

The relationship between cardiovascular risk factors and knowledge of cardiovascular disease in African men in the North-West Province

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Dissertation submitted in fulfilment of the requirements for the degree *Magister Curationis* in *Nursing* at the Potchefstroom Campus of the North-West University

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November 2014



ACKNOWLEDGEMENTS

Firstly, I would like to thank my Heavenly Father for His grace, the strength He has given me, as well as all the blessings I have received.

I would like to extend my gratitude to the following persons who contributed greatly to making this study possible:

- **Doctor Ronel Pretorius**, my supervisor, for her guidance and financial support.
- **Doctor Carla MT Fourie**, my co-supervisor, for her professional and scientific input to improve the quality of the study.
- **Professor Aletta E Schutte**, my assistant supervisor, for her professional and scientific input to improve the quality of my dissertation, as well as contributing to the improvement and development of my research skills.
- **Doctor Karin Minnie**, for her time and effort to assist with my studies in the absence of my study supervisor.
- **Doctor Lisa Uys**, for her expert advice and encouragement throughout the study.
- **Doctor Suria Ellis and her team** from the Statistical Consultation Services of the NWU in sharing their knowledge.
- **Christien Terblanche (Cum Laude Language Practicioners)**, for language editing of the final product (*see attached declaration of editing*).
- All the staff and students from **physiology, nursing** and **biokinetics** for their input in the data collection process.

- All my colleagues and friends for their support and motivation throughout my study.
- All the **participants** that took part in this study.
- My **husband** and **children** for their sacrifices to help me achieve my academic goals and for their love and support that made it possible for me to complete this dissertation.
- My **mother and sister** for their love and for believing in me.
- My **late father**, for his strength and love. I know my father would have been very proud of me.

***“Unless you try to do something beyond what you have
already mastered, you will never grow”***

– Ralph Waldo Emerson

RESEARCH OUTLINE

This dissertation is presented in the article format. This format is approved, supported and defined by the North-West University guidelines for postgraduate studies. The first chapter consists of the background, motivation, aim and objectives, as well as an overview of the study protocol, and all methods used to obtain the data. Chapter 2 contains a detailed review of the literature. Chapter 3 is a research article in the format in which it was submitted for publication. Chapter 4 is the conclusion, recommendations and limitations of the research study. Each chapter's references are included at the end of the chapter. For Chapter 1, 2 and 4, the references are according the NWU Harvard style. Chapter 3 is according the journal's instruction guidelines. For the purpose of this study United Kingdom (U.K.) English was used. Chapter 3 used United States (U.S.) English for adhering to the journal's instruction guidelines.

AUTHOR CONTRIBUTIONS

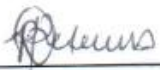
This research study was planned and executed by the following researchers:

NAME	ROLE IN THE STUDY
Mrs. A Burger	Responsible for initial proposal of this study along with literature searches, critical evaluation of study protocol and methodology, design and planning of research study, interpretation of results and writing of all sections of this dissertation.
Dr. R Pretorius	Supervisor. Guidance, intellectual input and critical evaluation of the study.
Dr. CMT Fourie	Co-Supervisor. Guidance, intellectual input and critical evaluation of the final product.
Prof. AE Schutte	Assistant Supervisor. Guidance, intellectual input, statistical analysis and interpretation of results, as well as evaluation of the final product.

The following is a declaration by the co-authors to confirm their individual contribution and involvement in this study and to grant their permission that the research article (Chapter 3) may form part of this dissertation.

Declaration:

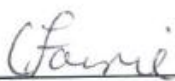
I hereby declare that I have approved the inclusion of the article mentioned above in this dissertation and that my contribution to this study is indeed as stated above. I hereby grant permission that this article may be published as part of the M.Cur dissertation of Mrs. Adèle Burger.



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13.11.2014

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SUMMARY

TITLE: The relationship between cardiovascular risk factors and knowledge of cardiovascular disease in African men in the North-West Province

BACKGROUND

Cardiovascular disease (CVD) is a major health problem worldwide. In South Africa, the prevalence of cardiovascular disease (CVD) is often underestimated. The prevalence of CVD is very high, especially in urban areas, where two thirds of Africans present with multiple risk factors for CVD. The surge in CVD seems largely caused by modifiable risk factors. Although several studies have been conducted on the high prevalence and burden of CVD, there is limited research investigating possible relationships between CV risk factors and CVD knowledge. In order to address the burden of CVD as a public health issue, it is necessary to determine the level of CVD knowledge to bridge the possible knowledge gap in the control and primary prevention of CVD. It is therefore important to get a clear understanding of the relationship between CV risk factors and knowledge of CVD to contribute to the development and implementation of primary prevention programmes to reduce the prevalence of CVD. The findings from the study may be useful in designing community based health promotion programmes to prevent and control CVD within primary health care settings. A clear and comprehensive understanding of how risk factors contribute to the development of the CVD may enable individuals to identify their risk factors, but also to take action to reduce their risk for developing CVD.

AIM

This study aimed to determine the relationship between CV risk factors and knowledge of CVD in a group of African men.

METHODOLOGY

This study is quantitative in nature and followed a descriptive correlational design to describe the relationship between CV risk factors and knowledge of CVD. The study included 118 African men employed at the Vaalharts Water Scheme, North-West Province, South Africa. For the purpose of the study, data was collected by means of *questionnaires* and *individual health screening*. Participants completed a general health questionnaire, as well as a Heart Disease Knowledge Questionnaire. Individual health screening included anthropometric measurements (height, weight, waist circumference and body mass index), blood pressure (BP), rapid testing of blood glucose and cholesterol. By using Pearson correlations we determined whether CVD knowledge scores relate to individual CV risk factors.

RESULTS

The mean CV knowledge score was 75%, with an acceptable Cronbach's alpha of 0.64 (CA=0.64). One third of the group displayed moderate to high CV risk profiles. Participants had a mean BP of 146/92 mmHg, which falls in the hypertensive range of the European guidelines. Their fasting blood glucose levels of 5.8 ± 2.0 mmol/L were higher than the normal cut-off of 5.6 mmol/L. Their mean body mass index was 25.9 ± 5.9 kg/m². Overall, we observed a lack of association between CV risk factors and CVD knowledge. Only one borderline significant association existed between triglycerides and CVD knowledge ($r=0.167$; $p=0.071$).

CONCLUSIONS

Despite African men having increased CV risk and a relatively good knowledge of CVD risk factors, there seems to be a disconnect between their CV risk and CVD knowledge. Furthermore, in this group of African men, this knowledge does not appear to translate to changes in their own perceived severity of risk factors. Our results suggest that a good CVD knowledge does not appear to influence changes in CV risk factor levels.

KEY WORDS: heart disease, hypertension, stroke, risk, black, health knowledge, health promotion

OPSOMMING

TITEL: Die verband tussen kardiovaskulêre risikofaktore en kennis van kardiovaskulêre siektes by swart mans in die Noordwes provinsie

AGTERGROND

Kardiovaskulêre siektes (KVS) is wêreldwyd 'n groot probleem. In Suid-Afrika word die voorkoms van kardiovaskulêre siektes (KVS) dikwels onderskat. Die voorkoms van KVS is baie hoog, veral in stedelike gebiede, waar twee derdes van die swart populasie met veelvuldige risikofaktore vir KVS presenteer. Die toename in KVS blyk grootliks te wyte te wees aan aanpasbare risikofaktore. Alhoewel verskeie studies al gedoen is oor die hoë voorkoms en las van KVS, is daar min navorsing wat die moontlike verbande tussen kardiovaskulêre risikofaktore en KVS kennis ondersoek. Dit is nodig dat die vlak van KVS kennis bepaal word om sodoende die gaping in die beheer en primêre voorkoming van KVS te oorbrug ten einde die las van KVS as 'n openbare gesondheidskwessie aan te spreek. Dit is daarom belangrik om 'n goeie insig te verkry van die verhouding tussen risikofaktore en kennis van KVS om 'n bydrae te maak tot die ontwikkeling en implementering van primêre voorkomingsprogramme om die voorkoms van KVS te verminder. Die bevindinge van die studie kan bruikbaar wees vir die ontwerp van gemeenskapsgebaseerde gesondheidsbevorderingsprogramme om KVS in primêre gesondheidsorg omgewings te voorkom en te beheer. 'n Duidelike en omvattende begrip van hoe risikofaktore bydra tot die ontwikkeling van KVS kan individue in staat stel om hulle risikofaktore te identifiseer, maar ook om daadwerklik op te tree om hulle risiko vir die ontwikkeling van KVS te verminder.

DOELSTELLING

Die studie het ten doel gehad om die verband tussen KV-risikofaktore en kennis van KVS by 'n groep swart mans te bepaal.

METODOLOGIE

Die studie is kwantitatief van aard en het 'n beskrywende korrelatiewe ontwerp gevolg om die verband tussen kardiovaskulêre risikofaktore en kennis van KVS te beskryf. Die studie het 118 swart mans wat werksaam is by die Vaalharts Waterskema in die Noordwes provinsie van Suid-Afrika ingesluit. Vir die doel van die studie is data ingesamel by wyse van *vraelyste* en *individuele gesondheidssifting*. Deelnemers het 'n algemene gesondheidsvraelys voltooi, tesame met 'n Hartsiektekennisvraelys. Individuele gesondheidssifting het antropometriese metings (lengte, gewig, middelomtrek en liggaamsmassa), bloeddruk (BD), vinnige toetsing van bloedglukose en cholesterol ingesluit. Pearson korrelasies is gebruik om te bepaal of KVS kennistellings verband hou met individuele kardiovaskulêre risikofaktore.

RESULTATE

Die gemiddelde kardiovaskulêre kennistelling was 75%, met 'n aanvaarbare Cronbach's alfa waarde van 0.64 (CA=0.64). Een derde van die groep het gemiddelde tot hoë kardiovaskulêre risikoprofiele getoon. Deelnemers het 'n gemiddelde BD van 146/92 mmHg gehad, wat binne die hipertensiewe reikwydte van die Europese riglyne val. Hulle vastende bloedglukosevlakke van 5.8 ± 2.0 mmol/L was hoër as die normale afsnywaarde van 5.6 mmol/L. Hulle gemiddelde liggaamsmassa-indeks was 25.9 ± 5.9 kg/m². Daar was 'n oorhoofse gebrek aan 'n verband tussen kardiovaskulêre risikofaktore en KVS kennis, met slegs een grensiggende beduidende verband tussen trigliseriede en KVS-kennis ($r=0.167$; $p=0.071$).

GEVOLGTREKKINGS

Ondanks die toename in kardiovaskulêre risiko onder swart mans en 'n relatiewe goeie kennis van KVS risikofaktore, blyk daar geen koppeling te wees tussen hulle kardiovaskulêre risiko en KVS kennis nie. Wat meer is, dit blyk asof hierdie kennis nie gevolg gee tot veranderinge aan hierdie groep Afrikaanmans se eie persepsie

van die erns van die risikofaktore nie. Ons resultate toon dus dat 'n goeie KVS kennis nie veranderinge in kardiovaskulêre risikvlakke teweeg bring nie.

SLEUTELWOORDE: Hartsiekte, hipertensie, beroerte, risiko, swart, gesondheidskennis, gesondheidsbevordering

LIST OF ABBREVIATIONS

AIDS	Acquired immune deficiency syndrome
ART	Antiretroviral treatment
BMI	Body mass index
BP	Blood pressure
CARDIA	Coronary Artery Risk Development in Adults
CKD	Chronic kidney disease
cm	Centimetre
CV	Cardiovascular
CVD	Cardiovascular disease
DBP	Diastolic blood pressure
DOH	Department of Health
ESC	European Society of Cardiology
ESH	European Society of Hypertension
GHQ	General Health Questionnaire
HBM	Health Belief Model
HbA1c	Glycated hemoglobin A _{1c}
HDL-C	High-density lipoprotein cholesterol
HIV	Human immunodeficiency virus
HT	Hypertension

IHD	Ischemic heart disease
kg	Kilogram
kg/m²	Kilograms per meter squared
LDL-C	Low-density lipoprotein cholesterol
L	Litre
LMICs	Low- and middle-income countries
m	Metres
mm	Millimetre
mmHg	Millimetres Mercury
mmol/L	Milli mole per Liter
NCDs	Non-Communicable Diseases
NGOs	Non-Governmental Organisations
NS	Not significant
NWU	North-West University
OD	Organ damage
PHC	Primary health care
PURE	Prospective Urban and Rural Epidemiology
RF	Risk factor
SABPA	Sympathetic Activity and Ambulatory Blood Pressure in Africans
SADHS	South African Demographic and Health Survey

SAGE	Global Ageing and Adult Health
SANHANES	South African National Health And Nutrition Survey
SBP	Systolic blood pressure
SD	Standard deviation
SSA	Sub-Saharan Africa
TC	Total cholesterol
TG	Triglycerides
TUSA	Transition during Urbanisation of South Africans
UK	United Kingdom
URL	Uniform resource locator
USA	United States of America
WC	Waist circumference
WHO	World Health Organisation

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CHAPTER 1:

OVERVIEW OF THE RESEARCH STUDY

1.1 INTRODUCTION

The World Health Organisation (WHO) states that a rapid increase in the development of cardiovascular disease (CVD) is evident globally, and is a major health problem, accounting for 30% of all deaths (WHO, 2009). Adding to that, the leading causes of mortality in the world in 2030 are predicted to be ischemic heart disease (IHD) and cerebrovascular disease (stroke), both components of CVD (Mendis *et al.*, 2011). Results from the Framingham Heart Study found that the lifetime risk for developing CVD at age 40 is a 1-in-2 chance (48.6%) for men and 1-in-3 chance (31.7%) for women (Bergman *et al.*, 2011:2).

The WHO (2009) reports that one of the key risk factors for CVD is hypertension, which is already affecting one billion people worldwide. With Sub-Saharan Africa's population of 650 million, 10-20 million may be affected by some form of CVD (Kluger, 2004:34). The African Union has noted hypertension as one of the continent's biggest health challenges following human immunodeficiency virus-acquired immune deficiency syndrome (HIV/AIDS). In South Africa, the prevalence of cardiovascular disease is often underestimated. It commonly occurs in urban areas especially, with two thirds of urban black Africans (hereafter referred to as Africans) presenting multiple risk factors for CVD (Seedat, 2009:39). In the *Heart of Soweto* study, Tibazarwa *et al.* (2009:233) reports that hypertension is the most important cardiovascular (CV) risk factor, contributing to stroke more frequently in Africans than Caucasians.

According to Deaton *et al.* (2011:7) the relationship between lifestyle and CVD is well established. This statement is supported by Homko *et al.* (2008:332), who state that CVD risk factor knowledge and awareness are believed to be prerequisites for healthy lifestyle behaviours. However, compared to several studies done on the high prevalence of cardiovascular risk factors in Sub-Saharan Africa's population (Clara *et*

al., 2013:959; Opie & Seedat, 2005:3562; Twagirumukiza *et al.*, 2011:1243), there is limited evidence of studies that investigated possible relationships between cardiovascular risk factors and individuals' knowledge of CVD. No relevant studies could be found for South Africa. This finding is supported by Seedat (2009:39), who states that CVD will continue to be a health threat unless a clear and comprehensive understanding is established on what South Africans perceive as CV risk factors and how the various risk factors contribute to the development of this disease. Therefore it is relevant to investigate the possible relationship between increased CV risk factors and CVD knowledge of Africans. Once this information has been obtained, tailor-made prevention programmes and educational workshops can be developed. Although knowledge is generally believed to be a prerequisite for change, knowledge alone is not sufficient (Homko *et al.*, 2008:336). People must have knowledge about CVD risk factors to perceive themselves as susceptible to disease (CVD risk perception) and they have to believe that they are capable of doing something to prevent the disease (Homko *et al.*, 2008:333). With that said, the aim of this study is to examine the relationship between CV risk factors and knowledge of CVD in African men in the North-West Province of South Africa.

1.2 BACKGROUND

A cardiovascular risk factor is defined as a condition that is associated with an increased risk of developing CVD (Black, 1992:24). The association is almost always a statistical one, implying that if a particular individual presents with a particular risk factor, the probability of developing cardiovascular disease is increased. However, it does not suggest that the individual is certain to develop cardiovascular disease (Black, 1992:24).

Risk factors for the development of CVD can be divided into two groups: (1) non-modifiable factors (such as age, gender and genetic factors); and (2) modifiable factors i.e. factors related to lifestyle (such as smoking, diet, exercise, stress or consuming alcohol) (De Backer *et al.*, 2004:381).

By coining the expression “risk factor”, the Framingham Heart Study changed the way medicine is practiced. In 1948 a group of well-informed medical professionals influenced the U.S. Public Health Service to locate the Framingham Heart Study in the town of Framingham (Shindler, 2011:4). The Framingham risk assessments were developed over the years to specify the concept of “risk factor”, as well as to identify different factors that would increase cardiovascular risk (such as smoking; high blood pressure; obesity; and diabetes), as well as factors that would reduce cardiovascular risk (for example physical activity and high levels of high density lipoprotein cholesterol) (Oppenheimer, 2010:55). One of the limitations acknowledged by the authors (founders) of the Framingham risk assessment study was the fact that the original participants were from European descent, which prevented studying ethnic and socioeconomic diversity (Turnbull *et al.*, 2010:44). Although satisfying equations were found in Caucasian and African men and women, the question of whether the Framingham risk assessment could be applied to the South African population, characterised as a multi-ethnic society, is still there (Turnbull *et al.*, 2010:44). It is likely that the Framingham risk assessment can underestimate risk in Africans (Seedat & Rayner, 2011:60). The development of several other risk assessment tools has made it possible to calculate the CV risk of individuals to score their risk to assist with prevention of cardiovascular disease. Risk scoring using well-documented key risk factors is appropriate to estimate the total cardiovascular risk in adults (Mancia *et al.*, 2013:1288). Although the same risk factors are important throughout the world, their specific prevalence varies. The CV risk assessment described and applied in this study is the European Society of Hypertension and the European Society of Cardiology (ESH/ESC) guidelines, because this risk assessment model is adaptable for the use in many settings, including settings where there is limited resources (Mancia *et al.*, 2013:1288).

In the Heart of Soweto study, Tibazarwa *et al.* (2009:237) found that CVD is increasing and that hypertension has become a common cause of heart failure with obesity as main risk factor. It should be highlighted that the high prevalence of risk factors for CVD in Western populations resembles that found in African populations living in Soweto, South Africa (Tibazarwa *et al.*, 2009:233). This is supported by Sliwa *et al.* (2008:915) who found that CVD is increasing in the African population,

with hypertension as the most common cause of CVD and with obesity and increased serum cholesterol as main risk factors. Given that over three quarters of the African population had at least one measurable major risk factor of CVD, it is evident that there is more scope for research for CVD in the African population. The Heart of Soweto study reflected a poor awareness of modifiable risk factors for the development of CVD, for example, participants were unaware of the link between obesity and an increased risk of CVD (Tibazarwa *et al.*, 2009:234).

Stroke mortality rates are higher among Africans in general, but particularly high in middle-aged African men, relative to other ethnic groups (Opie & Seedat, 2005:3562). CV risk factor knowledge and awareness is very important for making decisions about health. Metelska *et al.* (2011:616) mention that an understanding of patients' knowledge, awareness and attitudes is considered a key factor in hypertension control. CV risk factor knowledge is limited among Africans due to perceived ideas influencing their understanding of CV risk factors (Tibazarwa *et al.*, 2009:234). This argument is supported by Bergman *et al.* (2011:2) who concluded that CVD will continue to be a health risk without a comprehensive understanding of what and how CV risk factors contribute to the development of the disease. Once this knowledge has been obtained, prevention programmes and educational workshops can be developed. Individuals should be able to identify their own CV risk factors in order for them to understand the disease, prevention and its control. The modification of CV risk factors requires a change in lifestyle behaviour that is informed by knowledge. Healthy lifestyle behaviour such as regular exercise and healthy eating habits reduce cardiovascular risk (Elmer *et al.*, 2006:495).

1.3 PROBLEM STATEMENT

The global burden of CVD is well established throughout the literature. But a study from the United States concluded that all ethnic groups have suboptimal knowledge about CV risk factors, while there are well-established methods of lowering these risks factors (Poduri & Grisso, 1998:531).

In sub-Saharan Africa, hypertension remains the most serious risk factor, with prevalence ranging between 15% - 30% (Kadiri, 2005:711). This statement supports the findings from Tibazarwa *et al.*, (2009:233) on the very high prevalence of risk factors for CVD among Africans in Soweto, South Africa. Hypertension in particular has also been indicated as a significant health issue for the African community, especially men (Seedat, 2009:39). However, compared to studies done on the high prevalence of CV risk factors in African men, there is limited evidence of studies that investigate a possible relationship between increased CV risk factors among Africans and their CVD knowledge. In order to address the burden of CVD as a public health issue, it is necessary to determine the level of CVD knowledge. By determining the level of knowledge the possible knowledge gap in the control and prevention of CVD might be addressed. It is also important to get a clear understanding of the relationship between CV risk factors and knowledge of CVD to contribute to the development and implementation of effective prevention programmes to reduce death and disability from non-communicable diseases.

1.4 RESEARCH QUESTIONS

In order to address the problem presented in the argument above, the following research questions were developed:

1. What is the cardiovascular risk profile of a group of African men?
2. What is the CVD knowledge of these men?
3. Is there a relationship between the CVD risk profile and the level of CVD knowledge of this target group?

1.5 AIM AND OBJECTIVES OF THE STUDY

The aim of the study is to investigate the relationship between CV risk factors and knowledge of CVD in a target population of African men in the North-West Province. In order to address the aim of the study the following objectives apply:

1. To describe the CV risk profile of the group of African men according to the risk score system developed by the European Society of Cardiology (ESC) and the European Society of Hypertension (ESH) (Mancia *et al.*, 2013:1288).
2. To describe the demographic information and the level of CVD knowledge of this selected target group by using a General Health Questionnaire (GHQ) and a validated Heart Disease Knowledge Questionnaire constructed by Bergman and colleagues at the National Institutes of Health (Bergman *et al.*, 2011:20).
3. To determine whether relationships exist between the CV risk profile and CVD knowledge.

In light of the above objectives, with a specific focus on the third objective, the following hypotheses were formulated as statements of the expected relationship between the variables in the study:

- (i) There is no statistically significant relationship between CV risk factors and CVD knowledge of African men in the North-West Province.
- (ii) There is a statistically significant relationship between CV risk factors and CVD knowledge of African men in the North-West Province.

1.6 RESEARCH ASSUMPTIONS

The researcher's assumptions serve as a determinant of the decisions made by the researcher and are grounded in a philosophical paradigm. It can be said that a research paradigm lays down the intent, motivation and expectations for the research. Maree *et al.* (2007:47) define a "paradigm" as a set of assumptions regarding the fundamental aspects of reality. The paradigm gives rise to a particular worldview (paradigmatic perspective) on aspects of life (Morgan, 2007:54). A

paradigm can thus serve as a lens through which reality is interpreted by the researcher. The researcher approached this study from a post-positivist paradigm because the research seeks to develop relevant, true statements that can serve to explain the situation under investigation or that describe the causal relationships of interest (Morgan, 2007:47). The researcher investigated the relationships among variables and posed this in answer to the research questions. Being objective is an essential component of inquiry; researchers must examine methods and conclusions for bias. For example, standards of validity and reliability are an important aspect in the research method. Post-positivists hold a worldview in which causes probably determine effects or outcomes. Thus the research question studied by the post-positivist reflects the need to determine or to identify the causes that influence the outcomes, such as found in the measurements. The knowledge that develops through a post-positivist lens is based on measurement of the reality that exists in the world. Thus, in the scientific method, the researcher starts with a theory, collects data that either support or refute the theory, and then makes the necessary conclusion before additional testing or intervention can take place (Creswell & Clark, 2011:7). “This worldview is sometimes called the scientific method or doing science research.” (Creswell & Clark, 2011:6).

1.6.1 Theoretical assumptions

Theoretical assumptions are provided as a point of departure and to justify the decisions made during the execution of the study (Burns & Grove, 2009:93). The following concepts are considered important to understand the phenomena under investigation. A conceptual definition from literature follows to ensure mutual understanding between the reader and the researcher:

1.6.1.1 Knowledge

Knowledge describes a familiarity, awareness or understanding of facts, information, or skills, which is acquired through experience or education by perceiving, discovering, or learning (Cavell, 2002:238). Knowledge could be practically or theoretically acquired by a person (Cavell, 2002:238). In this study knowledge refers

to the information that an individual has about CVD, and the possible risk factors contributing to the development of CVD. CV risk factor knowledge are very important for making decisions about health (Bergman *et al.*, 2011:74).

1.6.1.2 Health

The World Health Organization (WHO) defines health as “*a state of physical, mental and social well-being and not merely the absence of disease or infirmity.*” This definition is important because it encourages a holistic understanding of health, which regards a person’s physical and emotional health as related to the environment in which the person lives and works (Coulson *et al.*, 1998:1).

1.6.1.3 Cardiovascular disease

Cardiovascular disease can be defined as the development of pathology that occur in the vascular system (Black, 1992:24). CVD is the result of complex interactions between genetic and environmental factors over a period of time (O'Donnell & Elosua, 2008:305). CVD is associated with one or more characteristics or exposures of an individual that increases the likelihood of developing a disease (Kramer *et al.*, 2008:753). Hypertension is the most important cardiovascular risk factor under review in the study.

1.6.1.4 Risk factor

A risk factor is defined as a measurable characteristic that is associated with increased disease frequency. It is also causally associated with increased disease frequency and is a significant independent predictor of an increased risk of presenting with the disease (O'Donnell & Elosua, 2008:299). In this study risk factor refers to CV risk factors that can be assessed to estimate total CV risk for the development of CVD.

1.6.1.5 Cardiovascular risk factors

Cardiovascular risk factors are associated with an increased risk of developing cardiovascular disease. In general, CV risk factors include demographic characteristics, family history of CVD, smoking, physical inactivity, abnormal lipids and lipoproteins, obesity, hypertension and diabetes (Kramer *et al.*, 2008:753).

1.6.1.6 Hypertension

Hypertension (also referred to as high or raised blood pressure) is a chronic condition in which the systemic pressure in the arterial system is increased. Hypertension could be the result of an increased cardiac output or total peripheral resistance, or both (Windmaier *et al.*, 2013). Hypertension can be the leading cause of atherosclerosis, myocardial infarction, kidney damage, and stroke (Windmaier *et al.*, 2013). It is generally a symptomless condition, hence the reference to the “silent killer”. Hypertension is defined as values ≥ 140 mmHg systolic blood pressure (SBP) and/or a ≥ 90 mmHg diastolic blood pressure (DBP) (Mancia *et al.*, 2013:1288).

1.6.2 Theoretical framework

According to Brink *et al.* (2012:19) a theory summarises and organises the existing understanding of a particular phenomenon, and may be scientifically tested in the empirical world through research. Theories help the researcher to pull complex concepts together. Following the definition of concepts considered relevant to the phenomena under investigation, the Health Belief Model (HBM) was used to support the theoretical assumptions of the study. The model was developed to predict a wide variety of health-related behaviours. The components of the HBM are the individual's perceptions of:

- susceptibility to illness (e.g. “my chances of getting CVD are high”);
- the severity of the illness (e.g. “CVD is a serious illness”);
- the cost involved in carrying out the behaviour (e.g. “stopping smoking will make me irritable”);

- the benefits involved in carrying out the behaviour (e.g. “stopping smoking will save me money”);
- and cues to action, which may be internal (e.g. “symptoms of high blood pressure”), or external (e.g. information in the form of health education leaflets).

A person must have knowledge about a given condition (CVD risk factor knowledge), perceive themselves as susceptible to the disease (CVD risk perception), and believe that they are capable of doing something to prevent the disease (self-efficacy) before they would adopt a new behaviour. The HBM assumes that a person will take action to control their ill health if they believe it to have potentially serious consequences or if they believe it would be beneficial in reducing susceptibility of the condition (Rosenstock, 1990:20). However, knowledge alone is not sufficient to promote behaviour change (Homko *et al.*, 2008:20).

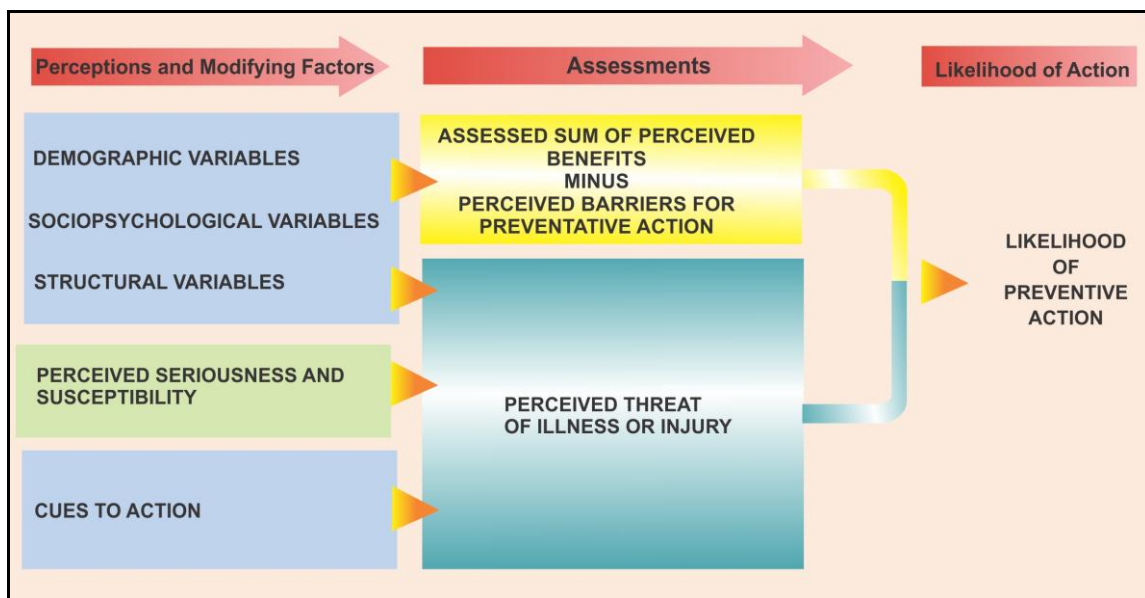


Figure 1.1 Illustration of the Health Belief Model (Kominiski, 2000:20).

1.6.3 Methodological assumptions

Methodological assumptions encompass the researcher’s beliefs concerning the nature of scientific research, in other words assumptions of what ought to be good research (Mouton & Marais, 1996:23). In this research study the worldviews and

methods all contribute to a research design that are quantitative in nature. Quantitative research is a means for testing objective theories by examining the relationship among variables. These variables can be measured with instruments so that data can be analysed using statistical procedures. The researcher who engage in quantitative research of inquiry have assumptions about testing theories deductively, building in protections against bias, controlling for alternative explanations, and being able to generalise and replicate the findings (Creswell & Clark, 2011:4).

1.7 RESEARCH DESIGN

This study is quantitative in nature and followed a descriptive correlational design (Burns & Grove, 2009:246) for the following reasons:

- The aim of a descriptive study is to accurately describe the phenomenon being investigated to discover new facts about it and to provide feedback on its characteristics (Mouton & Marais, 1996:23). The descriptive model provided the researcher with rich detail on the context of the study (demographic characteristics) as discussed in Chapter 3 of the dissertation.
- The aim of descriptive correlational research is to describe relationships among variables (Polit & Beck, 2012:226). This design focuses on relationships among the different study variables in a situation (Burns & Grove, 2009:246). The data are obtained from one group, and correlational statistical analyses are used to determine relationships between the variables. A descriptive correlational design was applied to this study because the study sought to describe the variables namely CV risk factors and CVD knowledge to be able to examine whether a relationship does exist between the variables in a group of African men in the North-West Province.

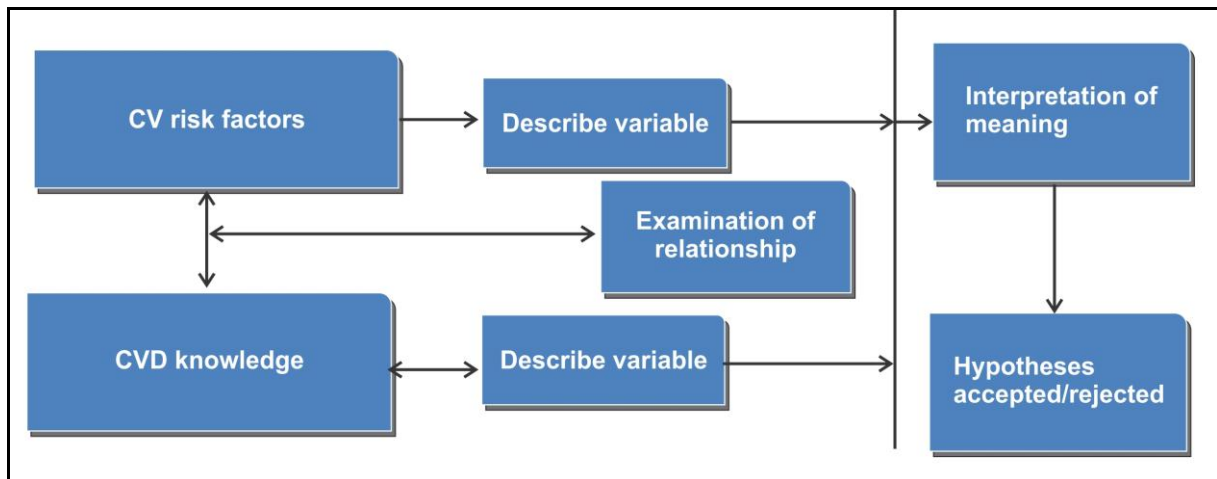


Figure 1.2 Descriptive correlational design of study (adapted from Burns & Grove, 2009:247).

1.8 RESEARCH METHOD

1.8.1 Data collection

For the purpose of the study data was collected by means of:

1.8.1.1 Individual Health assessment measurements

The following measurements were performed:

- Anthropometric measures (height, weight, and waist circumference) measured with the Seca 813 scale and a Seca 213 portable stadiometer (Seca, Hamburg, Germany), and a Holtain unstretchable metal type. Body mass index (BMI) was calculated as $\text{weight (kg)} / \text{height (m)}^2$.
- Blood pressure was measured with an Omron M10 (Omron Healthcare, Tokyo, Japan).
- Fasting blood glucose was measured with a One Touch Select glucometer (LifeScan, Johnson & Johnson, USA).

- Fasting lipid profiles, including low-density lipoprotein (LDL-C), high-density lipoprotein (HDL-C) and triglycerides (TG), were measured with the Cardiochek P.A. meter (Polymer Technology Systems, Japan).

The updated ESH/ESC risk SCORE system was used for individual cardiovascular risk assessment (Mancia *et al.*, 2013:1288). This cardiovascular risk assessment chart is illustrated and discussed in Chapter 2 of the dissertation.

1.8.1.2 Questionnaires

The following validated questionnaires were used to collect and construct the data based on the research question:

- *General Health Questionnaire (GHQ)*

This questionnaire was used to determine general information on health status, medication usage, demographic characteristics, and family history. This information is valuable in the determination of individual CV risk assessment. The GHQ is a validated questionnaire developed by the WHO. However, this questionnaire was adapted to fit the South African context (Addendum C).

- *Heart Disease Knowledge Questionnaire (measuring cardiovascular disease knowledge)*

This structured Heart Disease Knowledge Questionnaire was originally developed and validated by Bergman and her colleagues at the National Institutes of Health in Canada (Addendum D). This questionnaire consists of 30 true/false items to measure reliable heart disease knowledge. These items address five knowledge domains namely diet, epidemiology, medical knowledge, risk factors and symptoms of heart disease. When items are formulated to measure a certain construct, high levels of similarity among the items ought to be apparent. A measure of this degree of similarity is an indication of the internal consistency of the instrument. Cronbach's alpha coefficient is used to measure this internal reliability and is based on inter-item

factor loading. If the items are strongly correlated, their internal consistency is high and the Alpha coefficient will be close to one, but if the items are poorly formulated and do not show a strong correlation, the Alpha coefficient will be close to zero (Pietersen & Maree, 2007:221). Although the generally accepted value of 0.8 is appropriate for cognitive tests such as intelligence tests, for an ability test the cut-off point of 0.7 is more suitable. When dealing with psychological constructs, values below 0.7 can, realistically, be expected because of the diversity of the constructs being measured (Field, 2009:675). The original questionnaire from Bergman had an acceptable Cronbach's alpha of 0.73 (CA=0.73), with 21 of the items having a factor loading above 0.40, which indicates that items loaded well into their pre-established domains (Bergman *et al.*, 2011:18).

For the purpose of this study permission was obtained by Bergman and colleagues to pilot this structured questionnaire in an African population. Terminology was adapted to fit the context (Addendum D). For this reason the questionnaire was tested on a selected group to ensure content-related validity, as well as to establish the level of understanding, appropriateness of language and to establish whether the data collected will be appropriate, meaningful and correct. The questionnaire was critically evaluated by colleagues and experts in the field to establish face validity.

The data was collected over a period of one week on site at the Vaalharts Water Scheme in Jan Kempdorp, North-West Province, South Africa. The data were collected by a multidisciplinary team that consisted of a registered nurse, four nursing students, four cardiovascular physiology students, a biokinetics student and a dietician.

1.8.2 Setting

The study was conducted at the Vaalharts Water Scheme in the North West Province, South Africa. The scheme lies on the border between the Northern Cape and North West Provinces and is enclosed from the south by the Vaal River.

Vaalharts is the largest water and irrigation scheme in South Africa. The scheme is responsible for the building and maintenance of the water canals.

1.8.3 Population and sampling

Population

Population is defined as all elements (individuals, objects, events, or substances) that meet the sample criteria in a study; sometimes referred to as a target population (Burns & Grove, 2009:714). A total population of 174 employees work at the water scheme. As part of a wellness project, all the employees were invited to participate in voluntary health screening. A total of 168 (N=168) employees, consisting of 165 (N=165) men and 3 (N=3) women, volunteered participation. In congruence with the sample criteria, all the participants were 18 years or older and able to read and understand English.

Sampling

Sampling is the selection of groups of people, events, behaviours or the elements to perform a study and to do research (Burns & Grove, 2009:721). Ideally a sample should be representative of the population.

For the purpose of this study a convenient sampling method was used for selection, as the study formed part of a wellness screening project for the Vaalharts Water Scheme. According to other studies done in South Africa, African men have an increased risk for the development of CVD (Opie & Seedat, 2005). Therefore, 118 African men were included in the sample, and 50 employees were excluded due to their ethnicity and gender.

1.9 DATA ANALYSIS

Data analysis is the process of making sense of the data that constitute the finding of a study (Burns & Grove, 2009:402). Data analysis for this study included descriptive and inferential statistics. The data management and statistical analyses was done with SPSS v21.0 (SPSS Inc, Chicago, IL, USA). Descriptive statistics using frequencies, means and standard deviations were used to report on the demographic profile of the participants and their level of CVD knowledge.

Inferential statistics using correlations to determine the association between the variables, and tests for Cronbach's alpha were conducted to determine the internal reliability of the items in the comprehensive heart disease questionnaire. According to Field (2011:784), Cronbach's alpha is a measure of the reliability of a scale, indicating to what measure a construct is tested consistently. A discussion of the analysis and results will be presented in Chapter 3.

1.10 MEASURES TO ENSURE RIGOUR

Rigour is defined by Burns and Grove (2009:720) as the striving for excellence in research and involves strict accuracy. Research can only be called research if it confirms results and is not merely the researcher's perceptions. In quantitative research, rigour is described in terms of the components of validity and reliability.

1.10.1 Validity

Validity refers to the degree to which an instrument measures what it is supposed to measure. Validity is essential to ensure that the results of a study can be applied in practice (Burns & Grove, 2009:380). For an instrument to be valid, it should measure all the major elements relevant to the study. The instrument used in this study was evaluated for face validity using a range of research staff (included a critical care nurse, cardiovascular physiologist and a statistician) and was revised prior to use. All

measures were carefully taken to ensure adherence to the current literature, and scrutiny of the CVD knowledge questionnaires and the use of a validated CV risk assessment system in the context of this study ensured predictive and construct validity. One can conclude that the validity of this study was protected.

1.10.2 Reliability

Reliability represents the consistency, stability and repeatability of the measures and information obtained (Brink *et al.*, 2012:118). Reliability for this study was confirmed through the utilisation of a reliable and valid questionnaire (Heart Disease Knowledge Questionnaire by Bergman and colleagues). For the Vaalharts study an acceptable Cronbach's alpha coefficient of 0.64 (CA=0.64) was obtained.

1.11 ETHICAL CONSIDERATIONS

The following ethical measures were applied during this study:

- The Health Research Ethics Committee of North-West University granted approval for the research project (Ethical clearance number: NWU-00028-12-A1) (Addendum A); and
- An informed consent form (Addendum B) was signed by each participant, giving the researcher permission to include the participants' data in the research. This consent letter also confirmed that participation would be voluntary, that the participant could withdraw from the study at any time, and that all information will be treated as private and confidential.
- This study complied with the guidelines stipulated in the Declaration of Helsinki: Ethical principles for medical research involving human participants (Williams, 2013). The following principles were also adhered to:

Respect for the person, meaning that the participant has the ability to make moral choices. All the participants had freedom of choice to participate in the research and to withdraw at any stage of the research. The study and

questionnaires were explained to all participants. All information was kept confidential and participants remained anonymous.

Beneficence implies to do no harm and to promote good. Participants were informed of the outcome of the study and how the findings may benefit them.

Justice involves fairness, rights and obligations. All participants had an equal chance of being included in the research. The researcher kept all data anonymous and all participants were treated equally.

1.12 CLASSIFICATION OF CHAPTERS

Chapter 1: Overview of research study

Chapter 2: Review of the literature

Chapter 3: Manuscript to be submitted to the *Journal of Cardiovascular Nursing*.

Chapter 4: Conclusions, recommendations and limitations

1.13 SUMMARY

In the first chapter, the researcher presented a brief overview of the study. The introduction provided a short description and motivation of the study and was followed by the background and problem statement, aim and objectives. A discussion of the design, data collection methods and data analysis followed, and the chapter concluded with an overview of the relevant issues to ensure rigour and ethics. A comprehensive literature review of related concepts introduced in Chapter 1 follows in Chapter 2.

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CHAPTER 2: LITERATURE REVIEW

2.1 INTRODUCTION

A literature review in quantitative research is primarily performed at the beginning of the research process (Burns & Grove, 2009:92). The primary purpose of the literature review is to direct the planning and execution of the study. To that end, the researcher searched and reviewed literature related to the phenomenon under investigation to identify what is already known about the topic and what is considered important (Mouton, 2009:86). From the review, it was evident that the two phenomena involved – CV risk factors and knowledge of CVD – could not be studied as separate entities because CV risk factors and knowledge of CVD are closely linked.

2.2 SEARCH STRATEGY

In an effort achieve to the aim of the study, the researcher conducted a search of peer reviewed studies and publications related to CVD knowledge and CV risk factors. Databases such as Pubmed, ScienceDirect and Google Scholar were searched using a combination of the following keywords:

- Cardiovascular disease
- CV risk factors
- Hypertension
- CVD knowledge
- Framingham study
- Relationship between CV risk factors and CVD knowledge
- Africans

Articles were accessed using the North-West University (NWU) library's electronic database or hard copies were obtained with the help of the librarian. International and national articles were identified, of which 48 were considered relevant. In addition, the researcher consulted a number of textbooks considered to be relevant.

2.3 LITERATURE ON CV RISK FACTORS AND CVD KNOWLEDGE

The following section presents an overview of literature considered relevant in understanding the phenomenon under investigation, i.e. the relationship between CV risk factors and knowledge in a group of African men.

The prevalence of developing CVD is ever-increasing globally (Deaton *et al.*, 2011:5). The WHO (2009) predicts that by 2030 ischemic heart disease and stroke will be a major cause of mortality worldwide. South Africa is under the burden of two major health epidemics, HIV/AIDS and CVD. The African Union has stated that hypertension is one of the continent's biggest health challenges after HIV/AIDS, which is also in accordance with the WHO, which listed CVD as the number one cause of death globally (Kluger, 2004:34). With nearly 5.5 million people living with HIV, South Africa is the country with the highest prevalence of HIV infection (UNAIDS, 2008). Certain antiretroviral drug therapies (ART) can further contribute to CVD (Grinspoon, 2005:24). Findings from Seaberg *et al.* (2005:953) suggest that individuals taking ART may be at increased risk of developing hypertension and emphasise the importance of blood pressure monitoring among these individuals. Hypertension is therefore a realistic problem in South Africa – often overlooked when viewing the HIV/AIDS pandemic.

In a recent study on hypertension in low- and middle-income countries (LMICs), South Africa was found to report the highest rate of blood pressure among people aged 50 and over. It was found that 78% of those who took part were hypertensive ($\geq 140/90$ mmHg), but less than 50% of those with hypertension were aware of their condition, with only 10% controlled (Lloyd-Sherlock *et al.*, 2014:116). South Africa's

Various studies conducted in South Africa highlight the significance of the above-mentioned factors as contributors to the health threat of CVD, particularly in urban communities. The Transition and Health during Urbanisation of South Africans (THUSA) study assessed the relationship between the level of urbanisation and the influence on the health status in a African population of the North-West Province of South Africa (Van Rooyen *et al.*, 2002:69). The authors concluded that urbanisation in this population was a possible cause for higher blood pressure prevalence. The manifestation of hypertension is influenced by unhealthy lifestyle factors such as overweight, poor diet and an increased psychosocial stress due to urbanisation (Van Rooyen *et al.*, 2000:785). According to the Heart of Soweto study, hypertension is the most important CV risk factor, contributing to stroke more frequently in Africans than Caucasians (Tibazarwa *et al.*, 2009:237), as well as the most common diagnoses made by far in African patients reporting at healthcare centres (Sliwa *et al.*, 2008:915). The Prospective Urban and Rural Epidemiology (PURE) study forms part of a multinational epidemiological study and was conducted in South Africa in the North-West Province. The authors concluded that over 5 years, 24% of African participants with optimal blood pressure developed hypertension (Schutte *et al.*, 2012:1). The Sympathetic Activity and Ambulatory Blood Pressure in Africans (SABPA) study, conducted in African school teachers in 2008, indicated that more than 80.4% of African men are hypertensive (Van Lill *et al.*, 2011:358).

2.3.1 Understanding cardiovascular risk factors

Cardiovascular risk factors are defined by Black (1992:23) as conditions that are associated with an increased risk of developing CVD. The association is almost always a statistical one, and so the fact that a particular person presents with a risk factor (RF) merely increases the probability of developing a certain CVD (Black, 1992:23). It is important to note that CVD is multi-faceted condition consisting of various factors contributing to an overall risk profile. CVD is the result of interactions between genetic and environmental factors over periods of time (O'Donnell & Elosua, 2008:305).

CV risk factors can be divided into two groups: (1) non-modifiable factors such as age, gender and genetic factors, and (2) modifiable factors, i.e. factors related to lifestyle such as smoking, consuming alcohol, obesity and inactivity (Black, 1992:24). By addressing these modifiable risk factors, greater health can be achieved (Seedat & Rayner, 2011:62). In the section below, risk factor trends in South Africa are explained:

2.3.1.1 Non-Modifiable risk factors of CVD

Non-modifiable risk factors refer to risk factors that cannot be changed. They include the following:

- *Age*

Age is a powerful CV risk factor and is associated with an increase in risk for the development of CVD. One of the major reasons for this incidence is the progression in arterial stiffness, atherosclerosis and increased systemic inflammation (Mendis *et al.*, 2011:70). Recently, more emphasis has been placed on the role of arterial stiffness in the development of CVD (Laurent *et al.*, 2006:2588).

- *Gender*

A consistently higher blood pressure has been reported in men compared to women. Although heart disease is the principal cause of mortality in men and women, men have a significantly higher prevalence of hypertension (Seedat, 2009:39). Women initially have a lower risk for developing CVD before menopause compared to men of the same age, but their risk eventually increases in post-menopausal years (Cheek, 2003:36).

- *Ethnicity*

Hypertension in particular has been indicated as a significant health issue for Africans (Seedat, 2009:39). Recently, it was indicated that Africans are more frequently diagnosed with hypertension and heart failure than any of the other ethnic groups (Sliwa *et al.*, 2008:371).

2.3.1.2 Modifiable risk factors of CVD (including metabolic and behavioural risk factors)

Modifiable risk factors of CVD refer to risk factors that can be changed by lifestyle and behaviour modification and include:

2.3.1.2.1 Metabolic risk factors

- *Overweight and obesity*

Cardiovascular risk is augmented by being overweight (i.e., BMI ≥ 25 kg/m²) or obese (BMI ≥ 30 kg/m²) (Mancia *et al.*, 2013:1288). In the Heart of Soweto study it was clear that obesity was the most common cause of developing hypertension (Tibazarwa *et al.*, 2009:237). This finding is supported by that of Sliwa *et al.* (2008:915), who state that obesity is associated with hypertension as well as increased serum cholesterol levels. In the South African Demographic and Health Survey, it was concluded that the more urbanised communities are, the higher the rate of obesity (Puoane *et al.*, 2002:1040). The South African National Health And Nutrition Survey (SANHANES-1) reports that 19.6% of males were overweight and 11.6% were obese compared to 25% of women being overweight and 40% obese (Shisana *et al.*, 2013). Increased caloric intake and inactivity increase this problem over time (Shisana *et al.*, 2013).

- *Raised blood pressure (Hypertension)*

Hypertension is defined as a systolic blood pressure (SBP) of ≥ 140 mmHg and/or a diastolic blood pressure (DBP) of ≥ 90 mmHg (Mancia *et al.*, 2013:1288). Hypertension is the most important CV risk factor contributing to heart disease and stroke in South Africa (Charlton *et al.*, 2012). Although the South African Demographic and Health Survey (SADHS) collected data more than a decade ago, over 20% of men and 41% of women self-reported on having high blood pressure (Puoane *et al.*, 2002). A study on Global Ageing and Adult Health (SAGE) conducted by the World Health Organization found that

78% of those who took part in South Africa were hypertensive, thus putting South Africa as the country with the world's highest rate of blood pressure reported among people aged 50 and over for any country in the world at any time in history (Lloyd-Sherlock *et al.*, 2014:116).

- *Raised blood glucose (Diabetes Mellitus Type 2)*

Elevated plasma glucose (≥ 7.0 mmol/L) on two repeated measurements, and/or glycated haemoglobin (HbA1c) $\geq 7\%$ have been linked with early development of hypertension and later multiple end organ damage (Mancia *et al.*, 2013:1288). According to Seedat and Rayner (2011:64) hypertension is present in one third of patients diagnosed with type 2 diabetes. The risk for developing diabetes is more prevalent in urban women, due to the high prevalence of overweight and obesity (WHO, 2013). The SANHANES-1 study reports that 18.5% of participants throughout South Africa had elevated blood glucose and 9.5% was diagnosed with diabetes (Shisana *et al.*, 2013).

- *Dyslipidaemia*

The higher the cholesterol level and the more other risk factors present, the higher the CVD risk. Increased total cholesterol (TC) is commonly accepted as an important predictor of coronary heart disease, and the prevalence of hypercholesterolemia has been associated with systolic hypertension and hyperglycaemia (Mancia *et al.*, 2013:1288). It has been clearly established that higher high-density lipoprotein cholesterol (HDL-C) plasma levels could be related to lower risk of coronary artery disease, and that the HDL-C levels could result in major vascular protective effects such as protection against atherosclerosis (Turnbull *et al.*, 2010:40). According to Schutte *et al.* (2009:83) Africans exhibit lower triglyceride and higher HDL-C levels than Caucasians, but these levels are still related to obesity and CVD risk (Schutte *et al.*, 2008:528).

2.3.1.2.2 Behavioural risk factors

- *Smoking*

Smoking doubles an individual's CVD risk according to Mancina *et al.* (2013:1288). The Cancer Association of South Africa (Cansa, 2012) reports a very high prevalence rate of 35% of males and 10% of females classified as smokers. In a study conducted by Zatu *et al.* (2011:18) African smokers had significantly increased arterial stiffness, which can contribute to the development of CV dysfunction.

- *Harmful use of alcohol*

According to the findings of a study conducted by Schutte *et al.* (2012:8) in Africans, excessive use of alcohol was significantly associated with the development of hypertension over a 5 year period.

- *Physical inactivity*

Insufficient physical activity can be defined as less than 5 times of 30 minutes of moderate activity per week. Many studies have examined the association between physical activity and CVD. The SANHANES-1 reported that 27.9% of males and 45.2% of females were physically inactive (Shisana *et al.*, 2013). Urban residents were more likely to be unfit than residents from other localities.

2.3.2 Rationale for cardiovascular risk assessment

The rationale for assessing an individual CV risk profile is that certain risk factors contribute to increased risk of mortality and morbidity (Seedat & Rayner, 2011:62). An important aspect that should be accounted for when assessing a person's CV risk is ethnicity (Schutte *et al.*, 2009:80). Research has shown that certain groups such as the Pima Indians (Pavkov *et al.*, 2007:1758) or Aboriginal Australians (Daniel *et al.*, 2002:23) exhibit unique CV risk patterns. The same can be applied to the black South African population (Schutte *et al.*, 2009:80). CV risk assessment is therefore essential in determining the level of intervention. Modifiable risk factors e.g. smoking,

diabetes and dyslipidaemia can be addressed by lifestyle intervention and other treatments when appropriate. In addition to hypertension, target organ damage and associated clinical conditions must be managed and referred appropriately (Seedat & Rayner, 2011:67).

According to the Department of Health (DoH), the Strategic Plan for the Prevention and Control of Non-Communicable Disease (DoH, 2013) identifying individuals at risk is an important strategy to prevent CVD. This report emphasises the importance of lifestyle modification as first line treatment to reduce the level of risk of developing end organ damage. The second line of treatment is the initiation of drug therapy for further control if needed to reduce the impact of risk factors on end organs such as the heart, the kidneys or the brain. This is particularly important in people who have multiple risk factors, as the overall CV risk increases exponentially in people with more than one risk factor. The individual risk assessment is very useful and cost effective in primary health care settings as a tool to identify those people at risk in an attempt to control their risk factors and to give the appropriate drugs to prevent or control CVD (DoH, 2013).

Table 2.1: Risk factors contributing to stratification of CV risk

Risk factors
Male sex
Age (men ≥ 55 years)
Smoking
Dyslipidaemia
Total cholesterol > 4.9 mmol/l, and/or
LDL-C > 3 mmol/l and/or
HDL-C < 1 mmol/l (men) and < 1.2 mmol/l (women) and/or
Triglycerides > 1.7 mmol/L
Fasting plasma glucose 5.6–6.9 mmol/L
Obesity [BMI ≥ 30 kg/m ² (kg/height ²)]
Abdominal obesity (waist circumference: men ≥ 102 cm)
Diabetes mellitus
Fasting plasma glucose ≥ 7.0 mmol/L on two repeated measures, and/or HbA _{1c} $> 7\%$

Adapted from ESH/ESC Guidelines (Mancia *et al.*, 2013:1288).

BMI = body mass index; BP = blood pressure; LDL-C = low-density lipoprotein; HDL-C = high-density lipoprotein; HbA_{1c} = glycated haemoglobin

Table 2.2: Stratification of risk to quantify prognosis

Other risk factors, asymptomatic organ damage or disease	Blood pressure (mmHg)			
	High normal SBP 130-139mmHg or DBP 85-89 mmHg	Stage 1: Mild hypertension SBP140-159 mmHg or DBP 90-99 mmHg	Stage 2: Moderate hypertension SBP 160-179 mmHg or DBP 100-109 mmHg	Stage 3: Severe hypertension SBP > 180 mmHg or DBP > 110 mmHg
No other RF		Low risk	Moderate risk	High risk
1-2 RF	Low risk	Moderate risk	Moderate to high risk	High risk
≥3 RF	Low to moderate risk	Moderate to high risk	High risk	High risk
OD, CKD stage 3 or diabetes	Moderate to high risk	High risk	High risk	High to very high risk
Symptomatic CVD, CKD stage ≥ 4 or diabetes with OD/RFs	Very high risk	Very high risk	Very high risk	Very high risk

Adapted from 2013 ESH/ESC Guidelines (Mancia *et al.*, 2013:1287).

BP = blood pressure; CKD = chronic kidney disease; CV = cardiovascular disease; DBP = diastolic blood pressure; HT = hypertension; OD = organ damage; RF = risk factor; SBP = systolic blood pressure.

As reflected in Figure 2.2, the WHO (2013) describes the main contributing risk factors in the development of hypertension on modifiable risk factors that include behavioural and metabolic risk factors. Behavioural risk factors e.g. unhealthy diet, tobacco use, physical inactivity and harmful use of alcohol are directly and indirectly influenced by an individual’s living and working conditions. In addition, there are several metabolic factors e.g. obesity, diabetes and raised blood lipids, that increase the risk for developing CVD. Urbanisation also tends to contribute to the development of CVD as a result of unhealthy environments that encourage unhealthy diets, sedentary behaviour, stress, tobacco and harmful use of alcohol. In South Africa one of the Department of Health’s priorities is to focus on behavioural risk factors namely tobacco use, physical inactivity, unhealthy diets, and excessive use of alcohol. CVD’s are mostly preventable through the modification of these four risk factors. In addition, reducing non-communicable diseases and the main behavioural risk factors will increase population “wellness” or wellbeing, which is important for economic and social development (DoH, 2013:12).

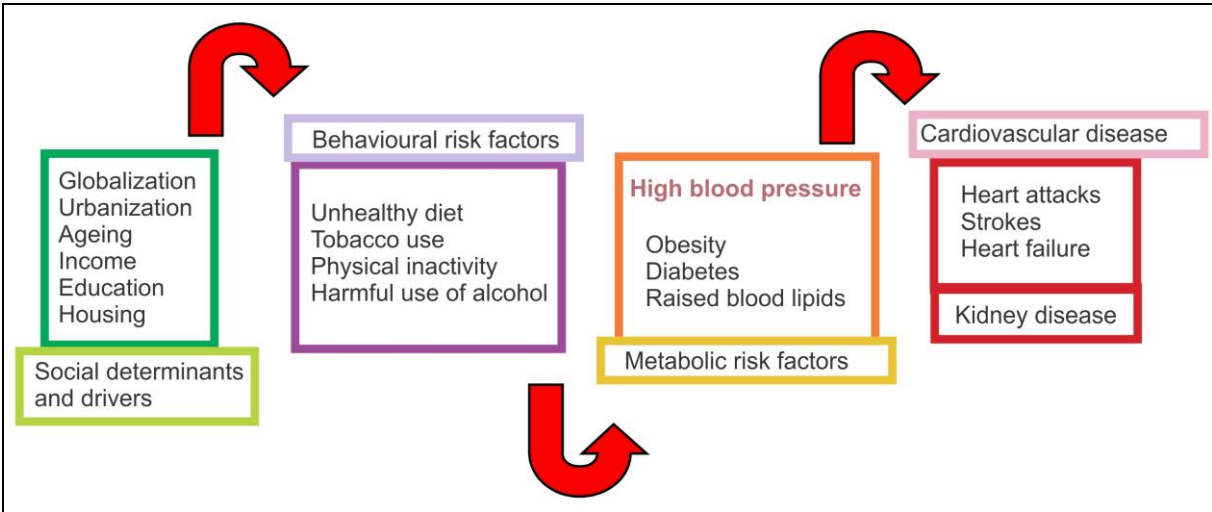


Figure 2.2: Main factors that contribute to the development of hypertension and its complications (WHO, 2013:18).

2.3.3 Focussing on cardiovascular risk

Deaton *et al.* (2011:3) state that CVD has no geographic, socioeconomic or gender boundaries and is the leading cause of death in developing as well as developed countries. The WHO (2013) reports that although the same risk factors are important throughout the world, their specific prevalence varies. For example, the prevalence of hypertension in developing countries has been estimated to be 1% to 30%, varying largely between continents. In sub-Saharan Africa, hypertension remains the most serious risk factor, with prevalence ranging between 15% and 30% (Kadiri, 2005:331). Epidemiological studies on hypertension in Africa have been conducted over the years in an attempt to estimate the burden of hypertension, both within and between different population groups (Addo *et al.*, 2013:1012). In the Heart of Soweto study it was clear that CVD is increasing and that hypertension has become a common cause of heart failure with obesity as main risk factor (Tibazarwa *et al.*, 2009:237). Therefore, it should be highlighted that the high prevalence of risk factors for CVD in Western populations resembles those found in Soweto, South Africa. In the review paper by Opie and Seedat (2005:3562), hypertension is the most important CV risk factor, contributing to stroke more frequently in Africans than Caucasians, placing the Africans at higher risk for the development of CVD. According to Stewart *et al.* (2011:22) there is a wealth of data available to describe the clinical consequences of untreated and undetected hypertension in African communities, and we therefore require effective primary and secondary prevention strategies to minimise the emergence of non-communicable forms of CVD. To minimise the emergence of CVD, it is necessary to control modifiable risk factors. Therefore, knowledge on CVD can be seen as a prerequisite for adopting healthy lifestyle (Homko *et al.*, 2008:332).

2.3.4 Knowledge of cardiovascular disease

A study was conducted by Homko *et al.* (2008:335) at two medical institutions in Pennsylvania, USA on CVD knowledge and risk perception amongst individuals of a low-income status, with increased CV risk factors. It was found that individuals at high risk of CVD demonstrated poor CV knowledge, especially among men.

Reduction of CV risk has a strong behavioural component, which emphasises the adoption of healthy behaviours. The authors conclude that CV risk factor awareness and knowledge are believed to be essential for adopting healthy lifestyle behaviours.

In a South African context, Metelska *et al.* (2011:616) agree that an understanding of patients' knowledge, awareness and attitudes is considered an important aspect in the prevention and control of CVD. Cardiovascular risk factor knowledge is restricted among Africans due to perceived ideas influencing their understanding of CV risk factors (Tibazarwa *et al.*, 2009:233). Tibazarwa *et al.* (2009:238), conclude that the Heart of Soweto study reflects a poor awareness of the modifiable risk factors for heart disease and other forms of CVD, for example, the participants were not aware of the link between obesity and an increased risk of CVD. It was only an assumption in this study, as the knowledge component was not measured.

It is clear from the literature available in South Africa on CVD, that the knowledge component of CVD has not yet been clearly investigated. Knowledge on CVD is an important factor that should be accounted for in the development of a prevention and control plan. General knowledge and health awareness might be necessary in taking action to reduce or prevent the disease (Crouch & Wilson, 2011:239).

2.3.5 Relationship between cardiovascular risk factors and knowledge

Worldwide, several studies conducted among various population groups and between different socio-economic status (low, middle and high) conclude that there is a significant relationship between CV risk factors and CVD knowledge and awareness. A study among Americans found that individuals with high CV risk factors had limited knowledge of CVD risk factors (Homko *et al.*, 2008:333). In several other studies it is clear that women are more knowledgeable than men about CVD and that socioeconomic status is a strong and consistent predictor of risk factor knowledge (Crouch & Wilson, 2011; Homko *et al.*, 2008:333). The study conducted by Crouch and Wilson (2011:238) among rural women in Australia found that the woman might have general good knowledge of CVD, but they might be unaware of their

susceptibility to heart disease in relation to the risk factors. Oliver-McNeil and Artinian (2002:221) examined the perception of CV risk and risk-reducing behaviours among suburban women, and found no relationship reported between higher levels of education and increased knowledge of CVD.

According to the Health Belief Model (HBM), knowledge of the negative health consequences is necessary for behaviour change (Rosenstock, 1990:42). It is generally thought that individuals who perceive themselves as having an increased risk of CVD (the perceived susceptibility dimension of the HBM) are more likely to adopt behaviours that reduce their risk, such as cessation of smoking and weight loss (Rosenstock, 1990:42). Understanding individual knowledge of risk factors is crucial because heart disease can be prevented or modified if health promotion strategies can be adopted (Crouch & Wilson, 2011:239). Without sufficient knowledge of personal susceptibility people might be less likely to modify their lifestyle and reduce the risk of heart disease (Crouch & Wilson, 2011:242). In order to address the burden of CVD as a public health issue, it is necessary to determine the level of CVD knowledge to address the possible knowledge gap in the control and prevention of CVD. It is therefore important to get a clear understanding of the relationship between CV risk factors and knowledge of CVD to contribute to the development and implementation of effective prevention programmes to reduce death and disability from non-communicable diseases. Cardiovascular disease is primarily a lifestyle disease, and can be changed by lifestyle behaviour that is informed by knowledge (Crouch & Wilson, 2011:242). It is therefore relevant to investigate whether a relationship does exist between CV risk factors and CVD knowledge, especially in African men known to be at elevated CV risk.

In recent years, several papers appeared on the prevalence of CVD in the South African context, especially on the very high prevalence rate of CV risk factors in African men (Opie & Seedat, 2005:3562). However, evidence indicating a link between CV risk factors and CVD knowledge is scant.

2.4 SUMMARY

It is well known that CVD is a global health problem that needs an urgent and proactive approach to prevention and control. There seems to be a general lack of health awareness among South Africans which has a significant impact on health as related to CVD risk reduction. The South African Department of Health distributed a report “Strategic Plan for the Prevention and Control of Non-Communicable Diseases” that emphasises the importance of effective primary and secondary prevention strategies on the health of vulnerable South Africans (DoH, 2013). This report can be used as essential information to develop community-specific education programmes to increase knowledge and contribute to behavioural change. However, since research is scant on the link between CVD knowledge and CV risk in Africans, the aim of the study is to determine CVD knowledge and whether it relates to CV risk factors in African men.

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CHAPTER 3: ARTICLE

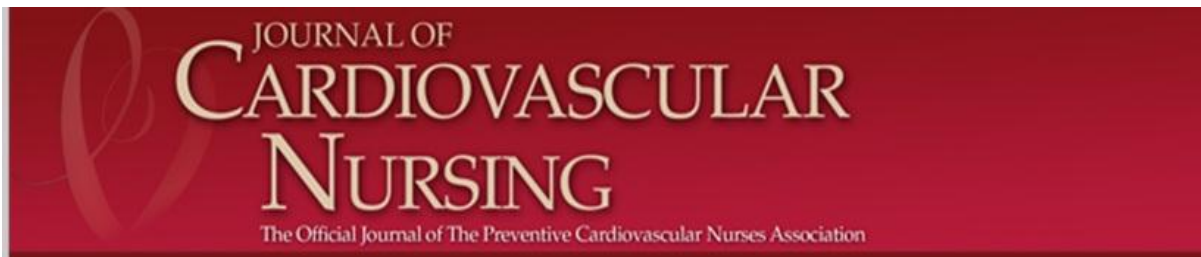
Manuscript for submission to the *Journal of Cardiovascular Nursing*

The relationship between cardiovascular risk factors and knowledge of cardiovascular disease in African men in the North-West Province

Authors:

A Burger; R Pretorius; CMT Fourie; AE Schutte

AUTHOR GUIDELINES



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Article Title: The relationship between cardiovascular risk factors and knowledge of cardiovascular disease in African men in the North-West Province

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Number of words in abstract: 297

Number of words in text: 2 999

Number of tables: 5

Number of figures: 1

The relationship between cardiovascular risk factors and knowledge of cardiovascular disease in a group of African men in the North-West Province

Abstract

Background: In South Africa, the prevalence of cardiovascular disease (CVD) is often underestimated. CVD occurs commonly, especially in urban areas with two thirds of Africans presenting with multiple risk factors for CVD. Although several studies have been done on the high prevalence and burden of CVD, there is limited research investigating possible relationships between CV risk factors and CVD knowledge. **Objective:** This study aimed to determine the relationship between CV risk factors and knowledge of CVD in a group of African men. **Subjects and Method:** The study included 118 African men employed at the Vaalharts Water Scheme, North-West Province, South Africa. Participants completed questionnaires on general health information, as well as a Heart Disease Knowledge Questionnaire. Individual health screening included anthropometric measurements (height, weight, waist circumference and body mass index), blood pressure (BP), rapid testing of blood glucose and cholesterol. By using Pearson correlations we determined whether CVD knowledge scores relate to individual CV risk factors. **Results:** The mean CV knowledge score was 75% with an acceptable Cronbach's α of 0.64 (CA=0.64). Participants had a mean BP of 146/92 mmHg, which falls in the hypertensive range of the European Hypertension guidelines. Their fasting blood glucose levels of 5.8 ± 2.0 mmol/L were higher than the normal cut-off range of 5.6 mmol/L. Their body mass index was 25.9 ± 5.9 kg/m². Overall, we observed a lack of association between CV risk factors and CVD knowledge. Only one borderline significant association existed between triglycerides and CVD knowledge ($r=0.167$; $p=0.071$). **Conclusions:** Despite African men having an increased CV risk and a relatively good understanding of CVD risk factors, there seems to be a disconnect between their CV risk and CVD knowledge. Our results suggest that a good CVD knowledge does not appear to influence changes in CV risk factor levels.

Key words: heart disease, hypertension, stroke, risk, black, health knowledge, health promotion

Introduction

Cardiovascular disease (CVD) is a major health problem and a leading cause of mortality, morbidity and economic burden.¹ Worldwide the primary risk factors (hypertension, obesity, physical inactivity, poor diet, alcohol and smoking) are increasing as a result of urbanization.² The African Union has identified hypertension as one of the continents biggest health challenges after HIV/AIDS. As with HIV, South Africa also has one of the highest rates of hypertension in the world.³ A recent paper published on hypertension in adults from low- and middle- income countries found South Africa to have the highest prevalence of hypertension of all countries, with 78% of adults older than 50 years being affected.⁴

Although several studies have been done on the high prevalence of cardiovascular (CV) risk factors in Sub-Saharan Africa,⁵ studies investigating relationships between cardiovascular risk factors and knowledge of CVD are limited. To the best of our knowledge no such studies exist for the South African population. CVD will continue to be a health threat unless the medical fraternity gains a thorough understanding on contributing CV risk factors on population level, since this would enable individuals to identify actions to reduce their own risk.⁶ It is therefore important for individuals to be able to identify their own risk and susceptibility by having acquired knowledge.⁷ Early detection and prevention are important to reduce the impact of CVD on health systems. This impact can be controlled effectively if patients are aware of their conditions and take precautionary measures.⁸ Before prevention programs and policies can be developed, the gap between CV risk factors and CVD knowledge has to be determined.⁶ Therefore, the purpose of this study was to investigate the relationship between CV risk factors and knowledge of CVD disease in a group of African men.

Methods

Study Design and Participants

This study is quantitative in nature and followed a descriptive correlational design. The data collection was conducted over a period of one week on-site at the Vaalharts Water Scheme. The study included 118 African men, aged 19-65 years. Based on several studies done in South Africa it is evident that African men have a significantly increased risk for the development of CVD.⁹ The data was collected by a multidisciplinary team that included the research nurse, a dietician and students from nursing, cardiovascular physiology and biokinetics.

Ethical Considerations

The study was approved by the Health Research Ethics committee of the North-West University (Potchefstroom Campus). This study complied with the guidelines stipulated in the Declaration of Helsinki: Ethical principles for medical research involving human participants.¹⁰ The participants were informed that participation was voluntary and that withdrawal from the study was possible at any time. Informed consent was signed after all procedures had been explained to them. Interpreters were available to relay the information in the participant's home language. Participants were encouraged to participate, but the voluntary nature of participation was emphasized, as this study formed part of a wellness screening project instituted by the employer. The participants consented to having their results used for research purposes. All participants with identified risk factors were given health education and referred to their Health Clinic or Medical Practitioner when indicated for further management.

Data Collection

The data collection process consisted of two questionnaires, namely a General Health Questionnaire (GHQ) and a Heart Disease Knowledge Questionnaire, to obtain relevant data on the CVD knowledge and relevant health information of the

participants. Questionnaires were completed online. Participants were also screened to determine their individual CV risk profile.

General Health Questionnaire (GHQ)

Participants completed a standardized GHQ to obtain information on their socio-demography, lifestyle and health status (including medical history, medication usage, smoking status, alcohol consumption, and exercise).

Heart Disease Knowledge Questionnaire

The Heart Disease Knowledge Questionnaire was originally developed and validated by Bergman and colleagues at the National Institutes of Health in Canada.⁶ The 30-item questionnaire was designed to measure heart disease knowledge as conceptualized across five domains namely diet, epidemiology, risk factors, medical knowledge and symptoms of CVD. Likert-scale type questions with True/False responses were used. Permission was obtained by the authors of this validated questionnaire to pilot it among a South African population. The questionnaire was presented in a pilot study within the research discipline and a number of minor adjustments were made to the original version terminology to fit in the specific population context.

In order to avoid translational errors, the questionnaires were completed with the assistance of nursing students familiar with all languages spoken in the North-West Province. However, the majority of participants were reasonably proficient in English.

Reliability and Validity of the Comprehensive Heart Disease Questionnaire

Bergman *et al.*⁶ reported an adequate Cronbach's α of 0.73 (CA=0.73), with 21 of the items having a factor loading above 0.40, which indicates that items loaded well into their pre-established domains.⁶ In this study the questionnaire was tested among a selected group to ensure content-related validity, as well as to establish the level of understanding, appropriateness of language and to establish whether the data collected will be appropriate, meaningful and correct. The questionnaire was

critically evaluated by colleagues and experts in the field to establish face validity. A Cronbach's α was used to calculate internal consistency and reliability. This questionnaire had an acceptable Cronbach's α of 0.64 (CA=0.64).

Health Screening Measurements

Individual health screening was performed after the completion of the questionnaires. Anthropometric measures, namely height and weight, were measured with a Seca 813 scale and Seca 213 portable stadiometer (Seca, Hamburg, Germany). The waist circumferences of each participant were taken in triplicate with a flexible metallic measuring tape with participants standing upright, with the face directed towards the observer. The waist circumference was measured at the widest point (below the last rib). Body mass index (BMI) was determined with the formula: $\text{weight}/\text{height}^2$.

Before blood pressure was measured the participants were seated for a rest period of 5 minutes. Blood pressure and heart rate were taken in a sitting position on both arms, repeated after a minimum 5 minute rest with the validated Omron M10 device (Healthcare, Tokyo, Japan). The appropriate cuff sizes were used according to the circumference of the upper arm.

Participants were requested to be in a fasted state for 4-6 hours before blood sampling. A blood sample was obtained via a finger-prick according to standard operating procedures.¹¹ Rapid blood glucose (BG) and the total cholesterol (TC) profile were measured in mmol/L. BG was measured using One Touch Select glucometer (Lifescan, Johnson & Johnson, USA) and the TC profile was measured with the Cardiochek P.A. (Polymer Technology Systems, Japan). Both measurements were performed with all participants seated in the same position.

All health information and individual results were interpreted and explained to the participants at the end of the screening process, with the provision of educational materials. In case of a participant being identified with any abnormalities (such as hypertension or hyperglycemia), they were referred to the local clinic, hospital or doctor.

Data Analysis

The data was analyzed with Statistica version 12 (Statsoft, Tulsa, OK, USA). The information of the GHQ, Heart Disease Knowledge Questionnaire and health screening measurements were analyzed using frequencies and means. The Heart Disease Knowledge Questionnaire was analyzed using the Cronbach's α coefficient to ensure internal reliability. The questionnaire was reduced from 30 items to 20 items to ensure a valid and reliable Cronbach's α . The 10 items that were excluded were indicated as invalid to accurately test knowledge (the chance of correctly guessing the answer was high).

Pearson correlation coefficients were used to determine associations between CV risk factors and CVD knowledge. A p-value of <0.05 was considered statistically significant. This analysis was firstly conducted within the total group of participants. Thereafter, the participant group was divided into tertiles according to knowledge scores of low (10-13/20), medium (14-16/20) and high (17-20/20) scores. Means and proportions were compared between the low and high CVD knowledge scoring groups using independent t-tests and Chi-square tests, respectively.

Results

Characteristics of Study Participants (including Cardiovascular Risk Factors)

Participant characteristics are indicated in Table 1. Participants' ages ranged from 19 to 65 years, with a mean 46.0 years. The mean systolic blood pressure (SBP) and diastolic blood pressure (DBP) of the group were respectively 145.6 ± 22.8 mmHg and 92.0 ± 13.9 mmHg. Both these values were within hypertensive ranges according to the European Society of Hypertension (ESH) and of the European Society of Cardiology (ESC) guidelines (SBP >140 mmHg and/or DBP > 90 mmHg).¹² The men had a BMI of 25.9 ± 5.9 kg/m² (Obesity: BMI ≥ 30 kg/m²), and a normal waist circumference of 90.3 ± 16.0 cm (Abdominal obesity, WC: men ≥ 102 cm) according to the ESH/ESC guidelines for obesity.¹²

Participants demonstrated a favorable lipid profile, but their fasting blood glucose (BG) measurement of 5.8 ± 2.0 mmol/L was elevated above the normal value of 5.6 mmol/L.¹²

More than half of the participants completed only primary school, and 69% of the men earned a total income of >R5000 per month.

The group risk stratification indicated that one third of the participants fall within the moderate to high CV risk classification (Figure 1). Only one out of four participants had a low CV risk profile. It should be kept in mind that the participant group consists only of men, which in itself is already considered a CV risk factor.¹²

Cardiovascular Disease Knowledge

The responses to the Heart Disease Knowledge Questionnaire are indicated in Table 2. The total mean score for the Heart Disease Knowledge questionnaire was 75.25%. The original questionnaire included 30 items. Upon analysis of the results the biostatistician recommended the exclusion of 10 items. The remaining 20 items (Table 2) resulted in an acceptable Cronbach's α of 0.64 (CA=0.64). The 10 items as indicated in Table 3 were excluded from the total knowledge score, as it indicated invalid testing of knowledge (the chance of correctly guessing the answer was high).

Relationship between Cardiovascular Risk Factors and Cardiovascular Disease Knowledge

Overall, we observed weak and non-significant correlations between CV risk factors and CVD knowledge, as indicated in Table 4. The only correlation that indicated borderline significance was between CVD knowledge and triglyceride levels, but the r-value was weak ($r=0.167$; $p=0.071$). This was also evident when comparing participants in the lowest tertile of CVD knowledge versus the highest tertile of CVD knowledge ($p=0.13$) as indicated in Table 5.

Discussion

The aim of the study was to investigate the relationship between CV factors and knowledge of CVD in a group of African men. We found that despite African men having an adverse CV risk profile and a relatively good knowledge of CVD risk factors, no relationship existed between their CV risk factors and CVD knowledge. One third of the men in this study had two or more CV risk factors according to the ESH guidelines. This finding indicated that men might know about CVD, nevertheless they might be unaware of their own susceptibility to CVD in relation to their risk factors. Without an awareness of personal susceptibility, men might be less likely to take action to reduce the risk of CVD.

The following hypotheses were formulated as statements of the expected relationship between the variables in the study: (i) there is no statistically significant relationship between CV risk factors and CVD knowledge of African men in the North-West Province, and (ii) there is a statistically significant relationship between CV risk factors and CVD knowledge of African men in the North-West Province. The second hypothesis is fully rejected. This finding is congruent with several studies.^{13,14,15} There is limited evidence of studies that only investigated men's CV risk factors in relation to their knowledge of CVD. Findings from a similar study that investigated Australian rural women's knowledge of heart disease and the association with lifestyle behaviors, indicated that despite having a good knowledge of heart disease, over half of the participants reported having two or more lifestyle risk factors for heart disease.¹⁴ In a study conducted by Homko *et al.*¹³ amongst men and women with a low socio-economic status (rural and urban) in Pennsylvania (USA), it was clear that although women had a better CVD knowledge than men, both sexes had high Framingham risk scores.¹⁶ No association was found between the perceived and actual CV risk, or between CVD knowledge and either perceived or actual CVD risk factors.¹³

Cardiovascular disease is largely caused by modifiable risk factors. Therefore, it can be referred to as a lifestyle disease, caused by changes in lifestyle, in particular dietary changes, increase in weight and obesity, tobacco and alcohol consumption.¹⁷ This is common in the African population with increased risk of CVD, especially

hypertension.¹⁷⁻¹⁹ Unlike our findings, a study conducted in an African-American population, indicated that knowledge of CVD risk factors was very low in young adults (CARDIA study).²⁰ African-Americans had higher CV risk factors and lower CVD knowledge than their white counterparts.²⁰ Race and education were predictors of knowledge in this multi-ethnic study, but the levels of CVD knowledge across all groups were low. In the study it was found that lower education levels and men of African-American ethnicity were associated with higher CVD risk burden.²⁰

According to the Health Belief Model, knowledge alone is not the only factor to change behavior, but it is a prerequisite for change.²¹ To adopt a new behavior, a person must have knowledge about the condition (CVD risk factor knowledge), perceive themselves as susceptible to the disease (CV risk perception), and believe that they can prevent or cure the disease (self-efficacy).²¹ Based on our study from the North-West Province, we could speculate on two possible explanations for the lack of association between CV risk factors and CVD knowledge. Only a small convenience sample of African men were included, which may mask a general correlation existing in the greater population. Another explanation may also be that knowledge does not necessarily associate with positive health behaviors, as expected. This might indicate that these men have a good CVD knowledge, but they are unaware of their own susceptibility to CVD in relation to their lifestyle habits (susceptibility to illness).²¹ Another reason might be that they have an unrealistic view of their own risk (perceived severity of the illness).²¹ For example, many smokers do not realize the serious health implications of smoking. In addition, the lack of association between CV risk factors and overall CVD knowledge score may indicate that despite having an overall good knowledge of CVD, there was a lack of health-promoting behaviors by the men to reflect their knowledge. Without awareness of personal susceptibility and self-efficacy, men might be less likely to modify their lifestyle and reduce the risk of CVD.

Study Limitations

There are limitations to this study that should be recognized. Firstly, the study utilized a convenience sampling method and therefore participants were limited to a relatively small sample of African men, therefore generalization to the wider population cannot be made. We suggest further studies with larger population samples to ensure generalization to the wider population. Secondly, the participants self-reported on their smoking and alcohol intake that may have affected the reliability of the data. Thirdly, we used rapid tests to assess glucose and lipid levels, which may have resulted in either over- or underestimation of true levels. However, both the One Touch Select glucometer and Cardiochek P.A. devices have been validated for screening use. Fourthly, we tested only CVD knowledge, but additional components such as own perception and own susceptibility to CVD, and beliefs relating to prevention or self-care of disease, were not tested, which could have led to a better understanding of our findings. However, this study could be used as a guide for the population and future studies. The findings from our study have an impact on community and primary healthcare practice, research, -education and policy development that lead can lead to primary prevention and control of the prevalence of CVD in South Africa.

Conclusion and Implications

Despite African men having an increased CV risk profile and a relatively good knowledge of CVD risk factors, there seems to be a disconnect between their CVD knowledge and CV risk. Furthermore, in this group of African men this knowledge does not appear to influence changes in risk factor levels. Our results suggest that a good CVD knowledge may not be sufficient to change their own CV risk factor levels.

The present study indicates that considerable work is required in the area of CVD primary prevention and control. We make several recommendations for primary health care (PHC) practice and future research. Firstly, innovative educational strategies are needed to increase knowledge of CV risk factors, awareness and self-efficacy among people. Health promotion programs should focus on providing health information and education that initiate individual behavior change. Better awareness

of CV risk factors might lead to a more accurate perception of a person's susceptibility to CVD. To adopt a new behavior people must have knowledge about the condition (CVD risk factor knowledge), perceive themselves susceptible (CVD risk perception), and believe that they are capable of doing something to prevent the disease (self-efficacy). Secondly, primary prevention through regular health screening is necessary to make individuals more aware of their risk factors. Cardiovascular disease with organ damage (OD) can be prevented through reduction of the risk factors, early detection and treatment. Thirdly, further research is needed to determine whether the results of the current study can be generalized to other population samples and to explore the impact of ethnicity, gender, educational levels on CVD knowledge. Lastly, a validated CVD knowledge questionnaire should be used to evaluate knowledge among a wider range of population groups, particularly in the South African context. The relationship between knowledge, risk perception, self-efficacy, and behavior change also needs further investigation.

Acknowledgements

This work is based upon research supported by the National Research Foundation (NRF). Any opinion, findings and conclusions or recommendations expressed in this material are those of the author(s) and therefore the NRF do not accept any liability in regard thereto.

The authors thank the participants for their voluntary participation, the North-West University for the funding supplied and the multi-disciplinary team for their invaluable input.

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Table 1. Characteristics of Cardiovascular Risk Factors of the study group

	African men (N=118)
Cardiovascular risk factors	
Age (years)	46.0 ± 12.0
Body mass index (kg/m ²)	25.9 ± 5.9
Waist circumference (cm)	90.3 ± 16.0
Hypertensive ¹ , N (%)	90 (76)
Systolic blood pressure (mmHg)	145.6 ± 22.8*
Diastolic blood pressure (mmHg)	92.0 ± 13.9*
Total cholesterol (mmol/l)	3.8 ± 1.3
Triglycerides (mmol/l)	2.5 ± 1.7*
LDL-C (mmol/l)	1.9 ± 0.9
HDL-C (mmol/l)	1.2 ± 0.6
Blood glucose (mmol/l)	5.8 ± 2.0*
Medication use	
Anti-Hypertensive treatment, N (%)	16 (13.6)
Glucose lowering drugs, N (%)	2 (1.7)
Lifestyle factors	
Alcohol (self-reported), N (%)	41 (34.7)
Smoking (self-reported), N (%)	40 (33.9)
Socio-economic status indicators	
Highest level of education	
None, N (%)	19 (16.1)
Primary school, N (%)	64 (54.2)
High school, N (%)	32 (27.1)
Tertiary education, N (%)	3 (2.5)
Total income per month	
<R1000, N (%)	2 (1.7)
R1000-R5000, N (%)	35 (29.7)
>R5000, N (%)	81 (68.6)

Values are number (N) of participants (%); arithmetic mean ±SD

Abbreviation: LDL-C, Low density lipoprotein cholesterol; HDL-C, High density lipoprotein cholesterol.

Values indicated with * are above normal cut-off ranges according to ESH/ESC Guidelines.

Participants were classified as hypertensive¹, according to ESH/ESC Guidelines (SBP ≥ 140mmHg and/or DBP ≥90 mmHg).

Table 2. Responses of the Heart Disease Knowledge Questionnaire used in this study

Item	Question	Correct Response	N=118 (%)
I1	Polysaturated fats (olive oil) are healthier for the heart than saturated fats (fat on meat or chicken skin).	True	95 (80.5)
I4	Eating a lot of red meat increases heart disease risk.	True	103 (87.3)
I6	Trans-fats (food that is fried in oil) are healthier for the heart than most other kinds of fats.	False	74 (62.7)
I8	Walking and gardening are considered types of exercise that can lower heart disease risk..	True	113 (95.8)
I9	Most of the cholesterol (bad fat) in an egg is in the white part of the egg.	False	45 (38.1)
I11	Taking aspirin each day decreases the risk of getting heart disease.	True	41 (34.7)
I12	Dietary fiber e.g. whole grain bread lowers blood cholesterol.	True	116 (98.3)
I13	Heart disease (e.g. high blood, stroke) is a common cause of death in South Africa.	True	113 (95.8)
I14	The healthier exercise for the heart involves rapid breathing for a sustained period of time.	True	86 (72.9)
I15	Turning pale or gray is a symptom of having a heart attack.	True	85 (72.0)
I16	A healthy person's heart beat should return to normal within 15 minutes after exercise.	True	102 (86.4)
I19	HDL refers to "good" cholesterol (fats in the blood that is good for the body), and LDL refers to "bad" cholesterol (fats in the blood that is bad for the body).	True	82 (69.5)
I21	Feeling weak, lightheaded, or faint is a common symptom of having a heart attack.	True	103 (87.3)
I22	Taller people are more at risk for getting heart attack.	False	74 (62.7)
I23	High blood pressure is defined as 110/80mmHg.	False	45 (38.1)
I25	Polyunsaturated fats come from plant sources such as corn, sunflower, and olive oil.	True	108 (91.5)
I26	People who have diabetes (high blood sugar) are at higher risk of getting heart disease.	True	109 (92.4)
I28	Eating a high fiber diet (e.g. brown bread, beans) increases the risk of getting heart disease.	False	94 (79.7)
I29	Heart disease is better defined as a short-term illness than a chronic, long term illness.	False	82 (69.5)
I30	Many vegetables are high in cholesterol (high in "bad" fat).	False	106 (89.8)
Total Score			75.25%

Table 3. Heart Disease Knowledge Questions not included in final analysis of this study

Item	Question	Correct Response	N=118 (%)
I2	Women are less likely to get heart disease after menopause than before.	False	62 (52.5)
I3	Having had TB increases the risk of getting heart disease.	False	86 (72.9)
I5	Most people can tell whether or not they have high blood pressure.	False	71 (60.2)
I7	The most important cause of heart attacks is stress.	False	112 (94.9)
I10	Smokers are more likely to die of lung cancer than heart disease.	False	110 (93.2)
I17	Sudden trouble seeing in one eye is a common symptom of having a heart attack.	False	82 (69.5)
I18	Cardiopulmonary resuscitation (CPR) helps to clear clogged/blocked blood vessels.	False	102 (86.4)
I20	Arterial defibrillation (shock) is a procedure where hardened blood vessels are opened to increase blood flow.	False	102 (86.4)
I24	Most women are more likely to die from breast cancer than heart disease.	False	93 (78.8)
I27	Men and women experience many of the same symptoms of a heart attack.	True	74 (62.7)

Table 4. Pearson Correlation Coefficients for the relationship between cardiovascular disease knowledge and cardiovascular risk factors (N=118).

Cardiovascular risk factors	r	p
Age (years)	-0.092	0.320
Body mass index (kg/m ²)	0.040	0.660
Waist circumference (cm)	0.037	0.626
Systolic blood pressure (mmHg)	0.075	0.421
Diastolic blood pressure (mmHg)	0.036	0.700
Total cholesterol (mmol/l)	0.080	0.388
Triglycerides (mmol/l)	0.167	0.071
LDL-C (mmol/l)	0.024	0.825
HDL-C (mmol/l)	0.070	0.453
Blood glucose (mmol/l)	-0.003	0.970

P≤0.05 regarded as statistical significant. Abbreviations: LDL-C, Low density lipoprotein cholesterol; HDL-C, High density lipoprotein cholesterol

Table 5. Comparison of CV risk factors between participants with high and low CVD knowledge scores

	CVD knowledge Low Score (10-13/20) (n=29)	CVD knowledge High Score (17-20/20) (n=26)	p-value
Cardiovascular risk factors			
Age (years)	48.7 ± 12.3	45.8 ± 13.8	0.42
Body mass index (kg/m ²)	26.8 ± 5.8	27.7 ± 6.4	0.58
Waist circumference (cm)	93.0 ± 16.4	94.9 ± 16.9	0.67
Systolic blood pressure (mmHg)	143.6 ± 22.8	147.8 ± 23.9	0.52
Diastolic blood pressure (mmHg)	90.4 ± 10.9	91.2 ± 14.72	0.82
Hypertensive ¹ , N (%)	16 (57.14)	16 (61.54)	0.91
Total cholesterol (mmol/l)	3.8 ± 1.2	4.0 ± 1.5	0.56
Triglycerides (mmol/l)	2.1 ± 1.4	2.7 ± 1.5	0.13
LDL-C (mmol/l)	2.1 ± 0.7	2.3 ± 1.2	0.60
HDL-C (mmol/l)	1.0 ± 0.4	1.1 ± 0.5	0.53
Blood glucose (mmol/l)	6.0 ± 2.3	6.1 ± 2.4	0.92
Medication use			
Anti-hypertensive treatment, N (%)	5 (17.2)	6 (19.2)	0.38
Lifestyle factors			
Alcohol (self-reported), N (%)	10 (34.5)	6 (23.1)	0.33
Smoking (self-reported), N (%)	13 (34.5)	7 (26.9)	0.33
Socio-economic status indicators			
Highest level of education			
None, N (%)	5 (17.2)	4 (15.4)	0.83
Primary school, N (%)	18 (62.1)	12 (46.2)	
High school, N (%)	5 (17.2)	9 (34.62)	
Tertiary education, N (%)	1 (3.5)	1 (3.9)	
Total income per month			
<R1000, N (%)	1 (3.5)	1 (3.9)	0.13
R1000-R5000, N (%)	6 (20.7)	5 (19.2)	
>R5000, N (%)	22 (75.9)	22 (76.9)	

Values are number (N) of participants (%); data are expressed as arithmetic mean ±SD; P≤0.05 regarded as statistically significant. Abbreviations: LDL-C, Low density lipoprotein cholesterol; HDL-C, High density lipoprotein cholesterol

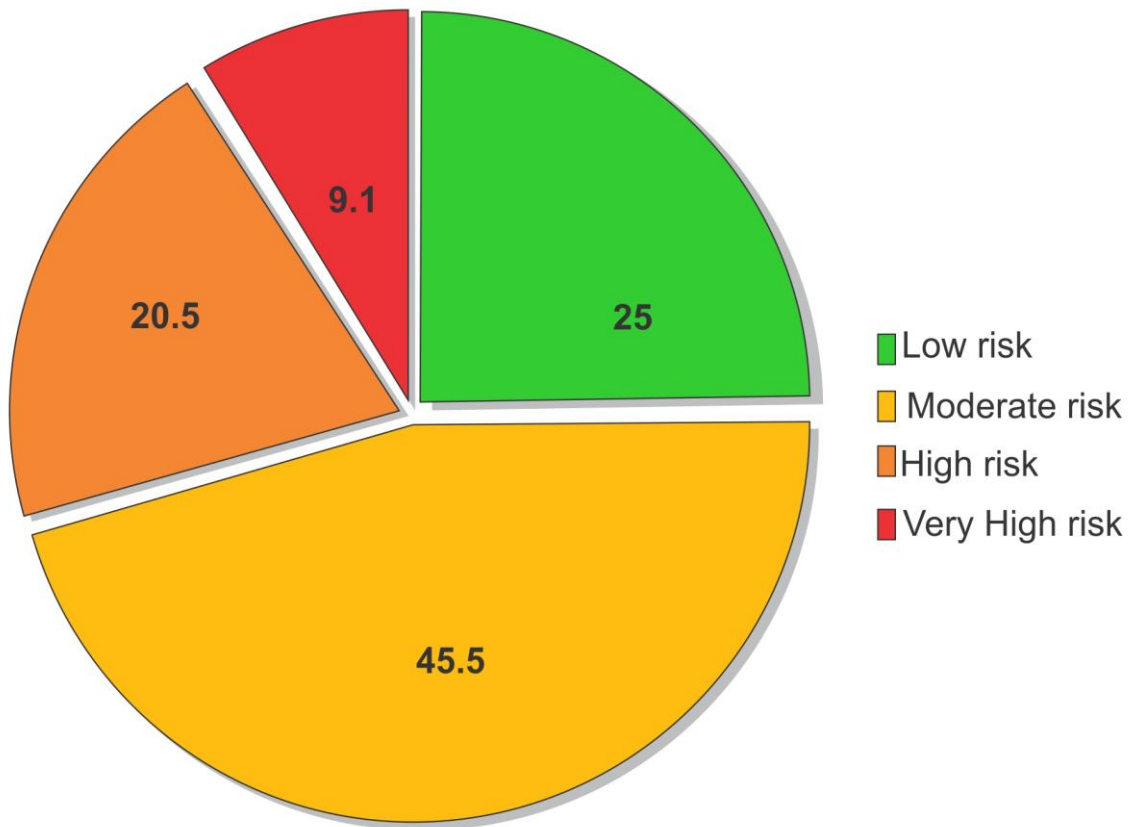


Figure 1 Cardiovascular risk stratification of participant group according to ESH/ESC Guidelines.¹²

CHAPTER 4:

CONCLUSION AND RECOMMENDATIONS

4.1 INTRODUCTION

In this Chapter, the researcher reflects on the findings by means of an evaluation of the objectives set in Chapter 1. The limitations encountered during the study are discussed, followed by recommendations for community and primary healthcare practice, research, education and policy development.

4.2 EVALUATION OF THE STUDY AND CONCLUSION

The aim of the study was to investigate the relationship between CV risk factors and knowledge of CVD in African men in the North-West Province of South Africa. To achieve the aim of the study, three objectives were set. Firstly, to describe the CV risk profile of the group according to the risk score system developed by the European Society of Cardiology (ESC), and the European Society of Hypertension (ESH) (Mancia *et al.*, 2013:1288). Secondly, to describe the demographic information and the level of CVD knowledge of the men by using a general health questionnaire (GHQ) and a validated Heart Disease Knowledge Questionnaire, constructed by Bergman and colleagues at the National Institute of Health (Bergman *et al.*, 2011:86). Thirdly, to determine the relationship between CV risk profile and knowledge of CVD in a group of African men.

The following hypotheses were formulated as statements of the expected relationship between the variables in the study: (i) there is no statistically significant relationship between CV risk factors and CVD knowledge of African men in the North-West Province, and (ii) there is a statistically significant relationship between CV risk factors and CVD knowledge of African men in the North-West Province. The second hypothesis is fully rejected. In brief, our study found that despite African men having an increased CV risk profile and a relatively good knowledge of CVD risk factors, their CV risk and CVD knowledge were completely unrelated. Our results suggest that a good knowledge of CVD may not be sufficient to prevent CV risk factors. From

the available data focusing on African groups, CVD, especially hypertension, seems more common with increasing urbanisation (Van Rooyen *et al.*, 2002:69). It is, however, the urbanised persons who have better access to proper healthcare facilities and treatment (Opie & Seedat, 2005:3562). Cardiovascular disease is primarily a lifestyle disease and is modifiable by adapting a healthy lifestyle. It is clear from various studies conducted that knowledge does not always associate with positive health behaviour (Crouch & Wilson, 2011:242; Homko *et al.*, 2008:333; Lynch *et al.*, 2006:1177). Individuals seem to continue to underestimate their CV risk despite available information and health promotion programmes. Risk factors and knowledge cannot exist in isolation and need further investigation to address the gap between actual CV risk and CVD knowledge. The perceived susceptibility dimension of the Health Belief Model (HBM) states that individuals who perceive themselves to have an increased risk of CVD are more likely to change behaviours that reduce their risk, for example to stop smoking and to lose weight (Rosenstock, 1990:20). According to Lynch *et al.* (2006:1177) there is a threshold level of CVD knowledge that must be attained in order for knowledge to influence behaviour.

4.3 LIMITATIONS OF THE STUDY

When doing research, it is important to evaluate the validity and reliability of the study. It can be possible that the answer to the research question is incorrect because of a methodology flaw. Therefore, it is important to acknowledge these threats and issues so that the research results can be interpreted usefully.

There were limitations requiring recognition in this study. Firstly, the study utilised a convenience sampling method and participants were limited to a relatively small sample of African men. Therefore generalisation to the wider population cannot be made. We suggest further studies with larger population samples to ensure generalisation in the wider population. Secondly, it appears that the utilised Heart Disease Knowledge Questionnaire to measure CVD knowledge was not a good fit for this population. Although validated in a Canadian population group, the content was not familiar to the participants of this study, therefore yielding a weak Cronbach's alpha. Some of the questions had to be clarified by using examples. After removing

ten items from the original questionnaire, a more acceptable Cronbach's alpha were obtained. However, the chance of participants still guessing cannot be excluded. Thirdly, participants self-reported on their smoking and alcohol intake and this may have affected the reliability of the data. Fourthly, we tested only CVD knowledge, but additional components such as own perception and own susceptibility to CVD, and beliefs relating to prevention or self-care of disease, were not tested, which could have led to a better understanding of our findings. The findings of our study may, however, lead to practical and educational implications for nurses in community and primary healthcare settings. It clearly demonstrates the need for effective community-based prevention and education programs.

4.4 RECOMMENDATIONS

The following recommendations in terms of community and primary healthcare practice, -research, -education and policy development emanated from the findings of the study.

4.4.1 Recommendation for community and primary healthcare practice

When reviewing the Strategic Plan for the Prevention and Control of Non-Communicable Diseases 2013 – 2017 it was foreseen that the Non-Communicable Diseases (NCDs) epidemic can be prevented through reduction of the risk factors, early detection and treatment (DoH, 2013:7). Primary health care (PHC) should move beyond clinical and curative services to focus on health promotion to prevent ill-health from occurring. Primary prevention should therefore focus on providing health information with initiation of individual behaviour change as its goal. This strategy is in line with the Ottawa Charter for health promotion, which is a basic framework for the planning of a health promotion activity (WHO, 1986). The Charter definition of health promotion:

“Health promotion is the process of enabling people to increase control over, and to improve, their health. To reach a state of complete physical, mental and social well-being, an individual or

group must be able to identify and to realize aspirations, to satisfy needs, and to change or cope with the environment. Health is, therefore, seen as a resource for everyday life, not the objective of living. Health is a positive concept emphasizing social and personal resources, as well as physical capacities. Therefore, health promotion is not just only the responsibility of the health sector, but goes beyond healthy to well-being.” (WHO, 1986).

Therefore, it is relevant to focus on strategic health outcomes that address the following aspects:

Prevention and health promotion

- Innovative strategies are needed to increase knowledge, risk awareness and self-efficacy of NCDs amongst individuals. According to the HBM, knowledge of the negative health consequences of behaviour is necessary for behaviour to change. To adapt a new behaviour people must have knowledge (CVD knowledge), perceive themselves as susceptible to the disease (CV risk perception), and believe that they are capable of doing something to prevent the disease (self-efficacy) (Rosenstock, 1990:20).
- To increase health promotion, the media can be used to improve individual perception of their own susceptibility. Although it is no quick solution for health problems, it is a powerful communication aid if used correctly, and it can contribute towards health promotion. Social marketing can be utilised as a technique to encourage behaviour change for example the “Salt Watch” and “Five Fruits and Vegetables a Day” campaigns. Media, for example brochures, pamphlets and videos can also be useful to create awareness and improve health literacy to keep people informed of different health options and choices.

Screening

- Early identification could be performed through screening programmes when patients attend clinics. This can lead to health awareness and risk perception for disease.
- Wellness campaigns can also contribute to health screening and awareness of one's own health status.

4.4.2 Recommendations for research

- A standardised CVD knowledge instrument better suited to the South-African population should be developed and validated. This can be valuable information that can assist in the design of effective health intervention programmes. It can also serve as a tool by which education material can be developed to address individuals' specific gaps in CVD knowledge.
- Future research is necessary to determine whether different dimensions of knowledge are related to health behaviour. Measures of knowledge vary widely across studies examining the relation between knowledge and lifestyle changes.
- More research should be done to discover which factors affect patients' behaviours with regard to adhering to a low-salt diet, smoking abstinence, and excessive use of alcohol, so that behaviour interventions can be designed to address risk factors.
- The relationship between knowledge, risk perception, self-efficacy, and behaviour change also needs further investigation.

4.4.3 Recommendations for nursing education

- Innovative educational strategies are needed to increase knowledge of CV risk factors to create risk awareness and self-efficacy among individuals.
- Providing health education may not be adequate to control and prevent CVD. Health behaviour theories (e.g. Bandura's self-efficacy theory, Health Belief

Model and Prochaska's Stages of Change), should be considered in creating interventions to target behaviour change.

- Generally, nurses are responsible for the counselling of patients in primary healthcare clinics about behaviour changes, namely smoking, harmful drinking, physical activity and an unhealthy diet. By giving patients the correct information on prevention of CV risk factors and health behaviour counselling, much can be done to prevent and control NCDs. Therefore, it is important that nurses get the relevant training to support health promotion and risk reduction behaviours.
- Nurses should therefore be equipped with good knowledge and training on NCDs. Relevant training in health behaviour counselling skills will empower nurses with knowledge transfer and perceptions of health.

4.4.4 Recommendations for policy development

- Effective health policy development is the basis of good health. Before effective prevention programmes and policies can be developed, the gap between risk factors and knowledge has to be determined.
- Effective prevention and control of NCDs require a multi-sectorial approach (such as tobacco control policies and agricultural policies). Partnership between private sector, non-government organisations (NGOs) and the public sector will contribute to this initiative (DoH, 2013:7).
- Health promotion and communication is an integral part of the National Health System. Therefore, government and the Department of Health must ensure relevant and effective policies to overcome the burden of CVD. This will be in line with the overall health sector goal of "a long and healthy life for all" through prevention and control of NCDs (DoH, 2013:7).

4.5 SUMMARY

This Chapter offered a reflection on the objectives by means of an evaluation of the study. Limitations and recommendations were also provided. To conclude, there is sufficient evidence that knowledge does not appear to influence changes in risk factor levels. However, an individual must have knowledge about the condition (CVD risk knowledge) and perceive themselves as susceptible to the risk (CV risk perception). To conclude: “Luckily we know the answer. Unluckily, we often lack the willpower to change our lifestyles”(Opie, 2011:31).

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ADDENDUM A: HEALTH RESEARCH ETHICS COMMITTEE APPROVAL OF THE NORTH-WEST UNIVERSITY



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HART

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21 October 2014

Dear Ms Burger

Ethics Application: NWU-00028-12-A1 "The relationship between cardiovascular risk factors and knowledge of cardiovascular disease in African men in the North-West Province"

Your application to amend this study has been approved by the Health Research Ethics Committee until 30/03/2015.

Yours sincerely

Prof Minnie Greeff
Health Research Ethics Committee Chairperson

Original details: Prof Minnie Greeff(10187308) C:\Users\13210572\Documents\ETIEK\2012\ETHICS\NWU-00028-12-A1 (R Pretorius-A Burger) - Approval letter.docm
21 October 2014
File reference: 9.1.5.3

ADDENDUM B: INFORMED CONSENT AND INFORMATION LEAFLET



PARTICIPANT INFORMATION LEAFLET – SCREENING DAY

Project title: Vaalharts

Principle Investigator: Sr. A Burger

Participant number - -

You are invited to take part in this study. Taking part in this study is voluntary and before you decide whether you would like to take part, it is important for you to understand why the research is being done and what it will involve. The purpose of this leaflet is to explain this to you as openly and clearly as possible to help you decide.

You may also wish to discuss the project with a relative or friend or your local health worker. Feel free to do this. If you decide to take part and later change your mind, you can withdraw from the study at any time and without a given reason. Your decision will not affect your routine treatment, your relationship with those treating you or your relationship with the North-West University.

Before you make your decision, a member of the research team will be available so that you can ask any questions you have about the research project. You can ask for any information you want.

Once you have read this, if you decide not to take part or you have any questions that you would like answered to help you decide, please talk to the study team.

Thank you for taking the time to read this and for considering taking part in this important study.

Sister Adele Burger
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Why are we doing this study?

In South Africa cardiovascular disease (CVD) is very common, especially in towns and cities. CVD includes high blood pressure, heart disease and stroke. When blood stops flowing to the heart, this can cause a heart attack and part of the heart dies. A stroke is when there is a problem with the blood supply to the brain and a part of the brain is damaged. This aim of this study is to measure the risk of CVD in South African people living in and around the North West.

This study is very important because it could help doctors and nurses prevent more people in the local community having strokes and heart attacks. The study has been approved by the Human Research Ethics Committee of North-West University Potchefstroom (Reference No. **NWU-00028-12-A1** and will be carried out in accordance with the Declaration of Helsinki (2000, 2002: developed to protect people who agree to take part in human research studies).



Why have I been invited to take part?

You have been asked to take part as you are working at the Vaalharts Water Scheme in the North West Province. Our aim is to screen all the employees working at Vaalharts Water Scheme, to assess for cardiovascular risk factors and to determine cardiovascular disease knowledge to reduce the future impact on chronic disease to minimize the risk of cardiovascular disease of. Individual feedback on CVD risk and advice on how to reduce risk will be given. You will be referred to your medical doctor or clinic if needed.



What do I need to do?

If you decide to take part, before we begin any tests, we will again go through what is involved with you and check you have understood the information in this leaflet. If you are happy to proceed, we will ask you to sign a consent form stating that you are volunteering to participate in this study.

After you have signed the consent form, we will ask you to:

- Complete some questionnaires
- Give a small urine sample which we will test to check that your kidneys are healthy.
- Have your height, weight, waist/hip circumference, neck circumference & blood pressure measured
- Have a small amount (less than a teaspoon) of blood taken from your finger to measure cholesterol & glucose (blood sugar)
- Have your temperature taken in your ear and a simple test to see how healthy your eyes are. This test is called Intraocular pressure – it is the same test that an optician uses to measure the pressure of fluid in your eye. A small amount of anaesthetic is applied to each of your eyes then a small measuring device is rested briefly on each eye to measure pressure.



Are there any possible risks?

All of the equipment used in the tests is very safe and you will not feel any discomfort during these measures, all the tests are painless. Giving a small blood sample when we prick your finger may cause a little discomfort but all tests are performed by experienced nurses and none of the measures taken are expected to cause any risk to you. For the eye pressure

measure, the antibiotics drops may sting a little when they are put in your eye but this does not last long.

What happens to my results?

All information provided by you and the results of tests will be treated in the strictest confidence, and will only be used for research. No information that could identify any person taking part in the study will be revealed when the results are reported. Your results will only be disclosed with your permission, except as required by law. If your results indicate that you should be referred to a doctor or physician, we will provide you with a confidential referral letter you can use with your results clearly stated.

What are the benefits for me to take part?

- You will receive all the clinic tests for free.
- You will get feedback on your obesity levels, blood pressure and blood glucose/sugar values and cholesterol and this will give you a good picture of your risk of CVD.
- If necessary, we can refer you to physicians, clinics or hospitals for further tests or treatment and the test results may assist your doctor in making decisions about further treatment.

If I want to take part, what will happen next?

1. **The evening before:**
Do not eat or drink anything except water after 10 pm and before you come to the clinic in the morning.
2. **On the study day, please bring with you:**
 - This leaflet
 - All medication you currently are taking
 - Your ID card

For more information, please contact the study team:

Sister Adele Burger

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Email: adele.burger@nwu.ac.za

Fax: 018-285 2260

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PARTICIPANT CONSENT FORM – HEALTH SCREENING

Project title: Vaalharts Study

Principle Investigator: A Burger

Participant number:

Initial boxes below

<p>I understand that my taking part in this study is voluntary and that I can withdraw at any time without having to give a reason and without compromising my relationship with NWU, the study team or any health care I may receive. I agree to thoroughly consider any decision to withdraw from the research as I understand it may affect how reliable the results of the study are.</p>	
<p>I consent to having the tests outlined in the Participant Information Leaflet and for the results of these tests to be used for the purposes of research. I understand all personal data will be handled with care and remain confidential.</p>	
<p>The nature of the study, the procedures, the possible risk factors and the benefits of taking part in this study has all been explained to me and I have read and understood the statements on Page 3 of this consent form.</p>	

I declare that I understand the information given to me, I have had the opportunity to ask questions and discuss the project with the study team and I agree to take part in the project as a volunteer. I hereby give my consent to be a participant in this study.

Participant:

Full Name..... Signature

DateTime.....

Study team member taking consent:

Full Name.....Signature

Date.....Time.....

Witness: Full Name..... Signature

Participant Contact Details:

Current Address

Cell Phone Number

Home telephone number.....

ID number.....

Date of Birth.....

Employers Address

To the participant signing the consent form

It is important that you read/listen to and understand the following general principles, which apply to all participants in our research:

1. Participation in this project is voluntary.
2. It is possible that you personally will not derive any benefit from participation in this project, although the knowledge obtained from the results may be beneficial to other people.
3. You will be free to withdraw from the project at any stage without having to explain the reasons for your withdrawal. However, we would like to request that you would rather not withdraw without a thorough consideration of your decision, since it may have an effect on the statistical reliability of the results of the project.
4. The nature of the project, possible risk factors, factors which may cause discomfort, the expected benefits to the subjects and the known and the most probable permanent consequences which may follow from your participation in this project, are discussed in the Patient Information Leaflet.
5. We encourage you to ask questions at any stage about the project and procedures to the project leader or the personnel, who will readily give more information. They will discuss all procedures with you.

ADDENDUM C: GENERAL HEALTH QUESTIONNAIRE



GENERAL HEALTH QUESTIONNAIRE

We are very grateful to you for your participation in this study. All information given by you will be held in strict confidence, and will be used for the purpose of this study only after removing any personal identifying information.

INSTRUCTIONS

Please answer each question by marking X in **ONE BOX** on each line
(unless otherwise instructed)



OR

By writing number(s) in the spaces provided:



OR

By specifying the answer on the line(s) provided

Section A – Personal information

Participant number

Gender: Female Male

Race: White Black Indian Coloured

Date of birth: -- (Year-month-day)

South African ID number

How many years have you lived in Potchefstroom/Potchefstroom area:

Other town/city/area where you are currently living, please specify town:

.....

Years

What is your home language?

Afrikaans English

Sesotho Setswana

isiZulu isiXhosa

Other, specify please.....

Section B Personal history

Please mark the option that describes your marital status

- Never married
 - Currently married
 - Living with partner
 - Widowed
 - Separated
 - Divorced
-

Education:

What level of education have you completed?

- None
- Primary school
- High School
- College/University/Other tertiary institution

Are you still busy with?

- School YES NO
- University YES NO
- College YES NO
- Other tertiary institution YES NO

At which institution?

Occupation:

Are you employed currently? YES NO

If YES, what is your occupation e.g. what job do you do?

.....

Which of the following applies to your current employment situation?

- Full-time day
 - Nightshift
 - Housewife
 - Retired
 - Sick leave
 - Part time > 24 hours per week
 - Part time < 24 hours per week
 - Multiple part-time
 - Irregular work
-

Level of occupation (please choose one)

According to South African Standard Classification of Occupations (SASCO)

- Legislators, senior officials and managers
 - Professionals
 - Technicians and associate professionals
 - Clerks
 - Service workers and shop and market sales workers
 - Skilled agricultural and fishery workers
 - Craft and related trades workers
 - Plant and machinery operators and assemblers
 - Elementary occupation
 - Armed forces, occupations unspecified and not elsewhere classified and not economically active persons
-

Income:

What is the total income of your household per month?

- <R1000
 - R1000-R4999
 - R5000-R9 999
 - R10 000-R20 000
 - >R20 000
-

Housing:

In what type of house do you live?

- Brick house
- Flat/apartment
- Informal housing (shack)
- Other

Please specify:.....

Do you own/rent this property? Own Rent Other, please specify

.....

Section C: Lifestyle

Do you smoke? YES NO

At what age did you start smoking?

I only smoke on occasion, not every day. YES NO

Did you smoke in the past and quit? YES NO

At what age did you quit?

Cigarette with filter per day YES NO How many per day?

Rolled cigarettes/beedies/zol/Boxer YES NO How many per day?

Tobacco (chewing) YES NO Times per day?

Pipe YES NO Times per day?

6

Cigars YES NO How many per day?

Hubbly YES NO Times per day?

Snuff YES NO Times per day?

Dagga YES NO Times per day?

Alcohol use:

Are you currently consuming alcoholic beverages on a regular basis (at least once a week?) YES NO

Glasses (500ml) of beer per week

Glasses (500ml) of traditional beer per week

Glasses of wine per week

Boxes of Thlokwe per week

Tots (25 ml) of Spirits per week

Glasses of cider per week

At what age have you started drinking regularly?

Physical activity

During a typical week, how many times do you do the following kinds of exercise for more than 15 minutes during your free time?

a) Strenuous exercise (heart beats rapidly). Examples: Running, jogging, soccer, rugby, netball, vigorous long distance cycling, vigorous swimming, karate, boxing

Times per week

b) Moderate exercise (not exhausted). Examples: Fast walking, easy bicycling, dancing.

Times per week

c) Mild exercise (minimal effort). Examples: Golf, easy walking, Fishing on riverbank.

Times per week

During a typical week, in your leisure time, how often do you engage in any regular activity long enough to work up a sweat (heart beats rapidly)?

Often

Sometimes

Never/Rarely

Have you had any of the following in the past?

Heart attack YES NO

Stroke YES NO

Cancer YES NO

TB YES NO

Section D: Health History

Long lasting health problems:

Examples: Kidney stones, Arthritis, Asthma, Bilharzia, Malaria

Do you have any long lasting health problems? YES NO

What type of long lasting health problem?

How long (in years) have you had the health problem(s)?

Do you have any disease affecting your heart or blood vessels?

Hypertension (high blood pressure)

YES NO

Starting date (Year of diagnosis)

High cholesterol

YES NO

Starting date (Year of diagnosis)

Heart disease

YES NO

Starting date (Year of diagnosis)

Do you have diabetes (sugar)?

YES NO

Type 1 Type 2 Unknown

Starting date (Year of diagnosis) Year unknown

Which of the following do you use to manage your diabetes?

Diet

Pills

Injections

Other Specify.....

Nothing

Please list all medication you are **currently** taking:

	Name of medication (chronic & acute medication)	Units/day	Dosage
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Section E: Family History

Please indicate if your **mother** has/had any of the following:

Heart disease YES NO Don't know

At what age did this start/occur?

Under 60 years

Over 60 years

Age unknown

Stroke YES NO Don't know

Under 60 years

Over 60 years

Age unknown

Diabetes Mellitus (sugar) YES NO Don't know

Type 1 Type 2 Unknown

High blood pressure YES NO Don't know

High cholesterol YES NO Don't know

Please indicate if your father has/had any of the following:

Heart disease YES NO Don't know

At what age did this start/occur?

Under 60 years

Over 60 years

Age unknown

Stroke YES NO Don't know

Under 60 years

Over 60 years

Age unknown

Diabetes Mellitus (sugar) YES NO Don't know

Type 1 Type 2 Unknown

High blood pressure YES NO Don't know

High cholesterol YES NO Don't know

Section F: For Women

Do you still have your period every month? YES NO

Do you take a contraceptive pill? YES NO

Do you take contraceptive injection? YES NO

Do you take hormone replacement therapy? YES NO

If YES, at what age have you started taking hormone replacement therapy?

Have you had a hysterectomy? YES NO

ADDENDUM D: HEART DISEASE KNOWLEDGE QUESTIONNAIRE

Heart Disease Knowledge Questionnaire with correct responses

(Bergman et al., 2011: 86).

- | | | |
|-----|--|--------------|
| 1. | Polyunsaturated fats are healthier for the heart than saturated fats. | True |
| 2. | Women are less likely to get heart disease after menopause than before. | False |
| 3. | Having had chicken pox increases the risk of getting heart disease. | False |
| 4. | Eating a lot of red meat increases heart disease risk. | True |
| 5. | Most people can tell whether or not they have high blood pressure. | False |
| 6. | Trans-fats are healthier for the heart than most other kinds of fats. | False |
| 7. | The most important cause of heart attacks is stress. | False |
| 8. | Walking and gardening are considered types of exercise that can lower heart disease risk. | True |
| 9. | Most of the cholesterol in an egg is in the white part of the egg. | False |
| 10. | Smokers are more likely to die of lung cancer than heart disease. | False |
| 11. | Taking an aspirin each day decreases the risk of getting heart disease. | True |
| 12. | Dietary fibre lowers blood cholesterol. | True |
| 13. | Heart disease is the leading cause of death in the United States. | True |
| 14. | The healthiest exercise for the heart involves rapid breathing for a sustained period of time. | True |
| 15. | Turning pale or grey is a symptom of having a heart attack. | True |
| 16. | A healthy person's pulse should return to normal within 15 minutes after exercise. | True |

17. Sudden trouble seeing in one eye is a common symptom of having a heart attack. **False**
18. Cardiopulmonary resuscitation (CPR) helps to clear clogged blood vessels. **False**
19. HDL refers to “good” cholesterol, and LDL refers to “bad” cholesterol. **True**
20. Atrial defibrillation is a procedure where hardened arteries are opened to increase blood flow. **False**
21. Feeling weak, lightheaded, or faint is a common symptom of having a heart attack. **True**
22. Taller people are more at risk for getting heart disease. **False**
23. “High” blood pressure is defined as 110/80 (systolic/diastolic) or higher. **False**
24. Most women are more likely to die from breast cancer than heart disease. **False**
25. Margarine with liquid safflower oil is healthier than margarine with hydrogenated soy oil. **True**
26. People who have diabetes are at higher risk of getting heart disease. **True**
27. Men and women experience many of the same symptoms of a heart attack **True**
28. Eating a high fiber diet increases the risk of getting heart disease. **False**
29. Heart disease is better defined as a short-term illness than a chronic, long-term illness. **False**
30. Many vegetables are high in cholesterol. **False**

ADDENDUM E: SUMMARY OF TURN-IT-IN REPORTS

In order to establish the authenticity of the dissertation, *Turn-it-in* was used to determine similarities between this and other literature documents.

Chapter 1: 31%

Chapter 2: 29%

Chapter 3: 26%

Chapter 4: 19%

From the *Turn-it-in* reports it is evident that less than 1-3% similarities per source were detected. The excepted criteria for similarity are 33% and less. Further investigation on the specific similarities that were picked up indicated common concepts used in research literature such as: The relationship and aim of the study, as well as tables.

**ADDENDUM F:
DECLARATION OF LANGUAGE EDITING**



Director: CME Terblanche - BA (Pol Sc), BA Hons (Eng), MA (Eng), TEFL
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Baillie Park, 2531 cumlaudelanguage@gmail.com

DECLARATION OF LANGUAGE EDITING

I, Christina Maria Etrechia Terblanche, hereby declare that I edited the article entitled:

The relationship between cardiovascular risk factors and knowledge of cardiovascular disease in African men in the North West

as Cum Laude Language Practitioners for Adele Burger for the purpose of submission as a postgraduate study to the NWU. No changes were permanently affected and were left to the discretion of the student.

Regards,

CME Terblanche

Cum Laude Language Practitioners (CC)

SATI reg nr: 1001066

PEG registered