ASSESSING THE RISK FACTORS OF CORONARY HEART DISEASE AMONG RURAL ADULTS IN THE JOE GQABI DISTRICT: EASTERN CAPE

by

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ABSTRACT

Cardiovascular disease (CVD) such as coronary heart disease (CHD) is a contributing factor to a large percentage of mortalities and morbidities worldwide including in affluent South African setting. In the Eastern Cape of Province, South Africa, there is no extensive data reported on Coronary Heart Disease (CHD) determinants and risk factors. The present study sought to assess the risk factors and determinants of CHD.

This case (n=50) control (n=50) study matched for sex and age, was conducted among Xhosa adults from rural and semi urban/ township areas of Joe Gqabi District, Eastern Cape Province of South Africa. Non modifiable, environmental, lifestyle, and psychological factors were investigated using univariate analysis and multivariate logistic regression analysis.

Depression, alcohol excessive intake, family history of CHD were the CHD univariate risk factors. The independent risk factors of CHD were uncontrolled systolic hypertension (Odds Ratio (OR)=95; 95% Confidence Interval 16.9-128; P< 0.0001), personal history of hypertension (OR=72; 95% CI 15.8-328; P<0.0001), married (OR=6.7;95% Confidence Interval 2.2-20.9; P<0.001), personal history, of diabetes mellitus (OR=6.3; 95% CI 1.1-42.4; P=0.049), no intake of fibre (OR=3.6;95% CI 1.1-12.8; P=0.049), semi urban/township (OR= 6.5; 95% Confidence Interval 2-20.5; P=0.002), and severe overall obesity (OR=5.8; 95% CI 1.5-22.4; P=0.011).

In front of a multifactorial disease driven by interactions of socio determinants and traditional risk factors, urgent programmes of education, clinical management and health promotion for adequate diet, physical activity, adherence and compliance to medication and are needed to curb epidemic proportions of CVD risk factors.

DECLARATION

I, Thando Tetana, Student Number 199003874 hereby declare that an investigation into "Assessing the risk factors of coronary heart disease among rural adults of Joe Gqabi District: Eastern Cape" which I submit for the degree of MASTER OF PUBLIC HEALTH (COMMUNITY MEDICINE) at Walter Sisulu University is my own work and all relevant references are shown in the reference list. The study has not previously or in part been submitted at any university in order to obtain an academic qualification

Master's Candidate Thando Tetana

SIGNATURE

DATE

SUPERVISOR

DATE

DECLARATION ON PLAGIARISM

(i) I am aware that plagiarism is defined at Walter Sisulu University (WSU) as the inclusion of another's or others' ideas, works, discoveries and inventions from any source in an assignment or research output without the due, correct and appropriate acknowledgement to the author(s) or source(s) in breach of the values, conventions, ethics and norms of the different professional, academic and research disciplines and includes unacknowledged copying from intra-and internet and peers/fellow students.

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CHAPTER 1: ORIENTATION AND OVERVIEW OF THE STUDY

1.1 INTRODUCTION

Globally, cardiovascular disease (CVD) has to date been labelled as among the main causes of death and has claimed an estimate of 17 million lives, it is no longer just a problem of industrialized world as previously labelled (WHO, 2011). Maredza, et al. (2011) published that the South African burden of CVD was rapidly escalating amongst all age groups, race, gender and was predicted to become the prime contributor to overall morbidity and mortality in the over fifty (50) year age group (Maredza, et al.,2011).

Cardiovascular disease have been defined as disease which encompass conditions or disorders of the heart and referred to as "any disease of the heart and blood vessels", the most common ones are diseases of the heart muscle, strokes, heart attacks, heart failure and heart disease" (Steyn, 2007).

In 2011, the World Health Organization published the prevalence of CVDs on the prioritized research agenda for prevention and control on non communicable disease among countries, by highlighting the significant burden among high income countries and low middle income countries. The latest evidence shows that nearly 85% of the global mortality and disease burden from CVD is borne by low- and middle-income countries (LMIC). The increase in CVD burden in LMIC has largely been the result of the rapid economic transition; urbanisation (which may be due to people leaving their rural home in search for a better life), industrialisation and globalisation, thus bringing about lifestyle changes which stimulate heart diseases (WHO, 2011).

1.2 THE WORLD IN TRANSITION: IMPLICATIONS FOR CARDIOVASCULAR DISEASE

1.2.1 Epidemiological Transition

The substantial increase on cardiovascular disease related mortalities and morbidity within LMIC and High Income Countries is part of the broader concept dubbed as

"epidemiological transition", which was recorded by Olshansky and Pearson (Mbewu, et al., 2006*).*

In 1994, a journal article by Mackenbach described epidemiological transition as the historical development of mortality overtime and which is characterized by three phases, namely, "Age of pestilence and famine, Age of receding pandemics, and the Age of degenerative and man-made diseases", this was a transition from a cause of death pattern dominated by infectious diseases with a very high mortality, especially at younger ages to a pattern dominated by chronic diseases and injuries (Mackenbach, 1994). Epidemiologic transition provided a potentially powerful framework for the study of disease and mortality in populations and its primary purpose is to describe and explain the spectacular fall in mortality which has occurred in all industrialized countries and can be used to speculate future changes in mortality in countries which are lagging behind to those which have already completed the epidemiologic transition (Mackenbach, 1994).

Fourteen years later in 2009, Mbewu described the epidemiological transition as the transition that comprises of four stages which are "Age of pestilence and famine, Age of receding pandemics, Age of degenerative and man-made diseases, and Age of delayed degenerative diseases." This transition is mainly fuelled by rapid changes in demographics which include the declining rate of infant and child mortality resulting in large increases in the number of individuals who survive until middle and older age (Mbewu, 2009). Secondly, a major decrease in the number of communicable disease related death rates due to improved immunizations, maternal health, nutrition programs and socio economic development, however in the same breath the socio economic changes have resulted in environmental and behavioural determinants of CVD such as but not limited to: tobacco use, physical inactivity, increase in fatty food consumption (Mbewu, 2009).

Lessons learnt from the Heart of Soweto Study by Pretorius, et al. (2011) affirms the statements by Mbewu, at which they stated that South Africa is concurrently experiencing epidemiological transition with diseases of lifestyle on the increase, while still being burdened by poverty related diseases as well. The socio-economic status and

development of a country have a direct impact on the mortality and morbidity of its people.

(Luepker, 2012) reviewed on the implications of CVD on the epidemiological and demographic transition as the health trajectory at which cardiovascular diseases are becoming the leading causes of morbidity and mortality among adults in both industrialized and developing world. Historically, the peak and decline of the CVD epidemic in the 1960s and 1970s in some countries was not well recognized, which lead to calls for more population-based disease surveillance. The Framingham study and the WHO Multinational MONItoring of Trends and Determinants in CArdiovascular Disease (MONICA) Project were the most comprehensive approach to better understanding disease transition, etiology, incidence and trends at the population level (Leupker, 2012).

1.2.2 Demographic Transition

In recent years Africa, in particular the Sub Saharan Region has undergone demographic transition which resulted in the epidemiological transition. Mbewu, et al. (2006) clarifies this transition as a transition marked by a rapid shift in population mortalities from infancy to adulthood, where there has been evident decline in infant and child mortalities thus resulting in the number of individuals surviving until middle and older age. Declining mortality rates are a result of improved public health care which is accompanied by socio economic development, improved vaccination and improved Primary Health Care services (Mbewu, et al., 2006).

In South Africa (SA) when the African National Congress (ANC) led government came into power in 1994 a national health plan was developed which focused on key priority programmes (maternal and child health, nutrition, the control of communicable disease, violence and special attention to vulnerable groups such as programmes for women's health, rural areas, chronic illnesses) and to provide targets for implementing changes to the current health system (national Health Policy, 1994). This crucial health policy development positively influenced the shift in geographical distribution of health care and the patterns of internal and international migration thus resulting in epidemiological transition (National Health Policy, 1994).

1.2.3 Economic, Social and Nutritional transition

These transitions are marked fundamental changes in the main determinants of health and seem to indicate the point in economic development at which the vast majority of the population gained reliable access to the basic material necessities of life. As the country improved on policies (National Planning Commission: National Development Plan Vison 2030, 10 point plan) and health care services over the years in addressing communicable diseases, the occurrence of chronic non communicable diseases still continued to escalate leaving the country in an alarming state of vulnerability.

Among the total South African population, there are 800 deaths per 100 000 as a result of cardiovascular disease and in every 10 minutes one South African dies from a cardiovascular related disease (Anand, et al., 2008) The Heart of Soweto Study in Pretorius, et al. (2011) suggest that data on the population of Soweto has shown a low prevalence for CVD and the underlying risk factors, as this might however be changing, as several studies have shown that urbanisation and the nutrition transition in South Africa is accompanied by an increase in the CVD risk factors in those of African descent. According to Venter (2008) urbanisation lead to a lifestyle change and with it a reduction in physical activity. This combined change is a known risk factor for increasing hypertension, may explain the 40.2 % prevalence of hypertension found in West-African urban subjects (35 years and older).

Several studies and reviewed data on Sub Saharan black Africans scientifically suggest that black Africans pose higher vascular reactivity, "but whether this contributes to smooth muscle cell changes, and the underlying mechanism thereof, is largely unknown" (Venter, 2008). More data is however needed to determine whether this increase in CVD risk is related to urbanisation per se, or whether socio-economic position influences the nutrition transition and related increase in CVD risk.

1.3 BACKGROUND

It has been scientifically assumed from the start that Cardiovascular Diseases do not have a single cause. Rather it is a result of multiple causes which worked slowly on the individual to produce the disease. Reliable data on disease progression of cardiovascular disease and its risk factors has been recorded differently among individuals and countries. In the Eastern Cape region: South Africa there has not been sufficient data reported on disease progression and currently rely on studies done in other countries and provinces, such as the Heart of Soweto Study, a risk factor profile for chronic lifestyle disease in three rural Free State towns to name a few.

1.4 PROBLEM STATEMENT

When the African National Congress (ANC) led government democratically assumed power in South Africa in 1994 using two pre- election document (The Reconstruction and Development Programme :RDP and a National Department of Health: National Health Plan for South Africa) as means to guide the imminent reform and declaring free health services for all. The National Health Plan for South Africa clearly elaborated in detail the post-apartheid health strategy and viewed health from a development perspective (National Health Policy, 1994). The plan aimed at redressing and reforming the country's health care system which was suffocated by major past distortions, inequalities and inefficiency in health care delivery that was influenced by racial segregation (Van Rensburg, 2011).

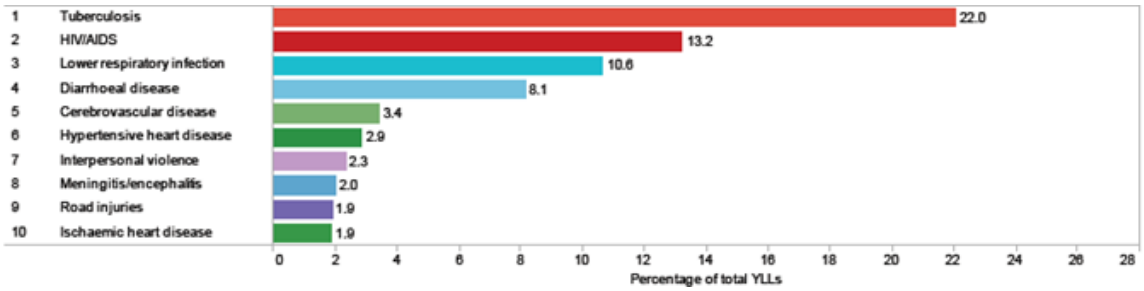
South Africa is a country of great diversity, extending from highly industrialised cities where people follow urban westernised lifestyle to remote rural regions with traditional lifestyles. Pre 1994 health data show that infectious and parasitic diseases were responsible for 14% of deaths amongst Black people, 2% of deaths among White people. Cardiovascular disease accounted for 12% of deaths among Blacks (4 million), and 40% of deaths among Whites, that is, 2 million (National Health Policy, 1994). Back then, mortality and morbidity was strongly related to poor environmental and socio-economic circumstances as well as to lifestyle. Chronic diseases were emerging as an increasing problem in all population groups especially in the rural areas (National Health Policy, 1994). Twenty years later, the situation has exacerbated with an increase in urbanisation, cardiovascular disease related risk factors are becoming more

and more prevalent among blacks namely hypertension, diabetes and obesity. This highlights the magnitude of the problem our country is facing. Within the Eastern Cape Province: South Africa, prevalence of CVD and determinants differ, in Joe Gqabi District during 2011/2012 financial year, hypertensive heart disease accounted for 2.9% Years of Life Lost (YLL) and 1.9% on ischaemic heart disease.

Joe Gqabi District in 2013, there has been a significant increase in the working-age population which was 34.2% of the total population which are in the working age group (that is, 20-49 years) and 14.59% between 50-79 years. This demographic shift has both positive and negative district policy implications which are influenced by socioeconomic and behavioural patterns. During 2012/2013 financial year, the district prevalence of hypertension was at 29.2% and 2013/2014 first quarter prevalence on 25.8% with Maletswai Sub District (semi urban) at 35.2% as the highest among the three sub district. Figure 1.1 cited from Massyn, et al. (2014) elaborates the top ten leading causes of mortality in Joe Gqabi District, and amongst the top five, cerebrovascular disease accounts for 3.4% of mortalities. Followed by Hypertensive heart disease accounting for 2.9% of year's life lost and lastly, Ischaemic heart disease which accounts for 1.9% of years of life lost.

The continued occurrence of CVD especially in this District (Joe Gqabi) which is characterized by heavy resource constraints calls cost effective interventions in the management of cardiovascular disease. This provides compelling reasons for a detailed demonstration of risks factors which motivates for an important step towards investigating why the apparent failure of the interventional programs and this proximal and district determinants of CVD.

Figure 1.1**:** Leading of causes of death in Joe Gqabi District, Eastern Cape



Source: District Health Barometer 2012/2013 (Massyn, et al., 2014)

1.5 RATIONALE OF THE STUDY

The lack of valid information on the etiology of CVD in Joe Gqabi District: Eastern Cape justified the initiation of the present study.

1.6 SIGNIFICANCE OF THE STUDY

It is then, that the researcher felt an extreme urgency to assess the risk factors of coronary heart disease among rural adults in the Joe Gqabi District: Eastern Cape Province. This has been fuelled by the affirmation of the Ministry of Health on the unequal development which includes poverty and health illiteracy which is strongly associated with increased mortality and morbidity. Furthermore, the researcher also feels that the baseline analysis and findings of the study will assist in the latest focus of developing a tailored detection and treatment strategies for those individuals unfortunate enough to develop clinically detectable forms of CVD and in development of integrated care interventions for cardiovascular disease in the district in order to shorten what is shaping up to be a devastating epidemic in vulnerable communities subject to the profound effects of epidemiological transition.

1.7 RESEARCH QUESTIONS OF THE STUDY

The research questions were raised as follows:

1. what are the risk factors of CVD (Coronary Heart Disease) in Joe Gqabi District, Eastern Cape: South Africa?

2. what are the most important independent risk factors among non modifiable,

environmental risk factors, socio demographic risk factors, traditional risk factors, physiological risk factors, lifestyle/behavioural factor and psychological factors.

1.8 AIM

The aim of this study was to assess the risk factors of coronary heart diseases (CHD) among rural adults in Joe Gqabi: Eastern Cape Province with a purpose of accelerating and strengthening the planned health promotion (primary intervention) activities.

1.9 OBJECTIVES OF THE STUDY

The objectives of the study were specifically designed to achieve the aim of the study as follows:

1. To determine the demographic profile of diagnosed CHD cases and undiagnosed controls
2. To determine the anthropometric risk factors of diagnosed CHD cases and undiagnosed controls
3. To assess the behavioral determinants of cardiovascular diseases (diet, smoking habits, alcohol use and physical activity) among diagnosed CHD cases and undiagnosed controls
4. To describe the environmental risk factors and psychological risk factors of diagnosed CHD cases and undiagnosed controls

1.10 THEORETICAL FRAMEWORK WITH CONCEPTUAL MODEL OF THE STUDY AND HYPOTHESIS

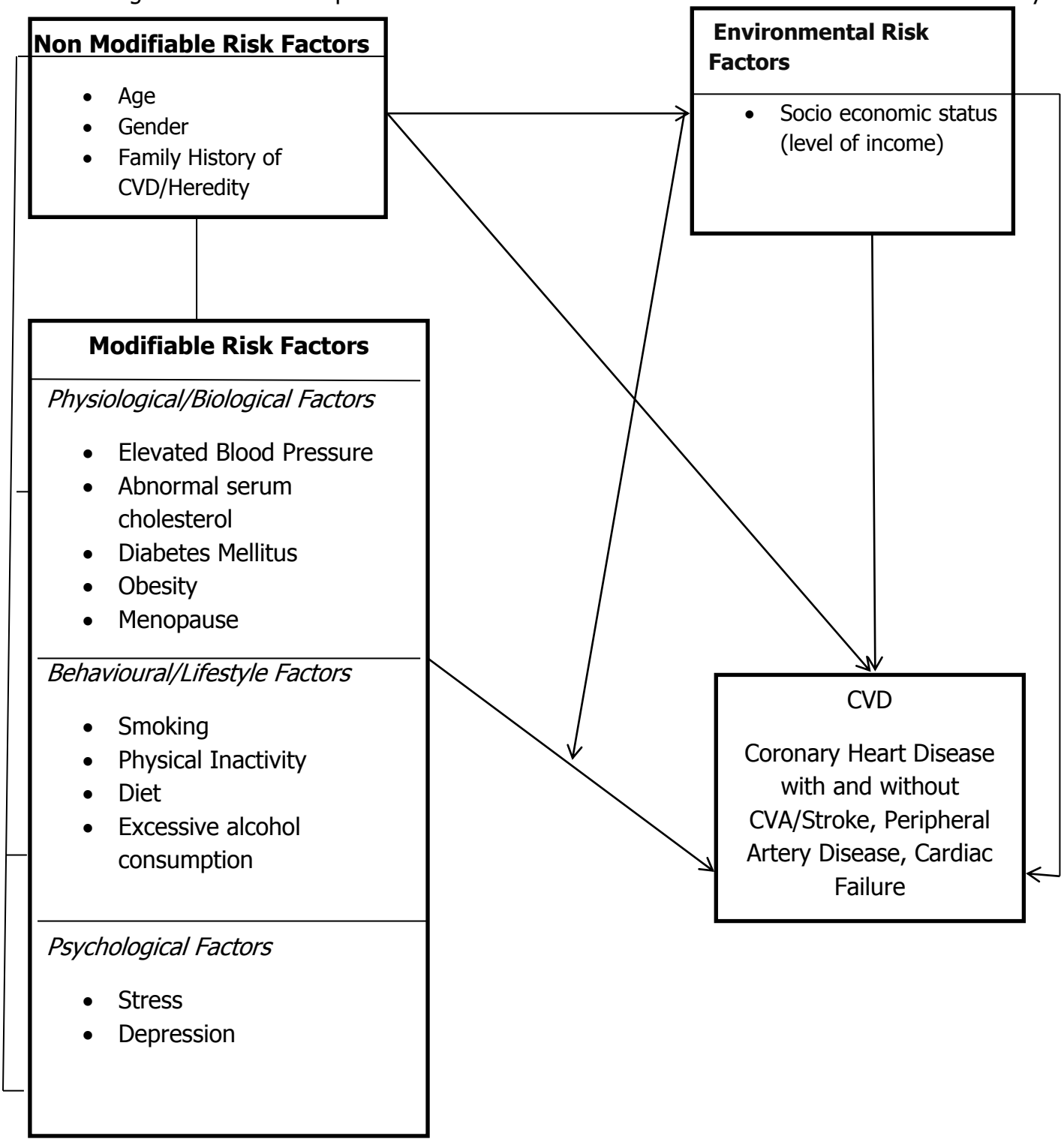
According to the evidence in the literature and experience of the researcher, among black South Africans, the theoretical framework develops a process, knowledgeable within the conceptual model of the study using a diagram (Figure 1.2).

The process considers the dependent variable such as Coronary Heart Disease (CHD)/ Ischaemic Heart Disease or Coronary Artery Disease with other CVD (Severe Stroke, Cardiac Failure, and Peripheral Artery Disease). At the right end bottom of the diagram explained by different variables at the left of the diagram

The independent variables include non modifiable risk factors, modifiable risk factors (physiological or biological risk factors of CVD: control of hypertension and Type 2 Diabetes Mellitus, lifestyle or behavioural factors, psychological factors) and contextual or environmental risk factors.

These factors were clustered as moderators of the relationships between major risk actors and the severity of cardiovascular disease (CHD, Peripheral Artery Disease, and Stroke). The conceptual framework of this study is presented in Figure 1.2.

Figure1.2 Conceptual Framework of CHD in the study



DEFINITION OF TERMS

Cardiovascular disease has been commonly defined as diseases which encompass conditions or disorders of the heart and refer to "any disease of the heart and blood vessels (Steyn, 2007). The most common ones are disease of the heart muscle, strokes, heart attacks, heart failure and heart disease" (Steyn, 2007).

Coronary Heart Disease (CHD) is a disease resulting from narrowing of the arteries carrying blood to the heart muscles. CHD includes sudden death, heart attack, unstable angina, chronic angina and often heart failure (Capewell, et al., 2008).

Peripheral Arterial Disease is a deficit caused by ischaemia due to impaired blood flow to a limb. This commonly affects one or both legs causing muscle pains, leg ulcers, gangrene of the lower limb (Capewell, et al., 2008).

Congenital Heart Disease is a heart condition resulting from any abnormality in heart structure or function that is present at birth. Most congenital heart conditions occur because the heart or its valves or vessels are not properly formed. Additional defects such as holes between the chambers of the heart may be present (Capewell, et al., 2008).

Rheumatic Heart Disease is a condition in which permanent damage to heart valves between the chambers of the heart occurs. The heart valves are damaged by a disease process called rheumatic fever which begins with a throat infection caused by a streptococcus bacterium (Steyn, 2007).

Ischaemic Heart Disease is characterized by reduced blood supply to the heart muscle, that is, myocardium (Capewell, et al., 2008)

Valvular Disease a disease of the valves within the heart that are needed to regulate blood flow, valvular disease means that the valves either do not open enough to allow blood to flow freely or they do not close effectively and blood cab flow backwards.

Inflammatory Heart Disease involves inflammation of the heart muscle and or the tissue surrounding it (Steyn, 2007)

Pulmonary Embolism is a sudden blockage of the main artery of the lung or one of its branches by blood clot, the blockage usually is caused by a blood clot that travels to the lung from a vein in the leg (Capewell, et al., 2008).

Hypertension is often referred to as high blood pressure, is a condition in which the arteries have persistently elevated blood vessels. Every time the human heart beats, it pumps blood to the whole body through arteries (Steyn, 2007).

Morbidity refers to people who have a disease or condition but have not yet died of this (Steyn, 2007).

Prevalence refers to the percentage of people in the population who have a condition at any point in time (Steyn, 2007).

Chronic Non Communicable Diseases are illnesses that are preventable, prolonged unlikely to resolve spontaneously and impossible to cure completely (National Department of Health, 2009).

Heart Failure is a condition that occurs when the heart is no longer able to pump out enough oxygen-rich blood and is often a long term chronic condition (Capewell, et al., 2008).

Risk Factor is defined as "a measurable characteristic that is causally associated with increased disease frequency and that is a significant independent predictor of an increased risk of presenting with the disease." (O'Donnell, et al., 2008)

Determinants of Health are defined as many factors combined together to affect the health of individuals and communities, whether people are healthy or not, and are determined by their circumstances and environment (WHO, 2012).

Determinants are defined as ecological factors that provide the background in which a disease develops and not to be directly linked to the disease causally (Mbewu, et al., 2006).

Depression is defined generally as a mood state characterized by a sense of inadequacy, a decrease in activity or reactivity, pessimism, sadness and related symptoms (Reber, et al., 2009)

Multivariate Analysis a genetic term used to cover any of several statistical techniques for examining multiple variables at the same time including factor analysis, multiple linear regression, multivariate analysis of variance and multivariate of covariance (Reber, et al., 2009).

Univariate consisting of but one variable, an experiment using only one variable may be called a univariate study (Reber, et al., 2009).

Variable that which changes, that which is subject to increases and/or decreases over time (Reber, et al., 2009).

Independent Variable is any variable the values of which are in principle, independent of the changes in the values of other variables, therefore, if the variables represent an outcome of the study (Reber, et al., 2009).

Dependent Variable is defined as "any variable the values of which are, in principle, the result of changes in the values of one or more independent variable or if they are presumed to influence the value of the dependent variable" (Reber, et al., 2009).

Diabetes Mellitus is defined as a cluster of metabolic disorders characterised by hyperglycaemia high enough to significantly increase the incidence of a specific and unique type of microangiopathy (Alemu, 2015)

Type 2 Diabetes Mellitus is a metabolic disorder that is defined by high blood glucose levels due to insulin resistance and a relative insulin deficiency (American Diabetes Association, 2014).

Rural is the proportion of population living in a non-urban environment. Non-urban, or rural areas include commercial farms, small settlements, rural villages, former homelands and other areas which are further away from towns and cities created by the apartheid removals, which depend for their survival on migratory labour and remittances. (Statistics South Africa, 2001).

CHAPTER 2: LITERATURE REVIEW

2.1 INTRODUCTION

In the midst of health transition, and the country's success on health care, the decline in infectious diseases particularly HIV/AIDS, gradual reduction in child deaths and maternal deaths, implementation of the Reengineering Primary Health Care, National Health Insurance, implementation of the Millennium Development Goals and National Development Plan vision 2030. The reality is that Africa and South Africa is challenged by the rise in chronic diseases dubbed as "Tsunami of NCDs" by Volmink (2011).

Mbewu (2009) highlights that, historically CVD was seen a disease of affluence afflicting populations in the industrialized world, however this has in fact changed. Poor socio-economic conditions in childhood determine CVD in the middle age. David Barker as cited by Mbewu (2009) introduced the "fetal origins" at which it was quoted "The fetal origins hypothesis states that fetal under nutrition in middle to late gestation, which leads to disproportionate fetal growth, programmes later coronary heart disease and hypertension." This meant that, individuals who were born small and became heavier childhood are highest risk of cardiovascular disease as they go through "catch-up growth."

2.2 EPIDEMIOLOGY OF CARDIOVASCULAR DISEASES IN AFRICA

Epidemiology involves the study of disease frequency and its determinants within the population, cardiovascular epidemiology began in the 1980s as a result of changes in the causes of death (O'Donnell, et al., 2008). In the 1950s several epidemiological studies were set in motion with the aim of clarifying the cause of cardiovascular disease and a few years later the Framingham Heart study started, at the time researchers had identified that high levels of cholesterol and high blood pressure were important factors in the development of cardiovascular diseases (O'Donnell, et al., 2008)

Africa is a continent of great diversity where it consists of extremely poor and remote rural regions with traditional existence and while there are highly industrialized cities which are populated with people following an urban westernized population. Mbewu (2009) publicised that in Africa, epidemiological data is scanty and off poor quality.

National vital registrations are only available in five percent (5%) of Africa's fifty three (53) countries. Whilst verbal autopsy has shown to be economically and useful way of improving the quality of cause of death information. Sentinel surveillance has also proven useful in the monitoring changes in CVD prevalence with disease surveys periodically conducted. Demographic health surveys are conducted in several African countries which include South Africa.

Gradually the prevalence of CVD in South Africa continued to rise through the 1980s becoming the third most common cause of death in a prospective autopsy study where 90 of the 167 deaths in one year at Tshepong Hospital in the North West province of South Africa (Mbewu, 2009). 15 Of these CVD deaths, 32% were cerebrovascular events, (intracerebral haemorrhage in 50%, cerebral infarction in 29%); pulmonary hypertension in 31%; dilated cardiomyopathy 17%, chronic rheumatic valvular disease 17%, and hypertensive heart disease 14%. Only 3% of the examined vessels had signs of severe atherosclerosis (Mbewu, 2009).

2.3 TYPES OF CARDIOVASCULAR DISEASE

Heart related cardiovascular disease include the following: coronary heart disease (CHD), cardiomyopathy, congenital heart failure, valvular diseases, congestive heart failure, inflammatory heart disease, rheumatic heart disease, Heart failure, Ischaemic heart disease, angina, and arrhythmia.

2.3.1 Coronary Heart Disease

Coronary heart disease (CHD), also known as coronary artery disease, is a disorder of the coronary arteries around the heart (which supply oxygen and nutrients to the heart muscle) in which the regional blood supply is insufficient to deliver the oxygen needed by the heart muscle. CHD is almost always due to atheroma (fatty deposit in the blood vessel); with estimates that over 20% of CHD worldwide being due to a lack of physical activity or exercise (Libby, 2005).

In Libby (2005) it is outlined that, amongst most developed countriesm CHD is the leading cause of death, and accounts for 17% of all deaths and 49% of deaths from cardiovascular disease in Australia. In South Africa coronary heart disease is the major

cause of death among white people and South Africans of Indian descent, with incidence rates of 165.3 and 101.2 per 100 000 people respectively, but only 55.1 per 100 000 among people of mixed descent and 5.3 per 100 000 among black African people (Mbewu, 2009).

The increase in coronary heart disease (CHD) in sub-Saharan Africa is presumably owed to the epidemiological transition impelling the developing communities to westernization which has attributed to the gradual increase of prevalence on classical risk factors for CHD among African populations which are: smoking, a diet high in saturated fat, high sodium intake, hypertension, obesity, diabetes mellitus, and lack of physical exercise (Akintunde, 2010). In addition, life expectancy in sub- Saharan Africa has risen so that more people are exposed to these risk factors for long enough periods to cause CHD.

2.3.2 Rheumatic Heart Disease

Rheumatic heart disease (RHD) is referred as the most common acquired heart disease in children in many countries of the world, especially in developing countries. The global burden of disease caused by rheumatic fever currently falls disproportionately on children living in the developing world, especially where poverty is widespread. RHD is a chronic heart condition caused by rheumatic fever that can be prevented and controlled (Mendis, et al., 2011). Rheumatic fever is caused by a preceding group (. A streptococcal (strep) infection. Treating strep throat with antibiotics can prevent rheumatic fever. Moreover, regular antibiotics (usually monthly injections) can prevent patients with rheumatic fever from contracting further strep infections and causing progression of valve damage (Mendis, et al., 2011).

In the 1980s, most of sub-Saharan Africa was in stage one of the epidemiological transition (Age of pestilence and famine) which is characterised by uncontrolled infection and deficiency conditions as risk factors (Mbewu, 2009). During the period, Rheumatic heart disease (RHD) accounted for 10% to 35% of hospital cardiac patients in sub-Saharan Africa and up to 20% of cardiac deaths.

In Soweto, Gauteng, the incidence of RHD among primary school children was 6.9 per 1 000; and in Ibadan, Nigeria, the incidence was 3 per 1 000 among children. RDH as

explained by Mbewu, is a disease of poverty, related to overcrowding, poor housing, and under nutrition and requires a multi-sectoral response for prevention and cure. It is caused by group beta-haemolytic streptococci. The principal methods of control are primary and secondary prevention of streptococcal infection.

2.3.3 Dilated Cardiomyopathy

Dilated Cardiomyopathy develops when the ventricles enlarge and weaken. The condition usually starts in the left ventricle and over time can affect the right ventricle (Elliot, 2000). Elliot (2000) also outlined that, the weakened chambers of the heart don't pump effectively, causing the heart muscle to work harder. Over time, the heart loses the ability to pump blood effectively. Dilated cardiomyopathy can lead to heart failure, heart valve disease, irregular heart rate, and blood clots in the heart (Elliot, 2000).

In the Sub- Saharan Africa, a Dilated Cardiomyopathy (DCM) is surprisingly common and accounting for up to 20% of cardiac cases in some regions (Mbewu, 2009. Occasionally the disease is familiar with specific candidate genes recently identified. There may be a whole spectrum of causes of DCM, including genetic etiology, toxins, and vitamin or micronutrient deficiency, such as selenium deficiency. Dilated cardiomyopathy is often seen as a late complication of HIV infection (Mbewu, 2009).

2.3.4 Congenital Heart Disease

Congenital heart disease, in a definition proposed by Mitchell et al., is defined as "a gross structural abnormality of the heart or intrathoracic great vessels that is actually or potentially of functional significance." (Hoffman, 2002). This definition excludes functionless abnormalities of the great veins, such as persistent left superior cava (even though this might be important during surgery), or of the branches of the aortic arch such as a combined brachiocephalic-left carotid arterial trunk. Even though the abnormal genes that cause these disorders are present at birth, the cardiomyopathy is rarely detected at this time but usually presents later in childhood or adolescence. Another genetically determined lesion, Marfan syndrome, is often included as CHD because the phenotype may be present at birth, although because the cardiac and

aortic lesions may not appear for many years not all studies include this syndrome (Hoffman, 2002).

2.3.5 Cerebrovascular

Cerebrovascular disease refers to a group of conditions that affect the circulation of blood to the brain, causing limited or no blood flow to affected areas of the brain. Cerebrovascular disease is one of the most common reasons for neurological emergencies and constitutes a serious public health problem (Ustrell-Roig, et al., 2007).

. Brain related cardiovascular diseases include the following: myocardial infraction cerebrovascular disease (stroke and transient ischemic attacks), Haemorrhagic stroke and Ischaemic stroke

Data extracted from the World Health Organisation indicates that, cerebrovascular disease is the most common cause of death and the leading cause of disability (Ustrell-Roig, et al., 2007).

2.3.6 Stroke

A serious medical condition where one part of the brain is damaged by a lack of blood supply or bleeding into the brain from a burst blood vessel. A stroke happens when the blood supply to part of the brain is blocked or interrupted, for example, by a blood clot (where the blood thickens and solidifies). This is the most common cause of stroke and is known as an ischaemic stroke (Behrouz, et al., 2012).

The lack of blood causes part of the brain to die, a process known as cerebral infarction. About 10% of strokes are caused by bleeding from the arteries in the brain, which directly damages the brain's tissues and can also cause loss of blood supply. This is known as haemorrhagic stroke or cerebral haemorrhage (Behrouz, et al., 2012).

Stroke is probably the commonest form of CVD in sub-Saharan Africa today, having progressed in the latter half of the twentieth century as a result of increased life expectancy and changes in environmental determinants and risk factors. The majority of strokes occur in young and middle-aged people and are related to hypertension.

South Africa in 2006, stroke has accounted for 5% of deaths. The number of reported stroke deaths has more than doubled since 1995 (reaching 34 926 deaths in 2006), the actual proportion of total deaths has fallen from 6.6% in 1995 to 4.6% in 2006 of total deaths due to the tripling of number of deaths largely due to HIV and AIDS and tuberculosis (Mbewu, 2009).

2.4 DIAGNOSING CARDIAC DISEASE

During the Framingham study in the early 1950s, persons at high risk of cardiovascular disease were effectively identified from a measurement of their serum cholesterol and blood pressure, smoking history, an electrocardiogram and a determination of glucose intolerance. During the study, one of the general functions for identifying persons at high risk of cardiovascular disease was to effectively identify each of the specific diseases (that is, coronary heart disease, atherothrombotic brain infarction, hypertensive heart disease) for the at risk person.

2.4.1 History and examination

Today, many cardiac disorders can be identified by a clinical examination and a patient's history where patients will complain of recurrent chest pains, but in the majority, if not all cases, an echocardiogram is required to confirm clinical suspicions (Elliot, et al., 2014). Heart attack (myocardial infarction) is usually diagnosed from the reported medical history of sudden severe pain in the central chest, neck or arm, which can then be confirmed by an electrocardiogram and blood tests to measure cardiac enzymes.

2.4.2 Special investigations

Investigations such as an electrocardiogram (ECG), a machine that measures and records the heart rate and rhythm or an echocardiogram also a cardiac machine which technically is more difficult are used as investigative tools. The transthoracic echocardiogram is the most important screening and diagnostic tool in identifying structural lesions and assessing cardiac function (Elliot, et al., 2014). In the Sub Saharan region, confirmation of the diagnosis of CVD relies essentially on echocardiography which is performed in few referral centres in urban areas due to low

availability of human resources for cardiovascular care (Mocumbi, 2012). Interventional cardiology and cardiac surgery are not readily available in most countries and in some services rely essentially on collaborative partnerships that bring teams from overseas to perform cardiac catheterization and surgery, for example, in Mozambique, there is only one catheterization laboratory and two centres performing open heart surgery, the country has 13 cardiologists and 3 cardiac surgeons Mocumbi (2012).

In managing CVD, the WHO issued out National Essential Medicine list at which countries can use to manage cardiovascular diseases (Mocumbi, 2012). But there has been less compliance for reasons that seem to be related to political will, insufficiency of human resources or funding and conflict of interest (Mocumbi, 2012).

2.5 GLOBAL BURDEN OF CARDIOVASCULAR DISEASES

In 1998 worldwide, the World Health Organization's CVD estimations were on 28.5%, as evolution of epidemiological transition occurred, chronic non communicable diseases drastically became the leading causes of mortality and morbidity. In 2002 World Health Organisation declared cardiovascular diseases as among the leading causes of mortality and responsible for one third global deaths (WHO, 2002). 85% of these mortalities occurred in low to middle income countries and the mortality burden was largely the result of an increase on behavioural risk factors such as smoking, alcohol usage, and decreases in physical activity (Gaziano, 2007).

2.6 NATIONAL BURDEN OF NON COMMUNICABLE DISEASES AND CARDIOVASCULAR DISEASE

Current evidence indicates that chronic non communicable diseases account for 35% of mortalities within low- middle income countries and this is expected to rise in future by 2030 (Mondo, et al., 2013). Chronic Non Communicable Diseases negatively affect the country's economic, financial and health costs as countries have to invest more on prevention measures, which include health promotion.

Future predictions by the World Health Organization (2002) illustrates that, the burden of diseases resulting from Chronic non communicable diseases will sharply increase and possibly double the number of deaths to communicable disease, and if nothing is done

to address this, the risk of chronic illness the country's active economic production would be lost to heart diseases, stroke and diabetes. Further estimates by WHO (2002) on Chronic NCD places South Africa as two to three times higher than that in developed countries.

The South African Ministry of Health identified chronic non communicable diseases as major contributors to the burden of diseases as there has been a recorded trend increase in the chronic diseases (National Department of Health, 2009). In Joe Gqabi District: East Cape Province, chronic non-communicable diseases are among the top (10) diseases contributing to mortality. Both these statements mirror the alarming state of health our country and rural districts are facing.

In South Africa, stroke has been documented as highest among females and ischaemic heart disease is highest in males, while hypertensive heart diseases feature top death for females (Bradshaw, et al., 2003). In 1995, strokes accounted for 6.3% and ischaemic heart disease for 5.6% of deaths among males aged 45-49 and in women stroke accounted for10% and IHD accounted for 3.8%.

Even though in Joe Gqabi District: East Cape Province the hypertension detection rate has varied between 0.3% to 0.4% over the past 5 years, and has been in line with the Provincial and National averages for the same period, cerebrovascular diseases has been recorded to be at 3.4% of Years of Life Lost during 2011/2012 financial year and leading cause of death on chronic non communicable diseases.

The burden of cardiovascular related disease are escalating among rural communities and the poor have been affected mostly especially those who have migrated to urban settings (National health policy, 1994). 25% of the South African health care spending will be devoted to cardiovascular diseases as the proportion of South Africans living in rural areas has fallen by about 10% since 1994, with concurred escalation to 60% of the population living in urban areas (National Development Plan 2030).

In 2012/2013 South Africa's average hypertension detection rate was 0.25%. Over a third of the districts in Eastern Cape had hypertension detection rates above the national average, with John Taolo Gaetswe District (Northern Cape Province) and Gert Sibande District (Mpumalanga Province) ranked first and second respectively and

Capricorn (Limpopo Province) ranked last, whilst Joe Gqabi's hypertension detection rate 29.2% (Massyn, et al., 2012).

Upon analysing the major causes of Years Life Lost, in the top ten (10) leading causes of the country's Years Life Lost cerebrovascular diseases, hypertensive heart disease, and ischaemic heart disease are ranked 5th, 8th and 10th respectively. In 2008 and 2009 the burden on CVD in Eastern Cape has been above 30% putting pressure for the province to develop and implement integrated interventional programs.

The World Health Organization and World Bank data predicted that over the next 30 years not only will there be an almost doubled on CVD related deaths in South Africa, but an increasing proportion (41%) of these will be among the working-age group (ages 35-64) as compared to other age groups (Chopra et al., 2007). Thus impacting negatively on economic costs both directly (health care) and indirectly (such as loss of workers and productivity).

2.7 COST OF CARDIOVASCULAR DISEASE

There is no legal standard or regulation for what is cost effective, however the World Health Organization (WHO), Commission on Macroeconomics and Health recommended choosing interventions that were less than three times a country's GNI per capita (Gaziano, 2007). In 2003, cardiovascular disease cost the European Union €169 billion and $475.3 billion in direct and indirect annual costs in the USA in 2009. Similar information is minimal in South Africa as recent data shows that total costs of heart disease and stroke accounted for 2 to 3% of the GDP of the country in 1991 (i.e. between R4 135 billion and R5 035 billion). Direct costs comprised 42% of the total, of which 75% was carried by the private sector. Assuming a 4% rate of inflation, and a higher prevalence of CVD, the overall costs for CVD in 2010 would be more than double that 20 years ago (Maridza, et al., 2011).

2.8 KNOWN RISK FACTORS AND DETERMINANTS ASSOCIATED WITH CVD IN SOUTH AFRICA

South Africa has a well-documented and complex burden of diseases which includes the emergence of chronic non-communicable diseases such as cardiovascular disease, diabetes, cancer and chronic respiratory diseases (Kahn, 2011). These diet related

disease ailments which account for a large proportion of South Africa's disease burden are expected to rise further especially among poor African women. These chronic diseases have multiple preventable risk factors operating at different levels, from biological to structural factors (Puoane, et al., 2013). These factors can be classified as both modifiable (factors that can be altered, for example, living conditions, socio cultural factors and community influences) and non-modifiable (factors beyond control for example, age, sex and hereditary factors) (Puoane, et al., 2013).

2.8.1 DETERMINANTS OF CVD

Many factors combine together to affect the health of individuals and communities, whether people are healthy or not it is determined by their circumstances and environment. To a large extent, factors such as where we live, the state of our environment, genetics, our income and education level and our relationships with friends and family all have considerable impacts on health (WHO, 2011).

Determinants are defined as ecological factors that provide the background in which a disease develops and not to be directly linked to the disease causally (Mbewu, et al., 2006). More people exposed to determinants do not inevitably develop the disease. Genetic determinants provide the foundation on which behavioural, sociocultural, economic and educational determinants build (Mbewu, et al., 2006).

2.8.1.1 Urbanization

One major determinant in South Africa as shared by BeLue, et al. (2009) is urbanization. Globally, Sub Saharan Africa is the least urbanised region which is rapidly urbanising. Compared in 2001, 50% of the population was already urbanised and at the time projections were expected to increase to 62% by 2025 (Van Rensburg, et al., 2011). The South African population is currently more mobile compared to few decades ago. The shift of population from rural to urban brings with its substantial implications for nutrition, access to food and preventative health care. An environment that increases health risk exposure which also includes under nutrition and malnutrition.

Available literature suggests that the exploding growth in cities often results in deterioration in the health and well-being of people due to poor quality of urban housing, sanitation issues and limited access to efficient health care system. Furthermore, it has been outlined that, urbanization plays a significant role in increasing the burden of CVD.

2.8.1.2 Socio cultural

While understanding the burden of clinical CVD risk conditions is an important step towards addressing the epidemic of CVD in South Africa, it is also important to understand the contributing and competing socio cultural context and related lifestyle beliefs and behaviours associated with the burden of these clinical risk factors (BeLue, et al., 2009).

The Framingham Heart study, InterHeart study and MONICA project and all other studies were initial steps towards exploring and surveying the causes of CVD in different populations across the world and the importance of known and emerging risk factors.

Figure 2.1: The pathway model, illustrates the proximal societal level determinants plus individual level information on nutrition, lifestyle factors, biological markers as well as genetic variations. Jeemon, et al. (2009) the pathway model emphasizes the cumulative effect of life events and the reinforcing effect of differing psychological and socio-economic circumstances throughout life cycle. The duration of exposure to at risk living conditions has a dose effect on subsequent health and well-being.

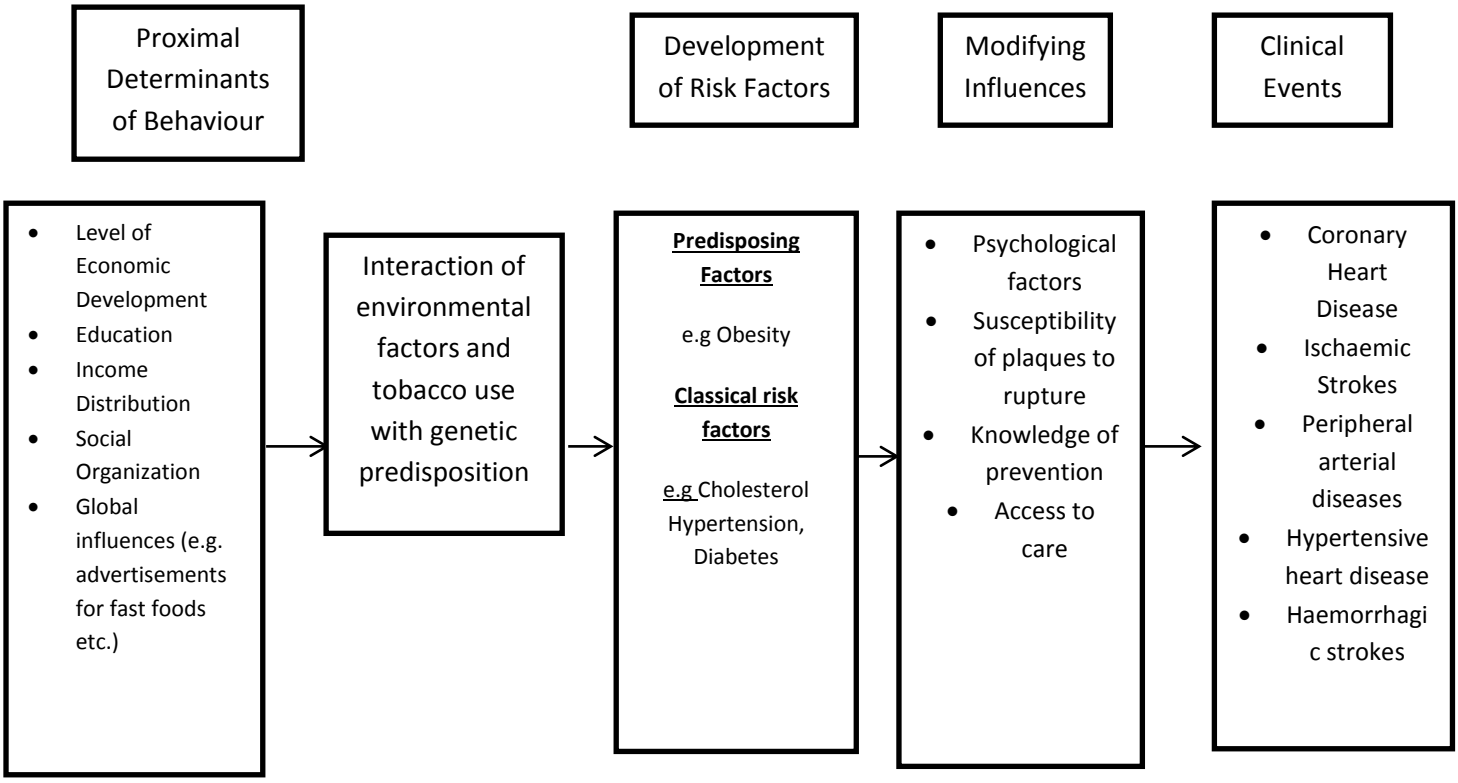


Figure 2.1: The Pathway model: Causal diseases Pathways for cardiovascular disease (Yusuf et al., 2002)

2.8.2 RISK FACTORS OF CVD

The Framingham study and other epidemiological studies helped in the identification risk factors associated with cardiovascular disease which are now considered as classical risk factors. A risk factor is defined as "a measurable characteristic that is causally associated with increased disease frequency and that is a significant independent predictor of an increased risk of presenting with the disease." (O'Donnell, et al., 2008).

Risk factors arise from determinants and are directly linked to a disease in a casual manner, although not everyone with the risk develops the disease (Mbewu, et al., 2006).

2.8.2.1 MODIFIABLE RISK FACTORS

2.8.2.1.1 PHYSIOLOGICAL RISK FACTORS

Modifiable risks factors include abnormal blood cholesterol (elevated total cholesterol, triglycerides, LDL-C, and low HDL-C levels), hypertension (especially systolic blood pressure elevations), cigarette smoking, physical inactivity, cocaine, glucose intolerance and diabetes mellitus (Crawford et al., 2010).

2.8.2.1.1.1 Triglycerides

Abnormal blood lipid levels, which is high total cholesterol, high levels of triglycerides, high levels of low-density lipoprotein or low levels of high-density lipoprotein (HDL) cholesterol all increase the risk of heart disease and stroke. Pisa, et al. (2011) warns that a diet with excess saturated and trans-fats leads to dyslipidaemia and especially hypercholesterolemia a risk factor for CVD. Therefore changing to a healthy diet, exercise and medication can modify your blood lipid profile.

2.8.2.1.1.2 Diabetes Mellitus

Diabetes mellitus(DM) has been defined as a group of metabolic diseases characterized by hyperglycemia resulting from defects in insulin secretion, insulin action, or both (American Diabetes Associations, 2014) The chronic hyperglycemia of diabetes is associated with long-term damage, dysfunction, and failure of various organs, especially the eyes, kidneys, nerves, heart, and blood vessels (American Diabetes Association, 2014).

Before the 1990s, diabetes was considered a rare medical condition in Africa. Epidemiological studies carried out in that decade, however provided evidence of a trend toward increased incidence and prevalence of type 2 diabetes in African populations (Mbanya, et al., 2006). The global diagnosis of Diabetes Mellitus in the year 2000 was at an estimated to be 171 million (2.8% of the world's population), a figure projected to increase in 2030 to 366 million (6.5%), 298 million of whom will be living in developing countries (Wild, et al., 2004).

In Africa, the estimated prevalence is 1% in rural areas and up to 5% to 7% in urban sub-Saharan Africa and between 8% and 13% in more developed areas such as South Africa and in populations of Indian origin (Sobngwi, et al., 2001). By 2025, the prevalence of DM in sub-Saharan Africa is expected to be more than double the current figures (Wild, et al., 2004). Table 2.1 and Table 2.2 illustrate the criteria for diagnosing Diabetes Mellitus and classification, according to the American Diabetes Association (2014).

During the African InterHeart study which looked at the contribution of conventional risk factors among subjects with coronary heart disease, it was established that 90% of the study participants had the convectional risk factors of smoking, diabetes mellitus, hypertension and abdominal obesity (Akintunde, 2010). Moreover, Coronary Heart Disease is a major cause of death among individuals with abnormal glucose tolerance. It has also been suggested impaired glucose tolerance develops slowly among hypertensive subjects (Akintunde, 2010).

Table 2.1 Criteria for the diagnosis of Diabetes Mellitus (American Diabetes Association, 2014)

- HbA1C ≥6.5%. The test should be performed in a laboratory using a method that is NGSP certified and standardised to the DCCT assay.

OR

- Fasting plasma glucose ≥7.0mmol/L. Fasting is defined as no caloric intake for at least 8 hours.

OR

- 2-hour plasma glucose ≥11.1mmol/L during an OGTT. The test should be performed as described by the WHO, using a glucose load containing the equivalent of 75g anhydrous glucose dissolved in water.

OR

- In a patient with classic symptoms of hyperglycaemia or hyperglycaemic crisis, a random plasma glucose concentration of ≥11.1mmol/L.

NGSP: National Glycohemoglobin Standardization Program; DCCT: Diabetes Control and Complications Trial; OGTT: Oral glucose tolerance test; WHO: World Health Organisation

Table 2.2. Diabetes Classification (American Diabetes Association, 2014)

Type 1 diabetes (due to β-cell destruction, usually leading to absolute insulin deficiency)
Type 2 diabetes (due to a progressive insulin secretory defect on the background of insulin resistance)
Other specific types of diabetes due to other causes, e.g., genetic defects in β-cell function, genetic defects in insulin action, diseases of the exocrine pancreas (such as cystic fibrosis), and drug- or chemical-induced (such as in the treatment of HIV/AIDS or after organ transplantation)
Gestational diabetes mellitus (GDM) (diabetes diagnosed during pregnancy that is not clearly overt diabetes)

NGSP: National Glycohemoglobin Standardization Program; DCCT: Diabetes Control and Complications Trial; OGTT: Oral glucose tolerance test; WHO: World Health Organisation

2.8.2.1.3 Hypertension

Hypertension is the single biggest risk factor for cardiovascular disease or coronary heart disease in the African continent and has been declared by the African Union as one of the greatest health challenges to the continent other than HIV/AIDS, TB which plays a significant role in heart attacks (Onen, 2013). As explained by Venter (2008) the cause of hypertension is multifactorial and includes factors such as age, gender, urbanisation, obesity and malnutrition. Many of these independent and dependent risk factors coincide with the same factors causative of coronary heart disease (CHD). Hypertension significantly and specifically contributes to heart disease, stroke and end-organ failure (e.g. kidney failure). Currently one fourth of the United States of American (USA) population is affected and one third of the USA population still have uncontrolled Blood Pressure (Bell, et al., 2008).

It can be prevented and successfully treated but only if you have it diagnosed and stick to your recommended management plan. But the problem is compounded by lack of

awareness, frequent under diagnosis, low levels of control and the severity of its complications (Onen, 2013).

The mean Systolic Blood Pressure (SBP) ranges between and including 120 mmHg and 139 mmHg or the mean Diastolic Blood Pressure (DBP) ranges between and including 80 mmHg and 89 mmHg (Table 2.3) is introduced as pre-hypertension. Prehypertension is not a disease category. Rather, it is a designation chosen to identify individuals at high risk of developing hypertension and provide early intervention through adoption of healthy lifestyles that could reduce BP, decrease the rate of progression of BP to hypertensive levels with age, or even prevent hypertension entirely (National High Blood Pressure Education Program, 2004). Blood Pressure classification formulation is important in CVD primary management care

Table 2.3. Changes in Blood Pressure Classification (Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation and Treatment of High Blood Pressure (National High Blood Pressure Education Program, 2004)

JNC6 Category Classification	Systolic BP mmHg	Diastolic BP mmHg	JNC 7 category
Optimal	120 mmHg	80 mmHg	⟶ Normal
Normal	120-129	80-84	
Borderline	130-139	85-89	} Prehypertension
Hypertension	≥140	90	⟶ Hypertension
Stage 1	140-159	90-99	
Stage 2	160-179	100-109	
Stage 3	≥180	110	

BP= Blood Pressure

Available data by Mbewu (2009) indicates that in mixed populations (coloureds) of South Africa, 50-60% of people over the age 65years have hypertension, and is also prevalent among 12% of adults with the Sub Saharan Africa who are often undetected and uncontrolled and in West Africa 30-40% of people aged 65 years or older in rural areas are affected by hypertension.

In 2013, SANHANES-1 (South African National Health and Nutrition Examination), clinical examination records indicated that, the mean systolic blood pressure for males was significantly higher than for females, but, the diastolic blood pressure did not differ significantly by gender. Mean systolic blood pressure and diastolic blood pressure increased progressively with increasing age from a mean of 118.1 mmHg to over 149.3 mmHg in the over 65 years of age group and 66.4mmHg to 80.6mmHg respectively which plateaued between 54 and 65 years. This clinical examination differed from urban informal and rural informal, province to province (Shisana, et al., 2013). Upon conducting a racial comparison between white and coloured race, SANHANES-1, 2013, outlined that, white (130.8 mmHg) and coloured (132 mmHg) had the highest mean systolic blood pressure (Shisana, et al., 2013).

The relationship between BP and risk of CVD events is continuous, consistent, and independent of other risk factors. The higher the BP, the greater the chance of heart attack, heart failure, stroke, and kidney diseases. The presence of each additional risk factor compounds the risk from hypertension (National High Blood Pressure Education Program, 2004)

2.8.2.1.4 Obesity

WHO (2006) defines Body Mass Index (BMI) as a simple index of weight-for-height that is commonly used to classify underweight, overweight and obesity in adults. It is defined as the weight in kilograms divided by the square of the height in metres (kg/m^2). WHO (2006) BMI values are age-independent and the same for both sexes. BMI may not correspond to the same degree of fatness in different populations due to different body proportions. The health risks associated with increasing BMI are continuous and the interpretation of BMI grading in relation to risk may differ for different populations (WHO, 2006). Table 2.4 illustrates the classification of BMI in adults as per the World Health Organization.

Table 2.4.The International Classification of adult underweight, overweight and obesity according to BMI (Adapted from WHO, 1995, WHO, 2000 and WHO 2004.)

	BMI (kg/m^2)	
Classification	Principal cut-off points	Additional cut-off points
Under weight	<18.50	<18.50
Severe thinness	<16.00	<16.00
Moderate thinness	16.00-16.99	16.00-16.99
Mild thinness	17.00-18.49	17.00-18.49
Normal range	18.50-24.99	18.50-24.99
Overweight	≥25.00	≥25.00
Pre obese	25.00-29.99	25.00-29.99
Obese	≥30.00	≥30.00
Obese Class I	30.00-34.99	30.00-34.99
Obese Class II	35.00-39.99	35.00-39.99
Obese Class III	≥40.00	≥40.00

The health risks associated with increasing BMI are continuous and the interpretation of BMI grading in relation to risk may differ for different populations. Findings by Pretorius, et al., (2011) in the Heart of Soweto Study suggested that the most prevalent CVD risk factor by far was obesity were (43%), while up to 70% were overweight an observation that is consistent with other community-based surveys in the region, with far more obese women than men (23% versus 55%: OR 0.24 95% CI 0.19 to 0.30: p <0.001).

The fundamental importance of this finding should be emphasised, in a culture where low weight is either associated with the stigma of malnutrition or, worse, HIV/AIDS. It is difficult to educate individuals and the wider community about the dangers of excess weight. Cardiovascular disease risk factors are recorded to be high even in rural parts of South Africa. Some of these risk factors but not limited to render women at greater risk, for example, obesity is said to be higher in women than in men. And upon combining obesity and overweight is almost non-existent in boys than teenage girls (Kahn, 2011).

Indeed, the general lack of weigh scales both in the homes and healthcare facilities of Soweto are a major challenge in managing obesity even when an individual is committed to losing weight.

2.8.3 BEHAVIOURAL RISK FACTORS

2.8.3.1 Smoking

As its components are absorbed into the bloodstream, tobacco smoking becomes an established risk factor for CVD through a variety of mechanisms. BeLue, et al., (2009) warns that tobacco use still remains as one of the most serious epidemiological risk factor in terms of prevalence of CAD and smoking prevalence is increasing among men and women in the Sub Saharan Africa. A review of tobacco use and smoking research showed that males are more likely to smoke than females and older males (30-49 years) are more likely to use tobacco products than younger males. The prevalence of smoking also increased among women with age where 11% of the South African women have been reported to be smoking.

The highest occurrence of smoking is among black men who are 53%, followed by coloured men and women (58% and 59% respectively) Indian men are at 48% while white males stand at 43% (Van Rensburg, 2011). But once a person stops tobacco use, the risk of a coronary event among ex-smokers declines rapidly after quitting. After one year of smoking cessation, the risk of CHD is halved compared to those who continue to smoke (BeLue, et al., 2009).

In an aid to prevent or reduce the rate of smoking in South Africa, the Tobacco Products Amendment Act of 1999 was passed. The aim was and it still to deal with the harmful effects of tobacco on the health of people. The act prohibited smoking in public places, sponsorship of sporting or any event and also included selling of tobacco products to minors (Tobacco Products Control Amendment Act, 1999).

2.8.3.2 Excessive Alcohol Use

In many parts of the world, including South Africa, using alcoholic beverages is a common feature of social gathering; this is a culture that has been there for centuries.

Among Africans, alcohol forms part of almost all traditional or cultural gatherings and this has been viewed as an acceptable practice (WHO, 2014).

WHO (2014) defines alcohol as a psychoactive substance with dependence-producing properties. Consumption of alcohol and problems related to alcohol vary widely around the world, but the burden of disease and death remains significant in most countries. SANHANES-1, 2013 clinical examinations report outlined that, of those respondents who volunteered to undergo a clinical examination and were found to have a high blood pressure, more than two thirds were overweight or obese and less than a third consumed alcohol (Shisana, et al., 2013). The harmful use of alcohol ranks among the top five risk factors for disease, disability and death throughout the world. It is a causal factor in more than 200 diseases (WHO, 2014).

In 2010, WHO approved a strategy to reduce the harmful use of Alcohol which was fast becoming a major public health concern, subsequently to that, in 2014 a global status report on alcohol and health was published. This report provided a global overview of alcohol consumption in relation to public health as well as information on the consumption of alcohol in populations, the health consequences and country policy responses. Despite all that, the consumption of excessive alcohol continued on to rise and posing adverse risk to health where chronic disease such as CVD, Liver cirrhosis may develop in those who drink large amounts over a number of years (WHO, 2014).

In South Africa according to WHO (2014) the prevalence of heavy episodic drinking for males is 31.7% and 13.9% females among the ages of 15 years and above. In comparison with Swaziland (21.9% males, 7.4% Females), Zimbabwe (42% males and 22.2% Females), Lesotho (16.9% males, 4.1% females) and Namibia (46.4% and 23.6% females).

As a political response to the raging public health hazard in South Africa laws, policies and interventions were put in place which includes excessing tax on beer, wine and spirits. Setting a national legal minimum age for off and on premise sales of alcoholic beverages, setting restrictions for on/off premise sales. Setting national maximum legal

blood alcohol concentration when driving a vehicle, legally binding regulations on alcohol advertising/product placement/ sponsorship, and Prevention of and Treatment for Substance Abuse Act (70 of 2008) was gazetted. Subsequently to that, The National Drug Master Plan (NDMP) 2013 – 2017 of South Africa was also formulated. Among its expected outcomes is to eliminate availability of dependence-forming substances/drugs, including alcoholic beverages. Both plans intend to help realise the vision of a society free of substance abuse so that more attention can be focused on raising the quality of life of the poor and vulnerable and of developing the people to achieve their true potential.

2.8.3.3 Lack of Physical Activity

Physical activity has been defined as any bodily movement produced by skeletal muscles that require energy expenditure (WHO, 2015). Globally, it has been identified as the fourth leading risk factor for global mortality causing an estimated 3.2 million deaths globally (WHO, 2015). This is mainly due to the changes which include revolutions in transportation, communication, workplace and domestic-entertainment technologies, which are occurring predominantly in urban settings. The consequences of urban living and employment, coupled with easier access to public transport and a lack of basic infrastructure for exercising, have been associated with significantly reduced physical activity (Peer, 2013).

Notably, even rural locations far from cities are increasingly becoming urbanised and mechanised. Even in developing regions, the physical activity patterns over the past few decades have shifted from labour-intensive lifestyles to more sedentary and less physically demanding activities. Technology and economic incentives tend to discourage activity; technology by decreasing the energy requirements for routine daily activities, and economics by greater reimbursements for sedentary than active work (Peer, 2013.)

2.8.4 PSYCHOLOGICAL RISK FACTORS

Dedkhard (2006) inking psychosocial factors with coronary heart disease are important in making causal inferences and therefore in designing preventive interventions.

Psychosocial factors may act alone or combine in clusters and may exert effects at different stages of the life course. Psychosocial factors may affect health related behaviors such as smoking, diet, alcohol consumption, or physical activity, which in turn may influence the risk of coronary heart disease.

The stressor may be something actually or potentially unpleasant. If it is perceived as a threat, a sensation of stress is felt. Thibodeau & Patton, 2002 cited in Dedkhard (2006) outlines that, stress coupled with stimuli leads to multiple bodily responses which could be regarded as mechanisms to increase our capacity for flight or fight – to run or to overcome. Physiological and psychological stress responses result from the sympathetic nervous system (SNS) directly and by the way of endocrine system. Numerous factors have effects on stress responses—individual physical and mental conditions, age, sex, heredity, socioeconomic status, and perceived experience of similar stressors. Stress can lead to not only many stress-related disorders such as gastritis, ulcerative, irritable bowel syndrome, rheumatoid, asthma, headache, anxiety, and depression, etc., but also chronic disease/illness such as CVD (Dedkhard, 2006).

2.8.5 NON MODIFIABLE RISK FACTORS

2.8.5.1 Family History, Age and Gender

Among individuals, age and gender work hand in hand at causing variation in Blood Pressure. As cited by Venter (2008), Torng, et al indicate that cardiovascular risk factors can potentially change with age, as is particularly the case with women; as the menopausal status is considered a cardiovascular risk factor (venter, 2008). Post-menopause is considered to occur between and during the age of 45 to 54 years of age. During this period blood pressure changes is natural in menopausal women, this is called the menopausal transitional period, where the SBP increases only slightly. Later, the lack of the oestrogen hormone causes both the SBP and DBP to increase. This change is lessened by oestrogen administration (Torng et al as cited by Venter, 2008).

Furthermore, the risk of hypertension generally increases above the age of 35 years, but incidentally the age at which individuals experience urbanisation is also found to have a synergistic effect in precipitating a risk to cardiovascular disease.

Generally, aging brings about changes in arterial wall properties, such as elasticity (distensibility) and thus its buffering capacity (compliance). A decrease in arterial compliance causes elevated pulse pressure, leading to isolated systolic hypertension, detectible by non-invasive echo-tracking techniques (Venter, 2008). When considering family history association, there are increased risks of first-degree blood relative has had coronary heart disease or stroke before the age of 55 years (for a male relative) or 65 years (for a female relative). Findings by Pretorius, et al., (2011) in the Heart of Soweto Study suggested overall 145 patients (9.1%) reported a family history of stroke.

2.8.6 ENVIROMENTAL RISK FACTORS

2.8.6.1 Socio Economic Status

An article by Jeemon, et al. (2009) states that, in developed countries socio-economic mortality differentials show that the low socio economic group suffer the highest mortality. Socio economic mortality differentials have been demonstrated using several indicators of social position representing occupational, educational and financial aspects.

2.9 GOVERNMENT INITIATIVES AND GUIDELINES TO ADDRESS CVD

Despite the growing burden of CVD and its potential catastrophic costs, there has been a limited health system response. This can be partially attributed to attention being focused on HIV/AIDS and other communicable disease; however government recognitions and initiatives are gradually beginning to be targeted at chronic disease more broadly. In 1996, the Directorate of Chronic Diseases, Disabilities and Geriatrics was established within the National Department of Health. In 2006, this directorate developed national guidelines for the management and control of NCDs. The intent was to facilitate a cross-sectorial response to the NCD burden in line with the World Health Organisation's Action Plan for 2008 to 2013. In 2014, WHO issued strategic areas of work with government and partners for 2015-2020 in addressing the raging increasing of chronic non communicable disease which includes cardiovascular. One of the strategies outlined is on the importance of government to contribute effectively,

comprehensively and have multi-sectorial and multidisciplinary collaborations. This would be achieved through support to inter-ministerial actions on alcohol, tobacco and diet, the integrated school health program and the national health promotion (WHO, 2014). The second strategy involves the capacity enhancement for government to implement public policies, strategies and regulations on the prevention and control of risk factors, furthermore, support evidence-based policies and strategies for public health problems which include the monitoring of the National NCD strategy and promote national guidelines on physical activity for health (WHO, 2014). Another strategic area of work in on strengthening health systems to manage chronic non communicable conditions through the inclusion of supporting the integrated Chronic Disease Management Model (ICDM) policies and integration of NCDs in national monitoring frameworks and ensuring access to medicine for chronic conditions (WHO, 2014).

2.9.1 Development of Guidelines

Several disease specific guidelines for hypertension, chronic diseases of lifestyle (CDL) and for Type 2 Diabetes Mellitus have been developed in South Africa and across the world. These guidelines provide information on the management and control and include interventions that have been shown to be cost-effective in middle and lower-income countries. But available evidence suggests that primary prevention and management of common cardiac conditions is limited even with these guidelines "in place".

The South African guideline based on those of the European Society of Cardiology (ESC) recommends the assessment of risk in primary prevention using the updated Framingham risk chart. The four categories Framingham risk score as mentioned by Opie (2014) refer to the 10 year risk of any cardiovascular event, for the highest risk group (>30%), the LDL-C goal is 1.8 mmol/l, for the 15-30% risk group it is 2.5 mmol/l and for <15% risk goal is 3 mmol/l.

The Department of Health has implemented standard treatment guidelines (STGs) and an Essential Drugs List (EDL) for treatment and management of CVD. Although drug supply remains problematic, these guidelines have been instrumental in getting

essential medicines to poorer and less accessible communities. Standard treatment guidelines enable more rational prescribing and the guidelines warrant more careful scrutiny. For example, hypertension treatment guidelines 2011 are based solely on the blood pressure level approach in diagnosis and management of hypertension except where diabetes is a co-morbid condition.

2.9.2 Population wide interventions

Population-wide approaches targets the entire population and addressing the causes rather than the consequences and targets individuals who are at high risk or aimed at persons with established disease (Gaziano, 2007). Tobacco Legislation is one example in South Africa, Tobacco Products Control Act which passed in 1993. This legislation prohibited and/or restricted smoking in public places, regulated the sale and advertising of tobacco products and warning labels on tobacco packages. Maredza, et al. (2011) noted that following this legislation, annual cigarette consumption fell by 33% from 1993 to 2003. Consistent with this trend there has been a decline and stabilisation in the number of smoking-related CVD deaths. Although the decline in CVD cannot be definitely attributed to the legislation, it is encouraging that the trend is in the expected direction.

From both an effectiveness and cost-effectiveness perspective, the government increased tobacco taxes (also known as sin taxes) to 50% of the retail price of a pack of cigarettes in 1997. Taxes were gradually increased to 52% in 2002, where they now remain (Maredza, et al., 2011).

Salt Reduction which is a potential new policy in South African, a government notice was issued in 2013 which provides regulations to the reduction of sodium in certain food stuffs. Maridza, et al. (2011) modern diets contain many times the minimum daily requirements of sodium, most of this coming from packaged foods and restaurant meals, making it difficult for individuals to control their intake. In South Africa, salt ingestion amongst all population groups exceeds international guidelines of <6g salt/day. Salt consumption is estimated 8 to 10 grams per person per day. Close to 50% of this intake comes from non-discretionary sources, with bread as the single greatest contributor (WHO, 2014). Maridza, et al., (2011) emphasized that evidence

from around the world including South Africa, equates salt reduction with a drop in blood pressure and a lower risk of CVD events. Recent data from the United States of America indicates that as little as three grams per day decrease in salt intake could reduce annual healthcare costs attributable to cardiovascular disease by $10-24 billion annually.

Another South African potential policy is the trans-fatty acid policy, which aims to reduce trans-fats present in certain processed and prepared foods currently on sale. Because trans-fatty acids significantly increase the risk of cardiovascular disease, the Maridza, et al., (2011) cited WHO at which it recommends that trans-fatty acids should be less than 1% of daily energy consumption. Currently, the oils in South African fast food outlets contain up to 25% of industrially produced trans-fatty acids and in most store-bought foods unless labelled otherwise contain trans-fats.

CHAPTER 3: METHODOLOGY

3.1 STUDY DESIGN

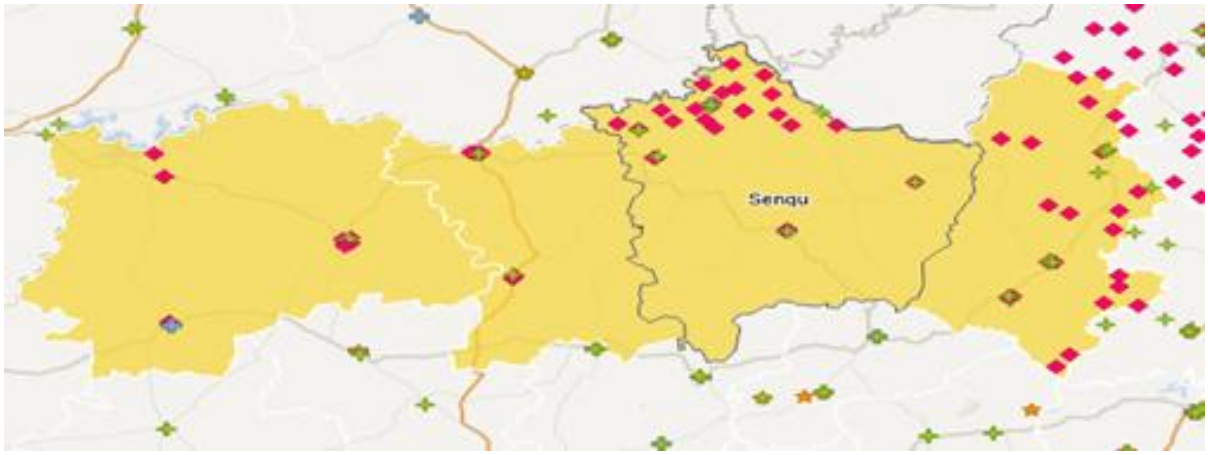
To meet the aim and specific objectives of the study, the researcher made use of a case- control study design to demonstrate casual association, in deed, the case- control study was an analytic research (etiology design). Two groups of study participants, that is, the diagnosed and non-diagnosed CHD participants were recruited and interviewed from hospital Out Patients Department (OPD) and clinic/s about their socio-demographic, physiological risk factors, behavioral risk factors, psychological risk factors and determinants of their CVD diagnoses.

3.2 AREA OF STUDY

The study was conducted at the Joe Gqabi District. In the district, there are three (3) sub districts, namely; Elundini Sub District, Maletswai Sub District and Senqu Sub District. Senqu Sub District (Map 1) was purposively selected as it has a larger population in the district of 135 676 in 2013 and an estimation on 136 349 in 2014 (Massyn, et al., 2013). This is the main sub district with 20 clinics, 2 health posts and four hospitals. It is also a rural sub district with borders of Lesotho and Free State Province. The language preference in the sub district is isiXhosa, seSotho and isiHlubi. 95% of the population in these areas are uninsured and use public health facilities.

The sub district is affected by migrant and commuter labour, the proportion of households reporting at least one migrant household member to 18% of sub district households (Joe Gqabi District Five year Integrated Development Plan, 2013).

According to the community survey 2007, the educational levels within Senqu Sub District are above the provincial average (34%) and a relative large proportion (10.8%) has no formal schooling and over 86% of the residents live in poverty.



Map 1: Joe Gqabi District, Eastern Cape: South Africa (BroadReach Health Care, 2014)

3.3 STUDY POPULATION

The study population were all black rural adults who are 18 years and older attending the randomly selected public health facilities at the time of interview within the sub district, with a CVD (CHD, PAD, IHD, Hypertension) diagnoses and/ or are at risk of developing cardiovascular disease. Study participants were matched according to age and gender.

3.4 SAMPLE SIZE CALCULATION

As the prevalence (P) of CHD (Coronary Heart Disease) is not known in the Joe Gqabi District, Eastern Cape (No publication), we assume if the prevalence equals to 50% (0.50). Thus, the study sample size (Ni) was calculated using the following general formula (Hulley et al., 2007):

$Ni= 4x(Z\alpha)^2 x P (1-P)/ W^2$

Where = constant, Z α = the standard normal deviate for a two sided α, where (1-α) is the confidence level (e.g, since α=0.05 for a 95% confidence level = 1.96, and W= total width of confidence interval = 0.20. Then the total of participants required was

Ni= 4x3.84x0.50x0.50/0.225

=96 + round 100 participants.

3.5 SAMPLING

Multistage sampling technique was used and simple random sampling at each primary unit for selecting from identified heath care facilities see (figure 3.1). Therefore figure 3.1 illustrates the total district sample, n=100.

3.5.1 Unit 1 (Senqu Sub District)

This was the first stage of sampling where one sub districts was identified, Senqu Sub District has a population of 135 676. The sub district was purposively sampled as it comprises of rural communities and isiXhosa is the main language spoken.

3.5.2 Unit 2 (Hospitals)

In the second unit there are 2 (two) public rural hospitals drawn from the sub district. Patients were purposively recruited from the Out Patients Department (OPD) 20 (twenty) patients were randomly sampled from each hospital and therefore n=40 from unit 2.

3.4.2 Unit 3 (Clinics)

The last unit consisted of clinics which were randomly selected unit 1. Senqu Sub District has 20 clinics and due to its accessibility 6 clinics were randomly sampled. Out of the 6 clinics ten (10) study participants were randomly selected. Therefore n=60 from unit 3.

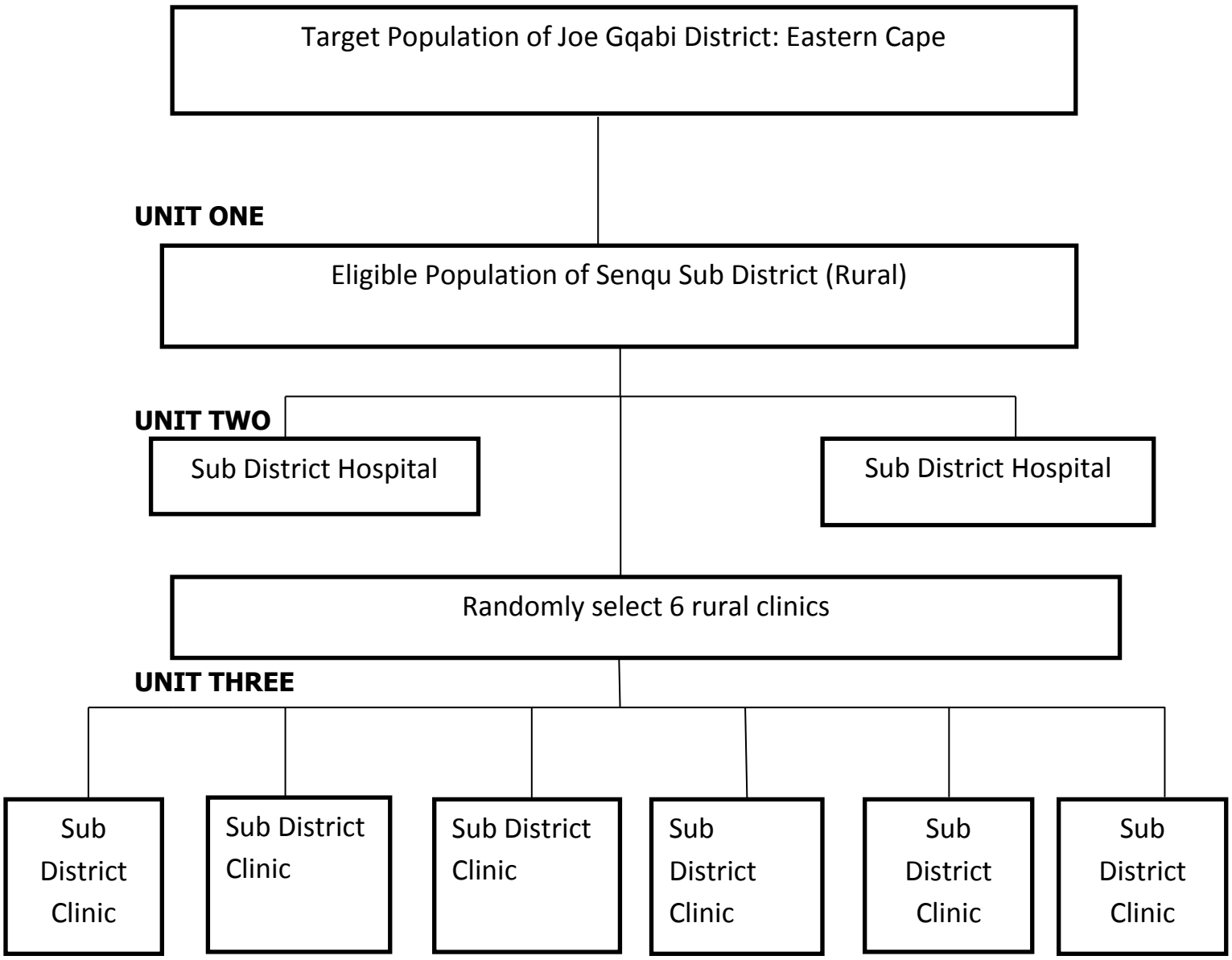


Figure 3.1: Study Sampling Process, Joe Gqabi District: Eastern Cape

3.6 INCLUSION CRITERIA

For the study one hundred (100) rural adult (18 years and older) participants were purposely recruited as per sample size calculations in all sampled eight (8) public health facilities as follows:

Fifty cases (50) rural adults (18years and older) with a CHD diagnosis were recruited and matched with 50 controls with no CHD diagnosis. Participants were matched according to their age and gender.

3.6.1 EXCLUSION CRITERIA

All patients from the neighbouring country (Lesotho) and province (Free State) seeking medical help from the sampled sub district's health facilities were excluded. Patients who were below 18 years were also excluded from the study. Pregnant or lactating women were also excluded from the study. Patients who were not able to speak due to the medical condition were also excluded in the study.

3.7 DATA COLLECTION AND RESEARCH INSTRUMENT

Data was collected through a standardised research questionnaire which consisted of questions that were divided into sections namely, demographic characteristics and socio economic factors, behavioural risk factors, family diagnosis, biological risk factors, socio demographic factors, psychological stressors and anthropometric measures or medical history. The standardised research questionnaire was formulated in both English and IsiXhosa.

The tool focused on:

1. Demographic information of the responded
2. Medical history at time of response
3. Environmental factors of the responded (Socio economic factors)
4. Biological determinants (genetic factors; ethnicity, age)
5. Behavioural (smoking, Lifestyle, diet, drinking) and Psychological factors of responded

3.8 ANTHROPOMETRIC MEASURES

The anthropometric measurements were done by trained facility professional nurses who followed the Joint National Committee 7 (2004) guidelines for hypertension to classify study participants. Systolic blood pressure (SBP) ≥ 140mmHg and diastolic blood pressure (DBP) ≥ 90 mm Hg were defined as "hypertension". Diabetes Mellitus was also measured using the American Diabetes Association (2014) guidelines. Waist circumference (WC) was measured over the abdomen between the costal margin. Measurements were taken to the nearest 0.1 cm using a non-stretchable standard tape; Weight was measured to the nearest 0.1 kg with the participants being barefoot and lightly clothed. Height was measured to the nearest 0.1 cm in the upright standing position with a stadiometer. For this study, body weights were defined according to BMI as follows: normal weight 18.5–24.9 kg/m^2; overweight 25–29 kg/m^2; obesity ≥ 30.0 kg/m^2 (obesity class I 30.0 –34.9, class II 35.9 –39.9, class III ≥ 40 kg/m^2).

3.9 DATA ANALYSIS

The dependent variable (CHD) was described in numbers (n=frequency) and proportions (%). The independent variable was characterised using frequency and proportions for categorical data, while the continuous information of the independent variables was expressed as mean ±standard deviation (SD). Tables and figures were used to highlight the summary findings of dependent and independent variable. Comparative analysis between cases and controls were carried out using uni-and multi-variate analyses as described below. P-value <0.05 was considered to be statistically significant difference. All analyses were performed using Statistical Package for Social Science (SPSS) version 22.0 for windows (IBM SPSS Inc, Chicago, IL, USA)

3.9.1 Univariate Analysis

The proportions between (CHD: cases and controls) were compared using Pearson Chi-Square test including linear-by-linear association).

Student t-test was used to compare mean values of continuous variables between the two groups of the study population at identifying potential univariate risk factors of

CHD. The univariate association between some independent variable (such as: non modifiable risk factors, environmental risk factors, traditional risk factors, psychological risk factors and lifestyle risk factors) and CHD cases was calculated using odds ratio (OR) and 95% Confidence Interval (95 % CI). In model 1 entered all univariate risk factors were analysed in the logic regression analysis, whereas in model 2 hypertension was excluded in the logic regression analysis.

3.9.2 Multivariate Analysis

Multivariate Analysis from significant univariate to model 1 of multivariate analysis was used to identify the independent risk factors of multivariate risk of dependent variable of CHD in defining multivariate OR and their 95% CI using logistic regression models to avoid confounding factors adjusted. Some psychological risk factors were correlated with depression using simple correlation coefficient.

3.10 ETHICAL CONSIDERATIONS

Permission from the District Manager who is in charge of the selected public health facility was obtained and from the Epidemiology and Research unit if the Department (*Appendix 1*). Ethical approval was also obtained University ethics committee (Protocol number: 080/2014). (*Appendix 2*) All the relevant ethical conditions where adhered to at all times of the study.

As this study involved conducting questionnaires, informed consent (as per WHO clinical research guidelines) was obtained both in writing and verbally and study objectives, background of the study, benefits, potential risk and voluntary participation where clearly stated or explained. The purpose of the study was explained to all the participants and they were assured about the confidentiality of the information and that their names were not recorded instead codes where used to identify their participation. Therefore, personal identifiers of patients such as names, telephone numbers and addresses of patients were not recorded. The consent form was in English and translated into isiXhosa which was a local language. The recruited study participants were also notified that, should they wish not to take part in the study their access to health care was not compromised and will still receive medical care. (*Appendix 3-4)*

CHAPTER 4: RESULTS

This chapter summarises findings with special reference to most important and significant results. Both descriptive and inferential data are presented. Risk factors are also presented in both univariate analysis and multivariate analyses

4.1 SOCIO DEMOGRAPHIC FACTORS/ PROFILES

Table 4.1. Socio demographic characteristics among patients with CHD and controls

	Case		Control	
Characteristic	n	%	n	%
Age Group				
<30	1	2	20	40
30-34	5	10	5	10
35-39	5	10	6	12
40-49	1	2	4	8
50+	38	76	15	30
Gender				
Males	17	34	11	22
Females	37	74	39	78
Marital Status				
Married	41	67.2	20	37.8
Non Married	9	23.1	30	76.9
Residence				
Semi urban - Township	36	72	16	32
Remote rural areas	14	28	34	68

As CHD cases were matched with controls for gender and ages, females predominance is (37 women and 17 men in CHD cases versus 39 women and 11 men in controls; P=0.181) and older ages (61.7±19.1 years in CHD cases versus 62.4 ±19.6 years in controls; P= 0.857) were comparable between the study groups. The proportion of CHD cases (67.2% n=41/61 married and 23.1% n=9/39 non married) were significantly (P<0.0001) different from those of controls (37.8% n=20/61 married and

76.9% n=30/39 non married). Indeed, compared with non-married, the married status conferred 6.8-fold higher risk of CHD (OR= 6.8; 95% CI 2.7-17.1; P<0.0001)

The percentages of CHD cases varied significantly (P<0.0001) and unequally across the settings of the participants. Indeed, 52% (n=52) and 48% (n=48) out of all participants were living in semi-urban areas including township and remote rural areas (Figure 4.1) , respectively and semi-urban areas including (CHD=69.2%, OR= 5.5; 95% CI 2.3-12.9; P<0.0001) conferred significant 6-Fold higher risk of CHD than remote rural areas (CHD= 29.2%).

There was significant (P for trend =0.0002) but negative dose-responses relationship between the proportions of CHD cases and the educational levels. In this biologic gradient, the highest, intermediate, and lowest rates of CHD cases more observed in Illiterate-Primary, High School, and College and University, respectively.

4.2 CORONARY HEART DISEASE and OTHER CARDIOVASCULAR DISEASE

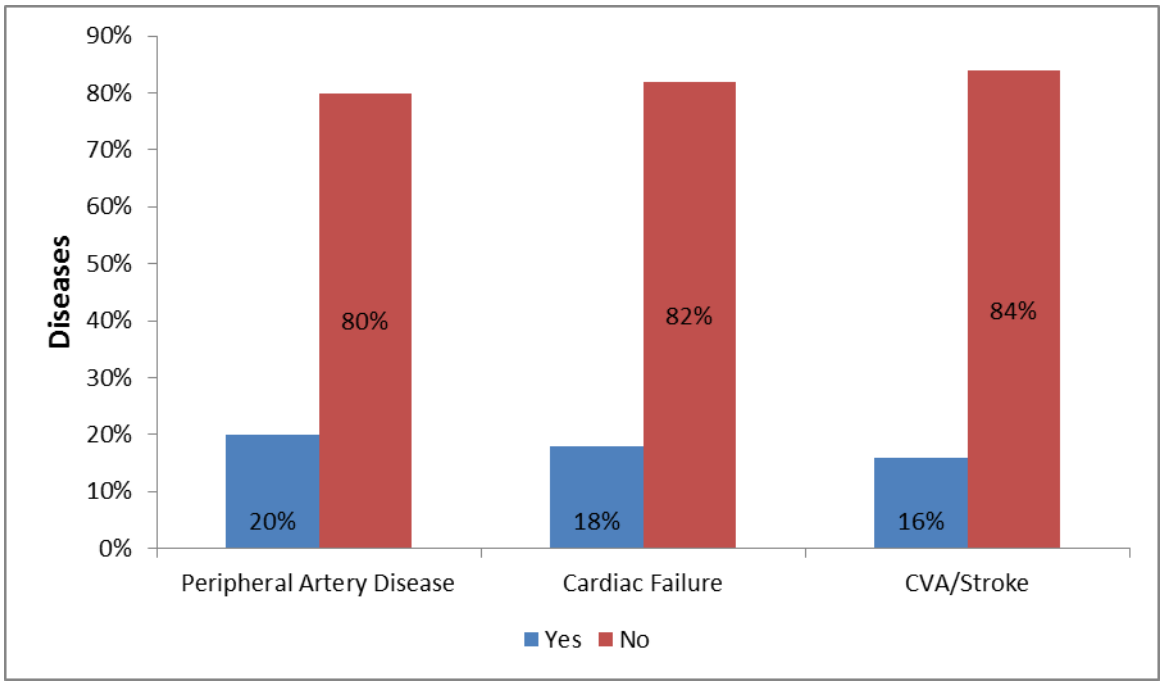
All CHD cases (100%) had elevated serum Total Cholesterol. The numbers (Table 4.2) and frequencies (Figure 4.1) of co-morbidity of CHD with other CVD cases such as Peripheral Artery Disease (PAD), Cardiac Failure, and CVA/Stroke. On average 1/5 CHD case was clustering with PAD, cardiac failure and CVA/ Stroke, respectively.

Table 4.2 Frequencies (n) of the other CVD among cases of CHD

Variables of interest	Cases n	Controls n
Peripheral Artery Disease	10	0
Cardiac Failure	9	0
CVA/Stroke	8	0
CHD only	23	0

Source: Data using SPSS version 22.0

Figure 4.1. Distribution of proportions of CHD cases by Peripheral Artery Disease, Cardiac Failure CVA/Stroke status



Source: Data using SPSS version 22.0

Table 4.2 (b) Distribution of proportions of CHD cases by Peripheral Artery Disease, Cardiac Failure CVA/Stroke status

	CHD %	Control %
Peripheral Artery Disease	20	0
Cardiac Failure	18	0
CVA/Stroke	16	0
CHD only	46	0

4.3 SOCIO ECONOMIC STATUS

There was no significant (P=0.681) effect of the socio economic status on CHD cases rates as follows: 40% (n=6/15) among not employed, 50% (n=16/32) in government subsidy, and 52.8% (n=28/52) among employed participants.

4.4 ANTHROPOMETRY

Table 4.3 presents the comparisons the anthropometric parameters between CHD cases and controls. The mean values of height were similar (P>0.05) between CHD cases and controls, whereas the mean levels of weight, BMI and waist circumferences (WC) were significantly (P<0.05) highest in CHD cases than those from controls.

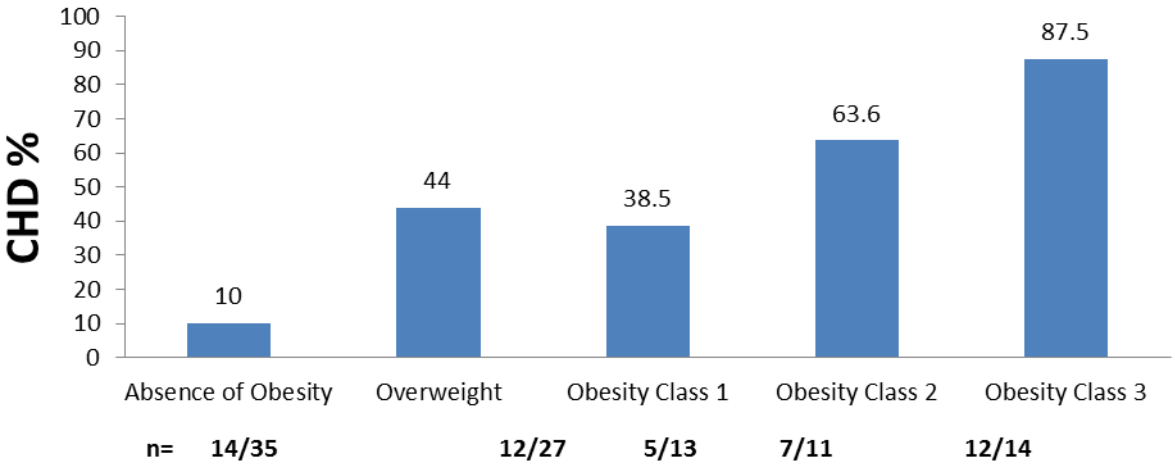
Table 4.3 Comparisons of levels of selected anthropometric parameters by the study population

Variable of interest	CHD cases Mean ±SD	Controls Mean ± SD	P-value
Height (m)	1.587±0.0097	1.607±0.125	0.373
Weight (kg)	80.4±20.2	68±10.5	<0.0001
BMI (kg/m^2	32.5±9.8	26.8±5.8	<0.001
WC (cm)	100.4±20.5	81.1±15.7	<0.0001

Source: Data using SPSS version 22.0

There was a significant (P for trend =0.005) and positive linear association between increasing rates of CHD cases and increasing levels of BMI (Figure 4.2). Indeed 9/10 and 2/3 of CHD cases were in obesity class 3 and Obesity Class 2, respectively, whereas 4/10 of CHD cases were observed in overnight, absence of obesity and Obesity Class 1

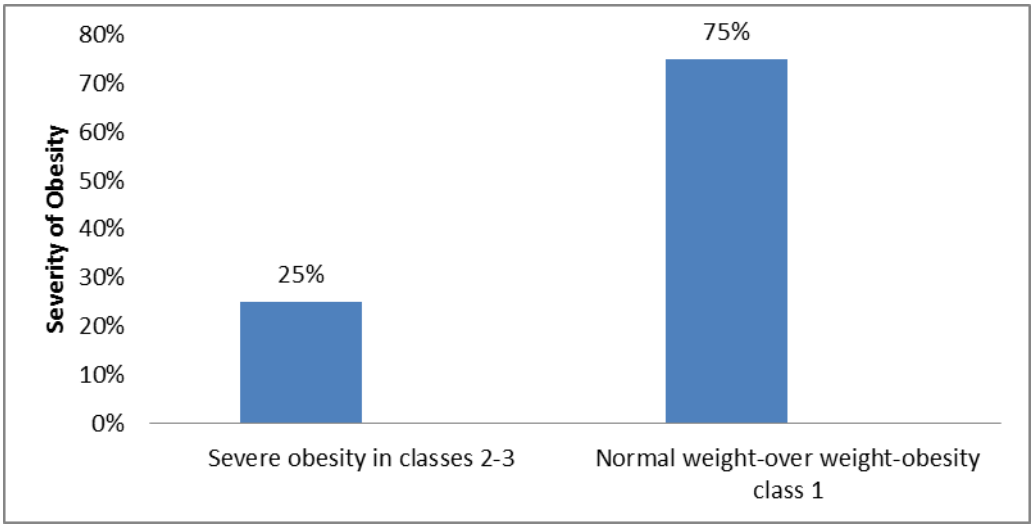
Figure 4.2 Distribution of proportions of CHD cases by the nutritional status



Source: Data using SPSS version 22.0

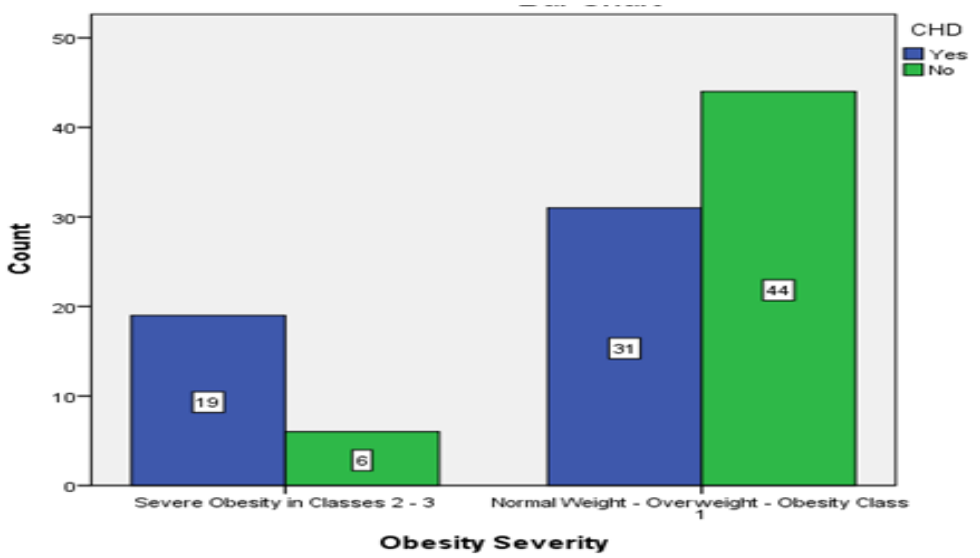
Then, in all participants Figure 4.3(a) considered ¼ people with Severe Obesity for Obesity Classes 2-3 were contrasted with a sub group including normal weight-Overweight-Obesity Class 1. The proportions of CHD were significantly common in case of Severe Obesity (CHD=76% n= 19/25, OR=4.5; 95% CI 1.6-12.6; P= 0.003) than in sub group of Normal- Overweight- Obesity Class 1 (CHD= 41.3% n=31/75)

Figure 4.3(a) Distribution of participants by counts of severe obesity



Source: Data using SPSS version 22.0

Figure 4.3(b) Distribution of participants by counts of Severe



Source: Data using SPSS version 22.0

The proportion of CHD cases were significantly commonest in the presence of IDF abdominal obesity (61.5% n=32/52, OR=2.7; 95% CI 1.2-6; 6=0.016) than those among controls (37.5% n= 18/48).

Table 4.3 (c) Distribution of participants by counts of Severe Obesity

Distribution	Cases n	Controls n
Severe Obesity in Classes 2-3	19	6
Normal Weight-Overweight-Obesity class	31	44

4.4.1 Blood Pressure components and disorder

The mean values of SBP, DBP, and Pulse Pressure (PP) of CHD cases were significantly (P<0.0001) highest than those of controls (Table 4.4).

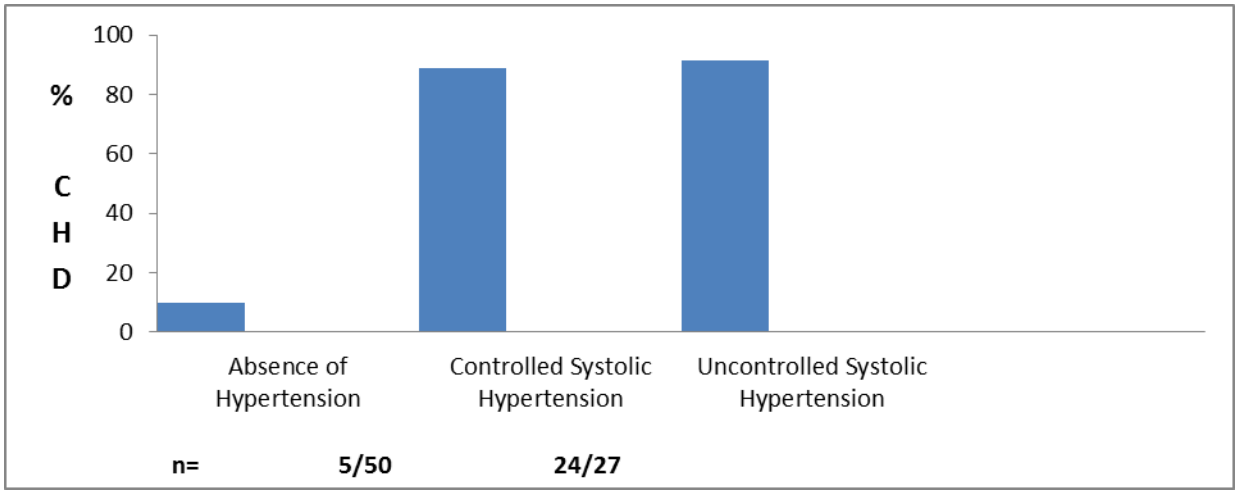
Table 4.4 Comparisons of mean levels of selected BP components by the study population

Variable of interest	CHD cases Mean ±SD	Controls Mean ± SD	P-value
SBP (mmHg)	138.3±21.8	116±14.2	<0.0001
DBP (mmHg)	79.6±17.1	68.6±8.8	<0.0001
PP (mmHg)	58.9±21.4	47.5±12.4	<0.002

SBP= Systolic Blood Pressure, DBP= Diastolic Blood Pressure, PP= Pulse Pressure (Source: Study data using SPSS version 22.0)

In considering BP control, there was a significant (P<0.0001) and biologic gradient linear positive association of lowest, intermediate, and highest CHD rates with no hypertension, controlled systolic hypertension, and uncontrolled hypertension (Figure 4.4).

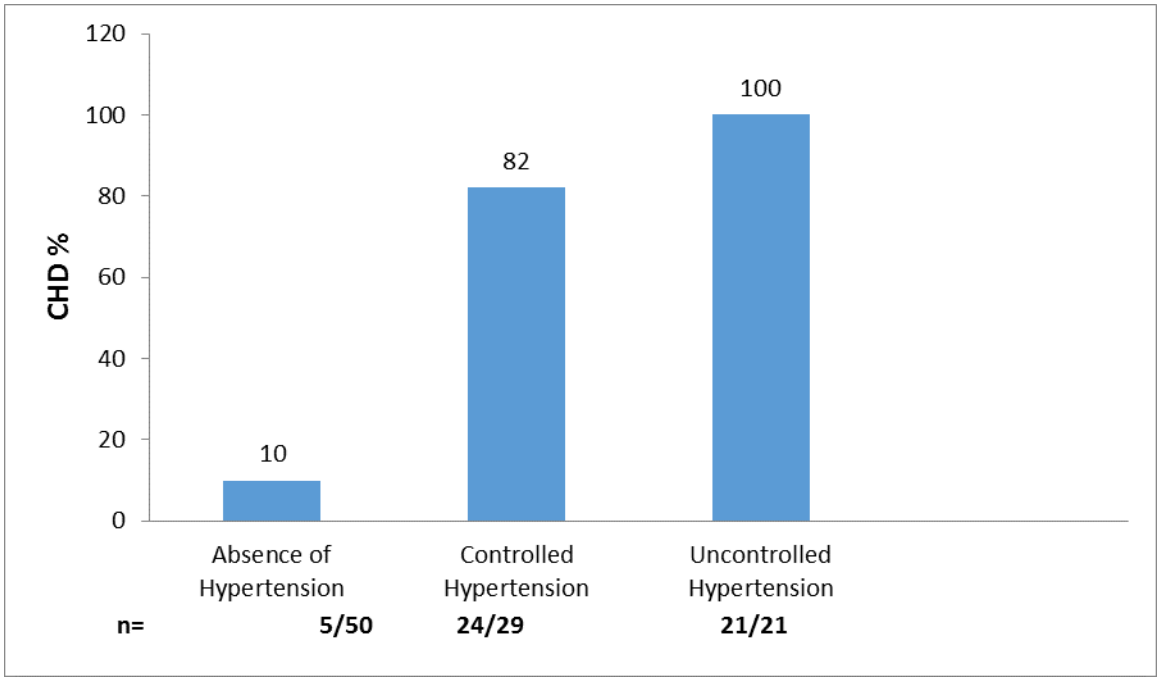
Figure 4.4 Distribution of proportions of CHD cases by SBP control levels



Source: Study data using SPSS version 22.0

There was also a significant (P<0.0001) variation of CHD rates DBP control levels: the lowest, intermediate, and highest proportions of CHD cases in absence of hypertension, controlled diastolic hypertension, and uncontrolled diastolic hypertension (Figure 4.5)

Figure 4.5 Distribution of proportions of CHD cases by DBP Control level



Source: Study data using SPSS version 22.0

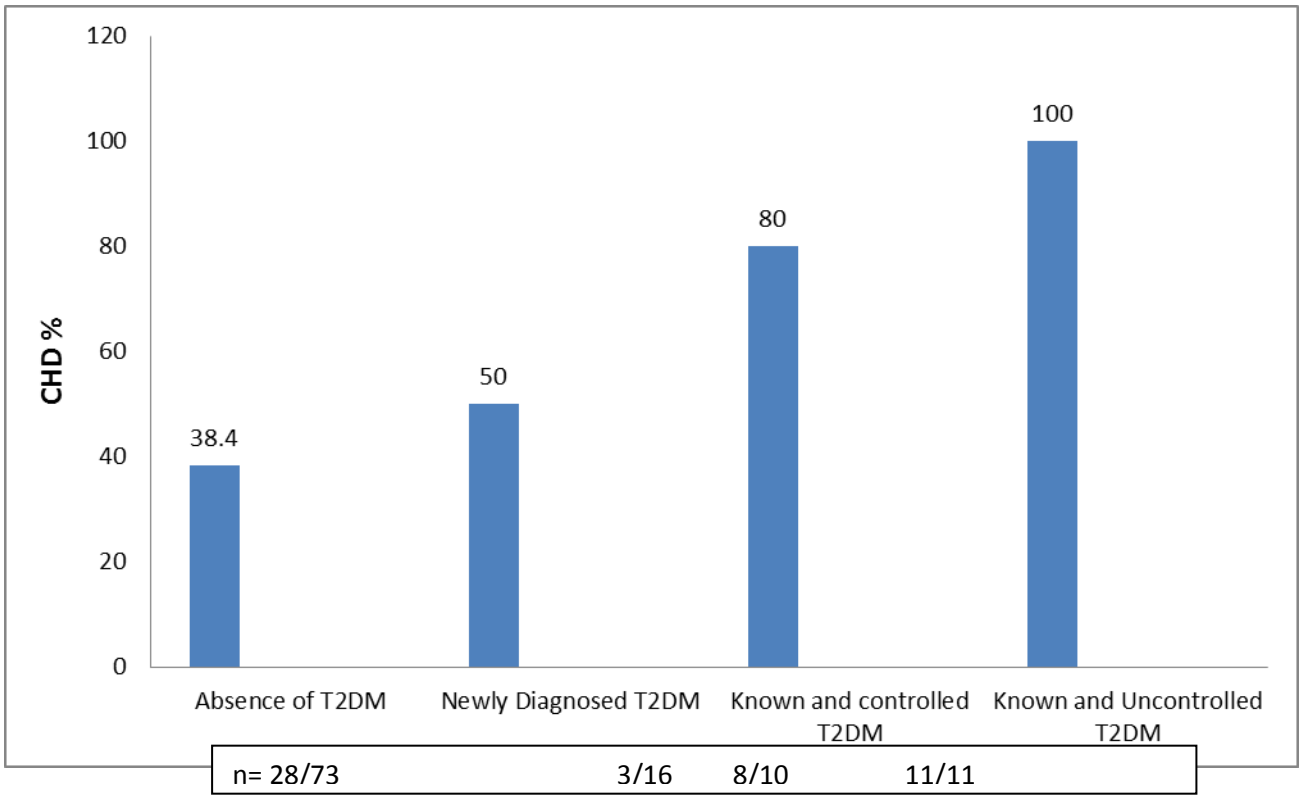
4.4.2 Metabolism of Glucose

The mean concentration of fasting plasma glucose was significantly (P=0.003) higher in CHD cases (FPG= 6.8±3.7 mmol/L) than that for controls (FPG= 5.2±0.8 mmol/L).

Thus, CHD was significantly more frequent in the presence of T2DM (90% n=18/20; P<0.0001) than in the absence of T2DM. Indeed, the presence of T2DM conferred 14-Fold highest risk of CHD (OR=13.5; 95% CI 2.9-62.2; P<0.0001) than the absence of T2DM.

The significant (P for trend <0.0001) increases in CHD rates from the absence of T2DM, through newly diagnosed T2DM, known and controlled T2DM, to known and uncontrolled T2DM is demonstrated in Figure 4.6.

Figure 4.6 Distribution of percentages of CHD by FPG control levels



Source: Data using SPSS version 22.0

4.5 LIFESTYLE

Inactive participants (54.2% n=26) had similar (P=0.423) proportions of CHD cases in comparisons with those active participants (46.2% n=24).

Cigarette smokers had also similar (P=0.106) rates of CHD cases (36% n=9/25) in comparison with those of non-smokers (54.7% n= 41/75).

4.6 DIET

Table 4.5 presents associations between diet patterns, lifestyle and CHD in the study population. Paradoxically, there was no significant association between amount of fried foods, vegetables, fruits, coffee and CHD. However, the risk of CHD was multiplied by 4 times (OR= 4.1; 95% CI 1.6-10.6) and 2 times (OR=2.2; 95 CI 1-5) in case of no intake of starchy foods and excessive alcohol intake, respectively.

Table 4.5 Associations between Fried foods, Vegetable intake, Fruit intake, Coffee intake, Alcohol intake and CHD

Variable of interest	CHD n (%)	Controls n (%)	P-value
Fried foods			0.466
< once/week	22/28 (57.9)	16/28 (42.1)	
2-3 times/week	23/51 (45.1)	28/51 (54.9)	
Everyday	5/11 (45.5)	6/11 (54.6)	
Vegetables			0.217
< once/week	10/14 (71.4)	4/14 (28.6)	
2-3 times/week	34/74(46)	40/74 (54.1)	
Everyday	6/74(50)	6/74 (50)	
Fruits			0.640
No	39/76(51.3)	37/76 (48.7)	
Yes	11/24(45.8)	13/24 (54.2)	
Coffee			0.214
<once/week	16/29 (55.2)	13/29 (44.8)	
1-4 cups/ Day	28/63 (44.4)	35/63 (55.6)	
≥5 cups/ Day	6/8 (75)	2/8 (25)	
Drinks			0.048
Excessive alcohol	23/37 (62.2)	14/37(37.8)	
Moderate alcohol and soft drinks	27/63 (42.9)	40/63(63.5)	
Fiber/Starchy			0.002
No	22/30 (73.3)	8/30(26.7)	
Yes	28/70 (40)	42/70(60)	
Tobacco Use			0.106
Yes	9/25 (36)	16/25(64)	
No	4/75 (54.7)	71/75(94.7)	

Source: Data using SPSS version 22.0

4.7 HEREDITY/FAMILY HISTORY OF RISK FACTORS OF CVD

Table 4.6 shows associations between heredity/ family history of risk factors of CVD and CHD cases in the study population. There was no significant ($p>0.05$) associations between Family History of CVD, Family or relationship dispute, Father CVD, Mother CVD, Grand Parents CVD, Extended family CVD, Hypertension in family, CVA (Stroke) in family and CHD cases. However, there were significant associations between siblings CVD, cardiac failure in family, CHD in family and CHD cases

However, highest risk of CHD was significantly conferred by siblings family of CVD (87.5% n=14/16, OR= 9.3; 95% CI 2-43.7;P<0.001 in yes versus 42.9% n=36/84 in no), cardiac failure in Family (82.4% n=14/17, OR = 6.1; 95% CI 1.6-22.8; P=0.003 in yes versus 43.4% n=36 183 in no), and CHD in Family (90% n= 9/10, OR= 10.8; 95% CI 1.3- 88.5; P=0.008 in yes versus 45.6% n=41/90 in no);

Table 4.6 Associations between Heredity/ Family history Of Risk factors Of CVD and CHD cases

Variables of Interest	CHD n (%)	Controls n (%)	P- Values
Family history of CVD			0.161
Yes	27/47 (57.4)	20/47 (42.6)	
No	23/53 (43.4)	30/53 (56.6)	
Family/ relationship dispute			0.338
Yes	4/11 (36.4)	7/11 (63.6)	
No	46/89 (51.7)	43/89 (48.3)	
Father CVD			0.799
Yes	9/19 (47.4)	10/19 (52.6)	
No	41/81 (50.6)	40/81 (49.4)	
Mother CVD			0.585
Yes	7/16 (43.8)	9/16 (56.2)	
No	43/84 (51.2)	41/84 (48.8)	
Grand Parents			0.585
Yes	9/16 (56.3)	7/16 (43.8)	
No	41/84 (48.8)	43/84 (51.2)	

Variables of Interest	CHD n (%)	Controls n (%)	P- Values
Extended Family			0.315
Yes	0/1 (0)	1/1 (100)	
No	50/99 (50.5)	49/99 (49.5)	
Hypertension Family			0.834
Yes	17/35 (48.6)	18/35 (51.4)	
No	33/65 (50.8)	32/65 (49.2)	
CVA (stroke in family)			0.629
Yes	10/22 (45.5)	12/22 (54.5)	
No	40/78 (51.2)	38/78 (48.7)	
Siblings			<0.001
Yes	14/16 (87.5)	2/16 (12.5)	
No	36/83 (43.4)	47/83 (56.6)	
Cardiac failure in family			0.003
Yes	14/17 (82.4)	3/17 (17.6)	
No	36/83 (43.4)	47/83 (56.6)	
CHD in family			0.008
Yes	9/10 (90)	1/10 (10)	
No	41/90 (45.6)	49/90 (54.4)	

Source: Data using SPSS version 22.0

4.8 PSYCHOLOGICAL FACTORS

Out of a huge number of psychological factors, almost all factors were not significantly associated with CHD cases

Table 4.7 Comparisons of proportions of neutral psychological factors by the study population

Variables of Interest	CHD cases n (%)	Controls n (%)	P-Value
Death of spouse	12(24)	7(14)	0.202
Death of a friend	11(22)	5(10)	0.102
Death of a family	25(50)	20(40)	0.315
Illness in family	16(32)	13(26)	0.509
Disputes in family	4(8)	7(14)	0.338
Divorce/separation	2(4)	2(4)	0.691
Anxiety	36(72)	37(74)	0.822
worry	41(82)	41(82)	0.602
Panic	39(78)	38(76)	0.812
Felling uneasy	35(70)	30(60)	0.812
Sadness	37(74)	40(80)	0.476
Hopelessness	31(62)	38(76)	0.130
Apathy	31(62)	35(70)	0.398
Loneliness	32(64)	30(60)	0.680
Social interest	27(54)	35(70)	0.100
Angered	34(68)	34(68)	0.583
Frustrated	38(76)	38(76)	0.373
Resentment	29(58)	30(60)	0.839
Hostility	34(68)	30(60)	0.405
Irritability	36(72)	31(62)	0.288

Source: Data using SPSS version 22.0

However, numbers of sexual difficulties, Depression, Accelerated Heart rate when upset and inability to control breathing were higher in CHD cases than in controls.

Table 4.8 Association between quality life and stress factors and CHD

Variables of Interest	CHD n (%)	Controls n (%)	P value
Accelerated heart rate when upset			<0.0001
Yes	43/54 (79.6)	11/54 (20.4)	
No	7/46 (15.2)	39/46 (84.8)	
Recurrent feeling of unease			0.295
Yes	35/65 (53.8)	30/65 (46.2)	
No	15/35 (42.9)	20/35 (57.1)	
Inability to control breathing			<0.0001
No	39/59 (66.1)	20/59 (33.9)	
Yes	11/41 (26.8)	30/41 (73.2)	
Depression			<0.0001
Yes	47/78 (60.3)	31/78 (39.7)	
No	3/22 (13.6)	19/22 (86.4)	
Personal Difficulties			0.753
Yes	1 /2 (50)	1/2(50)	
No	49/98 (50)	49/98 (50)	0.079
Sexual Difficulties			
Yes	3/3 (100)	0/3 (0)	
No	47/97 (48.5)	50/97 (51.6)	

Source: Data using SPSS version 22.0

In all participants, CHD cases, and controls, the burden of Mental Health was defined by psychological stress and Personalities Disorders such as Worry, Sadness, Panic, Breathing Control, Anxiety, Feeling of Unease, Hopelessness, Apathy, Loneliness, Frustrated status and Depression. Moreover, Frustrated status ($r = 0.314$; $P< 0.001$), Loneliness ($r= 0.231$; $P=0.021$), Feeling of unease ($r= 0.268$; $P=0.001$), Accelerated Heart rate ($r= 0.236$; $P= 0.018$), and inability to control breathing ($r=0.294$; $P= 0.003$) were significantly linked with Depression. Demonstrates the collinearity between

Frustrated status, no control of breathing, Loneliness, Accelerated heart rate, Unease and Depression (Distribution of proportions of some psychological factors within sub group of the presence of Depression in all participants).

4.9 INDEPENDENT RISK FACTORS OF CHD USING MULTIVARIATE ANALYSES

In considering all significant univariate risk factors of CHD using multivariate logistic regression analysis and adjusting for confounding factors (socio demographic, heredity, obesity, psychological factors, T2DM factors) (Model 1, only uncontrolled systolic hypertension and personal history of hypertension were significantly and independently associated with CHD cases (Table 4.9).

Table 4.9 Independent Risk Factors of CHD in Model 1

	B	SE	Wald	Adjusted OR	95%CI	P
Independent Variables						
Uncontrolled hypertension						
Personal History of hypertension	4.549	0.877	26.875	95	(16.9-128)	<0.0001
Hypertension Ht	4.277	0.773	30.625	72	(15.8-133)	<0.0001

Ht= Hypertension. Source: Data using SPSS version 22.0

When Model 2 at not entering collinearity variables (Hypertension components) and after ad justifying for confounders (not in the equation such as Depression, Ischemic Heart, History in Family, Educational level, personal history of T2DM, control, intake of soft drinks versus Excessive Alcohol, CVD History in siblings, Cardiac Failure History) using multivariate logic regression analysis, married, personal history of T2DM, no intake of starchy foods, plenty of fibre, semi-urban areas including township and severe obesity were identified as the most important significant independent risk factors of CHD (Table 4.10).

Table 4.10 Most important and Independent Risk Factors of CHD in Model 2

	B	SE	Wald	Adjusted OR	(95%CI)	P
Independent Variable Marital Status						
Married	1.902	0.581	10.727	6.7	(2.2-20.9)	<0.001
Personal History of T2DM						
Yes	1.829	0.979	3.491	6.3	(1.1-12.4)	0.049
No Intake of starchy foods plenty of fibre						
No	1.277	0.649	3.866	3.6	(1.01-12.8)	0.049
Semi-Urban with Township	1.865	0.589	10.009	6.5	(2-20.5)	0.002
Severe Obesity	1.752	0.692	6.421	5.8	(1.5-22.4)	0.011
Constant	-3.165	0.672	22.195			<0.0001

Source: Data using SPSS version 22.0

CHAPTER 5

5.1. DISCUSSSION

The study was to assess risk factors of coronary heart diseases among rural adults in Joe Gqabi: Eastern Cape Province of South Africa. To achieve this aim, we assessed the demographic profile, the anthropometric risk factors, the behavioural determinants of cardiovascular diseases (diet, smoking habits, alcohol use and physical activity) and the environmental risk factors and psychological risk factors.

Three categories of risk factors examined were: Non modifiable risk factors, Modifiable risk factors and environmental risk factors. Non Modifiable risk factors comprised of age, gender and family history of CVD; Modifiable risk factors being further sub divided along behavioural risk factors, and physiological risk factors and environmental risk factors included socio economic status and psychological risk factors.

5.1.1 Demographic profile

Demographic characteristics of the sampled population are stratified by age, gender, marital status, educational status. Finding of this study demonstrated that gender had no positive relationship with risk factors of CHD; however when considering age, family history and marital status, age showed a slight significance, these finding were consistent with evidence from previous prospective reports where the increase risk for CVD continued sharply until the age of 60 to 65 years. During the current study a large proportion of participants were females. Out of the represented number of males, a large proportion was above the age 40. The 2013 SANHANES-1 study demonstrated the gender and age disparity where the mean systolic blood pressure for males was significantly higher than that for females, however, the diastolic blood pressure did not differ significantly by gender. Mean systolic blood pressure was reported to have increased progressively with increasing age especially in the over 65 years of age group (Shisana, et al.,2013) in the current study, when compared between groups, age variations between males and females were still substantial with older female counter parts dominating. Data extracted from the census 2011, generally outlines that within the sampled population there are more females than males and a large proportion within the population has only primary level education (Statistics South Africa, 2011).

Akinboboye, et al. (2003) had observed that, gender related differences among black people in the prevalence of CVD had not been clearly shown in Sub Saharan Africa.

Differences on levels of education among groups were also demonstrated, were a large proportion of participants between cases and controls indicated that they had no formal schooling or a low level of literacy. However data demonstrated a negative effect to risk factors. These findings therefore ruled out the educational risk factors as potential risk factor and determinant of cardiovascular in the rural area. This finding was also corroborated with the study done in Nigeria by Oguoma, et al. (2015) were it was observed that, education was not a protective factor against CVD risk factors, as trends showed that individuals with no primary education with those with at least a university education had higher prevalence of CVD risk factors than those with primary and secondary education.

During the study, it was demonstrated that indeed married participants as compared to the unmarried participants were at higher risk of CHD. Even though percentages of CHD cases varied significantly and equally across settings of the participants, it was evidently proven that participants who reside in semi urban participants had a higher risk of CHD than those residing in remote rural areas.

Family History is widely recognised as a reliable tool in predicting the risk of NCDs in individuals as it includes genetic characteristics and shared environmental as well as behavioural factors (Shisana, et al., 2013). The findings of the study demonstrated that, there was no significant association between family history of the mother, father, grandparents and extended family. However the highest risk was of CHD was significantly conferred by siblings where there was a high odds ratio. The same results were observed by Dedkhard (2006) as it was demonstrated that family history of CHD was not an independent risk factor of CHD in rural Thai women despite previous studies from the Western countries indicating that family history was a significant contributor in women. Contrary to this, Shisana, et al., (2013) on the SANHANES-1 study outlined that the self-reported rates of family history of NCDs highlighted that the rate of self-reported family history of all of the assessed conditions was highest among respondents in urban formal settings. Free State Province, Western Cape Province, Eastern Cape Province and Northern Cape Province had the highest rates of self-

reported family history. The rate of self-reported family history of high blood pressure, stroke, high blood sugar and heart disease was highest among Indians, while coloureds had the highest self-reported family history rate of stroke and Black Africans on the other hand, had the lowest self-reported of high blood pressure, stroke, high blood sugar and heart disease (Shisana, et al., 2013).

5.1.2 Anthropometric risk factors

For the study, following categories on the anthropometric measures were examined: weight, waist, height, blood pressure (systolic blood pressure, diastolic blood pressure), diabetes mellitus and body mass index.

The study findings demonstrated that, there was almost no association on levels of height between cases and controls even though the approach did not quite achieve significance, however, when compared to the mean levels of weight, BMI and waist circumferences, data shows that there was a strong trend of significance which seemed to be highest in CHD cases than those from controls. When documenting BMI levels as single a variable, the study data demonstrated a positive linear association between increasing rates of CHD cases and obesity, where cases conferred a higher odds ratio on increasing levels of obesity as compared to controls. Several studies have been consistent in demonstrating obesity as a causal factor in CHD morbidities and mortalities. Bassuck, et al. (2008) demonstrated a strong linear association between excess weight and CHD. Furthermore, in a study done Oguoma, et al. (2015) in Nigeria, higher BMI levels in females than males were demonstrated, this was corroborated with other studies done Durban and Tanzania confirmed that more females showed a higher BMI levels than females (Akinboboye, et al., 2003). In the current study, the proportion of abdominal obesity was prevalent and showing a significant and conferring a slightly high odds risk exposure. Evidently, in the current study, obesity was a prevalent risk factor. Previous studies have documented development of obesity to be mostly prevalent in urban settlements, were the transition has been linked to urbanization. A study by Mathenge, et al. (2010) demonstrated higher obesity prevalence in urban location compared to rural Kenya.

Hypertension was the most prevalent CHD risk factor in the current study just as have been reported by many other studies carried out the country. Previous studies carried out in South Africa have shown that high blood pressure contributes to a considerable burden of cardiovascular disease. The distribution of hypertension prevalence among cases and controls demonstrated differences, a high recording of hypertension in the study was documented among CHD cases were mean values of systolic blood pressure, diastolic blood pressure and pulse pressure showing a linear positive association of lowest, intermediate and highest CHD rates when compared to the controls. In the Heart of Soweto study, 56% of the study participants were hypertensive (Silwa, et al., 2008) and a study commissioned by Van Zyl, et al. (2010) also found that the prevalence of self reported hypertension was 63.1%. When comparing the two studies commissioned in the country, and the prevalence of hypertension in the current study it then demonstrates hypertension as a major risk factor of CHD in rural areas.

The second major CHD risk factor in this study is the prevalence of diabetes among study participants, which was demonstrated to be significantly higher among cases than controls. Data demonstrated a frequent significant presence of type 2 diabetes mellitus that conferred the both highest risk and odd ratio among the cases. Van Zyl, et al. (2010) in the study commissioned within rural Free State towns, found that the prevalence of diabetes high at 10.8% and explained it problematic within those communities, Alberts, et al. (2005) also demonstrated a high prevalence of diabetes in their study commissioned among Blacks in rural Limpopo. A study done in Ethiopia, demonstrated a consistency with the current study were finding revealed a high predominance of type 2 diabetes among sampled patients and had an escalating number of patients of patients with diabetes that previously (Alemu, 2015).

5.1.3 Behavioural determinants of cardiovascular diseases

In assessing behavioural determinants, diet, smoking habits, alcohol use and physical activity risk factors were classified under modifiable risk factors and were assessed among respondents.

There is overwhelming evidence that smoking, alcohol use and physical activity are important determinants of coronary heart disease, and prospective case control studies

have showed a strong graded relative risk relationship (Kromhout, 2002). In comparing alcohol and tobacco use, the current study data showed that excessive alcohol intake was commonest CHD cases and carried a slightly high odd ratio, however, smoking patterns among both groups also carried similar patterns where there was no statistical significance. Current studies done in the country illustrate that the prevalence of alcohol is more common in urban areas than rural settlements (Van Zyl, et al., 2010); however this study demonstrated the contrary to that. According to the study done by Kromhout, et al. (2002) a strong association between smoking and coronary heart disease was observed where the relative risk was five times more between smokers and non smokers. When illustrating physical activity, the current study demonstrated that inactive respondents had similar proportions with those active respondents, and therefore, physical activity was not decisively significant or there was no difference in statistical significant. Contrary to the findings, globally, physical inactivity and alcohol use are recognised as among leading risk factors of mortality and are responsible for NCD risks such as coronary heart disease, type 2 diabetes (Shisana, et al., 2013). The current study applied self-reported data during data collection, which was in turn a limitation for the study analysis as the findings differed from the studies conducted. In 2003, an international study on physical activity. Completed in 51 countries including South Africa, used self-reported data to confirm the finding of low levels of physical activity among South Africans

Healthy eating forms the basis for achieving and maintaining cardiovascular health. Finding from this study illustrated the effects of diet such as fried foods, fruits, vegetables and coffee had on the risk factors of coronary heart disease. Current study displayed frequent difference on intake of starchy food as the odds ratio was slightly high among CHD cases. Interestingly, prospective studies do show a beneficial effect of a similar magnitude of combined fruit and vegetable intake on the incidence of coronary heart disease, nonfatal myocardial infarction, stroke, coronary surgical procedures, and cardiovascular disease related death (Din, 2002). A study conducted by Reddy, et al., (2007) noted that, among urbanised populations who are also referred to as "early adopters", urbanization leads to lifestyle changes, resulting to an increased consumption of energy rich foods and in energy expenditure and loss social

support that is available for rural societies. Therefore the current study finding corroborated with other studies done

5.1.4 Environmental risk factors and psychological risk factors

The findings of this study demonstrated that there was no relationship on the socio economics status which included income levels among participants and CVD risk factors. However, in Nigeria, few reports were found on the association between socio economic status and cardio-metabolic syndrome, high prevalence of cardiometabolic risk factors were found in high socio economic status groups that in low socio economic groups (Oguoma, et al., 2015). A study among rural Thai women also corroborated that socio economic status including educational levels and low family income were negatively and significantly related to the severity of CHD (Dedkhard, 2006). Interestingly, the INTERHEART study also attested to the trends in socio economic status, where data demonstrated that, among the more educated and wealthier sector of society the risks are much higher than in poor sector (Steyn et al., 2005).

Socio economic status is a predictor of CHD and its risk factors, the nature of this relationship varies dependent on the economic development of the countries (Oguoma, et al., 2015). Evidently there is a relationship between socio economic status and risk factors in adult population in high income countries, even though the trend differs in low income countries were lower socio economic status is a potential marker for poor health outcomes.

When considering psychological risk factors among both sampled groups, the study demonstrated that almost all psychological factors observed data demonstrated no association to coronary heart disease however sexual difficulties, depression, accelerated heart rate when upset and uncontrolled breathing were observed to be higher among cases. In this study, depression was significantly linked to frustrated status, loneliness, feeling of unease and no control of breathing. Interestingly, this was not corroborated by Gupta, et al. (2012) in the study it was noted that, there was no prevalent association of depression among lower socio economic status participants despite psychological stress being greater in low educational status individuals.

As the study involved collection of data relating to the demographic profile, individual characteristics related to major risk factors of CHD, medical history and anthropometric profile. A clear demonstration on the presence of major risk factors such as high waist circumference, high BMI, elevated blood pressure, elevated blood glucose was presented in the current study which all contribute to the development of CVD related diagnosis was prevalent in this rural population. The INTERHEART Africa study showed that only five risk factors account for 89.2% of the risk for an initial CVD, that is, tobacco use, self reported hypertension, diabetes, abdominal obesity (Steyn et al., 2004). However, dietary or lifestyle behavior modification, productive physical activity and weight reduction and increase in the level of literacy were proved to be an important issue in the prevention and management of cardiovascular disease. In a study by Gupta, et al. (2012) it was observed that lower educational and socioeconomic status subjects unhealthy lifestyles despite them being major determinants of increased cardiovascular risk.

5.2 CONCLUSION

CHD is a multifactorial condition among poor black Xhosa people. Therefore major risk factors of CHD in the diagnosed cases are uncontrolled systolic blood pressure, personal history of hypertension, personal history of T2DM, marriage, no intake of starchy foods/ plenty of fibre, semi urban/township, and severe obesity. However, undiagnosed controls showed a CHD risk in diet patterns.

5.3 LIMITATIONS

In the district, there is a gross shortage of clinicians, this challenge was profound during this study. Joe Gqabi District bears the burden of these shortages as the district has difficulties in attracting and retaining enough clinical staff to provide health service. Availability and lack of medical equipment is another challenge that affected this study as some anthropometric measurements were not taken in all research participants. The study was also affected by access to public transport which became a potential bias to the sample as it favoured those who can afford and not walk long distances.

5.4 RECOMMENDATIONS

The risk factors of CHD among black Africans in rural communities are still obscure and demand more research. Our country is in dire need of a comprehensive action plan or program to help in reduction and elimination of increasing chronic epidemic of cardiovascular diseases. More research is needed on risk factors for CVD, and this study can be used as a baseline for Joe Gqabi District.

Health promotion measures are key components in increasing life expectancy among black people, therefore, educational programmes should be speedily implemented to educate rural populations with regard to the importance of balanced nutrition, increasing physical activity, early detection, adherence to treatment, stop smoking and reduce excessive alcohol consumption.

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APPENDIX 1: APPROVAL LETTER FROM THE DISTRICT MANAGER

Department of Community Service
Faculty of Health Sciences
Walter Sisulu University
Mthatha

15 December 2014

The District Manager: Ms N. Ndabula
Department of Health:Eastern Cape
32 Dan Pienaar Street
Aliwal North

RE: Cardiovascular disease data collection within Joe Gqabi Health District

The purpose for this study is to obtain an in depth understanding of the risk factors and determinants of rapidly growing global epidemic, to influence policy frameworks and prevention strategies.

I will be conducting data collection from two (2) hospitals (that is; Empilisweni Hospital, Umlamli Hospital) and 8clinics in Senqu Sub District. I have provided you with a copy of my research questionnaire which includes consent forms to be used in the research process as well as a copy of the approval letter which I received from the Walter Sisulu University Research Ethics Committee and the approval letter from the Provincial Department of Health.

I am hereby seeking your consent to conduct data collection from district rural facilities, and upon completion I accept to provide the Department of Health with a bound copy of the full research report. Thank you for your time and consideration in this matter

Sincerely

T. Tetana
MPH Student (199003874)

Approved/Not Approved

N.P. Ndabula
District Manager

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APPENDIX 2: ETHICAL CERTIFICATE

WSU
Walter Sisulu University

FACULTY OF HEALTH SCIENCES
POSTGRADUATE EDUCATION, TRAINING, RESEARCH AND ETHICS UNIT

HUMAN RESEARCH COMMITTEE
CLEARANCE CERTIFICATE

PROTOCOL NUMBER	:	080/2014
PROJECT	:	ASSESSING THE DETERMINANTS AND RISK FACTORS OF CARDIOVASCULAR DISEASES AMONG RURAL ADULTS IN THE JOE GQABI DISTRICT: EASTERN CAPE
INVESTIGATOR(S)	:	THANDO TETANA
DEPARTMENT	:	COMMUNITY MEDICINE
DATE CONSIDERED	:	26 NOVEMBER 2014
DECISION OF THE COMMITTEE	:	APPROVED

N.B. You are required to provide the committee with a progress or outcome report of the research after every 6 months. The committee expects a report on any changes in the protocol as well as any untoward events that may occur at any time during the study as soon as they occur.

Prof B Longo-Mbenza
DEPUTY- CHAIRPERSON

Walter Sisulu University
Academic Health Service Complex of the Eastern Cape
Postgraduate Education and Training
Faculty of Health Sciences
Walter Sisulu University
P/Bag X1, WSU, 5117, E.C.
Tel (047) 502 2100 / Fax (047) 502 2101

28-11-2014
Date

DECLARATION OF INVESTIGATOR(S)

(To be completed in duplicate and one copy returned to the Research Officer at Office L311, 3rd Floor, Old Library Building, NMD Campus, WSU)

I/We fully understand the conditions under which I am/we are authorized to carry out the abovementioned research and I/we guarantee to ensure compliance with these conditions. Should any departure to be contemplated from the research procedure as approved I/we undertake to resubmit the protocol to the Research Ethics Committee. I/We agree to a completion of a yearly progress report.

12-12-14

N.B. Please quote the protocol number in all enquiries.
Institutional Review Board (IRB) 00007448

HREC 1202009-020

APPENDIX 3: APPROVAL LETTER FROM EPIDEMIOLOGY AND RESEARCH UNIT

Province of the
EASTERN CAPE
HEALTH

Room 000 • 0th Floor • Gosvenor Lodge Building • Taylor Street • King Williams Town
Private Bag X0038 • Bhisho • 5605 • REPUBLIC OF SOUTH AFRICA
Tel.: +27 (0)40 608 0856/7 • Fax: +27 (0)43 642 1409 • Website: www.ecdoh.gov.za

To:	**Prof. D. L. Buso**
Enquiries	**Mr. Z.P. Merile** **Manager: Epidemiology and Research**
Subject:	Risk Behaviors and determinants of Cardio-Vascular diseases among the Urban and Rural Xhosa speaking adults in the Eastern Cape Province, South Africa
Date:	**10 September 2013**

The Department of Health would like to inform you that your application for conducting research on the abovementioned topic has been approved based on the following conditions:

1. During your study, you will follow the submitted protocol with ethical approval and can only deviate from it after having a written approval from the Department and the Ethics Committee.
2. You will observe and respect the rights and culture or traditions of your study participants and maintain confidentiality of their personal identifiers. This means you shall not impose or force them to participate in your study if they chose not to. Your study participants have a right to withdraw anytime they want to.
3. You are expected to provide a progress report after every three months (from the date of approval of this letter) in writing.
4. At the end of your study, you will be expected to send a full report with your recommendations to the Department of Health (Epidemiology & Research).
5. These results can only be shared or presented elsewhere unless you have given the department a report (in writing).

Your compliance in this regard will be highly appreciated.

DIRECTORATE: EPIDEMIOLOGY & RESEARCH

APPENDIX 4: INFORMATION SHEET

Description of the research and your participation

You are invited to participate in a research study conducted under supervision of Dr C. R. Sewani- Rusike and I am a MPH student at the Walter Sisulu University.

The purpose for this study is to obtain an in depth understanding of the risk factors and determinants of rapidly growing global epidemic, to influence policy frameworks and prevention strategies.

Voluntary Participation

Your participation in this research is entirely voluntary, it is your choice whether to participate or not. Whether you choose to participate or not, the facility (clinic or hospital) service will continue and nothing will change. You may change your mind later and stop participating even if you agreed earlier and will not be penalized in any way should you decide not to participate or to withdraw from this study.

Should you agree, your participation will involve one questionnaire interview with you which will take about 30 minutes and focusing of your knowledge and opinions of cardiovascular diseases. You are requested to honestly respond to the interview questions

Risks and discomforts

Whilst participating in this study, there are no anticipated risks or harm that you may sustain. The tool (questionnaire) used in the study focuses on your behavioural and societal questions and will not cause any discomforts.

Potential Benefits

The study unfortunately does not have any immediate benefits. Even though there may be no immediate benefits but your participation is likely to help us find the answer to research question (Assessing the determinants of cardiovascular diseases among rural adults of Joe Gqabi District: Eastern Cape) and provide strategic ways to manage,

influence policies. There may also not be societal benefits at this stage of the research but future generations are likely to benefit from your participation.

Protection of Confidentiality

The information that we collect from this research project will be kept confidential. Information about you that will be collected during the research will be put away an no one but the research team (researcher, supervisor and the ethics committee) will be able to see it. Any information about you will have a number instead of a name. only the researcher will know what your number is and only the information you gave consent to will be revealed. Data questionnaires will be stored in a lockable cabinet and safe electronic software will be used as analysis.

Contact information

If you have any questions or concerns about this study or if any problems arise, please contact Dr. C. R. Sewani-Rusike at Walter Sisulu University at 047 502 2773 If you have any questions or concerns about your rights as a research participant, please contact HSRC Research ethic Committee's toll free number 0800 212 123.

Appendix 5: Consent Form

I hereby agree to participate in the research on "Assessing risk factors of cardiovascular diseases among rural adults of Joe Gqabi District: Eastern Cape.

Please initial Box

1. I confirm that I have read and understand the information sheet for the above study and had the opportunity to ask questions. ☐

2. I understand that my participation is voluntary and that I am free to withdraw at anytime without giving reason ☐

3. I agree to take part to take part in the above study ☐

4. I understand that the information I provide will be stored electronically and will be used for research purposes now and later stage ☐

_____ _____

Signature of participant Date

Appendix 6: RESEARCH QUESTIONNAIRE

Research Question: "Assessing risk factors of cardiovascular diseases among rural adults of Joe Gqabi District: Eastern Cape.

Purpose of the study:

Code number:_____ Today's date:_____

Facility Name:_____

BACKGROUND and ENVIROMENTAL

AGE

How old are you?	

GENDER

male	
female	

ANTHROPOMETRIC MEASURES

Weight	Height	Waist	BMI	Blood Pressure	Blood Glucose

Are you currently (check only one)

Married	Separated	Divorced	Widowed	Single	Cohabitation

Please circle the highest year of school completed

1 2 3 4 5 (primary)	7 8 9 10 11 12 (high school)	College, FET, Under graduate	Post graduate (Honours)	Masters	PhD (other)

Source of Income: Are you currently (circle answer)

Employed	Not Employed	Self employed	Government Subsidy	Other (specify)

Housing: Do you stay in a

Mud Structure house	Urban rural	Shack	Urban Morden House	Other (specify)

Stress: Have you experienced any of the following events in the past 6 months (circle if applicable)

Death of spouse	Minor illness/injury/surgery	Illness in the family
Death of a family member	Marriage	Sexual difficulties
Divorce/Separation	Dismissal from work	Pregnancy
Marital reconciliation	Retirement	Personal difficulties at work
Jail term	Death of a friend	Minor violations of the law
Change in financial state	Family or relationship disputes	Change in work responsibilities

How often do you feel any of the following?

Anxiety	Not at all	A little	Quite a bit	Extremely
Worry	Not at all	A little	Quite a bit	Extremely
Sudden Feeling of panic	Not at all	A little	Quite a bit	Extremely
Inability to control breathing	Not at all	A little	Quite a bit	Extremely
Accelerated heart rate when upset	Not at all	A little	Quite a bit	Extremely
Recurrent feeling of unease	Not at all	A little	Quite a bit	Extremely

Do you have feelings of:

Sadness	Not at all	A little	Quite a bit	Extremely
Depression	Not at all	A little	Quite a bit	Extremely
Hopelessness	Not at all	A little	Quite a bit	Extremely
Apathy	Not at all	A little	Quite a bit	Extremely
Loneliness	Not at all	A little	Quite a bit	Extremely
Lack of interest in social interaction	Not at all	A little	Quite a bit	Extremely

Are you easily

Angered	Not at all	A little	Quite a bit	Extremely
Frustrated	Not at all	A little	Quite a bit	Extremely
Feel resentment	Not at all	A little	Quite a bit	Extremely
Hostility towards others	Not at all	A little	Quite a bit	Extremely
Frequently irritable	Not at all	A little	Quite a bit	Extremely

BEHAVIORAL

Exercise: How often do you engage in exercises (please circle one score)

Rarely or never	1-2 times each week	3 -4 times each week	5 or more times a week

Smoking: What is your current Cigarette smoking habit

I do not smoke	Ex smoker	Smoke less than 1 pack a day	Smoke about a pack a week	Smoke 2 or more packs a day	I do not smoke cigarettes, but I use other tobacco products

Alcohol use:

I do not drink	Ex drinker	Drink less than once a day	Drink twice a week	Drink more than three times a week

Diet

How often do you usually eat fried foods	Less than once a week	1-2 times a week	3-6 times a week	Everyday
How many of serves of bread, past,	0-1 serves daily	2 serves daily	3 serves	4 or more

rice, potatoes or other starchy foods do you have a day			daily	serves daily
How many servings of sweet foods like cakes, buiscuts, chocolates ect do you eat a day	Usually none	1-2 serves daily	More than 2 serves daily	
How many teaspoons of sugar do you consume daily in hot drinks, added to food etc.	0-3	4-6	7-9	10 or more
How often do you usually eat fish	Rarely	1-2 times a week	3-6 times a week	Everyday
How many pieces of fruit do you usually eat a day	Usually none	1-3 pieces daily	4 or more pieces	
How many serves of vegetables(exclpotatoes) do you usually eat a day	Usually none	1-3 pieces daily	4 or more pieces	5 or serves daily
How many cups of coffee do you usually drink a day	Usually none	1-3 cups daily	4 or more cups	5 or cups daily
How much soft drinks do you consume on average	Less than 500ml per week	1-2 litres per weeks	3-4 litres per week	5 or more litres per week
How much water do you drink a day	0- 500ml	500ml-1.25 litres	More than 1.25 litres	

DIAGNOSIS & BIOLOGICAL

Family History: What type of CVD were you told to be suffering from?

None	Yes /No
Hypertension	Yes /No
CVA (stroke)	Yes /No
Cardiac Failure	Yes /No
Ischaemic/Coronary Heart Disease	Yes /No
Congenital Heart Disease	Yes /No
Peripheral Vascular Disease	Yes /No
Rheumatic Heart Disease	Yes /No
Cardiomyopathy	Yes /No

Other (specify)	Yes /No
Do not know	Yes /No

Is/was there anybody in your family with a history of CVD?(circle all appropriate)

None	Yes / No
Father	Yes /No
Mother	Yes /No
Grand mother/Father	Yes /No
Brother/Sister	Yes /No
Other	Yes /No
Don't Know	Yes /No

If yes, what CVD did he/she/they suffer from (circle all appropriate)

None	Yes / No
Hypertension	Yes /No
CVA (stroke)	Yes /No
Cardiac Failure	Yes /No
Ischaemic/Coronary Heart Disease	Yes /No
Congenital Heart Disease	Yes /No
Peripheral Vascular Disease	Yes /No
Rheumatic Heart Disease	Yes /No
Cardiomyopathy	Yes /No
Other (specify)	Yes /No
Do not know	Yes /No

Have you in the past been diagnosed with:

Hypertension	Yes	No

If yes : Which statement best describes your Blood Pressure

Normal or low	
Borderline	
High	
I'm not sure	

Have you in the past been diagnosed with:

Diabetes	Yes	No

If yes : Which statement best describes your Diabetes

Normal or low	
Borderline	
High	
Im not sure	

Which statement best describes your Total Cholestorol

Normal or low	
Borderline	
High	
I'm not sure	

END OF QUESTIONNAIRE: THANK YOU FOR YOUR TIME

Ikhowdi yomthathi nxaxheba:_____

Umhla wodliwano ndlebe:_____

Igama lendawo:_____

INKCUKACHA ZENTLALO

IMINYAKA **ISINI**

Mingaphi iminyaka yakho?	

Uyindonda	
Ungowasetyhini	

ANTHROPOMETRIC MEASURES

Weight	Height	Waist	BMI	Blood Pressure	Blood Glucose

Ingaba (Khetha ibenye kwezilandelayo)

Utshatile	Nisohlukene okwethutyana	Waqhawuka umtshato	Ungumhlolo/umhlolokazi	Awutshatanga	Uyahlalisana

Elona nqanaba lemfundo eliphezulu oliphumeleleyo?

1 2 3 4 5 (Amabanga aphantsi)	7 8 9 10 11 12 (Amabanga aphakathi)	IDegree okanye iCollege	Post graduate (Honours)	Masters	PhD (other)

Ingaba uyasebenza ngoku?

Ewe-kumsebenzi osisigxina	Hayi andisebenzi	Ewe-Ndiziqeshile	Government Subsidy	Enye

Loluphi udidi lwendlu ohlala kuyo?

Yindlu yodaka yasezilalini	Ezizindlu zalamaxesha zasezilalini	Ityotyombe /umkhukhu	Indlu enkulu yasedolophini	Enye

Unxinezelelo lwenqondo (kwenyanga zintandathu zidlulileyo)

Ubujewe ngumilngane	Izigulo zexeshana/wenzakala/uhlinzo	Izigulo zezizalwana
Ubhuje;we lilungu losapho	Umtshato	Ingxaki kwezosondo
Waqhawuka umtshato	Wangxothwa emsebenzini	Ukhulelwa
Marital reconciliation	Umhlala phantsi	Ingxaki emsebenzini
Wakhe wabanjwa	Ubhujelwe ngumhlobo	Ukungsoli iso komthetho
Uthitsho kwisomo sezemali	Ukungaboni ngasonye nezizalwane	Utshinstho emsebenzini

Ingaba uziva kangaphi ezi zilandelayo

unxunguphalo	Ayikho	Kancinane	Kancinci	Ngamandla
ixhala	Ayikho	Kancinane	Kancinci	Ngamandla
Uzive usoyika	Ayikho	Kancinane	Kancinci	Ngamandla
Ukungakwazi ukuphefumla	Ayikho	Kancinane	Kancinci	Ngamandla
Intliziyo ebetha ngamandla xa ucaphukile	Ayikho	Kancinane	Kancinci	Ngamandla
Umane uziva ungenelisekanga	Ayikho	Kancinane	Kancinci	Ngamandla

Ukhe umane uziva:

Ungonwabanga	Ayikho	Kancinane	Kancinci	Ngamandla
Unxinrzelelo oulanamndla	Ayikho	Kancinane	Kancinci	Ngamandla
Uphelelwa lithemba	Ayikho	Kancinane	Kancinci	Ngamandla
usizi	Ayikho	Kancinane	Kancinci	Ngamandla
Umva ndedwa	Ayikho	Kancinane	Kancinci	Ngamandla
Ungakwazi ukkunxibelelana nabantu	Ayikho	Kancinane	Kancinci	Ngamandla

Ingaba uyakhawuleza ukuba nazo ezi zilandelayo

umsindo	Ayikho	Kancinane	Kancinci	Ngamandla
nxunguphele	Ayikho	Kancinane	Kancinci	Ngamandla
Uzive usonyanya	Ayikho	Kancinane	Kancinci	Ngamandla
Ubutshaba kwabanye abantu	Ayikho	Kancinane	Kancinci	Ngamandla
Soloko uziva udikiwe	Ayikho	Kancinane	Kancinci	Ngamandla

INDLELA ZOKUZIPHATHA

Ukuzilolonga: Ukhe uwulolonge umzimba?

Zange	Kanye ukuya kwisibini ngeveki	Kathathu-ukuya kwisine ngeveki	Kahlanu nangaphezulu ngeveki

Ukutshaya: Zingaphi icigareti / izoli ozitshayayo ngosuku?

Anditshayi	Ndayeka	Ndisebenzisa ngaphantsi kwe paketi enye ngosuku	Ndisebenzisa ipaketi ibenye ngeveki	Ndisebenzisa I paketi ezimbini nangaphezulu ngeveki	Anditshayi cigariti kodwa ndisebenzisa mhlobo wumbi

Ukutya

Uyitya kangakannai inyama egcadiweyo	Less than once a week	1-2 nge veki	3-6 times a week	Mihla yonke
Usitya kangakanani isonka, rayisi, amazambane okanye nakuphi ukutya okune sitatshi ngosuku.	0-1 serves daily	2 serves daily	3 serves daily	4 or more serves daily
Zingaphi ii switsi, kayiki, amaqebengwane ozityayo ngosuku	Nakanye	1-2 nge veki	More than 2 serves daily	
Mangaphi amatisipuni eswekile owathathayo ngosuku xa uphunga iziphungo ezishushu okanye.	0-3	4-6	7-9	10 okanye nangaphezulu
Uyangaphi intlanzi ngosuku	Rarely	1-2 nge veki	3-6 times a week	Mihla yonke
Mangaphi amaqekeza eziqhamo owatyayo ngosuku	Nakanye	1-3 pieces daily	4 or more pieces	
Zingaphi izitya zemifuno ozityayo ngosuku (ngaphandle kwamazambane)	Nakanye	1-3 pieces daily	4 or more pieces	5 or serves daily
Zingaphi iikomityi zee kofu oziphunga ngosuku	Nakanye	1-3 cups daily	4 or more cups	5 or cups daily

Iziselo ezihlwahlwazayo uzisela kangakanani	Less than 500ml per week	1-2 litres per weeks	3-4 litres per week	5 or more litres per week
Uwasela kangakanani amanzi ngosuku	1- 500ml	500ml-1.25 litres	More than 1.25 litres	

INGXELO KAGQIRHA NGESIGULO SAKHO & INKCUKACHA NGONOBANGELA

Sesiphi isigulo sentliziyo owaxelelwa ukuba unaso kwezi zilandelayo

(ukuba asisinyanga, bhala zonke)

Ayikho	Ewe / Hayi
High-high	Ewe / Hayi
CVA (stroke)	Ewe / Hayi
Cardiac Failure	Ewe / Hayi
Ischaemic/Coronary Heart Disease	Ewe / Hayi
Congenital Heart Disease	Ewe / Hayi
Peripheral Vascular Disease	Ewe / Hayi
Rheumatic Heart Disease	Ewe / Hayi
Cardiomyopathy	Ewe / Hayi
Enye (chaza)	Ewe / Hayi
Andazi	Ewe / Hayi

Ingaba ukho umntu kwizizalwane zakho onesifo okanye owayenesifo sentliziyo?

Akekho	Ewe / Hayi
uTata	Ewe / Hayi
uMama	Ewe / Hayi
Utatomkhulu/makhulu	Ewe / Hayi
Umnakwenu/udadewenu	Ewe / Hayi
Omnye umntu	Ewe / Hayi
Awunalwazi	Ewe / Hayi

Ukuba impendulo yakho ngu ewe, waye nesiphi isigulo kwezi?

(ukuba asisinyanga, zibhale zonke)

Ayikho	Ewe / Hayi
High-high	Ewe / Hayi
CVA (stroke)	Ewe / Hayi
Cardiac Failure	Ewe / Hayi
Ischaemic/Coronary Heart Disease	Ewe / Hayi
Congenital Heart Disease	Ewe / Hayi
Peripheral Vascular Disease	Ewe / Hayi
Rheumatic Heart Disease	Ewe / Hayi
Cardiomyopathy	Ewe / Hayi
Enye (chaza)	Ewe / Hayi
Andazi nto	Ewe / Hayi

Wena wakhe waxelelwa ngoGqirha ukuba:

unesifo se high-high?	Ewe	Hayi

Ukuba uphendule ngo Ewe: Yeyiphi incukhaca ecaza isimo sakho se Blood Pressure

Iphantsi/ Ikwisimo esilungileyo	
Iphakathi/Isecicini	
Iphezulu	
Andazi nto	

Ingaba wakhe waxelelwa ngoGqirha ukuba:

unesifo seswekile ngaphambili?	Ewe	Hayi

Ukuba uphendule ngo Ewe: Yeyiphi indlela ethe ncakasana ecacisa isimo seswekile kuwe

Asezantsi/ Akugele	
Iphakathi/Isecicini	
Aphezulu	
Andiqinisekanga	

Yeyiphi indlela the ncakasana ecacisa isimo sama futha emzimbeni kuwe:

Asezantsi/ Akugele	
Iphakathi/Isecicini	
Aphezulu	
Andiqinisekanga	

ISIPHELO SECHUNGECHUNGE LWEMIBUZO: ENKOSI NGOKUTHABATHA INXAXHEBA

Ingcazelo ethe vetshe malunga nolu phando nzulu

Uyacelwa okkuba uthabathe inxacheba kuphando nzulu olwenziwa phantsi kolawulo luka Dr. B. Bongsha kwi Dyinivesiti yase Walter Sisulu University.

Olu luphando oluzama ukunceda abaqulunqi bemithetho, abacwangcisi besebe lezempilo kwakunye noluntu lweMpuma Koloni ngokubanzi, ukuqwalasela nzulu imiceli mingeni ekulweni nezifo zentliziyo. Ukuthatha inxaxheba nentsebenziswano yakho koluphando luzakunceda ekuveliseni indlela ezingcono zokukhusela kwa nokulawula izifo zentliziyo kweliphondo nakwisizwe ngokubanzi.

Inxaxheba Enganasinyanzeliso

Inxhaxeba yakho kolu phando nzuli alisosinyanzeliso, yaye unelungelo lokukhetha okuba uyakuthanda okanye awukuthandi ukuthatha inxaxheba. Nokuba ukhethatha ukuthatha inxaxheba esibhedlele okanye eklinik ayenzimahluko lonto. Yaye unalo ilungelo lokuguqula ingqondo naiphi ixesha ufuna noba ubusele uvumile, awuyi kujeziswa ngalonto.

Ukuba uyavuma ukuzibandakanya noluchungecunge, kubalulekile wazi into yokuba izakuthatha imizuzu engamashumi amathathu apho sijongene nolwazi lwakho ngezifo zentliziyo. Uyacelwa ke ukuba uphendule ngokunyanisekileyo/.

Ungcipheko nokungahlaliseki kakuhle

Ngethuba uthatha inxaxheba kolu chungechuge lwemibuzo amathuba okukubeka elungciphekweni nokungonwabi awekho. Oluchungechuge lwemibuzo lusetyenziwe pha lujongana nendlela yokuziphatha yaye alunakuze lubanglele ukungonwabi.

Amaqithithi akhoyo

Kungelishwa lokuba olu phando zulu alunawo amaqithithi akhawulezileyo afumanekayo. Nangona engekhoyo amaqithithi, ulwazi osinika lona luzakincedisa ekufaneni impedulo zophando lokuba zeziphi indlela zokuziphatha ezibeka emngciphekweni, kunye nonobangela bezifo entliziyo

kubantu abadala abathetho yesiXhodsa kumnandla wase Joe Gqabi. Yaye kungakho nokuncedala kwesizwe siphela, yaye nesizukulwana esilandelalo singaxamla kwimpendulo zakho

Ukhuseleko Lolwazi

Zonke incukacha eziqokelelweyo kolu phando nzulu zoo ngcinwa ngokkufihlakeleyo. Yaye nencukacha ngawe ziyo ngicwa ngokufihlakeleyo ngaba qhubi bodliwano ndlebe. Ulwazi ngawe luyoba nee nomboro endaweni yegama lakho, yaye ngumqubi dliwano ndlebe yedwa uyokuyazi inomboro, xeshikweni kufuneka kukhutshwe ulwazi, lwakhukutswa ngemvume yakho.

Uchungenchunge lwemibuzo iyakugcwinwa ekhabhathini etixhwayo naleyo ifakwe kwi computer iyakugcinwa ngoku fihlakelyo.

Nxubelelana nathi

Ukuba uthe wanembibuzo Kanye kukho into ongayiqondiyo malunga nolu gcungecunge lwemibuzo, uyacelwa ungoyiki ukuqakamishelana nathi (I Dyunivesiti yase Walter Sisulu) ngoko mxeba kule nomboro 083 683 8767. Kananjalo ukuba unganemibuzo maunga namalungelo akho nje ngo mthati nxaxheba ungatsalela kule nomboro ingahlawulelwayo ye HSRC Research ethic Committee ethi 0800 212 123.

Appendix 5: Isivumelwano

Oku kubonakalisa ukuba ndiyavuma ukuba yinxalenye okanye ukuthatha inxaxeba kuncungechuge lwemibuzo on "Assessing risk factors of cardiovascular diseases among rural adults of Joe Gqabi District: Eastern Cape.

Bekaba u "X"

1. Ndiyaqinisekisa ukuba yonke into ndiyayiqonda kwaye ndizifundile zonke incukaca. ☐
2. Ndiyaqonda kwaye ndivuma ukuba andinyazeliswanga ukuba ndithtathe inxaxeba, yaye ndingayeka naninina ndifuna ngaphandle kwesizathu. ☐
3. Ndiyavuma ukuthabatha inxaxeba koluphando nzulu ☐
4. Ndiyaqonda ukuba kokne endikucazile kuyogcinwa yaye kusetyezise kwangoko okanye ngelinye ixesha ☐

_____ _____

Siginitsha yomthati nxaxeba Usuku