.36
50-59	3.09	1.53-6.26	<0.01
40-49	2.87	1.47-5.61	<0.01
30-39	1.49	0.76-2.91	0.24
20-29	1.00	Ref.	
Sex			
Female	3.72	2.54-5.44	<0.01
Male	1.00	Ref.	
Marital status			
Not currently married	1.14	0.72-1.80	0.57
Currently married	1.00	Ref.	
Job cadre			
Junior staff	0.74	0.50-1.09	0.12
Senior staff	1.00	Ref.	
Physical inactivity			
Physically active	0.84	0.48-1.47	0.55
Physically inactive active (ref.)	1.00	Ref.	
Medical history of hypertension			
Yes	2.99	1.70-5.29	<0.01
No	1.00	Ref.	

Table 14: Adjusted odds ratio of predictors of overweight and obesity

VARIABLES	OR	95% CI	P-VALUE
Age group (in years)			
≥60	1.90	0.49-7.46	0.36
50-59	3.09	1.53-6.26	<0.01
40-49	2.87	1.47-5.61	<0.01
30-39	1.49	0.76-2.91	0.24
20-29	1.00	Ref.	
Sex			
Female	3.72	2.54-5.44	<0.01
Male	1.00	Ref.	
Marital status			
Not currently married	1.14	0.72-1.80	0.57
Currently married	1.00	Ref.	
Job cadre			
Junior staff	0.74	0.50-1.09	0.12
Senior staff	1.00	Ref.	
Physical inactivity			
Physically active	0.84	0.48-1.47	0.55
Physically inactive active (ref.)	1.00	Ref.	
Medical history of hypertension			
Yes	2.99	1.70-5.29	<0.01
No	1.00	Ref.	

CHAPTER 5

DISCUSSION

In recognition of the increasing prevalence of NCDs and the associated behavioural risk factors, this study aimed at bridging the knowledge gap on the prevalence of the behavioural risk factors and prevalence of selected NCDs among a representative sample of civil servants in an urban setting, using a cross-sectional survey design. The study showed that hypertension, overweight and obesity alongside their behavioural risks factors are prevalent among civil servants in Kaduna. Physical inactivity was the most prevalent behavioural risk factor, followed by unhealthy diet. Tobacco use was reported predominantly among the male respondents. Increasing age and elevated BMI were independent predictors of elevated blood pressure (Midha, Idris et al. 2009; Ahaneku, Osuji et al. 2011). Female respondents were four times more likely to be overweight and obese compared with male respondents (Bansal, Saxena et al. 2012).

The prevalence of hypertension obtained from this study among Kaduna civil servants is similar to that documented among paid workers in Ilorin, Nigeria (27.1%) in 2008 (Oghagbon, Okesina et al. 2008). The prevalence obtained from these two studies are however lower than the estimated hypertension prevalence of 42.8% for the entire country (Nigeria) in same year 2008 (The-Impact-of-Chronic-Disease-in-Nigeria 2009). The higher prevalence at country level might have been due to involvement of the elderly and retirees in the study population. Unlike the findings from this project, Oghagbon et al documented a higher prevalence of hypertension among the Ilorin male workers compared with the female workers. The study found no statistically significant relationship between the behavioural factors and elevated blood pressure. However, a higher prevalence of hypertension was reported among the binge drinkers (40% vs. 29%). Previous studies have also shown correlations between harmful alcohol consumption and the occurrence of hypertension (Midha, Idris et al. 2009;

Briasoulis, Agarwal et al. 2012; Luo, Guo et al. 2012). Prevalence of hypertension was also higher among the women than men; similar to what has been documented in the literature (Hayes 2006; Turnbull, Woodward et al. 2010).

Increased risk of hypertension has been shown to rise with increasing age. This was demonstrated in this study with the older age groups (≥ 40 years) having higher prevalence of elevated blood pressure compared with the younger ones (<40 years). Although not statistically significant, higher prevalence of hypertension was seen among the physically inactive civil servants and binge drinkers. Overweight and obesity are documented risk factors for cardiovascular disease; this was demonstrated in the two-fold risk of hypertension seen among the obese respondents.

Compared with the estimated country prevalence of overweight and obesity in 2008, our study found a higher prevalence of overweight and obesity seen among the civil servants (35.3% vs. 26.8% and 27.0% vs. 6.5% respectively) (The-Impact-of-Chronic-Disease-in-Nigeria 2009). This might be explained by the essentially sedentary lifestyle associated with this group of the population. Older age group (≥40 years) tend to have a higher BMI when compared to the younger population (Sá and Moura 2011; Wakabayashi 2012). The older age group occupy the senior cadre jobs and are essentially at the decision-making level, with less frequent physically demanding routines. Apart from the older age group, studies have shown the female sex to be at higher risk of overweight and obesity compared with males (Ahanchu, Osuji et al. 2011; Olatunbosun, Kaufman et al. 2011; Fouda, Lemogoum et al. 2012). The study found a 4-fold higher prevalence of overweight and obesity among the female civil servants.

Also in this study, the physically active civil servants were less likely to be overweight or obese. This finding will not categorically authoritative because temporality could not be established. It is possible that the physically active at the time of study were the previously overweight and obese; with engagement in increased physical activity serving as an intervention for weight loss.

The study was conducted in order to identify the prevalence of hypertension, overweight and obesity among this at risk group of workers with essentially sedentary lifestyle, and identify associated behavioural factors. It is therefore going to be a useful tool in guiding policy-makers in decision making on what aspects of non-communicable disease prevention focus should be on.

LIMITATIONS

This study nevertheless had a number of limitations.

1) The cross-sectional design employed, did not allow for the establishment of causality or temporality between the independent variables (socio-behavioural factors) and the outcomes of interest (hypertension, overweight and obesity).

2) The study sample was only representative of civil servants in Kaduna city as such findings from the survey may not be generalizable to other urban settings within the country, Nigeria.

3) The elicited risk behaviours were self-reported as such respondents might have given answers that conveyed more favourable social behaviour.

Despite the above listed limitations, this study provides information on the risk and prevalence of hypertension, overweight and obesity through the cadre of civil servants in Kaduna, highlighting the need for preventive and promoting health care services and work-place health promotion activities.

CONCLUSION

Elevated blood pressure, overweight and obesity are prevalent among civil servants in Kaduna, Kaduna State. Physical inactivity and unhealthy dietary habits were the most prevalent behavioural factors. Increasing age and Body Mass Index were independent predictors of hypertension; female sex was at higher risk of overweight and obesity. There is a need for the provision of health promoting activities and recreational activities within the workplace to allow for easy access for physical exercise. Effective smoking cessation services and responsible alcohol-intake advocacy should be introduced into the work environment to assist cigarette smokers quit smoking and binge drinkers drink responsibly. Age and gender-specific public health strategies to promote healthy-living in the workplace are being advocated for with concerned authorities.

RECOMMENDATIONS

Based on the findings from this study, the following recommendations are made:

1. Age and sex-specific interventions should be introduced into the work-place to allow for early prevention/late onset of essential hypertension. The females also should be given priority engagement in interventions that will allow for weight control.
2. Provision of health promoting activities and recreational facilities should be made within workplaces to allow for easy access for physical exercises.
3. Awareness campaign and tailored nutrition education, with emphasis on the benefits of healthy eating for prevention of the burden of chronic diseases should be carried out among the civil servants.
4. Effective smoking cessation services should be introduced into the work environment to assist cigarette smokers quit smoking.
5. The study findings would serve as a template for future researches on non-communicable diseases among civil servants especially in Kaduna.

RECOMMENDATIONS

Based on the findings from this study, the following recommendations are made:

1. Age and sex-specific interventions should be introduced into the work-place to allow for early prevention/late onset of essential hypertension. The females also should be given priority engagement in interventions that will allow for weight control.
2. Provision of health promoting activities and recreational facilities should be made within workplaces to allow for easy access for physical exercises.
3. Awareness campaign and tailored nutrition education, with emphasis on the benefits of healthy eating for prevention of the burden of chronic diseases should be carried out among the civil servants.
4. Effective smoking cessation services should be introduced into the work environment to assist cigarette smokers quit smoking.
5. The study findings would serve as a template for future researches on non-communicable diseases among civil servants especially in Kaduna.

REFERENCES

Abidoye. Madueke and Abidoye (2002). "The relationship between dietary habits and body-mass index using the Federal Airport Authority of Nigeria as the sample." Nutr Health 16(3): 215-227.

Abiona. Aloba and Fatoye (2006). "Pattern of alcohol consumption among commercial road transport workers in a semi-urban community in south western Nigeria." East Afr Med J 83(9): 494-499.

Adeboye B., Bermano G. and C (October 2012). "Obesity and its health impact in Africa: a systematic review " Cardiovascular Journal of Africa 23(9): 512-521.

Adejuwon (2009). "Tobacco use and second hand smoke as risk factors for diseases in Nigeria: implications for collaborative research and multilevel tobacco control strategies." Afr J Med Med Sci 38 Suppl 2: 21-29.

Ahaneku, Osuji, Anisiuba, Ikeh, Ogucjiofor, et al. (2011). "Evaluation of blood pressure and indices of obesity in a typical rural community in eastern Nigeria." Ann Afr Med 10(2): 120-126.

Ahaneku, Osuji, Anisiuba, Ikeh, Ogucjiofor, et al. (2011). "Evaluation of blood pressure and indices of obesity in a typical rural community in eastern Nigeria." Annals of African Medicine 10(2): 120-126.

Aikins, Boynton and Atanga (2010). "Developing effective chronic disease interventions in Africa: insights from Ghana and Cameroon." Globalization and Health.

Akinkugbe (1969). "Hypertensive disease in Ibadan, Nigeria. A clinical prospective study." East Afr Med J 46(5): 313-320.

Akinkugbe (1976). "Arterial pressures in Nigerian women up to mid-pregnancy." Br J Obstet Gynaecol 83(7): 550-553.

Akinkugbe, Akinwolere and Kayode (1999). "Blood pressure patterns in Nigerian adolescents." West Afr J Med 18(3): 196-202.

Akinkugbe, Brown and Cranston (1966). "The direct renal action of angiotensin in the rabbit." Clin Sci 30(2): 259-266.

Akinkugbe, Brown and Cranston (1966). "Presser effects of angiotensin infusions into different vascular beds in the rabbit." Clin Sci 30(3): 409-416.

Akinkugbe and Jaiyesimi (1968). "The rarer causes of hypertension in Ibadan. (An eleven-year study)." West Afr Med J Niger Pract 17(3): 82-85.

Akinkugbe and Ojo (1968). "The systemic blood pressure in a rural Nigerian population." Trop Geogr Med 20(4): 347-356.

Alleyne, Binagwaho, Haines, Jahan, Nugent, et al. (2013). "Embedding non-communicable diseases in the post-2015 development agenda." Lancet 381(9866): 566-574.

Andy, Peters, Ekrikpo, Akpan, Unadike, et al. (2012). "Prevalence and correlates of hypertension among the Ibibio/Annangs, Eliks and Obolos: a cross sectional community survey in rural South-South Nigeria." Ethn Dis 22(3): 335-339.

Asima, Barzi and Chalmers (2011). "Mortality patterns in hypertension." J Hypertens 29 Suppl 1: S3-7.

Asfaw A. (2006). "The effects of obesity on doctor-diagnosed chronic diseases in Africa: empirical results from Senegal and South Africa." J Public Health Policy 27(3): 250-264.

Australian-Institute-of-Health-and-Welfare (2005).

Badr, Shah and Shah (2012). "Obesity Among Kuwaitis Aged 50 Years or Older: Prevalence, Correlates and Comorbidities." Gerontologist.

Balbia, Coutinho, Barufaldi, Abreu Gdc, Malhao, et al. (2012). "The costs of overweight and obesity-related diseases in the Brazilian public health system: cross-sectional study." BMC Public Health 12: 440.

Bansal, Saxena, Kandpal, Gray, Walker, et al. (2012). "The prevalence of hypertension and hypertension risk factors in a rural Indian community: A prospective door-to-door study." Journal of Cardiovascular Disease Research 3(2): 117-123.

Belue, Okoror, Iwelunmor, Taylor, Degboe, et al. (2009). "An overview of cardiovascular risk factor burden in sub-Saharan African countries: a socio-cultural perspective." Global Health 5: 10.

Blair, Sallis, Hutber and Archer (2012). "Exercise therapy - the public health message." Scand J Med Sci Sports 22(4): e24-28.

Bonita, Magnusson, Bovet, Zhao, Atalta, et al. (2013). "Country actions to meet UN commitments on non-communicable diseases: a stepwise approach." Lancet 381(9866): 575-584.

Boutayeb A (2005). "The burden of non-communicable diseases in developing countries." International Journal for Equity in Health 4(2).

Briasoulis, Agarwal and F.H. (2012). "Alcohol consumption and the risk of hypertension in men and women: a systematic review and meta-analysis" J Clin Hypertens (Greenwich) 14(11): 792-798.

C.D.C. (2001). "CDC, Chronic Disease Indicators: National Center for Chronic Disease Prevention and Health Promotion." National Center for Chronic Disease Prevention and Health Promotion.

C.D.C. (2004). "Chronic disease prevention. Atlanta, GA: US Department of Health and Human Services, CDC, National Center for Chronic Disease Prevention and Health Promotion, 2004." http://www.cdc.gov/nccdphp.

Daniel, Adejumo, Adejumo, Owolabi and Braimoh (2013). "Prevalence of Hypertension among Urban Slum Dwellers in Lagos, Nigeria." J Urban Health.

Deaton, Froelicher, Wu, Ho, Shishani, et al. (2011). "The global burden of cardiovascular disease." Eur J Cardiovasc Nurs 10 Suppl 2: S5-13.

Desalu, A., Danburam A. and F.K (2008). "Epidemiology Of Tobacco Smoking Among Adults Population In North-East Nigeria." The Internet Journal of Epidemiology 6(1).

Di Cesare, Khang, Asaria, Blakely, Cowan, et al. (2013). "Inequalities in non-communicable diseases and effective responses." Lancet 381(9866): 585-597.

Ehizele, Azodo, Ojehanon, Akhionbare, Unioh, et al. (2012). "Prevalence of tobacco use among dental patients and their knowledge of its health effects." Niger J Clin Pract 15(3): 270-275.

Essop, Anna Chan, Valle, Garcia-Palmer and Du Toit (2009). "Impaired contractile function and mitochondrial respiratory capacity in response to oxygen deprivation in a rat model of pre-diabetes." Acta Physiol (Oxf) 197(4): 289-296.

Familoni and Familoni (2011). "Determinants and perception of cardiovascular risk factors among secondary school teachers in Oyo state Nigeria." Afr J Med Med Sci 40(4): 339-343.

Fouda, Lemogoum, Manga, Dissongo, Tobbit, et al. (2012). "Epidemiology of obesity in the work milieu, Douala, Cameroon." Rev Med Brux. 33(3): 131-137.

Fisher (2012). "[An alarming threat to secondary prevention: low compliance (lifestyle) and poor adherence (drugs)]." Rev Esp Cardiol (Engl Ed) 65 Suppl 2: 10-16.

Golzarand, Mirmiran, Jessri, Toolabi, Mojarrad, et al. (2012). "Dietary trends in the Middle East and North Africa: an ecological study (1961 to 2007)." Public Health Nutr 15(10): 1835-1844.

Hayes (2006). "Preventing cardiovascular disease in women." Am Fam Physician 74(8): 1331-1340.

Heal, Gosden and Smith (2012). "What is the prognosis for new centrally-acting anti-obesity drugs?" Neuropharmacology 63(1): 132-146.

Hendriks, Wit, Roos, Brewster, Akande, et al. (2012). "Hypertension in sub-Saharan Africa: cross-sectional surveys in four rural and urban communities." PLoS One 7(3): e32638.

Heymann and Goldsmith (2012). "Best approaches in the battle against Globesity? Learning lessons from our experience tackling HIV-AIDS and tobacco smoking." JRSM Short Rep 3(7): 45.

Hogerzeil, Liberman, Wirtz, Kishore, Selvaraj, et al. (2013). "Promotion of access to essential medicines for non-communicable diseases: practical implications of the UN political declaration." Lancet 381(9867): 680-689.

Hosseinpoor, Bergen, Kunst A., Harper S., Guthold R., et al. (2012). "Socioeconomic inequalities in risk factors for non communicable diseases in low-income and middle-income countries: results from the World Health Survey." BMC Public Health http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3507902/.

Hunt, Heiss, Sholinsky and Province (2000). "Familial history of metabolic disorders and the multiple metabolic syndrome: the NHLBI family heart study." Genet Epidemiol 19(4): 395-409.

J.N.C. (2003). "7th Joint National Committee Report on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure." National Institutes of Health | International Medical publishing.

James (2008). "WHO recognition of the global obesity epidemic." Int J Obes (Lond) 32 Suppl 7: S120-126.

Jankun, Al-Senaidy and Skrzypczak-Jankun (2012). "Can inactivators of plasminogen activator inhibitor alleviate the burden of obesity and diabetes? (Review)." Int J Mol Med 29(1): 3-11.

Joshi, Mohan, Grin and Perin (2012). "Burden of Healthcare Utilization and Out-of-Pocket Costs Among Individuals with NCDs in an Indian Setting." J Community Health.

Kadiri, Walker, Salako and Akinkugbe (1999). "Blood pressure, hypertension and correlates in urbanised workers in Ibadan, Nigeria: a revisit." J Hum Hypertens 13(1): 23-27.

Khatib (2004). "Noncommunicable diseases: risk factors and regional strategies for prevention and care." East Mediterr Health J. 10 (6): 778-788.

Kimberly, Forrest, Bunker C.H., Kriska A.M., Ukoli F.A.M., et al. (2001). "Physical activity and cardiovascular risk factors in a developing population." Medicine and Science in Sports and Exercise 33(9): 1598 - 1604.

Lambrinoudaki, Ceasu, Depypere, Erel, Rees, et al. (2013). "EMAS position statement: Diet and health in midlife and beyond." Maturitas 74(1): 99-104.

Lawes, Vander Hoorn and Rodgers (2008). "Global burden of blood-pressure-related disease, 2001." Lancet 371(9623): 1513-1518.

Lawoyin, Asuzu, Kaufman, Rotimi, Owoaje, et al. (2002). "Prevalence of cardiovascular risk factors in an African, urban inner city community." West Afr J Med 21(3): 208-211.

Lenoir-Wijnkoop, Jones, Uauy, Segal and Milner (2013). "Nutrition economics - food as an ally of public health." Br J Nutr 109(5): 777-784.

Luo, Guo, Hao, Yao, Zhou, et al. (2012). "Interaction of current alcohol consumption and abdominal obesity on hypertension risk." Physiol Behav. 9384(12): 329-330.

Magnusson (2009). "Rethinking global health challenges: towards a 'global compact' for reducing the burden of chronic disease." Public Health 123(3): 265-274.

Matvar and Harrison (2012). "Stress-dependent hypertension and the role of T lymphocytes." Exp Physiol 97(11): 1161-1167.

Mccarthy W, A. Yancey, G. Harrison, J. Leslie and Siegel (2007). "Fighting Cancer with Fitness: Dietary outcomes of a randomized, controlled lifestyle change intervention in healthy African-American women." National Institute of Health.

Mcclean, Kee, Young and Elbom (2008). "Obesity and the lung: 1. Epidemiology." Thorax 63(7): 649-654.

Mendez-Chacon, Santamaria-Ulloa and Rosero-Bixby (2008). "Factors associated with hypertension prevalence, unawarencss and treatment among Costa Rican elderly." BMC Public Health 8: 275.

Midha, Idris, Saran, Srivastav and Singh (2009). "Prevalence and determinants of hypertension in the urban and rural population of a north Indian district." East Afr J Public Health 6(3): 268-273.

Mittal and Singh (2010). "Hypertension in the developing world: challenges and opportunities." Am J Kidney Dis 55(3): 590-598.

Mohd, Matcti, Konuru, Parmar and Kunduru (2012). "A study on prescribing patterns of antihypertensives in geriatric patients." Perspect Clin Res 3(4): 139-142.

Nelson, Perez, Alcaraz, Talavera and Mccarthy (2007). "Family History of Diabetes, Acculturation, and the Metabolic Syndrome among Mexican Americans: Proyecto SALSA." Metab Syndr Relat Disord 5(3): 262-269.

Nguyen and El-Serag (2010). "The epidemiology of obesity." Gastroenterol Clin North Am 39(1): 1-7.

Nguyen and Lau (2012). "The obesity epidemic and its impact on hypertension." Can J Cardiol 28(3): 326-333.

Niakara, F. Fournet, J. Gary, M. Ilarang, L.V.A Ndbiéa, et al. (2007). "Hypertension, urbanization, social and spatial disparities: a cross-sectional population-based survey in a West African urban environment (Ouagadougou, Burkina Faso) " Transactions of the Royal Society of Tropical Society and Hygiene 101(11): 1136-1142.

Magnusson (2009). "Rethinking global health challenges: towards a 'global compact' for reducing the burden of chronic disease." Public Health 123(3): 265-274.

Manvar and Harrison (2012). "Stress-dependent hypertension and the role of T lymphocytes." Exp Physiol 97(11): 1161-1167.

Mccarthy W, A. Yancey, G. Harrison, J. Leslie and Siegel (2007). "Fighting Cancer with Fitness: Dietary outcomes of a randomized, controlled lifestyle change intervention in healthy African-American women." National Institute of Health.

Mcclean, Kee, Young and Elborn (2008). "Obesity and the lung: 1. Epidemiology." Thorax 63(7): 649-654.

Mendez-Chacon, Santamaria-Ulloa and Rosero-Bixby (2008). "Factors associated with hypertension prevalence, unawareness and treatment among Costa Rican elderly." BMC Public Health 8: 275.

Midha, Idris, Saran, Srivastav and Singh (2009). "Prevalence and determinants of hypertension in the urban and rural population of a north Indian district." East Afr J Public Health 6(3): 268-273.

Mittal and Singh (2010). "Hypertension in the developing world: challenges and opportunities." Am J Kidney Dis 55(3): 590-598.

Mohd, Mateti, Konuru, Parmar and Kunduru (2012). "A study on prescribing patterns of antihypertensives in geriatric patients." Perspect Clin Res 3(4): 139-142.

Nelson, Perez, Alcaraz, Talavera and Mccarthy (2007). "Family History of Diabetes, Acculturation, and the Metabolic Syndrome among Mexican Americans: Proyecto SALSA." Metab Syndr Relat Disord 5(3): 262-269.

Nguyen and El-Serag (2010). "The epidemiology of obesity." Gastroenterol Clin North Am 39(1): 1-7.

Nguyen and Lau (2012). "The obesity epidemic and its impact on hypertension." Can J Cardiol 28(3): 326-333.

Niakara, F. Fournet, J. Gary, M. Hlarang, L.V.A Nébié, et al. (2007). "Hypertension, urbanization, social and spatial disparities: a cross-sectional population-based survey in a West African urban environment (Ouagadougou, Burkina Faso) " Transactions of the Royal Society of Tropical Society and Hygiene 101(11): 1136-1142.

Njelekela (2009). "Gender-related differences in the prevalence of cardiovascular disease risk factors and their correlates in urban Tanzania." BMC Cardiovascular Disorders 9(30).

Ogah, Okpechi, Chukwuonye, Akinyemi, Onwubere, et al. (2012). "Blood pressure, prevalence of hypertension and hypertension related complications in Nigerian Africans: A review." World J Cardiol 4(12): 327-340.

Oghagbon, Okesina and Biliaminu (2008). "Prevalence of hypertension and associated variables in paid workers in Ilorin, Nigeria." Niger J Clin Pract. 11(4): 342-346.

Ojo and Akinkugbe (1969). "Nontoxemic hypertension in pregnancy in the African indigene. An analysis of 30 cases." Am J Obstet Gynecol 105(6): 938-941.

Oladapo, Salako, Sodiq, Shoyinka, Adedapo, et al. (2010). "A prevalence of cardiometabolic risk factors among a rural Yoruba south-western Nigerian population: a population-based survey." Cardiovasc J Afr 21(1): 26-31.

Olatunbosun, Kaufman and Bella (2011). "Prevalence of obesity and overweight in urban adult Nigerians." Obes Rev. 12(4): 233-241.

Olatunbosun, Kaufman, Cooper and Bella (2000). "Hypertension in a black population: prevalence and biosocial determinants of high blood pressure in a group of urban Nigerians." J Hum Hypertens 14(4): 249-257.

Onwuchekwa, Mezie-Okoye and Babatunde (2012). "Prevalence of hypertension in Kegbara-Dere, a rural community in the Niger Delta region, Nigeria." Ethn Dis 22(3): 340-346.

Oyediran and Akinkugbe (1970). "Chronic renal failure in Nigeria." Trop Geogr Med 22(1): 41-44.

Patel, Patel, Patel and Rathi (2012). "Factors associated with consumption of diabetic diet among type 2 diabetic subjects from Ahmedabad, Western India." J Health Popul Nutr 30(4): 447-455.

Pickering, Hall, Appel, Falkner, Graves, et al. (2005). "Recommendations for Blood Pressure Measurement in Humans and Experimental Animals: Part 1: Blood Pressure Measurement in Humans: A Statement for Professionals From the Subcommittee of Professional and Public Education of the American Heart Association Council on High Blood Pressure Research." Circulation: AHA Scientific Statement 111: 697-716.

Russo, Amato and Gravante (2005). "Familiar history and predictive risk factors to type 2 diabetes: a cross sectional study in young Sicilian subjects of both sexes." Panminerva Med 47(4): 259-264.

Popkin (2006). "Global nutrition dynamics: the world is shifting rapidly toward a diet linked with noncommunicable diseases." Am J Clin Nutr 84(2): 289-298.

Popkin (2006). "Global nutrition dynamics: the world is shifting rapidly toward a diet linked with noncommunicable diseases." American Journal of Clinical Nutrition 84(2): 289-298.

Qiu, Williams, Leisenring, Sorensen, Frederick, et al. (2003). "Family history of hypertension and type 2 diabetes in relation to preeclampsia risk." Hypertension 41(3): 408-413.

Renehan, Soerjomataram, Tyson, Egger, Zwahlen, et al. (2010). "Incident cancer burden attributable to excess body mass index in 30 European countries." Int J Cancer 126(3): 692-702.

Room, Babor and Rehm (2005). "Alcohol and public health." Lancet 365(9458): 519-530.

Sá and Moura (2011). "Overweight: socio-demographic and behavioral determinants in Brazilian adults 2008." Cad Saude Publica. 27(7): 1380-1392.

Sani, Wahab, Yusuf, Gbadamosi, Johnson, et al. (2010). "Modifiable cardiovascular risk factors among apparently healthy adult Nigerian population - a cross sectional study." BMC Res Notes 3: 11.

Santos, De Oliveira, Peters and Conde (2010). "Trends in morbid obesity and in bariatric surgeries covered by the Brazilian public health system." Obes Surg 20(7): 943-948.

Schonfeldt and Gibson (2008). "Changes in the nutrient quality of meat in an obesity context." Meat Sci 80(1): 20-27.

Segura and Ruilope (2012). "Are there new threshold and goals in the treatment of arterial hypertension?" Eur J Clin Invest 42(8): 914-920.

Sobngwi, Mbanya, N C Unwin, A P Kengne, L Fezeu, et al. (2002). "Physical activity and its relationship with obesity, hypertension and diabetes in urban and rural Cameroon." International Journal of Obesity 26(7): 1009-1016.

Steyn, Levitt, Hoffman, Marais, Fourie, et al. (2004). "The global cardiovascular diseases risk pattern in a peri-urban working-class community in South Africa. The Mamre study." Ethn Dis 14(2): 233-242.

Summerbell, Cameron and Glasziou (2008). "WITHDRAWN: Advice on low-fat diets for obesity." Cochrane Database Syst Rev(3): CD003640.

The-Impact-of-Chronic-Disease-in-Nigeria (2009). www.who.int/chp/chronic_disease_report/en/.

The-J.N.C.-7-Report (2003). "The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure." http://www.nhlbi.nih.gov/guidelines/hypertension/jnc7full.pdf.

Tobacco-and-the-Developing-World (2009). "Tobacco and the Developing World ".

Toft U, L. Kristoffersen, M. Aadahl, S. Von Huth, C. Pisinger, et al. (2007). "Diet and exercise intervention in a general population-mediators of participation and adherence: the Inter99 study." European Journal of Public Health 17(5): 455-463.

Tumbull, Woodward and Anna (2010). "Effectiveness of blood pressure lowering: evidence-based comparisons between men and women." Expert Rev Cardiovasc Ther 8(2): 199-209.

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

Vadera, Yadav, Yadav, Parmar and Unadkat (2010). "Study on obesity and influence of dietary factors on the weight status of an adult population in jamnagar city of gujarat: a cross-sectional analytical study." Indian J Community Med 35(4): 482-486.

Van De Vijver, Oti, Addo, De Graft-Aikins and Agyemang (2013). "Review of community-based interventions for prevention of cardiovascular diseases in low- and middle-income countries." Ethn Health.

Van Der Sande, Walraven, Milligan, Banya, Ceesay, et al. (2001). "Family history: an opportunity for early interventions and improved control of hypertension, obesity and diabetes." Bull World Health Organ 79(4): 321-328.

W.H.O (2009). "Global Health Risks: Mortality and burden of disease attributable to selected major risks." World Health Organization Geneva(2009).

W.H.O.-N.C.D.-Report (2009). "WHO NCD Report; Burden: mortality, morbidity and risk factors." www.who.int/nmh/publications/ncd_report_chapter1.pdf.

W.H.O.-N.C.D.-Report. (2009). "WHO NCD Report; Burden: mortality, morbidity and risk factors." www.who.int/nmh/publications/ncd_report_chapter1.pdf.

W.H.O. (2004). "The International Classification of adult underweight, overweight and obesity according to BMI." http://apps.who.int/bmi/index.jsp?introPage=intro_3.html.

W.H.O. Technical Report Series. (2000). "World Health Organization Obesity: preventing and managing the global epidemic

" Report of a WHO Consultation (WHO Technical Report Series 894).

Wagner and Brath (2012). "A global view on the development of non communicable diseases." Prev Med 54 Suppl: S38-41.

Wakabayashi (2012). "Age-dependent influence of gender on the association between obesity and a cluster of cardiometabolic risk factors." Gend Med. 9(4): 267-277.

Whitworth (2003). "2003 World Health Organization (WHO)/International Society of Hypertension (ISH) statement on management of hypertension." J Hypertens 21(11): 1983-1992.

Who-Ncd-Report (2009). "WHO NCD Report; Burden: mortality, morbidity and risk factors." www.who.int/nmh/publications/ncd_report_chapter1.pdf.

Who (STEPwise approach (STEPS) www.who.int/chp/steps). The WHO STEPwise approach to chronic disease risk factor surveillance (STEPS) www.who.int/chp/steps.

Yang, Kelly and He (2007). "Genetic epidemiology of obesity." Epidemiol Rev 29: 49-61.

Yeh, Kuller, Bunker, Ukoli, Huston, et al. (1996). "The role of socioeconomic status and serum fatty acids in the relationship between intake of animal foods and cardiovascular risk factors." Ann Epidemiol 6(4): 290-298.

Yokoyama, Kawai, Ohishi and Sone (2008). "Familial predisposition to cardiovascular risk and disease contributes to cardiovascular risk and disease interacting with other cardiovascular risk factors in diabetes: implication for common soil (JDDM 14)." Atherosclerosis 201(2): 332-338.

Young (2004). "The global epidemiology of heart failure." Med Clin North Am 88(5): 1135-1143, ix.

Zhao and Chen (2001). "Implications from and for food cultures for cardiovascular disease: diet, nutrition and cardiovascular diseases in China." Asia Pac J Clin Nutr 10(2): 146-152.

Zinman (2011). "Initial combination therapy for type 2 diabetes mellitus: is it ready for prime time?" Am J Med 124(1 Suppl): S19-34.

APPENDICES

MINISTRY OF HEALTH, KADUNA STATE

All Communications to be Addressed to
THE HON. COMMISSIONER
Quoting Reference and Date
Tel: (062) 240084
(062) 240252

Independence Way,
P.M.B. 2014,
Kaduna
Kaduna State, Nigeria

MOH/ADM/744/VOL.I/

28th May, 2012

The Director,

.....

.....

ETHICAL APPROVAL

I have been directed to convey the Ministry's approval to Abisola M. Obadimeji, a resident attached to the Epidemiology Unit of the Kaduna State Ministry of Health. She is carrying out a survey on the topic: Risk Behaviours for Non-Communicable Disease among Civil Servants in Kaduna State. The survey will include questionnaires, measurement of individual blood pressure, weight and height of staff of various Ministries within the State.

You are kindly requested to give her the maximum co-operation needed please.

Accept our esteemed regards.

F. A. Kurah
For: Hon. Commissioner.

QUESTIONNAIRE ON PREVALENCE AND FACTORS ASSOCIATED WITH HYPERTENSION AND OBESITY AMONG CIVIL SERVANTS IN KADUNA

Introduction

Good day sir/ ma. My name is .....I am gathering information about the health behaviours of civil servants in Kaduna State. This project is being conducted by Dr. Ohidimeli. a resident doctor with the Nigeria Field Epidemiology and Laboratory Training Program. Kaduna State Ministry of Health. Kaduna. I would like to ask some questions about your knowledge and your health practices regarding non communicable diseases. I will not ask for your name, address, or other personal information that can identify you. You do not have to answer any question you do not want to, and you can end the interview at any time. Any information you give me will be confidential. Please answer each question as truthfully as possible. This survey will take about 20 minutes to complete. If you have any questions about the survey, do not hesitate to ask.

Thank you.

Signature.....

Date .....

Please write the number for the option you choose in the response box

SECTION A: Socio-Demographics	Options	Response
1.Which Ministry are you in?	.....	
2. Which Department are you in?	.....	
3. What was your age last birthday?	.....(Years)	
4. Which sex are you?	1. Male 2. female	
5. What ethnic group are you from?	1. Hausa (Nonhemer) (If a northemer, pls. specify tribe) ..... 2. Igbo 3. Yoruba 4 .Others (please specify).....	
6. What is your marital status?	1 .Single (never married) 2. Married 3. Divorced 4. Widowed 5. Separated 6. Co-habiting	
7.What is the highest class or year of school you completed?	1. No formal education 2. Arabic school 3. Primary school 4. Secondary 5. Tertiary 6. Postgraduate (pgd. masters. PhD)	
8. Which is your religion?	1. Christianity 2. Islam 3. Traditional 4. Others (pls specify)	

QUESTIONNAIRE ON PREVALENCE AND FACTORS ASSOCIATED WITH HYPERTENSION AND OBESITY AMONG CIVIL SERVANTS IN KADUNA

Introduction

Good day sir/ ma. My name is .....I am gathering information about the health behaviours of civil servants in Kaduna State. This project is being conducted by Dr. Oladimeji. a resident doctor with the Nigeria Field Epidemiology and Laboratory Training Program. Kaduna State Ministry of Health. Kaduna. I would like to ask some questions about your knowledge and your health practices regarding non communicable diseases. I will not ask for your name. address. or other personal information that can identify you. You do not have to answer any question you do not want to. and you can end the interview at any time. Any information you give me will be confidential. Please answer each question as truthfully as possible. This survey will take about 20 minutes to complete. If you have any questions about the survey. do not hesitate to ask.

Thank you.

Signature.....

Date .....

Please write the number for the option you choose in the response box

SECTION A: Socio-Demographics	Options	Response
1.Which Ministry are you in?	.....	
2. Which Department are you in?	.....	
3. What was your age last birthday?	.....(Years)	
4. Which sex are you?	1.Male 2.Female	
5. What ethnic group are you from?	1. Hausa (Northerner) (If a northerner, pls. specify tribe) ..... 2. Igbo 3. Yoruba 4. Others (please specify).....	
6. What is your marital status?	1. Single (never married) 2. Married 3. Divorced 4. Widowed 5. Separated 6. Co-habiting	
7.What is the highest class or year of school you completed?	1. No formal education 2. Arabic school 3. Primary school 4. Secondary 5. Tertiary 6. Postgraduate (pgd, masters, PhD)	
8. Which is your religion?	1. Christianity 2. Islam 3. Traditional 4. Others (pls specify)	

	.....
9. Give a brief description of your job	.....
10. What is your salary grade level?	.....
11. What is your average monthly household income from all sources?	.....
12. How many children less than 18 years of age live in your household?	.....

SECTION B: Behaviours

Behaviours	Options	Response
13. When you are at work, which of the following best describes what you do? Would you say—?	1. Mostly sitting or standing 2. Mostly walking 3. Mostly heavy labour or physically demanding work	
14. During the past month, other than your regular job, did you participate in any physical activities or exercises such as football, jogging, tennis, golf, gardening, or walking for exercise?	1. Yes 2. No	
15. If yes, which exercise did you engage in?	.....	
16. How long do you usually spend on the average exercising during each session?	.....	
17. If yes, how often do you engage in this kind of exercise?	1. Daily 2. 1 – 3 times per week 3. Once weekly 4. 1- 3 times per month	
18. How many cigarettes have you smoked in your entire life? NOTE: 5 packs = 100 cigarettes	1. None 2. 1–4 packs 3. 5 packs or more	
19. Do you now smoke cigarettes every day, some days, or not at all?	1. Every day 2. Some days 3. Not at all	
20. During the past 12 months, have you stopped smoking for one day or longer because you were trying to quit smoking?	1. Yes 2. No 3. Not applicable	
21. During the past 30 days, have you had at least one drink of any alcoholic beverage such as beer, wine, spirit or liquor?	1. Yes 2. No	
22. During the past 30 days, how many days per week or per month did you have at least one drink of any alcoholic beverage?	00) Not applicable 01) Monthly or	

	ess 2) 2 to 4 times month 3) 2 to 3 times week 4) 4 or more times a week
23. During the past 30 days. what is the largest number of drinks you had on any occasion?	. _ _ Number of drinks 2. Don't know / Not sure 3. Not Applicable

These next questions are about the foods you usually eat or drink. Please state how often you eat or drink each one, for example, twice a week, three times a month, and so forth. Remember, I am only interested in the foods you eat. Include all foods *you* eat, both at home and away from home.

24. Not counting juice, how often do you eat fruit?

1 _ _ per day 2 _ _ per week 3 _ _ per month 4 _ _ per year 5. Never 6. Don't know / Not sure

25. How often do you eat green salad /carrots (uncooked vegetables)?

1 _ _ per day 2 _ _ per week 3 _ _ per month 4 _ _ per year 5. Never 6. Don't know / Not sure

26. Not counting carrots, potatoes, or salad, how many servings of vegetables do you usually eat?

(Example: A serving of vegetables at both lunch and dinner would be two servings.)

1 _ _ per day 2 _ _ per week 3 _ _ per month 4 _ _ per year 5. Never 6. Don't know / Not sure

How often do you eat/drink the following (State the number of times in ONE box only)

Item	Per day	Per week	Per month	Per year	never	Don't know
27. Pastries e.g. meat-pies, cakes, biscuits)						
28. Fried foods e.g. dodo						
29. Soft drinks e.g. coke, fanta,						
30. Sweets e.g. chocolates, toffee etc						
31. Fast foods e.g. Mr Biggs, tantalizers						
32. Red meat e.g. beef, pork						

33. Can you state the meals you ate yesterday

Breakfast : .....

Lunch : .....

Supper: .....

Snacks :.....

SECTION C: Factors affecting behaviour

Have you ever been told by a doctor that you have any of the following diseases?

Items	Yes	No
34.Diabetes		
35.Diabetes (but only during pregnancy)		
36.Hypertension		
37. Hypertension(but only during pregnancy)		
38.Asthma		
39.Cancer		
40.Arthritis(pain in the joints)		
41.Obesity(excessive body weight)		
42. Stroke(paralysis of an arm and leg)		
43.High cholesterol level		

Do any of your immediate family (i.e. father, mother, sister or brother) have any of the following?

Items	Yes	No
44.Diabetes		
45.Diabetes (but only during pregnancy)		
46.Hypertension		
47. Hypertension(but only during pregnancy)		
48.Asthma		
49.Cancer		
50.Arthritis		
51.Obesity		
52. Stroke		
53.High cholesterol level		

54. Do you consider yourself to be at risk of any of the non-communicable diseases stated above?

1. Yes 2. No

STEP 2

Blood pressure (mmHg)	S.P D.P
Weight (kg)	
Height (metres)	
Body mass index (kg/m^2)	
Abdominal circumference (cm)	

Thank you for your time and response