PREVALENCE AND RISK FACTORS FOR CARDIOVASCULAR DISEASE AMONG HEALTH WORKERS IN SECONDARY AND TERTIARY CENTRES GUSAU, ZAMFARA STATE

BY

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A DISSERTATION SUBMITTED TO THE SCHOOL OF POSTGRADUATE STUDIES AHMADU BELLO UNIVERSITY, ZARIA IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF MASTER OF PUBLIC HEALTH IN FIELD EPIDEMIOLOGY, DEPARTMENT OF COMMUNITY MEDICINE,

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ATTESTATION

I declare that this dissertation entitled “Prevalence and risk Factors for Cardiovascular Disease among Health Workers in Secondary and Tertiary Centres Gusau, Zamfara State”. A descriptive cross sectional study was written by me in the Department of Community Medicine under the supervision of Dr. A.A. Abubakar and Dr. S.S. Bashir.

The information derived from the literature has been duly acknowledged in the text and in the list of references. No part of this dissertation has been previously presented for another degree or Diploma at any University.

_____ _____

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CERTIFICATION

This dissertation entitled "**Prevalence and risk factors for cardiovascular disease among health workers in secondary and tertiary centres Gusau, Zamfara State by Ahmad Sufyan J** meets the regulation governing the award of the degree of master of public health of Ahmadu Bello University, Zaria and is approved for its contribution to knowledge and literary presentation.

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DEDICATION

This dissertation is dedicated to my late father Alh. Ahmad Jibrin for guiding and supporting me in all the aspects of my life, A big thank you mum who believes and has so much confidence in me and for all the sleepless nights you devoted to praying for me.

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TABLES OF CONTENTS

LIST OF TABLES

LIST OF FIGURE

LIST OF APPENDICES

LIST OF ABBREVIATIONS

AHA	American Heart Association
AIDS	Acquired Immune Deficiency Syndrome
ATP	Adult Treatment Panel
BMI	Body Mass Index
BP	Blood pressure
CAD	Coronary Artery Disease
CHD	Coronary Heart Disease
CI	Confidence Interval
CM	Centimeter
CVDs	Cardiovascular Diseases
DALYS	Disability Adjusted Life Years
EU	European Union
HDL	High Density Lipoprotein
IDF	International Diabetic Federation
IHD	Ischaemic Heart Disease
LDH	Low Density Lipoprotein
LVH	Left Ventricular Hypertrophy
MI	Myocardial Infarction
mm/hg	Millimetre mercury
NCD	Non-communicable Disease
NDHS	National Demographic and Health Survey
NFELTP	Nigerian Field Epidemiology and Laboratory Training Programme
NHLBI	National Heart, Lung and Blood Institute
OR	Odd Ratio
PAD	Peripheral Arterial Disease
PE	Physical Exercise
RCT	Randomized Control Trial
RHD	Rheumatic Heart Disease
RR	Relative Risk
TG	Triglycerides
WC	Waist Circumference
WHO	World Health Organization

SUMMARY

Cardiovascular diseases are the number one cause of death globally. An estimated 17.5 million people died from CVDs in 2012, representing 31% of all global deaths and three quarter of these deaths occur in low and middle income countries.

A cross sectional descriptive study was conducted among health workers in Gusau, Zamfara state. Four hundred and ten participants were selected from the secondary and tertiary health centres, an adapted WHO STEPS questionnaire administered, socio-demographic, CVD risk factors data, blood samples and anthropometric readings were obtained and analysed using SPSS version 17.

The mean age of the respondents was 33years (±9.6SD) and the overall prevalence of hypertension was 8.4%, isolated systolic hypertension 17.7%and isolated diastolic hypertension 11.7%, There was a statistical significant association between systolic blood pressure with age(OR 2.923, 95%CI 1.664-5.135, P=<0.0001) and vigorous exercise,(OR 1.800, 95%CI 1.033-3.136, P=0.03). The diastolic blood pressure was statistically significant with age and addition of salt to diet. Other behavioural variables were not significant.

The prevalence of addition of salt to diet (22.9%), use of monosodium glutamate (75.1%) and sitting more than 6hours at work (43.7) was high. Males were more likely to be obese than females, however, females were more likely to have abdominal obesity than males.

The percentage of cigarette smoking, blood pressure, obesity and alcohol was comparably lower than the national NCD survey.

The prevalence of the cardiovascular risk factors; Diabetes mellitus was high (26.6%), hypertension 8.4% and dyslipidaemia were also low. Obesity and under -nutrition coexist.

The State Ministry of Health and other stakeholders should partner to improve the knowledge of cardiovascular disease/ risk factors among the health workers.

Key words: Zamfara state, CVD, Health workers, Risk factors

CHAPTER ONE:

1.0 INTRODUCTION

1.1 Background

Cardiovascular diseases (CVDs) are the number one cause of death globally-: more people die annually from CVDs than from any other cause. An estimated 17.5 million people died from CVDs in 2012, representing 31% of all global deaths. Of these deaths, an estimated 7.4 million were due to coronary heart disease (CHD) and 6.7 million were due to stroke.[1]At least three quarters of the world's deaths from CVDs occur in low- and middle-income countries. People in low- and middle-income countries who suffer from CVDs and other non communicable diseases have less access to effective and equitable health care services which respond to their needs. As a result, many people in low- and middle-income countries are detected late in the course of the disease and die at a younger age from CVDs and other non communicable diseases, often in their most productive years.[1,3]

Out of the 16 million deaths under the age of 70 due to non communicable diseases, 82% are in low and middle income countries and 37% are caused by CVDs. Cardiovascular disease has reached near epidemic proportion in Africa, according to WHO report 2002. The World Health Organization has reported that the number of disability adjusted life years lost to cardiovascular disease in sub-Saharan Africa rose from 5.3 million for men and 6.3 million for women in 1990 to 6.5 million and 6.9 million in 2000, and could rise to 8.1 million and 7.9 million in 2010.[3]

Among the non-communicable diseases (NCDs), CVDs contributed 48% of all deaths due to NCDs. In a study conducted in Northern Nigeria it was shown that multiple risk factors do occur to predispose individuals to CVDs. The multiple risk factors may include high blood pressure, obesity and physical inactivity. It is worthy to note that risk factors can be very high in groups thought to be free of them.[4] The World Health Organization (WHO) defined

(CVDs) as a group disorders of the heart and blood vessels that include coronary heart disease, cerebrovascular disease, peripheral arterial disease, rheumatic heart disease, congenital heart disease, deep venous thrombosis and pulmonary embolism.[1]

The behavioural risk factors of heart disease and stroke are unhealthy diet, physical inactivity, tobacco use and harmful use of alcohol. The effects of behavioural risk factors may manifest as high blood pressure, elevated blood sugar, raised blood lipids, overweight and obesity. These "intermediate risks factors" can be measured in primary health centres and can indicate an increased risk of developing a heart attack, stroke and heart failure [1].There are also a number of underlying determinants of CVDs or "the causes of the causes". These are a reflection of the major forces driving social, economic and cultural change – globalization, urbanization and population ageing[2,14] Other determinants of CVDs include poverty, stress and hereditary factors. There is increased incidence of non-communicable diseases (NCDs) in developing countries; the World Health Organization estimated that CVDs accounted for 28.5% of all deaths in the developing countries in 1998 , further increase in the burden of CVDs are expected in the near future in these countries . According to global burden of disease study, a 55% rise would occur in Disability Adjusted Life Years (DALY) loss attributable to CVDs between 1990 and 2020 in the developing countrie.[3] This double burden of communicable and chronic non-communicable diseases has long-term public health impact as it undermines healthcare systems.[2]

Sub-saharan Africa (SSA) countries are currently experiencing one of the most rapid epidemiological transitions characterized by increasing urbanization and changing lifestyle.[2] In a study conducted in Katsina, Northwest Nigeria, hypertension was the most common form of CVD , the age group 40-49 years having the highest incidence . Hypertension, closely followed by stroke, is the most prevalent CVDs. while Coronary Heart Disease

(CHD) is the least prevalent CVDs,[7] contrary to the developed world like USA where CHD is the most prevalent.[6]

In the recent four decades, Africa witnessed increasing urbanization and changing lifestyle. These factors are responsible for the surge in the incidence of chronic non-communicable diseases with more inclination to cardiovascular diseases. The WHO 2002 report mentioned hypertension as the highest risk factor for CVDs, and hypertension national prevalence ranges between 15%-30% in adults.[43] A study conducted in Nigeria indicated that 5%of death occured as a result of hypertension and that the reduction in attributable risk associated with treatment could be 2%, over 10 times high than in the United States.[1]

1.2 Problem Statement

Premature death is avoidable and a pointer to the impact of NCDs in any population, with approximately 42% of all NCD deaths occurring before the age of 70 years in 2012.[7] This represents 16 million deaths, an increase from 2000 when there were 14.6 million deaths due to NCD before the age of 70 years. The majority of premature deaths (82%), are in the developing countries. In low and middle income countries, a higher proportion (48%) of all NCD deaths are estimated to occur in people under the age of 70 years, compared with high-income countries (28%). Cardiovascular diseases were responsible for the largest proportion of NCD deaths in persons under the age of 70 years (37%).[7]

The double burden of communicable as well as non communicable diseases, has complicated the already inadequate and poorly equipped health system of the state governments, the aged long infectious diseases lacks a comprehensive reliable qualitative surveillance system data, therefore the available data on non communicable diseases is poor , inadequate or lacking in Zamfara state. Africa as a whole has the lowest output in the world of cardiovascular research.[1]

Zamfara State like all the other north western states lacks a comprehensive intervention strategy to combat the menace of the growing non communicable diseases. Cigarette smoking in north western Nigeria ranked third among the six geographic zones.[10] Routine medical check up by the health workers to detect cardiovascular disease early is not common. Some healthcare workers are predisposed to sedentary life style at work, the nurses and the laboratory scientists spend long hours sitting carrying out their work which is a risk factor to CVDs[8].

1.3 Justification

The country as well as the state needs a sound non-communicable disease surveillance data base to address the increasing trend of cardiovascular diseases. Non communicable diseases surveillance data is very poor or almost nonexistent. With such absent or inadequate data, it will be difficult to understand the epidemiology of cardiovascular diseases in the state, let alone create policies and control measures to tackle it. As a result, the outcome of this study will help to derive and create policies for the state instead of using data obtained from the developed countries to plan control measures, that defy the principle of Alma Atta declaration.

In the developed world, urbanization occurs in a prospering economy, while in the developing world, it occurs in a setting of high poverty and international debt, and receding resources for public health responses. Organised efforts at prevention began in developed countries when the epidemics had peaked and often accelerated a secular downswing while the efforts to control CVDs in the developing world is commencing when the epidemics is on the upswing. Strategies to control CVD in the country must be based on these similarities and differences.[3] The healthcare workers are a productive work force as they deliver health care services from primary , secondary up to the tertiary level. This group of white collar jobs have stable income hence they are more likely to emulate western lifestyle - to smoke

cigarette, drink alcohol or have access to high cholesterol based foods (unhealthy diet). The job description of some cadre involve sitting for long hours which could lead to physical inactivity and consequent predisposition to development of cardiovascular diseases. Similarly staying long hours on computers and watching television is highly likely in this group.

Dearth of studies on the awareness and knowledge of the risk factors for cardiovascular diseases among healthcare workers in Zamfara State stimulated the need to conduct this study. The study can provide a knowledge base to inform policy on health workers cardiovascular health in Zamfara state and would further stimulate research in cardiovascular diseases. The research will provide a baseline to help design and implement interventions in the work environment which may help to achieve a decrease in the risk of cardiovascular diseases.

1.4 Research Questions

- Are health workers in Gusau, Zamfara State at risk of CVD because of lifestyle or poor risk communication?
- What is the knowledge of CVD among health workers in Gusau, Zamfara State?
- What is the prevalence of hypertension, high cholesterol, Diabetes mellitus, and obesity among the health workers in Gusau, Zamfara State?

1.5 General and specific objectives.

1.5.1 General Objectives

To assess prevalence of risk factors for cardiovascular diseases among health workers in Gusau, Zamfara State.

1.5.2 Specific objectives

1. To assess behavioural risk factors for CVDs among the health workers in Zamfara State.
2. To determine the prevalence of hypertension among health workers in Zamfara State.
3. To determine the prevalence of obesity among health workers in Zamfara State.
4. To determine the prevalence of diabetes mellitus among the health workers in Zamfara State.
5. To assess the prevalence of dyslipidemia among health workers in Zamfara State.

CHAPTER TWO:

2.0 LITERATURE REVIEW

2.1 INTRODUCTION

The 20th century, has witnessed an unprecedented transformation in the causes of morbidity and mortality as a result of epidemiological transition. The drift is caused by urbanization, industrialization and associated lifestyle change which is taking place globally across race, ethnic group, and cultures[2]. Cardiovascular diseases (CVDs) are the leading cause of mortality globally. Worldwide most deaths are attributed to non-communicable diseases (32 million) and over 50% of these (16.7 million) are as a result of CVDs-:with more than one-third of these deaths occuring in middle aged adults.

In developed countries, heart disease and stroke are the first and second leading causes of death. Surprisingly for adult men and women, in some of the developing nations, CVDs have also become the first and second leading causes responsible for one third of all dealth.[11]The four patterns of epidemiological transition are stage of pestilence and famine; stage of receding pandemics; stage of degenerative and man-made disease and stage of delayed degenerative disease. The dynamics of those affected and type of cardiovascular disease at every stage depends on type of population, urban, rural, rural-urban .[12].

Cardiovascular diseases (CVDs) are responsible for about 25% of Disability Adjusted Life Years(DALYs) lost due to NCD in South East Asia Region countries. Of these Ischeamic Heart Diseases (IHD) account for 40% of DALYs lost, cerebrovasculardisease about 19%, RHD 6%, inflammatory heart disease 6% and other conditions 29%. The multi-functional nature of CVD has made it more common in urban than rural areas because, factors such as tobacco consumption, lack of physical activity, unhealthy diet and obesity tend to be more accessible in urban set up.

In 2012, alone 17.5million people died from CVDs- representing 31% of all global deaths. Of these deaths 7.4 million were due to Coronary Heart Disease(CHD) and 6.7million were due to stroke. Over Three quarter of CVD deaths take place in low-middle income countries. Out of the 16 million deaths under the age of 70 years due to NCD, 82% are in middle income countries and 37% are caused by CVDs.[1]

By 2020, studies predicted that mortality from CVD is expected to increase by 120% in women and 137% in men. These findings necessitate the need to explore the nature and magnitude of CVDs and other NCD in developing countries. Sub Saharan Africa(SSA) are currently experiencing one of the most rapid epidemiologic transitions characterized by urbanization and changing life style which in turn raised the incidence of CVDs. Studies indicated that urbanization and economic development have also led to the emergence of nutritional transition a shift to a higher caloric content diet, low in dietary fibres and a decrease in physical activity, these in turn create a serious public health challenge that must be addressed because it poses a serious economic burden for the health and economic sector.

In countries such as Nigeria, Ghana and South Africa, the prevalence of chronic diseases is increasing, likewise the threat of communicable and poverty related diseases malaria, infant mortality, cholera, malnutrition still exist. In South Africa, CVD is the second leading cause of death after HIV accounting for up to 40% death among Adults.[2] Cardiovascular disease is now a global phenomenon and it is no longer a developed nation's public health issue. It is estimated that by 2020 35% of all deaths in the developing countries will be due to CVD. Therefore, there is need for multiple approaches to tackle the issue in those at risk of the epidemic and those already affected with the limited public health resources at the disposal of the government.[14]

Systemic arterial hypertension, the main risk factor to heart disease and stroke leads to about 50% of CVD morbidity and mortality worldwide, it is a known risk factor that Left Ventricular Hypertrophy(LVH) cause high mortality in hypertensive patients with ventricular arrhythmias and coronary artery disease.[15]In a study conducted in Taiwan, metabolic derangement was found to be the most important health problem among health workers. The study also reported a high prevalence of hypertension among health workers .[8]

2.2 Behavioural Risk Factor for Cardiovascular Diseases

2.2.1 Knowledge of Cardiovascular Disease

In a research in Canada, it more people know about the behavioural related risk factors for CVD than about the physiological risk factor, 60% recalled fat in food, 52% smoking and 41% lack of exercise but only 32% identified weight, 27% cholesterol and 22% high Blood Pressure(BP). Education was the socioeconomic status indicator most strongly and consistently associated with the ability to recall risk factors for CVD. The odd ratio of reporting an association of the risk between people with the elementary education and those with university degree varies between 0.16 (95 confidence interval 0.12 to 0.22) for lack of exercise to 0.55 (95% CI 0.39 – 0.77) for smoking.[19]

A study carried out in India has identified that poor knowledge among a sampled Indian population regarding modifiable risk factors of CVD especially DM, The study notably reveals certain characteristic that are significant predictor of poor knowledge of modifiable risk factors. Participants who reported low level of routine exercise and are current smokers had a significant poor knowledge of CVD risk factors.[20]

In another study conducted in Kazakhstan, more than half of the respondents could identify tobacco smoking (60.4%), alcohol drinking (64.8), overweight (72.5%) and hypertension (49.9%) as risk factors for CVDs; and the ability to identify risk factors is high with more

knowledge. However, only one quater of the respondents had a good level of knowledge and female were more knowledgeable than males (P = 0.03). Employment and high income subjects were also more likely to be knowledgeable than other groups (P=0.022).[21] The benefit of knowledge in the prevention and control of diseases is inevitable, thus the Nigerian expert committee of NCD established the ten command civil duties of all Nigerians. The list includes knowing one's blood pressure from ≥ 30 age (annually and six monthly), blood sugar from 40 years, blood cholesterol by obese or overweight people from 40 years, Body Mass Index BMI (>30kg/m^2 obesity, > 25kg/m^2 overweight and < 18.5kg/m^2 under-nutrition) as measures to prevent the occurrence of CVD as part of Non-communicable disease spectrum.[16]

There is paucity of knowledge of cardiovascular disease in Nigeria. A study conducted in South Western Nigeria showed that the overall knowledge of CVD- risk factors was poor, and about 56% of the respondent could not identify a risk factor. It was found that those with good knowledge of CVD and risk factors have more years of formal education, and positive family history of CVD or diabetes (DM).[17]Adequate knowledge of CVD risk factors is the first step in the prevention and control of CVDs, being the number one cause of mortality globally [11]. In the study Heart Disease Fact Questionnaire (HDFQ) scores was used to assess the level of knowledge, (HDFQ > 70% good, 50-69% moderate and < 50% as low). It was discovered that among the university staff in a Nigerian university about 50% of the participants had low level of knowledge compared to 31.1% with moderate level of knowledge and 19.9% with good knowledge. There was no statistically significant difference between those with low, moderate and high level of knowledge as regards to highest level of education and there was also no statistical difference between those with different level of knowledge as it is associated with prevalence or family history of hypertension and obesity.[18]

2.2.2 Active Smoking

Active Smoking is one of the nine factors targeted in the control of NCD as reported in the global status report 2014,whose target is to achieve a 30% relative reduction in prevalence of current tobacco use in persons aged 15 and above. It is a huge challenge when the annual production of cigarette is up to 5.5 trillion- enough to provide the 6 billion global population with 1,000 cigarettes each.[22,23] In 2000 about 1.2 million people smoke cigarette and the number is projected to reach 1.6 million by 2030.[23] Tobacco Smoking is entirely an avoidable external agent that contributes greatly to the risk of CVDs. The proportion of all deaths attributed to tobacco is estimated from 1.4% in 1990 to 13.3% in 2020, and a similar rise from 9.2 to 16% will occur in china during the same period. The overall global escalation would be from 6 to 12.3% in 30 years. Of the 10 million lives that would be lost globally in 2025 due to tobacco, seven million would be from the developing countries. The declining tobacco consumption pattern and the tactical, albeit limited retreat of the tobacco industry in the developed world are accompanied by aggressive marketing and rising consumption in the developing nations.[3]

Tobacco use remains the cause of 6 million preventable deaths per year globally. Risk to health results not only from direct consumption of tobacco but also from exposure to second hand smoke. Out of the 6 million deaths, about 10%(600,000)deaths occurs due to effect of second hand smoke. Tobacco use accounts for 7% of all female and 12.0% of all male death globally. Unless measures are taken, the death toll due to tobacco use will rise to 8 million per year by 2030 or 10% of all death projected to occur that year .[7,22]

Tobacco use also imposes an economic burden in the form of increased medical cost and loss to productivity. In most economies the health cost burden from tobacco also exceeds the total tax collected by government from tobacco companies. In 2012, the global prevalence of current tobacco smoking among adult was estimated to be around 22% with smoking rate

varying across the six WHO region, with western pacific region the highest (30%) and African region lowest (12%). Global smoking prevalence is about five times higher among men (37%) than among women (7%).[24]

The Framingham tobacco study strongly associated the tobacco dose dependence in the causation of all cardiovascular events (Coronary heart disease, stroke, peripheral arterial disease, myocardial infarction and death). Men who smoke are three times more likely to die age 45 -64 years and twice more likely to die age 65-84 years than non-smokers.[25] Smokers of all ages have death rates 2-3 times higher than non-smokers.[26]

In a report by the CDC Atlanta, from 2000 to 2011, the total consumption of all combustible tobacco decreased from 450.17 billion cigarette equivalent to 326.6 billion, a 27.5% decrease per capital. Consumption of all combustible products declined from 2,148 to 1,374, a 36% decrease. However, while consumption of cigarettes decreased by 32.8% from 2000 to 2011, consumption of lose tobacco cigars increased 123.1% over same period. As a result, the percentages of total tobacco consumption, composed of lose tobacco and cigars, increased from 3.4% in 2000 to 10.4% in 2011. The data suggest that certain smokers have switched from cigars to other combustible tobacco products. Most notably since 2009, increase in the federal tobacco tax exist that created tax disparities between the products. Therefore when enforcing taxes and policy, all forms of cigarette must be considered.[27]

2.2.3 Physical inactivity

Physical activity is defined as any body movement produced by skeletal muscles that requires energy expenditure. Physical inactivity has been identified as the fourth leading risk factor for global mortality causing an estimated 32 million deaths globally. Regular moderate intensity physical activity is said to reduce the risk for cardiovascular diseases.[28] Levels of physical activity are rising in many countries with major implications for the general health

of the people globally and for non- communicable diseases in particular. Physical inactivity is estimated as being the principal cause for approximately 21to 25% of breast cancer and colon cancer burden, 27% of DM and approximately 30% of IHD burden.Also NCDs now account for over 50% of global deaths with 6 out of 10 deaths is now attributed to NCDs.[29]

The beneficial effect of exercise on the cardiovascular system, is a known fact as, there exists a direct relation between physical inactivity and cardiovascular mortality. Physical inactivity is an independent risk factor for the development of CAD. There is a dose-response relationship between amount of exercise performed from approximately 700 to 2000 kcal expenditure per week and CVD mortality in middle age and elderly. In a study people who modify their behaviour after MI to include regular exercise have improved rate of survival and people who remain sedentary have the highest risk for all cause and cardiovascular diseases mortality.[30]

A study of the possible effect of physical inactivity and the magnitude of mortality caused by physical inactivity that could have been averted, shows that worldwide it was estimated that physical inactivity is responsible for 6% of the burden of diseases from CHD (range 3.2% in South East Asia to 7.8% in the East Mediterranean region); 7% of type 2 diabetes (3.9% to 9.6%), 10% of breast cancer (5.6%-14.1%) and 10% of colonic Cancer (5.7 % 0 13.8%). Physical inactivity is responsible for 9% of premature mortality (5.1-12.5%) or > 5.3 of the 57 million deaths that occurred globally in 2008. If physical inactivity were not eliminated, but decreased instead by 10% to 25%, 533,000 to 1.3 million deaths respectively may be averted yearly. By eliminating physical inactivity, life expectancy of the people globally is estimated to increase by 0.68 (0.41 – 0.05) years.[31]

Several observational studies examined the effect of physical activity on CVD after controlling for other risk factors identified. All the studies confirmed an inverse relationship

between physical activity and the risk of a coronary disease. Effect sizes ranges from non-significant relationship for specific types of activity (e.g. Active Commuting, hazard ratio 1.08, 95% CI 0.95 to 1.25),to highly significant association (for instance mean run for an hour or more weekly had a 42% risk reduction, RR 0.58, 95% CI 0.44-0.77) compared with man who did not run.[32]

2.2.4 Overweight and obesity

Obesity and/- or overweight is one of the behavioural risk factor that is preventable. However, overweight and obesity is growing in an alarming rate globally, it has more than doubled since the 1980s. In the year 2014, majority of the people live in countries where overweight and obesity kills more people than underweight. It cut across all age groups. In 2013 alone, there were over 42 million children under the age of 5 that were either obese or overweight; in 2014 more than 1.9 billion adults, 18 years and above were overweight. Of these over 600 million were obese, that is 39% of Adults aged 18+ were overweight and 13% were obese.[33]

Obesity and overweight were once considered a high income country problem but overweight and obesity are now on the rise in the low and middle income countries, especially in urban settings. The rate of increase of childhood overweight and/obesity is more than 30% higher than that of the developed countries. Obesity in children posed a great public health problem being associated with premature death and disability in adulthood. Obese children have other morbidities such as difficulty in breathing, increased risk of fracture, hypertension, early makers of CVD and diabetes.

Several studies have associated overweight/obesity to increase risk of CVDs. Notably among them was the Framingham study. After 44 years of follow up, it shows that CVD risk including Angina, MI, CHD and Stroke was higher among overweight men (RR 1.24, 95%

CI; 1.07-1.68) after adjustment for age, smoking, high blood pressure, high cholesterol and DM.

The association was not significant among overweight women,(in this case, overweight was defined as BMI ≥ 25 but < 30 and obesity BMI > 30).[34] The nurses health survey after 16 years of follow up, that generated the prospective data also indicated that the risk of death from CVD was significantly greater among women with BMI > 27 compared with the risk among women with BMI < 19. Among women with BMI > 32 The RR of death from CVD was 4.1 (95% CI: 2.1 -7.1) after accounting for cigarette smoking and disease related weight loss. Deaths due to CHD were even strongly associated with BMI among women in the study than death due to CVD, death rate began to increases at a BMI ≥ to 22 (RR 1.4); among those with BMI ≥ 29, the RR of Death was 4.6.[35]

In the 1990s, CVD was the leading cause of death in China, accounting for one third of total death, despite lower BMI levels and rate of overweight. The prevalence of hypertension, fasting serum glucose, high total blood cholesterol and low LDL cholesterol and their clustering were all raised with increase in BMI or waist circumference[36]. Throughout sub Saharan Africa there exist gender disparity in overweight and obesity, women are disproportionately affected by overweight and obesity compared to man. The prevalence of obesity in Urban West Africa is more than doubled (114%) over the past decade and the increased prevalence was accounted for almost entirely by women.[37]

2.2.5 Metabolic syndrome

The clustering of metabolic and pathophysiological cardiovascular risk factors has long been recognised but it was Reaven who popularized the syndrome in the Banting lecture of 1988, and several major international and national organization proposed their definitions for metabolic syndrome. The World Health Organization, the National Cholesterol Education

Programme expert panel in detection, evaluation and treatment of High blood cholesterol education in adult. (Adult Treatment Phase III), The American Diabetes Association, and the American Heart Association (AHA) defined metabolic syndrome as a cluster of the most dangerous risk factors for type II Diabetes and cardiovascular diseases.[38] Clinical diagnosis of metabolic syndrome in adults includes the presence of at least 3 to 5 conditions: elevated triglycerides, low in HDL , high fasting blood glucose, high BP, and obesity.[39,38]

International Diabetic Federation defined metabolic syndrome as a cluster of the most dangerous heart attack risk factors: Diabetes and pre-diabetes, Abdominal obesity, high cholesterol and high blood pressure. A quarter of the world's adult population have metabolic syndrome. People with metabolic syndrome are twice as likely to die from and three times as likely to have heart attack or stroke compared with those without the syndrome. They also have a fivefold risk of developing type 2 DM and up to 80% of the 200 million people with DM globally will die of CVDs. These put metabolic syndrome and diabetes way ahead of HIV/AIDs in morbidity and mortality terms, yet the problems are not well recognized.[40,38]

The prevalence of metabolic syndrome varies with definition, ethnicity and gender. It is said to be higher among the Asians.[41] In a study the prevalence of metabolic syndrome is under 20% among Chinese and Koreans people but over 50% among the Maori and pacific Islanders in New Zealand. People with metabolic syndrome have 50–60% high cardiovascular risk factors than those without.[38]

In another study conducted among adults in New York city, the age adjusted prevalence of metabolic syndrome was 26.7% (95 CI, 23.7 – 29.8%) highest among Hispanic (33.9%) and lowest among white (21.8%). Prevalence increased with age and BMI and was higher among women (30.1%) than men(22.9%). More than half of women(55.4%) and 33% of men with metabolic syndrome had only 3 metabolic abnormalities, one of which was abdominal

obesity, the commonest combination of abnormalities was obesity, elevated FBS and elevated BP. Alcohol use was inversely associated with metabolic syndrome among women but increased the likelihood of metabolic syndrome among men.

2.2.6 Diet

It is directly or indirectly associated with other behavioural risk factors as obesity/overweight and physical inactivity. The epidemiology of non-communicable diseases is related to the diet of the people, due to urbanization and adaptation of western lifestyle, utilization of fast foods, unhealthy diet, high calorie, low fibre, high salt intake, high simple sugars, also described as "coca colonization" use of soft drink. The effect of adoption of the western life style referred to as nutritional transition. This will lead to obesity and overweight.[43]

In a study conducted in Abia state, 90% of the subjects consume fruits but only 15.9% on a daily basis, only 175 (6.1%) consume uncooked vegetable daily while 1350 (47.2%) consumed cooked vegetable every day. Consumption of soda, sweet, chocolate, coffee and tea, and fast food is low in the population (2.0%, 1.8% , 8.3% and 1.3% respectively) about 5% add extra salt to diet already prepared food on a daily basis, however the use of bullion salt in prepared food is very high (78.1%). Also there is low consumption of protein diet while the consumption of carbohydrate is high.

The adverse effect of childhood nutrition on cardiovascular diseases is having a huge impact as noted in a study conducted in Sheffield, United Kingdom where serum cholesterol concentration was associated with late gestational under nutrition because it leads to disproportionate liver growth resulting in abnormal LDL cholesterol metabolism.[44]

A rise in total fat intake and a decline in carbohydrate consumption especially complex variety, excess energy intake coupled with micronutrient deficiencies, reduced physical activity with energy mismatched leading to obesity and excess salt intake, characterized the

nutrition transition that is becoming increasingly well documented in many developing countries.[45]

Consumption of fruit and vegetable can prevent CVDs, However low intake is responsible for 31% CHD and 11% of stroke globally.[45,46] A reduction of salt intake of 6g per day (100mmol or 2.3g Na per day) predicted a fall in blood pressure of 7.11/3.88mmHg ($p< 0.001$) for both systolic and diastolic hypertensive patients and 3.57/1.66mmHg in Normotensive patients (Systole: $P< 0.001$, diastole: $p<0.05$).[47]Diet rich in fruit and vegetable tend also to be low in fat. Two systematic reviews of cohort studies examined the benefits of fruit and vegetable consumption for the reduction of CHD risk. There is evidence from the study that support reduced CHD events rates from increased vegetable (RR 0.77) and fruit (Risk rate 0.86).[7,48]

2.3 Metabolic Risk Factors

2.3.1 Hypertension

Known as a silent killer,[2] according to the global burden of disease from 1990-2010 the ranking of hypertension has moved from fourth to third as the leading risk factors for death in West Africa. The prevalence of hypertension is expected to increase with the increasing urbanization, globalization and associated nutritional transition.[2,49] High blood pressure is one of the leading risk factors for global mortality and is estimated to cause 9.9 million death and 7% of disease burden as measured in DALYs in 2010. Hypertension is a major CVD risk factor which, if left uncontrolled, can lead to stroke, myocardial infarction, heart failure, dementia, renal failure, and blindness; indirectly imposing severe financial and service burden in the health system.[50] Studies have shown that a reduction of 10mmHg of systolic blood pressure is associated with 22% reduction in CHD and 41% reduction in stroke in a randomized control trial[51] and a 41 to46% reduction in cardiovascular mortality in epidemiological studies.[52] In Africa, the prevalence of hypertension is estimated at 20 million,

some 250,000 deaths could be averted each year through effective case management. Hypertension related stroke is high in Africa and victims are relatively young.[53]

In a study conducted in Spain, to compare the prevalence of hypertension among health care professionals and the rest of the workforce, it showed that there were fewer difference than expected among the health care personnel and the other workforce, despite the fewer differences in prevalence among the physicians but it was not statistically significant (α= 0.05). However, altered levels of BP (BP > 140/90) were lower in < 40 year male physicians (12.7% Vs. 17.7%) p=0.02 and as well as those =aged 40years(35.1% vs. 42.2%, p=0.02 than the reference group of the remaining workforce respectively. Regarding the nurses group, they only showed a lower prevalence of hypertension (3.8% vs. 5.1% P = 0.03) and altered BP levels (3.5% Vs 4.8% P = 0.02) among women younger than 40 years.

The global prevalence of hypertension was defined as systolic and diastolic BP > 140/90mmHg in adult 18 years and over was around 22% in 2004.[7] However studies have shown that the prevalence of hypertension among health workers varies, studies in Cote de voire shows a prevalence of 17.5% but a study conducted in Jos University Teaching Hospital showed a prevalence of (36.5%) and very similar study in Umuahia showed a prevalence of 37.5%.[2,60,68]

In a cross sectional study conducted among medical and non-medical staff of Jos University Teaching Hospital, more than half (58.5%) of the respondents rarely checked their blood pressure (except when ill) and only one third (35%) of the respondents checked their BP within 1 year preceding the study. Medical staff were more likely to have had their BP checked than non-medical workers (OR 10.3, 95% CI 2.4-34.1, P<0.0001), greater than one third (36.6%) of the respondents had hypertension (stage I & II), only l (29.5%) respondent had normal BP. Obese patients were more likely to be hypertensive than non- obese (OR

2.12, P = 0.004). On multiple logistic regression, alcohol and obesity were found to be independently associated with hypertension (OR 2.58, P = 0.03, OR 3.37 P = 0.006 respectively).[54]

2.3.2 Diabetes

Diabetes mellitus is a non-communicable insulin metabolic derangement affecting millions of individuals globally. It is associated with micro and macro-vascular complications and is among the leading cause of death among the NCDs, with DM accounting for 1.5 million deaths in 2012.[73] The prevalence of type 2 DM is rising at an alarming rate as five hundred and ninety two million people are estimated to be affected by 2035.[74] Diabetes Mellitus is a diseases associated with urbanization and dietary change, multiple studies characterised the difference in prevalence of DM between the urban and rural settings. In a study carried out in four sub Saharan African countries, hospital based cross sectional studies, the predominant risk factor was hypertension (74.1%) obesity (36.2%) and excessive alcohol consumption (25.6%). DM 17.7 vs. 10%, obesity 42.8 vs. 16.8% and hypercholesterolaemia 25.8 vs. Eighteen percent 18% were more prevalent among the hypertensive than the normotensives. The metabolic syndrome was more in women and hypertensive patient.[75]

In another related study in Ghana during the rural to urban transition age standardized prevalence of DM was significantly greater among the urban population of both sexes 6.6% for urban females and 5.7% for urban males. Difference between sexes stratified by residence was not significant. The effect of sex on fasting glucose was small while that of urban residence was even smaller however urban residence had 3.6 times greater odd of Diabetes. Mean fasting glucose was positively associated with age in all groups, whereas sharp increase in DM was evident only among urban females (>35 years) and urban males (>45 years).[76]

In a study conducted in Uganda and Tanzania on the prevalence of Diabetes and pre diabetes, the overall prevalence of Diabetes was10.1% and was highest in rural Uganda inhabitants (16.1 %) compared to teachers in Tanzania (8.3%) and periurban Uganda(7.6%). The prevalence of prediabetes was slow across all groups, where 68% of the participants with DM were not aware of their condition. Multivariate logistic regression show family history (OR 2.5, 95%CI: 1.1, 5.6) and hypertension (OR 2.3, 95%CI: I.1, 5.2) were significantly associated with DM.[78]

A cardiovascular risk factors study conducted in south western Nigeria shows that there were 2.6% current cigarette smokers, 22% drank alcohol and 12.2% added salt at the table while 2% had been told by their doctors that they had DM and 23,6% had hypertension. The atherogenic plasma index was at a high risk level of11.1%, elevated total cholesterol, LDL and low HDL were 5.7, 3.7 and 65.1% respectively. Prevalence of hypertension was 44.9%, Diabetes 5.2% obesity with BMI >30kg/m^2 was 5.7% and abdominal circumference was 27.7%.[79] A study to determine metabolic syndrome in rural north western Nigeria revealed a high prevalence of 25.78% of these systemic hypertension was found to be 78.45% while all had elevated cholesterol and TG, abdominal adiposity was 38.79% and 44(37.93%)had type 2 DM.[81] The national NCD survey of 2003 shows the prevalence of DM at 3.0% and was estimated by international Diabetic federation to about 4.4%.[82]

2.3.3 High Lipid Profile (High Cholesterol Level)

Globally raised cholesterol increases the risk of heart disease and stroke,and one third of Ischaemic Heart Diseases IHD is attributed to high cholesterol. The overall raised cholesterol caused 2.6 million death (4.5% of the total 29.7 million DALYs). High cholesterol is a global concern in both the developing and developed world as a major cause of IHD and stroke. A 10% reduction in serum cholesterol in men aged 40 years has been reported to result in 50% reduction in heart diseases within 5 years. The same serum cholesterol reduction in men aged

70 years can result in an average 20% reduction in heart diseases occurrence in the next 5 years. In Ireland, a 30% reduction in the heart disease has been attributed to 4.6% reduction of the population mean for total cholesterol.

In 2008, the global prevalence of raised total cholesterol among adults ≥ 5.6million was 39% (37% for males, 40% for females), the reduction in mean total cholesterol experience a little changed between 1986-2008 falling less than 0.1mlmol/l per decade in men and women. Affluence determines the prevalence of total cholesterol; it's highest in Europe (54% for both sexes) and American (48% for both sexes) and lower in the Afro and South East Asia regions with 22.6% and 29.0% respectively.[55]

In American, people with high cholesterol have twice the risk of heart disease as people with lower levels. About 71 million American adults (33.5%) have high LDL; less than half of them that have high LDL get treatment. High cholesterol is asymptomatic. Therefore, most people don't know they have high cholesterol, increasing the danger of IHD and stroke.[56] The link between cardiovascular risk and variation in blood lipid was shown in a study of over 356,000 men aged 35-57 years who were followed for up to 6 years. The study demonstrated a continuous, graded, strong relationship between serum cholesterol and 6 years age adjusted CHD mortality. This relationship in smokers and non smokers, people with or without hypertension and was evident irrespective of the presence or absence of a cardiovascular diseases. Low density lipoprotein cholesterol constitute up 60-70% of the total serum cholesterol and the strong association between serum cholesterol and CHD suggest that LDL cholesterol is the powerful risk factors.[57]And The role of LDL cholesterol in atherosclerosis is confirmed by studies carried out in individuals with genetic disorders such as familial hypercholesterolemia.[58]

CHAPTER THREE:

3.0 METHODOLOGY

3.1 Study Area

Zamfara state ,with Gusau as capital, is located in the north-western geopolitical region of Nigeria, It has a population of 3,278,873 (2006 census) and covers a land area of 38,418 km². The state has 14 local government areas (LGA) namely Anka, Bakura, Bukkuyum, Bungudu, Birnin Magaji, Gummi, Gusau, Kaura Namoda, Maradun, Maru, Shinkafi, Talata-Mafara, Tsafe And Zurmi. It has 147 wards, and 17 emirate councils, It's major ethnic groups are Hausa and Fulani and the major religions are Islam and Christianity.

There are 15 General hospitals, one in each LGA, except in Gusau, the state capital which has two secondary health centres (i.e King Fahad Abdulaziz Hospital and Farida General Hospital) .It also has two tertiary Centres (Yariman Bakura Specialist Hospital and Federal Medical Centre, Gusau). The secondary and tertiary centres serve as referral centres for the state and other neighbouring states. According to the state strategic health development plan, the state capital has the highest number of health care workers with more than 50% work force and the distribution of the health workers is skewed. The number of doctors , nurses and other health staff is grossly inadequate,with doctors less than hundred and about 300 to 400 nurses.

The federal medical centre offers services in medicine, surgery, obstetrics/gynaecology and other sub-speciality in ophthalmology and dentistry, radiological, chemical and histopathological tests are carried out in the centre. It has a total bed capacity of 300 bed spaces, 100 consultants/medical officers, 300 nurses, 72 laboratory scientist/technicians with 257 administrative staff.

Yariman Bakura specialist hospital is a tertiary centre directly under the supervision of the Executive Governor of the state. They run clinics in paediatrics, obstetrics/gynaecology, medicine and surgery and has a well equipped pathology laboratory. It has a capacity of 175 beds space ,54 consultants and medical officers ,144 nurses, 42 laboratory staff with 126 non medical staff,

.The secondary health centres, Farida General Hospital runs services in medicine, surgery, paediatrics and obstetrics and gynaecology. It has a bed capacity of 81, 14 doctors , 59 nurses ,30 laboratory staffs with 69 administration staff while King Fahad general hospital has the following department medicine, paediatrics, obstetrics/gynaecology and ophthalmology with a total bed capacity of seventy ,21 doctors. 67 nurses, 39 laboratory and 144 administrative staff.

3.2 Study Design

It is a cross- sectional descriptive study

3.3 Study Population

Health workers in Federal Medical Centre Gusau and Yariman Bakura specialist hospital (the tertiary health facilities). King Fahad Abdulaziz general hospital and Hajiya Farida general hospital Gusau (the secondary health centres).

3.3.1 Inclusion criteria

Healthcare workers who are permanent staff of the hospitals who consent to participate in the study between the ages 18-60 years.

3.3.2 Exclusion criteria

Staff who are pregnant, sick or on leave.

3.4 Sample Size Determination

Sample size was calculated using the

Kish and Leslie formulae for cross sectional studies[16]

$n = Z\alpha^2(pq) / d^2$

where: n = minimum sample size

$Z\alpha$ at 5% significant level =1.96

P= 39.1 %(prevalence of hypertension in north western Nigeria from previous study [5])

d= level of precision (5%)

Therefore

$n = 1.96^2(0.391 \times 0.609) / 0.05 \times 0.05$

n = 366

Sample size will be adjusted for potential non response using = n / (1 – NR)

=366/ 0.9

= 406.6

≈410

3.5 Sampling Technique

A systematic random sampling was used in this study. The respondents were selected based on the population proportionate to size of each of the secondary health and tertiary health centres for the study. At the health facility level the various cadres were allocated proportionate to their size in that particular hospital, considering the total number of healthcare workers calculated for the study in the hospital.

As calculated below

Federal Medical Centre Gusau = 729/1538 X 410 = 194

Yariman Bakura Specialist Hospital 366/1538 X 410 =98

King Abdulazaz Fahad hospital 271/1538 X 410=72

Hajiya Farida General Hospital 172/1538 X 410= 46

Using systematic random sampling, the sample interval k= N/n that is 1538/410 = 3.8 approximately 4, the random number table was used to select the first participant in each cadre and subsequently every fourth is selected for the study.

Using this formular; the Total number of each cadre of staff/ Total staff in the facility multiplied by the calculated sample size for that facility was used to arrived at the required number selected for that cadre in that facility.

Federal Medical Centre Gusau, n=194

Doctors 100/729 X 194=27

Nurses 300/729 X 194=80

Laboratorians 72/729 X 194=19

Others 257/729 X 194=68

Yariman Bakura Specialist Hospital, n=98

Doctors 54/366 X 98=14

Nurses 144/366 X 98=39

Laboratorians 42/366 X 98=11

Others 126/366 X 98=34

King Fahad Abdulaziz Hospital, n=72

Doctors 21/271 X 72=6

Nurses 67/271 X 72=18

Laboratorians 39/271 X 72=10

Others 144/271 X 72=38

Hajiya Farida General Hospital, n=46

Doctors 14/172 X 46=4

Nurses 59/172 X 46=16

Laboratorians 30/172 X 46=8

Others 69/172 X 46=18

Final respondents were selected by systematic random sample using, the daily staff register as sampling frame. The total population of the healthcare workers in all the health centres was 1538 that is Federal Medical Centre Gusau, Yariman Bakura Specialist Hospital, King Fahad Abdulaiziz Hospital and Hajiya Farida General Hospital.

For each health facility, to determine their sample size, the formular total number of healthcare workers in a facility/Total no. of healthcare workers in all the facilities multiplied by sample size was used .The healthcare workers are 729, 366,271, 172 respectively and based on our sample size of 410, the sample size from the health centres will be Federal medical centre Gusau, Yariman Bakura sprecialist, King Fahad Abdulaziz and Hajiya Farida general hospital, 194, 98, 72 and 46 respectively.

Data collection

3.6 Study Instruments

Interviewer- administered structured questionnaire adapted from WHO steps[9] was used, to collect data on socio-demographic characteristics, history of cigarette smoking, alcohol intake, dietary habits, fruits and vegetable intake, soft- drink and beverage intake, history of stress, physical activity, family history of cardiovascular diseases, and relevant medical histories.[9]

The anthropometric measurements which include weight(kg) and height(m^2) to generate the body mass index [BMI]), waist circumference and blood pressure in supine and erect positions , 5 ml of blood was collected from the participants for biochemical analysis 3ml in floride oxalate bottle for lipid profile and 2ml in plain bottle fasting blood sugar.

Scoring of CVDs and modifiable risk factors

Knowledge of cardiovascular diseases and risk factors of the respondents was done using knowledge score 0-4, 0-1 knowledge of zero or a disease or risk factor , score of 2-3 as knowledge of two or three diseases or risk factors, score of greater than 3 as knowledge of over four or more diseases or risk factors , then the knowledge is categorised in Good knowledge when >3 ,Fair knowledge a score of 2-3 and Poor knowledge a score of 0-1 of the cardiovascular disease or risk factors

3.7 Data Collection Method

This study was conducted between July to December 2015. Six research assistants were trained for four days on the questionnaire, data collection methods, calculation of BMI and the data were collected over a period of five days. Four trained research assistants with nursing,/health record,/data management background conducted the interviews using the adapted WHO STEPS questionnaires while the other two research assistants with community health and Laboratory science background measured the weight, height, to determine the BMI, blood pressure and took blood samples for FBS and serum lipids analysis.

The physical measurements include the height in metre (m), weight in kilogram (kg) to calculate the BMI. Waist circumference, blood pressure and a 5ml sample of blood for FBS and lipid profile was obtained using aseptic procedure at the venous plexus dorsal to the hand.

A total of 410 questionnaires were administered to the eligible respondents from the four health facilities giving a response rate of 100%.Blood pressure was measured using Omron digital sphygmomanometer, with expandable cuffs. Prior to the BP measurement participants were seated for 5 minutes to rest. Participants were made to sit on a chair with their feet flat on the floor, the left arm relaxed and the forearm supported at the cubital fossa to make the cuff at same level with the heart and the cuff is placed just above the elbow joint .

Then the START button was pressed and the machine light turns on and beeps and the unit start to monitor the reading using a dual sensor and self inflating the cuffs, if the unit is accurate and functioning well, the calibration checks the system light remains lit during the measurement when the measurement is completed, the cuff deflate and the blood pressure and pulse rate appears on the display.Omron automatically takes 3 readings consecutively a minute apart and displays the average, it also double check each reading, providing added assurance that the reading is accurate. Blood pressure based on WHO classification into mild, moderate and severe hypertension was done.

Weight (kg) and height (m) were used to calculate the BMI and the WHO classification was used BMI of <18.5 underweight, 18.5 – 24.9 normal weight and 25-29.9 as overweight and 30 and above as obesity.Weight was measured in kilogram with respondent standing barefooted with minimal clothing with pocket free of objects like handsets, wallet, and hand bags for ladies kept too. Bathroom weighing scale (Hansen China) was validated using a 10 kg mass, checked for zero error after each measurement.

A stadiometer was used to measure the height in cm, it was hanged against the wall, the participant barefooted and without headgear or caps were made to stand against the wall with the occiput, buttocks and Achilles against the wall. A pointer (ruler) was passed against the scalp and measurement was taken from the hanged stadiometer corresponding to the pointer

for accurate reading in meter to the nearest one decimal place. The measurement for the abdominal circumference was done to determine for abdominal obesity. Waist circumference of all participants was measured using a tape measure in cm, they were made to stand straight and abdominal muscles relaxed, the tape was placed mid way between the superior iliac crest and the last rib neither loose nor tight and wrapped around the waist and measured in cm.

Then 5 ml of whole blood was obtained from participants that consented. The procedure was explained to them and benefit of knowing their serum lipids and fasting blood sugar. Aseptic procedure was observed by a trained phlebotomist and the blood discharged into two different 2ml for fasting blood sugar and 3ml for serum lipid profile i.e. Total cholesterol , high density lipoprotein, triglycerides and low density lipoprotein and the sample was analysed in Yariman Bakura chemical pathology laboratory.

3.8 Data Management

3.8.1 Measurement of Variables

Independent variables

Age, sex, marital status, educational status, religion, monthly income, job cadre, good/poor knowledge, dietary habits, physical activity/exercise, alcohol consumption, tobacco smoking.

Dependent variables

These are BMI, high blood pressure(BP), high cholesterol, HDL, LDL and Triglycerides, High glucose level, High HDL levels.

Data were analysed using SPSS software version 17. Categorical variables were compared using - chi square. And results presented at 95% confidence interval and significance level of $\alpha<0.05$.

3.9 Ethical Considerations

Approval was sought from ethical/scientific committee of Zamfara State Ministry of Health, Yariman Bakura Specialist Hospital and Federal Medical Centre Gusau. Written Informed consent was obtained from all the study participants with the permission to opt out at will. Investigation results were shared with the participant.

3.10 Limitations

The validity of the result may be influenced by the recall bias of histories of smoking, alcohol intake, family history BP and Diabetes. Not all participants consented for the 5ml of blood to be taken despite informed consent signed. However, effort was made to convince the participants on the benefit of screening for diabetes and lipids.

CHAPTER FOUR:

4.0 RESULTS

A total of 410 questionnaires were administered for the study and all the respondents participated giving a response rate of 100%. However, only 364 (89%) consented to blood sample collection.

Socio-demographic characteristics of respondents

Table 4.1: Socio-demographic Characteristics of the health workers in secondary/tertiary facilities in Gusau

Parameter	Frequency (n=410)	Percent (%)
Age		
15-19	18	4.4
20-24	55	13.4
25-29	82	20
30-34	90	22
35-39	61	14.9
40-44	34	8.3
45-49	34	8.3
50-54	26	6.3
55-59	6	1.5
60+	4	1
Mean age	33(±9.6)	
Sex		
male	236	57.6
Female	174	42.4
Educational status		
primary	33	8
Secondary	28	11
Tertiary	45	81
Marital status		
Single	129	31.5
Married	266	64.9
Divorced	3	0.7
Widowed	12	2.9
Cadre		
Doctor	32	7.8
Nurse	170	41.5
Lab Scientist	49	12
Others	159	38.7

Others (Community health officers, community health extension workers, Physiotherapist, environmentalist, and social workers).

Majority of the respondents were males(58%), married (65%), tertiary education (81%), nurses(42%).and fall within the age group 20 to 34 years (55%) , less than 5% were below 19 and those over 50years were only 9%.

Table 4.2: Mean overall scores on the number of cardiovascular diseases the respondents were aware of:

Score	Frequency	Percent (%) (n=410)
Good	216	53
Fair	96	23
Poor	98	24

Majority of the respondents(53%) are knowledgeable about cardiovascular diseases and only about 24% have poor knowledge of cardiovascular disease.

Table 4.3: Knowledge scores of modifiable cardiovascular risk factors among respondents

Scores	Frequency	Percent (%) (n=410)
Good	287	70
fair	34	8
Poor	89	22

Majority of the respondents (70%) had good knowledge of cardiovascular disease risk factors.

Table 4.4: Distribution of various risk factors among different sexes

Parameters	Mean	Female	Male	N	p value
Age(yrs)	33.4±9.6	34±10.0	33±9.0	410	<0.001
BMI (Kg/M^2)	23.9±8.6	24.84±8.1	23.12±9.0	386	<0.001
Waist circumference (cm)	83.0±16.9	85.52±20.0	81.13±13.8	392	<0.001
Cholesterol(mg/d)l	140.7±38.3	136±39.0	144±38.0	364	<0.001
Diastole (mmHg)	126.3±12.0	78±12.0	77±12.0	403	<0.001
Systolic (mmHg)	77.3±19.0	124±23.0	128±15.0	403	<0.001

Missing values are not included

Table 4.4 above shows the gender difference among the participants of the cardiovascular risk factors, Age, BMI, Waist circumference, Cholesterol, systolic and Diastolic pressure show that there is statistical significant difference in all the parameters p-value <0.001.

Table 4.5: Blood pressure of respondents

Blood pressure		Frequency	Percent (%)
Systolic	<140	337	82.6
	≥140	73	17.4
Diastolic			
	<90	360	88.3
	≥90	50	11.7
Systolic/diastolic	≥140/90	34	8.4

Table4.5 shows a systolic blood pressure distribution, with 337(82.6%) normotensive, 73(17.4%) hypertensive, the diastolic blood pressure was 360(88.3%) normal and 50(11.7%) abnormal. 8.4 % of the respondents had blood pressure ≥140/90.

Table 4.6: Body mass index (BMI) of respondents

(n=407)

Weight	Female n=209	Male n=198	Total	P value
Normal BMI	111(53%)	84(44%)	195(48%)	<0.018
Underweight	30(14%)	21(11%)	51(13%)	<0.018
Overweight	52(25%)	51(26%)	103(25%)	<0.018
Obesity	10(5%)	32(17%)	42(10%)	<0.018
Morbid Obesity	6(3%)	10(2%)	16(4%)	<0.018

Missing values are not included

From the study 195(48%) respondents had normal weight and females were more likely to be underweight than males ($p<0.018$). Males were however more likely to be obese, but females were more likely to be overweight.

Table 4.7: Waist circumference of respondents

Waist Circumference (cm)	Frequency (n=167)	Percent (%)
Female n=167		
<88	92	55.1
≥88	75	44.9
Males n=225		
<102	214	95.1
≥102	11	4.9

Of the 167 female respondents, 92(55.1%) had waist circumference less than 88cm, 75 (44.9%) had abnormal WC > 88cm. whereas in Males 214(95.1%) of the male respondent had normal WC, 11(4.9%) had abnormal WC.

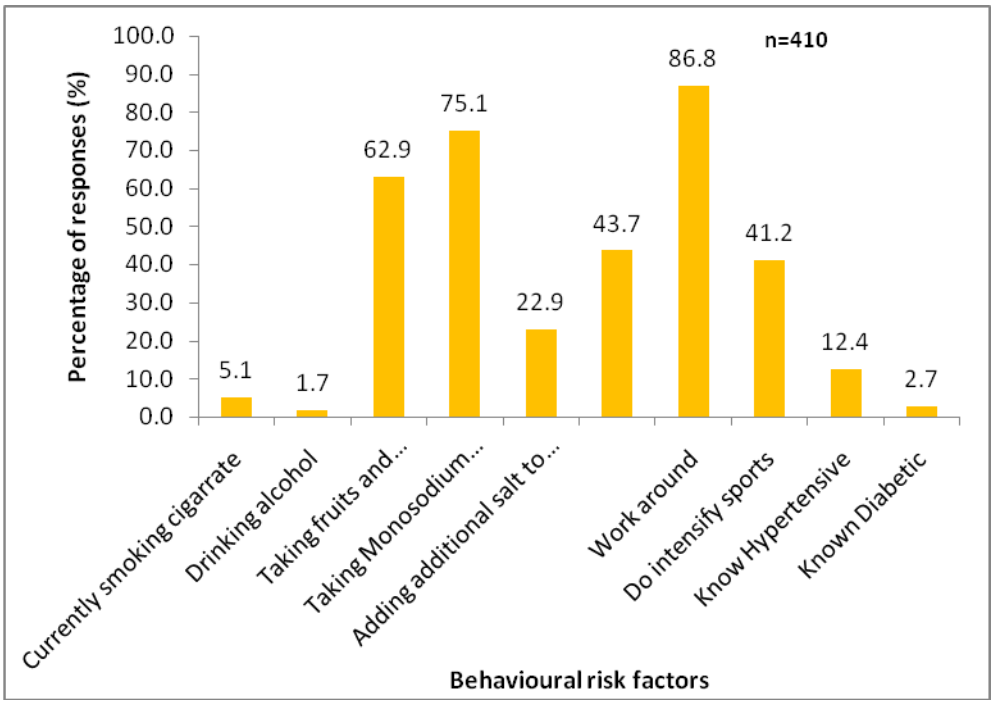

Figure 1: Behavioral risk factors among respondents

In terms of distribution of risk factors among the respondents, 86.8% walk around within working hours, 75.1% take monosodium glutamate, 62.9 % take vegetables and fruits, 43.7% sit at work for >6hours, 41.2 % partake in rigorous intensity exercise, 22.9% add salt on table, 12.4% were hypertensive, 5.1 % were current smokers, 2.7% were diabetic and 1.7% consume alcohol.

Table 4.8: Fasting blood sugar(FBS) among respondents

FBS	Frequency (n=364)	Percent (%)
Normal	267	73.4
Abnormal	97	26.6

The distribution of FBS, Two hundred and sixty seven (73.4%) respondents had normal blood sugar level and ninety seven (26.6%) had abnormal fasting blood sugar.

Table 4.9: Serum lipids profile of respondent

Variable		Frequency (n=364)	Percent (%)
Total cholesterol	Normal	336	92.3
	Abnormal	28	7.7
LDL	Normal	358	98.4
	Abnormal	6	1.6
Triglycerides	Normal	323	88.8
	Abnormal	41	11.2
HDL male	Normal	204	92.3
	Abnormal	17	7.7
HDL female	Normal	99	69.2
	Abnormal	44	30.8

Among the respondents, 28 (7.7%) had hypercholesterolaemia, 6(1.6%) had abnormal LDL, 41(11.2%) had abnormal triglycerides, 17(7.7%) of men had abnormal HDL and 44(30.8%) had abnormal HDL.

Table 4.10: Bivariate analysis of cardiovascular disease risk factors

Variable		Exposure	Outcome	OR	Lower 95% CI	Upper 95% CI	n	p-value
Systole/Age	Age	Systole<140	Systole >=140					
	<40 yrs	277	44	**2.923**	**1.664**	**5.135**	403	**<0.01**
	>=40yrs	56	26					
Cigarette/Systole	Cigarette	Systole<140	Systole >=140					
	Yes	19	2	2.064	.470	9.071	402	0.327
	No	332	70					
Intensify sports/Systole	Yes	Systole<140	Systole >=140					
	No	145	21	**1.800**	**1.033**	**3.136**	403	**0.030**
		188	49					
Knowledge/Systole	Knowledge of CVD	Systole<140	Systole >=140					
	<3	158	32	1.072	0.639	1.798	403	0.792
	>=3	175	38					
Knowledge of CVD Risk factors /Systole	CVD Risk factors	Systole<140	Systole >=140					
	<3	66	22	**0.539**	**0.304**	**0.956**	403	**0.033**
	>=3	267	48					
Extra salt/Systole	Extra salt	Systole<140	Systole >=140					
	Yes	81	12	1.554	0.795	3.036	403	0.195
	No	252	58					
Fruit /Systole	Fruit	Systole<140	Systole >=140					
	Yes	211	44	1.022	0.599	1.743	403	0.936
	No	122	26					
Alcohol/Systole	Alcohol	Systole<140	Systole >=140					
	Yes	6	1	1.266	0.150	10.684	403	0.828
	No	327	69					
Knowledge of CVD/Diastole	Knowledge of CVD	<90mm/Hg	>=90mm/Hg					
	<3	170	20	1.234	0.667	2.281	403	0.502
	>=3	186	27					
Knowledge of modified CVD Risk	CVD Risk factors	<90mm/Hg	>=90mm/Hg					

factors/Diastole								
	<3	76	12	0.792	0.392	1.599	403	0.514
	>=3	280	35					
Extra salt/Diastole	Extra salt	<90mm/Hg	>=90mm/Hg					
	Yes	98	4	**3.583**	**1.251**	**10.263**	403	**0.012**
	No	267	43					
Sitting at work(hrs)/Diastole	Sitting at work	<90mm/Hg	>=90mm/Hg					
	Yes	157	18	1.271	0.681	2.373	403	0.451
	No	199	29					
Age/Diastole	Age	<90mm/Hg	>=90mm/Hg					
	<40 yrs	294	27	**3.513**	**1.852**	**6.660**	403	**<0.000**
	>=40yrs	62	20					
Fruit /BMI	Fruit	BMI<25	BMI>=25					
	Yes	125	66	1.501	0.908	2.482	286	0.113
	No	53	42					
Sex/BMI	Sex	BMI<25	BMI>=25					
	Male	102	46	**1.809**	**1.116**	**2.933**	286	**0.016**
	Female	72	62					
Age/BMI	Age	BMI<25	BMI>=25					
	<40 yrs	156	72	**3.545**	**1.947**	**6.456**	286	**<0.000**
	>=40yrs	22	36					
Sex /Cholesterol	Sex	TL<200	TL≥200					
	Male	103	18	0.848	0.380	1.893	364	0.687
	Female	133	10					

In table 4.10, bivariate analysis was used to determine the statistical association between the exposure and outcome variables. The exposure variables in this study are the modifiable and the non modifiable risk factors which include age, cigarette smoking, drinking alcohol, taking fruits and vegetables, taking monosodium glutamate, adding salt on table, doing intense exercise , knowledge of cardiovascular diseases and their risk factors and having first degree relatives with cardiovascular disease. The outcome variables in this study were systolic blood pressure ≥140mmmg, Diastolic blood pressure ≥90, total cholesterol ≥200mg/dl, BMI ≥25.

Age was statistically associated with systolic BP and Diastolic BP. Those aged 40 years and above were more likely to have higher diastolic blood pressure (OR: 3.513; 95% CI:1.852-6.660)and systolic blood pressure (OR:2.923;95% CI:1.664-5.135). Intensity of exercise was

associated with systolic BP >140(OR: 1.800; 95% CI: 1.033-3.136). Addition of salt on table was statistically associated with diastolic BP (OR: 3.583 95% CI: 1.253-10.263). Female gender was statistically associated with BMI (OR: 1.809; 95% CI: 1.116-2.933) and older > 40years the higher the BMI of a person (OR: 3.545; 95% CI: 1.947-6.456).

However, currently smoking, knowledge of cardiovascular disease risk factors, taking alcohol, fruits and vegetables, sitting more than 6 hours were not statistically associated with cardiovascular diseases.

Table 4.11: Multiple linear regression analysis

Variables	Coefficients	Std. Error	F-test	p-value	95% CI	
					Lower Bound	Upper Bound
BMI	-0.035	0.174	-0.204	0.839	-0.377	0.307
Waist circumference	0.106	0.071	1.504	0.134	-0.033	0.246
Cholesterol	-4.996	0.13	0	1	-0.256	0.256
HDL	-0.015	0.132	-0.114	0.909	-0.275	0.245
LDL	0.025	0.128	0.197	0.844	-0.226	0.277
Triglycerides	-0.021	0.08	-0.261	0.794	-0.178	0.137
FBS	0.812	1.023	0.794	0.428	-1.204	2.828
Age	0.096	0.132	0.732	0.045	-0.163	0.356
Diastolic in mmHg	0.95	0.106	8.978	>0.01	0.741	1.158
CONSTANT	38.692	11.817	3.274	0.001	15.407	61.977

The table of multiple linear regression shows the relationship between systolic blood pressure with the following variables (BMI, Waist circumference, Total cholesterol. HDL, LDL, Triglycerides. FBS, Age and diastole). Diastole has a strong positive correlation with systole(r=0.95, p=<0.01), age also has a weak positive relationship with systole (r=0.09.p=0.04).Also FBS, WC, LDL, TC, Triglycerides were correlated and statistically significant.

CHAPTER FIVE:

5.0 DISCUSSION

Cardiovascular diseases as the leading cause of death globally,[11] needs a unique approach that is country specific in line with the stage of its development as described by Reddy who highlighted that though similarities and differences in the dynamics and determinants of CVDs exist between the developed and developing countries there is an increasing trend of CVDs in the low and middle income countries. Strategies to prevent cardiovascular disease spread must therefore recognized those similarities and differences, and principles of prevention must be based on evidence gathered in developed world, and interventions must be context specific and resource sensitive.[3]

Knowledge is the key to prevention and control of any disease. In this study, the knowledge of cardiovascular disease (53%), and modifiable cardiovascular risk factors (70%) too, in a similar study conducted in a university south western Nigeria, the level of knowledge about heart diseases was low with only 19.9%having good score.[18] However , another study in south western Nigeria showed the overall knowledge of cardiovascular disease was low with (56%)of the respondents notable to identify a risk factor but it was found that those with good knowledge of CVD and risk factors have more years of formal education, positive family history of CVDs or DM. This study recorded good knowledge score because of the high level of formal education among respondents (99%) and the research was conducted among health workers whose regular duty is to attend to patients with or without cardiovascular diseases.

In a study in Kazakhstan, more than half of the respondents could identify tobacco smoking (60.4%), alcohol (64.8%), overweight (72.5%) and hypertension (49.9%) as a risk factor for CVD. And the ability to identify a risk factor was high with more knowledge. However, only

one-fourth of the respondents had good knowledge and females were more knowledgeable than males(p=0.03). Employment and high income subjects were more likely to be more knowledgeable than other groups (p=0.022).[21]

In this study, 86.8% were found to do moderate exercise during their routine- work and 42.1%- do vigorous intensity exercise. This is similar to a study in Abia state with vigorous intensity exercise of 35.5%.[60] This is also similar to the national survey in 2003 that found a Prevalence of 41.1 %.[16] Physical activity is known to reduce the risk of cardiovascular disease, considering the respondents occupational background, more knowledge of the benefit of exercise or increased physical activity need to be addressed in order to address and achieve the World Health Organization's target of reducing cardiovascular diseases.

This study revealed that 75.1%, 22.9% and 62.9% of respondents took monosodium glutamate, add salt to meals and take vegetable and fruit respectively. The addition of salt and /monosodium glutamate to diet has a deleterious consequence as it indirectly leads to obesity and overweight.[43,45] A reduction of salt intake of 6gram per day is predicted to cause a fall in the blood pressure in both hypertensive and normotensive people. The finding are dissimilar to the study by Onyemelukwe and Ogah who reported 10% and 5% of salt added to diet. [16,60] The high practice of addition of salt to diet can be attributed to poor cardiovascular disease risk communication in the country as a whole and the possible cultural differences as the other two studies were carried out in the southern part of the country.

It was documented in this study that those who currently smoke constituted 5.1%. This is similar to the national prevalence of 9.7% in the NCD survey in south western Nigeria and the WHO estimate of 2008 of 4.6% of daily cigarette smoking.[16,61] The NDHS 2013 documented a national prevalence of 7% and the North West prevalence was 4.0%[10]. This is also similar to the study conducted in the south eastern Nigeria that revealed a prevalence of

6.3%.[60] Tobacco smoking still remains one of the most serious risk factors in CVDs. Males tend to have higher prevalence compared to women.[2] and others studies from Dakar and Ethiopia shows a higher prevalence tobacco smoking of 40%, and 20% respectively.[62,63]

Hypertension is a silent killer[2] and the third leading risk factor for death in West Africa. It is showing a rising trend due to urbanization , globalization and nutritional transition.[49] In this study, the prevalence of hypertension (blood pressure ≥140/90) was 8.4%, which is similar study in South –South Nigeria that showed a prevalence of 9.6% but in contrast to a study among healthcare workers in Mexico where prevalence of hypertension was 19%.[66]

The low prevalence of hypertension in this study may be due to good knowledge of the cardiovascular risk factors and the likelihood of the health workers to check their blood pressure routinely and since the study was carried out in Gusau it may be due to socio-cultural difference with the west as most West African studies documented a prevalence of blood pressure between 17.5-37.5%.[66] In another study in North Western Nigeria the prevalence was 39.1,[5] Nalado and his colleagues also found a high prevalence of systemic hypertension (78.45%).[67] Another study in North Central Nigeria found a prevalence of 36.6% among health care workers in Jos University Teaching Hospital.[68] However, considering the prevalence of systolic hypertention, this study showed a prevalence of 18.8 % which is similar to result of the national NCD survey of 2007 which was (22.5%).[16] It was also observed in this study that association of systolic blood pressure is significant with vigorous intensity exercise (OR 1.8, 95%CI 1.033-3.135, P=0.03) and age (OR 2.923, 95% CI 1.664-5.135, P=<0.001). However, they were not significant with addition of extra salt, cigarette smoking and alcohol consumption.

The prevalence of Diabetes from the study was 26.6% ,which is keeping with the rising prevalence in low and middle income countries. In a study carried out in four sub-Saharan

African countries that was hospital based.A cross sectional studies showed that the predominant risk factor for CVDs was hypertension (74.1%,), obesity (36.2%), and excessive alcohol consumption, (25.6%).Also DM 17.7 versus 10%, Obesity 42.8% versus 16.8% and hypercholesterolaemia 25.8% versus. 18% were more prevalent among the hypertensives than the normotensives. The metabolic syndrome was more in women and hypertensive patients.[75] Diabetes mellitus has been a diseases of urbanization and a study in Ghana revealed that the odds of getting diabetes was 3.6 times higher in urban than in rural settlers. Other studies in Tanzania and Ethiopia had a prevalence range of 7.6%-16.1%, family history and hypertension were significant determinant of Diabetes.[77]

In a study to determine metabolic syndrome in rural North Western Nigeria, high prevalence of 25.78% was reported, Of these, systemic hypertension was found to be 78.45% while all had elevated cholesterol and TG, abdominal adiposity was 38.79% and 44(37.93%) had type 2 DM.[80] These findings were similar to those established in this study which may have occurred due to similar dietary habits observed between the two populations. The national NCD survey of 2003 put the prevalence of DM at 3% and was estimated by International Diabetic Federation to be about 4.4%.[81] These may be dissimilar with what we found due to the time lag which allows for epidemiologic transition between the studies and also the diverse dietary habit of the two populations. Another study in South Eastern Nigeria revealed a prevalence of 3.6% which differs with finding of 26.6%. This can also be attributed to the variation in the dietary habit.[60]

The prevalence of overweight (25%) and obesity(10%) recorded in this study are comparable to 21.4% prevalence of obesity among urban adults in Jos Nigeria[70] and 30% prevalence of overweight and obesity in a study conducted among civil servants in Zaria, Nigeria. Difference in the prevalence of overweight/obesity between gender showed males are more likely to be obese than the females which is different from other studies. The sharp proximity

in overweight among the participants may be due to the same occupational exposure and similarity in hours spent walking during the day. Other studies findings shows that most males are sedentary after working hours where as female engaged themselves with household duties expending more energy than the males after working hours. However the result showed that male are more likely to be overweight than the females. Among the participants females were more likely to be morbidly obese than males. This may have resulted due to fat accumulation with subsequent deliveries.

Sex was showed to be positively associated with BMI (OR 1.809, 95% CI 1.116-2.933, P=0.016) and age is also a determinant of the BMI (OR 3.454, 95% CI 1.947-6.456 P=0.0001) age older than 40years were more likely to be obese than less than 40years.

The prevalence of abdominal obesity among the participants was unfavourably higher among females (44.9%) with WC >88cm than among (males4.9%)with WC > 102cm. This is similar to a study in Abia State, Nigeria, which found higher abdominal obesity among females (39.2 %) WC >88cm than among males (3.2%) among males.[73] It is also similar to findings from a study in urban Cameroon where the WC >88cm among females was 66% and the WC among the male respondents was 18%.[74] This high prevalence of abdominal obesity may be related to multi-parity of the females and their inability to shed the adipose tissue accumulated in pregnancy. High prevalence of abdominal obesity among the females may have serious consequences because it is linked to the risk of premature death, deep venous thrombosis and metabolic syndrome.

This study shows the prevalence of serum total cholesterol at 7.7%, high LDL 1.6%, high triglycerides 11.2%, abnormal HDL among males 7.7% versus 30.8% females. Norman and colleagues found that high cholesterol accounted for 59% of IHD and 29%ischaemic stroke burden in adults aged 30 and above.[2] In a study conducted in China among the overall

population, 45.8 % suffered from dyslipidemia. The prevalence of lipid abnormality was 18.6%, 12.7%, 9.8 %and 12.7 % for total cholesterol (TC), high-density lipoprotein (HDL), and low-density lipoprotein (LDL)and cholesterol and triglycerides (TG), respectively. Among all participants with dyslipidemia, 23.9 % were aware, only 11.5 % were treated and 10.0 % were controlled. For subjects with dyslipidemia, the risk for non-alcoholic fatty liver disease (NAFLD) was highest with a 3.3-fold over that of non-dyslipidmia (OR = 3.30, P < 0.001); followed by hyperuricemia and diabetes mellitus (DM), while with 2-fold increase (OR = 1.99, P < 0.001; OR = 1.92, P < 0.001); with only 1.5-fold risk for atherosclerosis (AS) (OR = 1.47, P < 0.001). The presence of high cholesterol was mainly associated with AS, while abnormal TG was correlated with NAFLD and DM.[82] The low levels of the serum lipids in our study may be due to the epidemiologic differences between the developed and developing countries.

Comparing our findings of serum total cholesterol (7.7%) , serum triglycerides (11.2%), high density lipoprotein (19.3%) and low density lipoprotein(1.6%) with a study conducted in Kumasi Ghana, almost half of the patients (45%) had serum total cholesterol concentration >5.17 mmol/L and 26% had also serum triglyceride concentration >1.69 mmol/L. High-density lipoprotein (HDL)-cholesterol dyslipidemia (HDL< 1.03 mmol/L) was found in 30.5% of the patients, and low-density lipoprotein (LDL)-cholesterol dyslipidemia (LDL>2.58 mmol/L) in 72%. Serum total cholesterol concentration was significantly high in the patients with hypertension alone (p=0.01).[83] It showed that the relatively low lipid profile in our study may not be unconnected to the diverse socio-cultural background and dietary habit between the two countries.

In a study in Port Harcourt among healthy adults, the mean fasting blood sugar, mean total cholesterol and mean LDL cholesterol were 4.45 ± 0.89 mmol/L, 4.76 ± 1.06 mmol/L and

3.65 ± 0.89 mmol/L respectively . The mean total triglyceride was 1.02 ± 0.30 mmol/L while the mean HDL was 0.90 ± 0.25 mmol/L. There was an increase in total cholesterol with increasing age and an increase in total cholesterol and LDL cholesterol with increasing social class. Subjects with total cholesterol above 6.5 mmol/L constituted 31.52% of study subjects. Comparing this study results with these, it shows that the health workers in Gusau have lower prevalence of dyslipidemia and females tend to have higher HDL.[84]

CHAPTER SIX:

6.0 CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

In this study, the behavioural risk factors for cardiovascular diseases such as addition of salt on table, use of monosodium glutamate, low vigorous physical activity was high. Effort to address such challenges will curtail the epidemic of cardiovascular diseases. The low prevalence of hypertension (8.4%) among the health workers might be an iceberg phenomenon opening up a chance for more community based research on cardiovascular disease to determine the morbidity and mortality.

The high prevalence of DM in the study is a wake-up call to the magnitude of non-communicable disease even among the health workers. Dyslipidemia was generally low in this study. Obesity and underweight coexist giving a clue to a double prong approach in the management of Malnutrition.The study highlighted a good knowledge of CVD and its modifiable risk factors:- the good knowledge needs to be maintained as the trend of CVDs is increasing in the developing countries.

6.2 Recommendations

1. The Zamfara State Ministry of Health and the hospital authorities should reduce the number of sitting hours at work and encourage light exercise at work.
2. The Zamfara State Ministry of Health together with the hospital management should provide free routine cardiovascular disease risk screening for employees at least twice a year for early detection and prompt treatment.
3. The Zamfara State Ministry of Health and the hospital authorities should create campaigns/workshops to hospital staff to improve awareness of cardiovascular disease risk factors.

4. The Zamfara state ministry of health and other stakeholders should encourage overweight and obese staff to shed weight by giving dietary advice by the nutritionist and also the introduction of hospital gymnasium to increase physical activity.
5. The health workers should be given update on the risk factors of CVDs and also improve on their physical activity because they serve as role models to the community.
6. The health workers should conduct annual fasting blood sugar screening for early detection and prompt treatment of Diabetes mellitus.

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APPENDICES

Appendix I

Questionnaire

Prevalence and Risk Factors for Cardiovascular Diseases among Health Workers , Gusau, Zamfara State.

1. Sex
   - Male
   - Female
2. Age in years
3. Hospital
   - Yariman Bakura Specialist Hospital, Gusau
   - Federal Medical Centre, Gusau
   - King Fahad Ibn Abdulaziz Maternal and Child Hospital, Gusau
   - Farida General Hospital, Gusau
4. Cadre
   - Doctor
   - Nurse
   - Laboratory scientist
   - Administrative staff
   - Others specify
5. Marital Status
   - Single
   - Married
   - Divorced
   - Widowed
6. Highest level of Education
   - No Formal Education
   - Primary School
   - Secondary School
   - Tertiary

Tobacco Use

7. Do you currently smoke cigarette?

Yes No

8. How long have you been smoking in years? ____years

9. On average how many sticks of cigarette do you smoke in a day? ____stick

Alcohol Use

10. Have you ever drink alcohol?

    Yes

    No

11. How many bottles do you drink in a day ?--------

12. For how long did you drink alcohol ?---------years

Diet

13. Do you take fruits and/or vegetable daily?

    Yes

    No

14. In a typical week , on how many days do you eat fruit and/or vegetables ?from 0-5days -------day

15. What is your usual source of protein?

    Beef Chicken

    Fish Mutton Others specify

16. What is your staple food?

    Tuwo Beans

    Rice Fura da nono

    Others specify

17. What type of oil or fat is most often used for meal preparation in your household?

    Vegetable oil Palm oil

    Groundnut oil Other specify

    I don't know

18. Do you take monosodium glutamate/ Ajinomoto in your food?

    Yes

    No

    I don't know

19. Do you add additional salt to your food?

    Yes

    No

20. How many bottles of soft drinks do you take per day?

    ------bottles/cans

    None

    I don't know

Physical Activity/ Sedentary Behavior

21. Does your job entail sitting down the whole day?

    Yes

    No

22. How long do you have to sit at work daily in hours?-------hours
23. Do you walk around for at least 30 minute daily?

    Yes

    No

24. Do you do any vigorous intensity sports, or recreational activities that cause large increase in breathing or heart beat like running/football for at least 30 minutes continuously?

    Yes

    No

25. In a typical week , on how many days do you do moderate intensity sport/exercise or recreational activities?

    --------day

    None

History of Raised Blood Pressure

26. Are you a known hypertensive?

    Yes

    No

    I don't know

27. Are you taking any hospital drug for hypertension?

    Yes

    No

28. If yes which drug are taking? ----------

29. Do you take this drug regularly as prescribed by the doctor?

Yes

No

30. Have you seen a traditional healer for raised blood pressure?

Yes

No

31. Are taking any traditional/local treatment?

Yes

No

History of Diabetes

32. Are you a known diabetic?

Yes

No

I don't know

33. Are you taking any drug for Diabetes?

Yes

No

34. If yes which drug are you taking for diabetes? ----------.

35. Do you take this drug regularly as prescribed by the doctor?

Yes

No

36. Have you ever seen a traditional healer for diabetes?

Yes

No

37. Are you taking a traditional/ local treatment for diabetes?

Yes

No

History of High Cholesterol

38. Where you ever told you have high cholesterol in the hospital?

Yes

No

I don't know

39. Which drug are you taking for high cholesterol?----------

40. Do you take your drug regularly as prescribed by your doctor?

Yes

No

41. Have you ever seen a traditional healer for high cholesterol

    Yes

    No

42. Are you taking traditional/ local treatment for high cholesterol?

    Yes

    No

Knowledge of Cardiovascular Disease and Risk Factors

43. Which of the cardiovascular diseases are you aware of?

    Hypertension

    Stroke

    Heart disease

    Diabetes

    Others specify

44. Do you have a first degree relative(parents, siblings, and children) who is hypertensive, diabetic ,stroke, heart disease?

    Yes

    No

45. Which of the cardiovascular risk factors are you aware of?

    Smoking

    Alcohol

    Physical inactivity/sedentary life style

    High blood pressure

    High cholesterol

    Obesity

    Diabetes

    Family history

    Old age

Physical Measurements

Variables	Reading/Value	Comment
Weight in kg		
Height in meter		
BMI= WEIGHT/HEIGHT^2		
Waist circumference in cm		
Total Cholesterol		
Triglycerides		
HDL		
RBS		
BP-SYSTOLIC in mmhg -DIASTOLIC in mmhg		

Thank you!

Appendix II

Ethical Clearance

ZAMFARA STATE OF NIGERIA

ZAMFARA STATE HEALTH RESEARCH ETHICS COMMITTEE
MINISTRY OF HEALTH

Registration Number: NHREC/10/11/ 2011b

OFFICE:
J.B Yakubu Secretariat
Gusau,
Zamfara State

Our Ref MOH/SUB/482 /VOL 1
Your Ref .....

Date 15th june,2015

Health Research Committee assigned number: ZSHREC/02/06/2015

Notice of Full Approval after full Committee Review

RE: The Prevalence and Risk Factors for Cardiovascular Diseases among Healthcare Workers in Secondary/Tertiary Health Facilities in Gusau, Zamfara State.

This is to inform you that the research described in the submitted protocol, the consent forms, advertisements and other participant information materials have been reviewed and *given full approval by the Health Research Ethics Committee*. This approval dates from 15th June, 2015 to 16th June, 2016. If there is delay in starting the research, please inform the HREC so that the dates of approval can be adjusted accordingly. Note that no participant accrual or activity related to this research may be conducted outside of these dates. *All informed consent forms used in this study must carry the ZSHREC assigned number and duration of ZSHREC approval of the study. The National Code for Health Research Ethics requires you to comply with all institutional guidelines, rules and regulations and with the tenets of the Code including ensuring that all adverse events are reported promptly to the ZSHREC. No changes are permitted in the research without prior approval by the ZSHREC except in circumstances outlined in the Code. The ZSHREC reserves the right to conduct compliance visit to your research site without previous notification and to have copy of your findings after the research.*

Chairman, ZSHREC

YARIMAN BAKURA SPECIALIST HOSPITAL GUSAU

OFFICE:
Tudun Wada
Round About
Gusau, Zamfara State

Your Ref: No:
Our Ref No: YBSH/SUB/205/VOL.1

Date: 15th June, 2015

Medical Director
Dr. Bello A. Mohammed MBBS.FWACS

Head of Clinical Services
Dr. Aminu Muhammad Sakajiki MBBS. MSC. Med. FMC

Director of Administration/Secretary to the Board
Alh. Abubakar Natama Jangebe NCE, B Ed, M.A (UDUS)

Dr. Ahmad Sufyan Jibrin
Nigerian Field Epidemiology &
Laboratory Training Program,
No. 50 Hailles Selasie,
FCT, Abuja.

RE: APPLICATION FOR ETHICAL APPROVAL

Sequel to your letter dated 8th June, 2015 on the above subject, I am directed by the Research and Ethics Committee of Yariman Bakura Specialist Hospital, Gusau to convey its approval to you to carry out research entitled "The prevalence & risk factors for cardiovascular diseases among health care workers in secondary and tertiary health facilities in Gusau Zamfara State".

Best wishes.

Aminu Mohammed Sirajo
Secretary of Committee

Federal Medical Centre, Gusau Zamfara State
Nigeria

Research and Ethics Committee

31st August 2015

Ethics Reference No: Please quote this ref. on all correspondence	FMC/2015/985/9
Project Title:	**Prevalence and Risk Factors for Cardiovascular Diseases among Health Workers, Gusau Zamfara State.**
Researches Name (s):	**Dr. Ahmad Sufyan J.**
Supervisor (s):	**Dr. A Abubakar**
Purpose:	**Masters in Field Epidemiology**
Institution / University	**Nigerian Field Epidemiology and Laboratory Training Programme**

Thank you for submitting your application which was considered at the Federal Medical Centre, Gusau Research Ethics Committee meeting for review of proposals which held on the 08/07/2015. The following documents were reviewed:

1. Ethical Application Form	NA
2. Participant Information Sheet	NA
3. Consent Form	NA
4. Questionnaires	NA
5. Research Proposal	08-08-2015

The Centre Research and Ethics Committee approve this study from an ethical point of view.

Approval is given for your project. Please note that project /research which have not commenced within one year of original approval, must be re- submitted to the centre, Ethics Committee.

The Ethics Committee must be informed when the research has been completed. If you are unable to complete your research within one year validation period you will be required to write to the Ethics Committee to request an extension or you will need to re-apply.

The soft and hard copies of your findings should be submitted to the Desk Officer HREC for record purposes. Note that your findings should be strictly used for the purpose of your research work only.

Approval is given on the understanding that the Guidelines for Ethical Research practice (http:www.nhec.net) are adhered to.

Yours sincerely,

Dr, Aremu S.B (FMCP)
Member HREC

Dr, Danladi Abubakar (FMCS)
Chairman HREC

ZAMFARA STATE OF NIGERIA

MINISTRY OF HEALTH

ADDRESS: J.B. Yakubu Secretariate, Gusau - Zamfara State.
☎:063-203772, 200906, 200896

Our Ref: Your Ref: Date: 27th April, 2015

The Medical Director
Yanuman Bakura Specialist
Hospital, Gusau.

LETTER OF INTRODUCTION

I am directed to introduce to you Dr. Ahmad Sufyan Jibrin of the Nigerian field epidemiology & laboratory training programme and a resident in the department of public health of this ministry.

He intends to carry out research on the cardiovascular risk factors of health care workers in the secondary and tertiary centers in Gusau, to enable him conclude his proposal, he needs background information of your institution.

Kindly accord him the necessary support to accomplish the task.

Yours faithfully,

27/4/15

Dr. Habibu Yalwa.
Director Public Health
For: Hon. Commissioner.