

**Physical activity and selected health risk
factors among local government employees
in Vhembe District, Limpopo
Province**

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Dissertation submitted in partial fulfilment of the requirements for the degree *Magister Scientiae in Biokinetics* at the Potchefstroom Campus of the North-West University

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The Author

May 2015

DEDICATION

THE GREATEST SOURCE OF MOTIVATION COMES
FROM YOUR DEEPEST VALUES.

-Anon-

THIS STUDY IS DEDICATED TO MY SON

OMPFUNA RETHABILE MULUVHU

DECLARATION

The co-authors of the article which form part of this dissertation, Prof Andries Monyeki (supervisor), Prof Gert Strydom (co-supervisor), and Ms Meriam Mohlala (Assistant co-supervisor) hereby give permission to the candidate to include the article as part of the Masters dissertation. The contribution of the supervisors and co-authors was limited to their professional advice and guidance as study leaders towards the completion of the study.



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ABSTRACT

Physical inactivity is a global health concern affecting all people from different walks of life, including employees. It is well documented that physical inactivity is positively associated with other health risk indicators, including amongst others; obesity, dyslipidaemia and hypertension. However, the burden can be prevented in part by addressing certain lifestyle factors, such as healthy nutrition practices and regular physical activity, both of which are associated with the reduction of all causes of morbidity and mortality as well as chronic diseases of lifestyle. The objective of the study was therefore twofold; to determine the prevalence of physical inactivity and some selected risk factors of chronic diseases among local government employees in the Vhembe district, and to investigate the relationship between physical activity and the risk factors of chronic diseases among local government employees.

A cross-sectional study design on an available sample of 533 (Men=251 and Women=282; age 24–65 years) local government employees in the Vhembe district in Limpopo province voluntarily participated in this study. A standardised physical activity questionnaire by Sharkey was used to determine the physical activity index (PAI) of the participants. Additionally, height and weight; and the clinical measures of waist circumference (WC) and blood pressure (BP) were assessed according to the American College of Sports Medicine standard procedures. Subsequently, body mass index (BMI) was calculated as weight divided by height squared ($\text{weight}/\text{height}^2$). The results showed high (72%) prevalence of physical inactivity among employees. The high prevalence of physical inactivity was more pronounced in women (84%) as compared to men (72%), and also varies by age groups. Additionally, the results show the prevalence's of both overweight and obesity (26.6%; 35.1%) and a high risk of WC (48%) in the total sample. Women (49.6%) accounted for a higher percentage of obesity as compared to the men (18.7%). For the total group, the prevalence of pre-hypertension for SBP was 20.5% and 13.3% for DBP, and hypertension for SBP was 49.3% and 24.2% for DBP, respectively. Women showed a high prevalence of systolic hypertension (50%) as compared to men (48.6%), and these differ by levels of PA and age groups. BMI was highly associated with WC.

Furthermore, the results indicated that there was significant relationship between measures of abdominal fatness and blood pressure, especially in women. The PAI was negatively related with age ($r = -.15$; $p = 0.000$), fatness (BMI) ($r = -0.14$; $p = 0.01$). PAI showed inverse relationship with SBP ($r = -0.09$; $p = 0.03$) and DBP ($r = -0.10$; $p = 0.02$). It can be concluded that there were high prevalence of physical inactivity, overweight, obesity and hypertension among the employees especially in women. PAI was negatively associated with measures of fatness (BMI and WC) and blood pressure (SBP and DBP). The study therefore recommends an urgent intervention programme, focusing on intervention campaigns about lifestyle diseases and their risk factors.

Keywords: Physical activity, health risk, local government employees, overweight, obesity, waist circumference.

OPSOMMING

Fisieke onaktiwiteit is 'n globale gesondheidsbedreiging wat mense op alle vlakke beïnvloed, insluitende werknemers in die werkplek. Fisieke onaktiwiteit as gesondheidsrisikofaktor is reeds deeglik beskryf en daar is aangetoon dat dit positief geassosieer kan word met toestande soos onder andere, obesiteit, dislipidemia en hipertensie. Hierdie probleem kan deels voorkoms word deur bepaalde leefstylfaktore aan te spreek soos bv. gesonde voeding en fisieke aktiwiteit, wat op hulle beurt 'n verlaagde morbiditeit en mortaliteit van alle- oorsake kan meebring, asook kroniese leefstylsiektes kan verminder. Die doelstellings van hierdie studie was tweërlei, nl. om die voorkoms van fisieke onaktiwiteit en sekere geselekteerde risikofaktore vir kroniese siektes by plaaslike regeringswerknemers van die Vhembe distrik in Limpopo te bepaal, en om die verband tussen fisieke aktiwiteit en risikofaktore vir kroniese siektes by die werknemers te bepaal. 'n Dwarsdeursnit-studie op 'n beskikbaarheidspopulasie van 533 persone (mans = 251, vrouens = 282; 24-65 jaar) as plaaslike regeringswerknemers in die Vhembe distrik in Limpopo het vrywillig aan die studie deelgeneem. 'n Gestandaardiseerde fisieke aktiwiteitvraelys van Sharkey is gebruik om die fisieke aktiwiteit-indeks (FAI) te bepaal. Verder is die lengte en gewig asook ander kliniese metinge naamlik, middel-omtrek (MO) en bloeddruk (BD) bepaal soos voorgeskryf deur die "American College of Sports Medicine". Die liggaamsmassa-indeks (LMI) is bereken deur die liggaamsgewig met die lengte kwadraat ($\text{massa}/\text{lengte}^2$) te deel. Die resultate toon 'n hoë voorkoms van fisieke onaktiwiteit (72%) by die werknemers. Die hoogste voorkoms van fisieke onaktiwiteit het by die vrouens voorgekom (84%) in vergelyking met die 72% by mans. Dit het ook varieer in ouderomsgroepe. Verder toon die resultate ook 'n voorkoms in oorgewig en obesiteit van 26.6% en 35.1% respektiewelik, tesame met 'n hoë voorkoms (48%) in middel-omtrek in die totale groep. Vrouens toon 'n hoë-voorkoms (49.6%) van obesiteit in vergelyking met mans (18.7%). In die totale groep was die voorkoms van prehipertensie (20.5% vir SBP en 13.3% DBP) en hipertensie (49.3% vir SBP en 24.2% vir DBP) respektiewelik. Vrouens toon 'n hoë-voorkoms van sistoliese hipertensie (50%) in vergelykings met die mans (48.6%) en die verskil by verskillende vlakke van FA asook ouderdom. Die LMI toon ook 'n hoë-verwantskap met MO. Die resultate toon verder dat daar 'n betekenisvolle verwantskap tussen abdominale vetheid en bloeddruk – veral in vrouens

voorkom. Die FAI het 'n negatiewe verband met ouderdom ($r = -0.15$; $p = 0.000$), en vetheid (LMI)($r = -0.14$; $p = 0.01$) aangedui. Die FAI toon verder ook 'n negatiewe verband met SBD ($r = -0.09$; $p = 0.03$) sowel as DBD ($r = -0.10$; $p = 0.02$). Uit die resultate blyk dit dus dat 'n hoëvoorkoms van fisieke onaktiwiteit, oorgewig, obesiteit en hipertensie by die werknemers voorgekom het. Veral vrouens het die hoogste voorkomste vertoon. Die FAI het 'n negatiewe verband getoon met die metinge van vetheid (LMI en MO) asook met SBD sowel as DBD. Hierdie studie beveel derhalwe aan daar dringende aandag aan intervensie-programme gegee moet word wat fokus op leefstylsiektes en risikofaktore wat daarmee gepaard gaan.

Sleutelwoorde: Fisieke aktiwiteit, gesondheidsrisiko, plaaslike regerings-werknemers, oorgewig, obesiteit, middel-omtrek.

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List of Abbreviations

ACSM	American College of Sports Medicine
BMI	Body mass index
BP	Blood pressure
CDL	Chronic disease of lifestyle
CHD	Coronary heart disease
CRI	Coronary risk index
DBP	Diastolic blood pressure
MSNA	Muscle-sympathetic Nerve Activity
PA	Physical activity
PAI	Physical activity index
SBP	Systolic blood pressure
US	United States (America)
WC	Waist circumference
WEF	World Economic Forum
WHO	World Health Organization

List of Symbols

%	Percentage
≤	Smaller or equal
±	Plus Minus
=	Equals

CHAPTER 1: Introduction

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1.1 INTRODUCTION

Physical inactivity is a global, public health concern affecting all people in different walks of life, including employees (Lee & Paffenbarger, 2000:293, Allman-Farinell *et al.*, 2010:14). Physical inactivity levels are rising in many countries with major implications for the prevalence of non-communicable diseases (NCDs) and general health of the population worldwide (World Health organization, 2013). It is also well documented that physical inactivity is positively associated with other health risk indicators which include obesity, dyslipidaemia and hypertension (Ehrman *et al.*, 2009). The higher the prevalence of health risks in an individual, the greater the risk for morbidity and mortality (Loock *et al.*, 2011:624). The prevalence of health risks and chronic diseases in the developed as well as developing communities such as South Africa, is on the increase (Bouchard *et al.*, 2007:347). This may be related to unhealthy lifestyles (Kruger *et al.*, 2005:991), and as such the health risk factors are interrelated with an exponential detrimental outcome (Strydom, 2005).

1.2 PROBLEM STATEMENT

Several researchers have revealed a global increase in mortality rates which are attributable to chronic diseases (also referred to as non-communicable diseases), such as coronary artery disease, diabetes, and hypertension (Bradshaw *et al.*, 2003:682; Murray *et al.*, 2007:109-110), with changing social and economic patterns all over the world, sedentary lifestyle have become a worldwide phenomenon (Lee *et al.*, 2011). This trend is also evident in South Africa, where 37% of all deaths are due to non-communicable diseases (Bradshaw *et al.*, 2003:682; Tollman *et al.*, 2008:893), leading to various companies in South Africa now investing in a variety of wellness programmes for employees (Labuschagne, 2006; Kalas *et al.*, 2012). NCD deaths are projected to increase by 15% globally between 2010 and 2020. The greatest increases will be in Africa, the Eastern Mediterranean, and South-East Asia, where they will increase by over 20% (WHO, 2011). The major risk factors, which include hypertension, smoking, hyperlipidaemia, obesity, physical inactivity, and unhealthy diet are increasingly prevalent in Africa, in both urban and rural settings (Maredza *et al.*, 2011:48). However, this burden may be prevented in part, through the worksite chronic disease program by addressing certain lifestyle risk factors such as healthy nutrition, regular physical activity, and refraining from

smoking (Aldana, 2005:558).

Physical activity is widely recognised as a key health behaviour associated with reduced causes of morbidity and mortality, as well as chronic disease of lifestyle (Lambert & Kolbe-Alexander, 2006:23). Epidemiological evidence suggest that physical activity (PA) plays an important role in the prevention and reducing the risk factors of diseases such as cardiovascular diseases (Juraschek *et al.*, 2014; Porebska & Mazurek, 2014:743-748), diabetes (Chimen *et al.*, 2012:542-551), cancer (Friedenreich *et al.*, 2014:919) and in the weight management to prevent obesity (van Wier *et al.*, 2006:140). It has been revealed that the associated health benefits of physical activity and early adaptations in the transition from sedentary living to becoming moderately active, seem to have the greatest effect on the reduction of chronic diseases of lifestyle in both men and women (Bouchard, 2001:347; Haskell, 2001:454). Some studies have reported the benefits of regular physical activity and a healthy lifestyle on the health status of employees. In this respect it became clear that the salutogenic effect of participation in physical activity on physiological and biochemical parameters may decrease the risk of coronary heart disease (Laubscher *et al.*, 2003:47).

In addition, research indicates that regular participation in physical activity programmes may contribute to reduce the rate of absence from work and accordingly increases productivity and engaging in job (Pirasteh *et al.*, 2012:159-165), and play a role in improving health status and lifestyle behaviours among employees (Plotnikoff *et al.*, 2014:329-346), and lower risk of cardiovascular disease (Lee *et al.*, 2012:219-229). It is therefore evident that effective participation in physical activity, as well as an improvement in lifestyle, may result in several health and professional benefits for executive employees (Paffenbarger *et al.*, 2001:1184-1192; Bolton *et al.*, 2004:56-70). The work setting is as an important area of action for health promotion and disease prevention (Engbrers, 2008).

Regardless of health benefits, physical inactivity still remains a major public health concern. In a study by Swanepoel (2001:100), it was pointed out that 75.6% of executives do not apply the basic principles of healthy lifestyle as suggested by Belloc and Breslow

(1972:46). This non-application contributes to more irregular lifestyles of workers because in companies, executive employees' lifestyles are more unbalanced due to factors such as long working hours, skipping meals, and lack of exercise (Kawadi & Suzuki, 2008:397). This unbalanced lifestyle is found to be associated with both physical and psychological stress that may negatively impact on health and performance at work and put employees at risk of developing chronic diseases of lifestyle (Laubscher *et al.*, 2003:47).

Research on high-level employees in the South African corporate sector indicates that the working environment is not always beneficial for ensuring good health of employees (Boshoff, 2000:256), and that almost 97% of management already shows some definite risk factors for the development of coronary heart diseases (Jacobs, 1991). Van Zyl (1995) found that 62% of employees in middle management positions have elevated total cholesterol. Those findings are not surprising, especially when considering the low levels of participation in physical activities typical of this population. In support of this, Uys & Coetzee (1989:4) found that only 12% of male managers in South Africa considered physical activity a priority in their schedule, while Bolton *et al.* (2004:56-70) reported that only 14.3% of male managers participated in regular and adequate physical activity to render any significant health benefits.

The presence of lifestyle-related chronic diseases and their associated risk factors may contribute to a decline in workplace productivity and hence in economic loss, as well as a possible decline in the quality of life of employees. Therefore, employers should be mindful of the health status of their employees (Sealy *et al.*, 2010).

It is against this background that the following research questions are posed:

- What is the prevalence of physical inactivity and some selected risk factors of chronic diseases among local government employees in the Vhembe District of Limpopo Province?
- What is the relationship between physical activity and selected risk factors of chronic diseases among these employees?

Answers to these questions may provide health professionals with scientific information regarding the importance of physical activity and its beneficial effects. Additionally, the results will provide biokineticists with valuable information in the design of physical activity intervention programmes, hence strategic programmes geared towards the

management of chronic diseases of lifestyle, become critically important to companies.

1.3 RESEARCH OBJECTIVES

The objectives of this study are to determine:

1. The prevalence of physical inactivity and some selected risk factors (hypertension, waist circumferences, and obesity) among local government employees in the Vhembe district.
2. The relationship between body mass index, waist circumferences, physical activity index, and blood pressure among local government employees in the Vhembe District.

1.4 RESEARCH HYPOTHESES

The study is based on the following hypotheses:

1. A high prevalence of physical inactivity and selected risk factors of chronic disease among local government employees in Vhembe District will be found.
2. A significant negative relationship between physical activity and some selected risk factors of chronic disease among local government employees in Vhembe District will be found.

1.5 STRUCTURE OF THE DISSERTATION

This dissertation will be submitted in the article format, as approved by the Senate of the North-West University, and will have the following content:

Chapter 1: Introduction.

Chapter 2: Physical activity and some selected risk factors of chronic disease in employees: A literature review. (The references in Chapters One and Two will be prepared in accordance with the guidelines proposed by the North-West University.

Chapter 3: Article 1: Physical activity and some selected risk factors for chronic disease among local government employees in the Vhembe District: The manuscript will be prepared for publication in the *African Journal of Physical, Health Education, Recreation and Dance (AJPHERD)*. The references will be prepared in accordance with the guidelines proposed by *African Journal of Physical, Health Education,*

Recreation and Dance (AJPHERD).

Chapter 4: Summary, Conclusion, Limitations, and Recommendations.

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CHAPTER 2: Physical activity and some selected risk factors of chronic disease in employees: a literature review

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2.1 INTRODUCTION

Physical inactivity is a behavioural risk factor that is associated with several chronic diseases, such as coronary heart disease, non-insulin dependent diabetes mellitus, osteoporosis, hypertension, obesity, and cancer (Warburton *et al.*, 2006:801). Current estimates suggest that less than half of the population in developed regions is meeting recommended physical activity guidelines in order to improve their health (Bauman *et al.*, 2002:5; Stamatakis, 2005). The increase in the prevalence of NCDs is accompanied by an increase in risk factors for these diseases, such as insufficient physical activity, smoking and poor nutritional habits (Mayosi *et al.*, 2009:934). Furthermore, the burden of disease due to NCD risk factors was higher in 2010 than in 1990, and physical activity, together with poor dietary habits, accounted for 10% of global disability life-years in 2010 (Lim *et al.*, 2012:2224). Given that physical inactivity has several negative health consequences, promoting physical activity participation widely is an urgent public health priority (WHO, 2006).

It has been well established that the number of deaths attributable to non-communicable diseases (NCD), such as coronary artery diseases, diabetes, and hypertension are increasing globally (Murray *et al.*, 2007:109). In South Africa, the increase of both communicable (HIV, Tuberculosis and others) and non-communicable diseases of lifestyle has accorded the label “double burden” of diseases to the country (Vorster & Kruger, 2006:178). Like many developing nations, South Africa has a dual burden of disease with non-communicable diseases (NCD) accounting for more than a third (37%) of all deaths (Bradshaw *et al.*, 2000:682). In addition to the increasing prevalence of non-communicable diseases resulting in morbidity and mortality, there is a concomitant increase in the prevalence of contributing risk factors, such as inactivity and obesity (King *et al.*, 1998:1414).

South African employees are at increased risk for cardiovascular diseases, with more than half not meeting recommended physical activity guidelines of engaging in physical activity at least 3-5 times per week (Kolbe-Alexander *et al.*, 2008:228). Similarly, Prochaska *et al.* (2008:226) reported that 71% of the employees studied were physically inactive, with 80% of the employees categorised as being at risk of two of the following behavioural risk factor; inactivity, overweight or obesity, smoking and not managing stress effectively, while 18% had three behavioural risk factors (Prochaska *et al.*, 2008:226). However, by addressing the health

and main risk factors of the employee's population, the burden of non-communicable diseases can be effectively reduced (Kolbe–Alexander *et al.*, 2008:228).

Thompson *et al.* (2009) indicated that regular physical activity can positively address all the above-mentioned pathological conditions thereby reducing the morbidity and mortality rates in the population. It is thus clear that regular physical activity is associated with improved health and quality of life (Durstine *et al.*, 2009:21; ACSM, 2010:72). Physical activity is also associated with the reduction in the prevalence and prevention of non-communicable chronic diseases, including cardiovascular disease, and can also reduce the impact of some health risk factors like smoking, hypercholesterolemia, hypertension and obesity (Serxner *et al.*, 2003: 1196-1200; Soler *et al.*, 2010:s237).

The worksite has been shown to be a favourable setting to implement intervention programmes aimed at reducing the risk for and prevalence of NCDs, as many individuals can be reached at the same time (Plotnikoff *et al.*, 2005:422). These programmes have been shown to play a role in improving health status and lifestyle behaviours, such as increased physical activity and reduced dietary fat intake among employees (Pronk *et al.*, 2011:872). In this chapter, global health trends or status among employees, non-communicable diseases in various countries, physical activity, and selected health risk factors among employees will be discussed.

2.2 PHYSICAL ACTIVITY AND SELECTED HEALTH RISK FACTORS

2.2.1 Physical activity

Physical activity is defined as any bodily movement produced by skeletal muscles that results in a substantial increase over resting energy expenditure (Caspersen *et al.*, 1985:126; Bouchard *et al.*, 2007:12). Energy expenditure can be measured in kilocalories (kcal) or kilojoules (kJ). One kcal is equivalent to 4.184 kJ (Caspersen *et al.*, 1985:126; Nieman, 2007:30). Every person performs physical activity in order to sustain life. The amount varies considerably from person to person and is largely subject to personal choice (Nieman, 2007:30). Thus, physical activity can be categorised in broad concepts which include:

- ***Leisure-time physical activity***

An activity undertaken in the individual's discretionary time that increases the total daily energy expenditure (Bouchard *et al.*, 2007:12; Powers & Dodd, 2009:6).

- **Exercise**

A form of leisure-time physical activity that is usually performed repeatedly over an extended period of time (training) with a specific external objective, such as improvement of fitness, physical performance or health (Caspersen *et al.*, 1985:128; Bouchard *et al.*, 2007:12; Powers & Dodd, 2009:6).

- **Sport**

Sport is a form of physical activity that involves competition (Bouchard *et al.*, 2007:12).

- **Work, chores and transport**

Work is an important component of daily activity and can be occupational work or even transportation (walking or cycling) (Bouchard *et al.*, 2007:12).

Physical activity is quantified by type or mode of activity (walking, cycling, swimming), intensity (low, moderate or vigorous), frequency (how many times a day or week), duration (length of each session), and volume (how much activity was done in total) (Welk, 2002:4; Cooper, 2003:83). It is important to consider these components when planning physical activity, due to the fact that there are minimum requirements that must be obtained to gain the desired physiological responses (ACSM, 2010:153-154).

According to Sharkey and Gaskill (2007:2), active life is one that people led before society achieved the benefits of industrial modernisation, resulting in technological developments, the automobile, labour-saving devices, television, and computers. These marvels of ingenuity now make it possible to minimise daily energy expenditure. The result is an alarming growth in the epidemic of diseases. South Africa is not excluded from this physically inactive behaviour. South African Demographic and Health Survey (2007) conducted a survey to determine the health status of the South African population.

Physical activity participation was divided into **three categories**:

- **Category 1** was inactive, low or insufficient activity and was defined as no activity reported, or some activity, but insufficient to qualify for categories 2 or 3, or energy expenditure less than 600 MET-minutes/week.

- **Category 2** was moderate to minimal activity and was defined as 20 minutes of vigorous activity for three days or more (per week), or 30 minutes of moderate intensity activity like walking, at least five days a week or more.
- **Category 3** was high or sufficient activity and was defined as vigorous activity at least three days a week with an energy expenditure of 1500 MET-minutes/week or any combination of activity for seven days a week that resulted in an energy expenditure of 3000 MET-minutes/week (SADHS, 2007:291-292).

According to this classification, only 24% of men and 14% of women reported being highly or sufficiently physically active (SADHS, 2007:292). The survey also indicated that 48% of men and 63% of women in South Africa are physically inactive (SADHS, 2007:292). These percentages of physical inactivity are greater than that determined by the World Health Organization (WHO, 2005:5) in 2002, which showed that 44% of men and 49% of women are physically inactive. The prevalence of inactivity is higher in urban areas than in rural areas in South Africa. The data shows that 49% of men and 66% of women living in urban areas are inactive, and 46% of men and 59% of women in rural areas are inactive (SADHS, 2007:292). Due to the high prevalence of inactivity, the risk for chronic diseases is increasing (SADHS, 2007:292). In addition to this, Marais (2008:71) reported that only 13.2% of the population in the South African corporate environment were physical active more than three days a week, for longer than 30 minutes at a time. This trend of inactivity could have serious health consequences, due to the fact that physical inactivity is regarded as a risk factor for the development of cardiovascular and other chronic diseases (Jackson *et al.*, 2004:180; Nieman, 2007:380; Matfin, 2009:484; ACSM, 2010:7). The lack of regular physical activity also known as sedentary lifestyle has been considered one of the most prevalent and worrisome public health problems in the world (Bull *et al.*, 2005). WHO (2002) estimates that around a million deaths are attributable to physical inactivity worldwide every year. Lack of physical activity is one of the central risk factors, especially for CVD and diabetes, contributing to 2-3% of the global burden of diseases (WHO, 2002). It has been shown that at least 60% of the world population do not undertake sufficient physical activity so as to gain health benefits (WHO, 2002, Bull *et al.*, 2005).

The majority of western societies do not undertake enough physical activity to confer protective health benefits (Pate *et al.*, 1995:402). Given the strong association between physical inactivity and cardiovascular diseases, increasing levels of PA represents great potential for public health improvement (Haapenen *et al.*, 1996:870).

Four commonly recognised and interrelated domains of physical activity are household work/house work, transportation, occupational and lifestyle (Kruger *et al.*, 2006:1143). There is compelling evidence that an active lifestyle maintains health and prolongs life; however, the association is considered to be casual and shows a dose-response relationship, with the intensity, duration, and frequency of physical activity determining the level and nature of health benefits (Chinn *et al.*, 2006:309). PA is also a modifiable risk factor for cardiovascular disease and is associated with a lower risk of other chronic diseases such as Type 2 diabetes mellitus, cerebrovascular diseases, obesity, hypertension, bone and joint diseases (osteoarthritis and osteoporosis), certain cancers (colon and breast), depression, anxiety and functional independence of older adults (Heil *et al.*, 2003:2; Walker *et al.*, 2003:169; Martinez-Gonzalez *et al.*, 2005:920; Berlin *et al.*, 2006:1137-1138; Bopp *et al.*, 2006:341 & Warburton *et al.*, 2006:801).

Health and fitness benefits which contribute positively to general wellbeing and quality of life, such as muscular strength, cardio-respiratory and muscular endurance, and flexibility, as well as reduced body fat, are obtained with regular participation in PA (Tudor-Locke *et al.*, 2004:158; Martinez-Gonzalez *et al.*, 2005:921). To achieve these health benefits, the United States (US) Surgeon-General recommends 30 minutes of moderate-intensity activity on most if not all the days of the week; this is equal to 150 kcal of energy per day (Berlin *et al.*, 2006:1137). With these compelling benefits, 20-30% of South Africans in the Western Cape (Levitt *et al.*, 1999:946) and 25% of the US (Walker *et al.*, 2003:169; Berlin *et al.*, 2006:1137) population do engage in regular physical activity.

Physical activity has been linked to increase productivity and reduction in illness-related absenteeism (Serxner *et al.*, 2001:351; Pronk *et al.*, 2004:23). However, studies specific to South Africa in this regard are limited and only a few will be discussed. According to Labuschagne *et al.* (2007) employees of a specific financial institution started to show specific health risk before the age of 35 years. The study also indicates that both men and women

showed low levels of physical activity participation and were in a moderate risk category for coronary risk profile. This situation can cause hypokinetic diseases, which have a negative effect on the employees' health as well as on their work productivity. It can also influence and increase health care costs (Scott, 1999). A study by Labuschagne *et al.* (2011:90) showed that even moderate participation in physical activity can help employees and particularly the older group (≥ 46 years), to keep healthy and extend their service and productivity for the company. The findings suggest the need for employers and employees to prevent hypokinetic disorders, in order to prevent reduced productivity, increased health care costs and increased morbidity and mortality (Labuschagne, 2011:88).

2.2.2 Blood Pressure (Hypertension).

Hypertension is defined as a transitory or sustained elevation of systemic arterial blood pressure to a level likely to induce cardiovascular damage or result in other adverse consequences (Contractor & Gordon, 2009:233). The aetiology of hypertension is unknown in 80-90% of cases and is called essential, idiopathic, or primary hypertension (Contractor & Gordon, 2009:233; Camm & Bunce, 2009:798). There are, however, multi-factorial aetiologies that might be linked to essential hypertension and include genetic, foetal and environmental factors such as obesity, alcohol intake, sodium intake, and stress (Camm & Bunce, 2009:798). Secondary hypertension represents systemic hypertension where blood pressure elevation is the result of a specific and potentially treatable cause. Conditions include renal disease, endocrine causes, drugs and pregnancy (Contractor & Gordon, 2009:233; Camm & Bunce, 2009:799).

Elevated arterial blood pressure is a major cause of premature vascular disease leading to cerebrovascular events, ischemic heart disease and peripheral vascular disease (Camm & Bunce, 2009:799). These pathological conditions from hypertension damages of the endothelium, which predispose the individual to atherosclerosis and other vascular pathologies. In the presence of hyperlipidaemia and a damaged endothelium, atherosclerotic plaque develops (Camm & Bunce, 2009:799). This hypertension-induced vascular damage can lead to strokes and transient ischemic attacks (Contractor & Gordon, 2009:235). This is why hypertension is considered one of the major risk factors for cardiovascular disease and is often found clustered with other cardiovascular risk factors (ACSM, 2010:28).

High blood pressure contributes to a considerable burden of cardiovascular disease in South Africa and especially poorly managed elevated blood pressure (Norman *et al.*, 2007:697). High blood pressure is the second leading risk factor for death in South Africa and in 2000, almost 47 000 deaths in South Africa were attributed to hypertension (Norman *et al.*, 2007:695). SADHS (2007:242) indicated that 40% of men and 51% of women in South Africa have elevated blood pressure.

Self-reported annual incidence rate (per 100 000) of hypertension among South African males in the 25-34 year age group is 1.08%, for the 35-44 year age group 2.6%, and for the 45-54 year age group 4.42% (South African Democratic and Health Survey, 2006). Furthermore, 6.3 million South Africans have hypertension, and 24% have a blood pressure of over 140/90 mmHg, of which 22.9% are men (Heart foundation of South Africa, 2006). In comparison 32.3% Americans have high blood pressure, of which 31.5% are males and 30.6% white males (American Heart Association, 2006).

High blood pressure remains the most important risk factor for stroke (Alberti *et al.*, 2009:1640-1645). SADHS data acquired in 2003 indicated self-reported hypertension to be 13.3% and 26.3% amongst Free State men and women, respectively; a significant increase of 20% for women in the province since 1998 (SADHS, 2009; Department of Health, 2000). In a South African study conducted by Connor *et al.* (2005:334), the overall hypertension prevalence rate in a study population of 9731 people in the age group of 30 years and older, was 55%. The overall hypertension prevalence rate in Black Africans and coloured people was 59% and 55%, respectively. Research by Strydom *et al.* (1998:125), on 392 South African executives from the construction, steel, mining, motor and financial industries, indicated that these executives are in the high risk zones of four primary risk factors high cholesterol, smoking, hypertension and physical inactivity for CHD. They conclude that 38.7% of the executives' systolic blood pressure was higher than the value of < 140mmHg, and 58.9% of the executives' diastolic blood pressure was higher than the value of <90 mmHg.

The above information regarding blood pressure implies increasing prevalence of chronic diseases and thus a higher probability of absenteeism or presenteeism (Kessler *et al.*, 2001:1257). If the employees have high blood pressure it may also increase the number of

other health risks, with a consequent increase in work limitation, where each additional risk factor is associated with an additional 2.4% excess productivity loss (Burton *et al.*, 2005:769).

It has been indicated that physical inactivity is associated with an increased prevalence of hypertension (Brown *et al.*, 2006:144), therefore physical activity has also been identified as a possible lifestyle intervention in the prevention and management of hypertension (Barlow *et al.*, 2006:142; Parker *et al.* 2007; Contractor & Gordon, 2009:245). Parker *et al.* (2007) observed a statistically significant inverse association of physical activity and incidence of hypertension in young adults. Vigorous physical activity was independently associated with a low incidence of hypertension in men (Hernelahti *et al.*, 2004:306). According to Barlow *et al.* (2006:142), an active lifestyle should be promoted for the primary prevention of hypertension.

Exercise also help reduce the blood pressure of those with hypertension (Sohn *et al.*, 2007:506; Collier *et al.*, 2008:682; Terra *et al.*, 2008:275; Contractor & Gordon, 2009:245). The higher intensity and frequency of endurance training has been shown to reduce both systolic and diastolic blood pressure by 5-10mmHg (Contractor & Gordon, 2009:245). According to Collier *et al.* (2008:682), as little as four weeks of exercise can reduce systolic blood pressure on average by 4.6 mmHg, and diastolic blood pressure by 3.1 mmHg. Thus, mean arterial pressure can be reduced on average by 3.2 mmHg in individuals who are pre-hypertensive and those with essential hypertension. Viecili *et al.* (2009:366) found that physical exercise, such as walking at moderate intensity for 20 minutes on alternate days resulted in a decrease in blood pressure, and most of the hypotensive effect occurred as early as after the first five sessions. Similarly, Sohn *et al.* (2007:503) indicated that increasing an individual's daily walking by 30 minutes considered as the safest and simplest mode of exercise, and it is important for reduction of systolic and diastolic blood pressure in newly diagnosed hypertensive and hypertensive patients of all age groups. Terra *et al.* (2008:276) investigated the effect of resistance training on individuals with hypertension and found that a 12-week resistance training programme promotes significant reduction in systolic blood pressure, diastolic blood pressure and mean arterial blood pressure, as well as the rate pressure product values at rest in individuals with controlled hypertension. However, although the mechanism is still unclear, this reduction can help reduce the risk of acute myocardial infarction and coronary disease (Terra *et al.*, 2008:275).

Physical activity does not only prevent and reduce the prevalence of hypertension, but several other advantages specific to the pathology were observed in studies with regard to hypertension and physical activity and fitness. Other advantages include:

- **Arterial stiffness**

Aerobic exercise decreases arterial stiffness in individuals with pre- to essential hypertension (Collier *et al.*, 2008:681). According to Madden *et al.* (2009:1533), a relative short aerobic exercise intervention (3 months) can reduce multi-factorial risk of geriatric age, Type 2 diabetes, hypertension, and hypercholesterolemia arterial stiffness in older adults.

- **Carotic atherosclerosis**

According to Jae *et al.* (2007:1004), hypertensive men with higher levels of cardiorespiratory fitness were less likely to have carotid atherosclerosis. This relationship was independent of established risk factors.

- **Left ventricular hypertrophy**

Regular physical activity prevents the development of left ventricular hypertrophy in individuals with hypertension. This effect is independent from the reduction in blood pressure caused by exercise. The mechanism is unclear, but a possible explanation is that there is a reduction in blood pressure or reduction in vascular resistance, blood volume and cardiac output, enhanced endothelial vasodilator function, suppression of the activity of the renin-angiotensin-aldosterone system, reduction of insulin resistance, and a reduction in sympathetic nervous system, all of which occur after programmed physical activity (Palatini *et al.*, 2009:225).

- **Baro-reflex sensitivity**

Studies show that physical activity can influence the baro-reflex of individuals with hypertension (Laterza *et al.*, 2007:1302; Collier *et al.*, 2009:344). Collier *et al.* (2009:344) found that four weeks of aerobic exercise improves baro-reflex sensitivity in pre- to essential hypertensive individuals. The baro-reflex control of heart rate and muscle sympathetic nerve activity (MSNA) is impaired in hypertensive patients, and moderate exercise training improves the baro-reflex control of muscle-sympathetic nerve activity (MSNA). Thus, exercise training normalises MSNA and significantly reduces blood pressure in hypertensive individuals who have never been treated (Laterza *et al.*, 2007:1302).

Physical activity is associated with high levels of health-related quality of life among individuals with hypertension (Brown *et al.*, 2006:137). Brown *et al.* (2006:144) observed a higher prevalence of lower levels of health-related quality of life among individuals with hypertension. Fernandez *et al.* (2007:354) show that a positive connection between physical exercise and quality of life has been established, especially in women over 65 years. Norman *et al.* (2007:692), results indicate that there is potential for health gain from implementing blood pressure lowering intervention including physical activity, which is known to be highly cost-effective.

2.2.3 Obesity

Obesity is defined as a severe excess of fat in proportion to lean body mass, whereas overweight is defined as a body weight that exceeds a reference threshold value (Murdy & Ehrman, 2009:211). Body mass index (BMI) is a simple index of weight-for-height that is commonly used to classify overweight and obesity in adults (WHO, 2011c). The WHO (2011c) defines overweight as having a BMI greater than or equal to 25, and obesity as having a BMI greater than or equal to 30. BMI provides a useful measure of overweight and obesity, but it should be considered as a rough guideline, because it may not correspond to the same degree of fatness in different individuals (WHO, 2011c). Waist circumference can also be used as a screening tool, and can be used to determine the distribution of body fat (Pleuss & Matfin, 2009:993).

The distribution of body fat may contribute more to diseases than total body fat alone. Fat distribution is divided into upper body fat also known as android, central, abdominal or visceral obesity or lower body fat also known as gynoid, peripheral, gluteal-femoral obesity. Upper body fat distribution is seen as an independent predictor of morbidity and mortality associated with obesity (Pleuss & Matfin, 2009:993). Factors that contribute to obesity include genetics, energy balance, and lifestyle (Jackson *et al.*, 2004:94).

It is clear that overweight and obesity have become global health problems and are associated with the leading risk factors for premature mortality and numerous chronic health conditions that reduce the overall quality of life (Ross & Janssen, 2007:176). Chronic health conditions associated with obesity include:

- Increased prevalence of high blood pressure (Nieman, 2007:515; Pleuss & Matfin, 2009:993).
- Increased levels of cholesterol and other lipids in the blood (Nieman, 2007:515; Pleuss & Matfin, 2009:993).
- Increased prevalence and risk of diabetes (Nieman, 2007:516; Pleuss & Matfin, 2009:993, WHO, 2011c).
- Increased risk and prevalence of cancer (Nieman, 2007:516; WHO, 2011c).
- Increased prevalence and risk of cardiovascular disease (Nieman, 2007:517; Pleuss & Matfin, 2009:993; WHO, 2011d).
- Increased risk of musculoskeletal disorders like osteoarthritis (Nieman, 2007:510; WHO, 2011d).
- Reduced lung volumes and alternation in respiratory mechanics (DeLorey *et al.*, 2005:1046).

Obesity rates are high among people aged 45-64 than other age groups. It is revealed that at this age brackets obesity have negative effects on aspects of productivity and workforce (Australian Institute of Health and Welfare, 2010). Obesity may, for example, be associated with employee absenteeism or propensity to be in the workforce and is a potential indicator of productivity, which is an important factor when assessing the economic implications of an aging Australian population (Australian Institute of Health and Welfare, 2010).

Few studies have examined the relationship between obesity and employee absenteeism. A US study found that obese employees tend to be absent from work due to illness substantially more than their non-obese counterparts (Tucker & Friedman, 1998). Burton and colleagues (1998) reported that a greater BMI was associated with other health risk factors, short-term disability, and illness absence. In a smaller study, Pronk *et al.* (2004:19-25) found that severe obesity was related to a higher number of work loss days. Finkelstein *et al.* (2005:45-51) recently reported a significant association between absenteeism and successive BMI grades for women, and greater absenteeism among Grade-2 and Grade-3 obese men. An association between excess body weight and lost workdays has also been reported in the US Air Force (Robbins *et al.*, 2002:397-7).

Exercise is an essential component in the management of obesity, along with diet and lifestyle changes (Murphy & Ehrman, 2009:211). As mentioned, although physical activity and exercise play an important role in the management of obesity, it is also important in the prevention of obesity. Having an active lifestyle reduces the likelihood of developing obesity (Waller *et al.*, 2008:359; Mustelin *et al.*, 2009:34; Li *et al.*, 2010:1). Waller *et al.* (2008:359) conducted a 30-year follow-up study of habitual physical activity of 146 pairs of twins and found that persistent participation in leisure-time physical activity is associated with decreased rate of weight gain and with a smaller waist circumference. Research also indicates that physical activity reduces the influence of genetic factors in developing high BMI and waist circumference (Mustelin *et al.*, 2009:34; Li *et al.*, 2010:1). According to Li *et al.* (2010:1), living a physically active life is associated with a 40% reduction in the genetic predisposition to developing obesity. Therefore, individuals at greatest genetic risk for obesity would benefit the most from physical activity (Mustelin *et al.*, 2009:34).

2.3 GLOBAL HEALTH TRENDS AND EFFECT OF NON-COMMUNICABLE DISEASES AMONG EMPLOYEES

Employers and employees throughout the world are facing immense challenges with an on-going economic crisis, an increasingly fast-paced business environment, growing demands for productivity, and a global rise in chronic diseases (WHO, 2008). Numerous studies have documented the negative economic consequences of poor employee health, health risks, and dissatisfaction in the form of absenteeism, presenteeism, accidents and healthcare costs (Mills *et al.*, 2007:45-43).

The alarming increase of chronic diseases in the workplace has left its mark on employees. According to WHO (2008), non-communicable diseases cause 38 million deaths annually, with 80% of these deaths occurring in low-and middle- income countries. The forecast is even worse: death rates from non-communicable diseases are likely to increase by 17% globally over the next 10 years, with the greatest increase projected in the African region (27%), followed by the Eastern Mediterranean region (25%) (WHO, 2008). In 2008, a study on health risk factors among South African employees concluded that in comparison with the general South African population, employees were more likely to have poor health and lifestyle habits, which places them at a higher risk of contracting a non-communicable disease (Kolbe-Alexander *et al.*,

2008:228). The workplace has been identified as a likely setting in which to reach a larger section of the adult population and positively impact on the health risk profiles of individuals (Pegas *et al.*, 2002: 228). Moreover, the focus of occupational health has shifted in recent years from occupational exposure to non-communicable diseases and the consequent impact on individual health and economic cost to companies (Matos *et al.*, 2004:5-4).

WHO (2008), identifies four major non-communicable diseases, cardiovascular diseases, diabetes, cancers, and chronic respiratory diseases, and four related risk factors to address – tobacco use, unhealthy diets, physical inactivity, and excess alcohol intake. The Oxford Health Alliance’s global campaign, focuses on three key risk factors, which are tobacco use, poor diet, and lack of physical activity; and four chronic diseases – heart disease, type 2 diabetes, lung disease, and cancers – which are responsible for more than 50% of deaths throughout the world (Taylor, 2009:1294). The obesity epidemic is probably one of the most highlighted public health challenges. Each year 2.6 million people die as a result of being overweight and obese (WHO, 2010b).

Once associated with high-income countries, obesity is now also prevalent in low- and middle-income countries. In light of the aging trend in many countries, the chronic diseases profile will become even more pronounced and create a growing challenge for international organisations, national governments, and employees at risk (Vaughan-Jones & Barham, 2009).

Vaughan-Jones & Barham (2009) issued a report on the future workforce of the United Kingdom that painted a bleak picture indicating that employees will be:

- Older
- With more long-term conditions or lifestyle conditions
- Caring for others
- Obese with diabetes/ heart problems
- In the kind of jobs more likely to have an impact on psychological health, and
- Working in knowledge-intensive or service industries

The economic impact of non-communicable diseases is staggering. Joint report by the World Health Organization and the World Economic Forum (WEF), preventing non-communicable

diseases in the workplace through diet and physical activity, the financial impact of lifestyle-related diseases to countries in 2015 will amount to the following (WHO/WEF, 2008):

- China \$558 billion
- India \$237 billion
- Russia \$303 billion
- United Kingdom \$33 billion
- Brazil \$9.3 billion
- Pakistan \$6.7 billion.

The rising burden of non-communicable disease and its risk factors will have health, social and economic consequences (Mahajan *et al.*, 2009:1). Chronic diseases are expensive to the economy, as individuals with chronic disease may incur higher medical costs and be less productive in their work (Tsui, 2008:123). The burden attributable to cardiovascular diseases translates into a significant loss of productivity and economic cost (Sullivan *et al.*, 2007:511).

Aside from the tremendous burden that NCDs in South Africa place on individuals, they also pose economic challenges to the country viz. NCDs can deepen poverty, reduce economic productivity, and strain an already under-resourced health care system (Joubert *et al.*, 2000:725). The economic consequences for an organisation with an unhealthy workforce are seen in high absenteeism and accidents at work, loss of productivity and increasing health-related litigation, all of which pose significant costs (Addley *et al.*, 2001:439). Health risks, particularly obesity, stress, and general lifestyle, are found to be significant predictors of health care costs in employees (Tucker & Clegg, 2002:225). A study in the United States that investigated the relationship between modifiable health risks and health care expenditure found that employees at high risk for poor health outcomes had significantly higher expenditure than did employees at lower risk (Goetzel *et al.*, 1998:843).

Similarly, a study in the United States that investigated the relationship between physical activity and health care costs among employees in different weight groups, reported that moderately active and very active employees paid significantly less health care costs annually, compared to sedentary employees across all weight categories (Wang *et al.*, 2004:428).

2.4 HEALTH RISK FACTORS AND NON-COMMUNICABLE DISEASES IN VARIOUS COUNTRIES

Chronic diseases of lifestyle (also known as non-communicable diseases) are a group of diseases accounting for millions of deaths globally each year. The National cause of death statistics, released by Statistics South Africa (STSA) in 2005 revealed that 20% of deaths in the age group 34 -64 years were as a result of chronic diseases of lifestyle (STSA, 2005). Lifestyle diseases share similar modifiable risk factors, which include hypertension, tobacco smoking, diabetes, obesity, hyperlipidaemia, and physical inactivity. The burden for the non-communicable disease risk factor in a comparative risk-assessment study conducted in South Africa about deaths due to selected risk factors, was ranked by Norman *et al.* (2007:637) as follows:

- First – Unsafe sex/STI (HIV/AIDS)
- Second – high blood pressure
- Third – tobacco smoking
- Fourth – alcohol abuse
- Fifth – obesity
- Sixth – Interpersonal violence (risk factors)
- Seventh – high cholesterol
- Eighth – diabetes
- Ninth – physical inactivity

The changes in lifestyle are also evident in studies among employees in Bulgaria (Koleva, 1999:21), Beijing (Fu *et al.*, 2003:363), Spain (Parkes, 2003:213), the United Kingdom, and Australia (Richmond *et al.*, 1998:324). It has been shown that employees with excessive body mass have a significantly higher prevalence of hypertension, diabetes, and coronary heart disease, characterised by dietary intake high in energy, fat, protein, and sodium with pronounced fibre deficit (Koleva, 1999:21; Fu *et al.*, 2003:363; Richmond *et al.*, 1998:324). Moreover, as a result of automation and mechanisation, employees are becoming more sedentary in the workplace, thus increasing the risk for the development of obesity and chronic disease of lifestyle (CDL) (Perbellin, 2004:211).

The lifestyle indicators used to define employees as “healthy” or “unhealthy” were self-reported perceived personal stress, smoking, drinking and excessive habits, as well as anthropometric (body mass index and waist-to-hip ratio) and clinical (blood pressure, fasting blood cholesterol and glucose) measurements (Perbellini, 2004:211). In 2008, for example, CDLs accounted for 36 million deaths worldwide with 80% of those deaths in low income countries such as Afghanistan and Bangladesh, and middle income countries e.g. Algeria and South Africa, with a projected global increase between 2010 and 2012 of 15% (WHO, 2013). High cholesterol remains an important cardiovascular risk factor in the population of South Africa (Norman *et al.*, 2007: 708). In a study conducted to determine the impact of chronic disease of lifestyle and related risk factors on mortality in South Africa, hypercholesterolemia and raised low-density lipo-protein-cholesterol indicated an increased risk for ischaemic heart disease (Steyn *et al.*, 1992:227).

Due to a more sedentary lifestyle, the prevalence of metabolic syndrome and chronic disease is increasing worldwide. A world health survey conducted by the World Health Organization in 2003 investigated the physical activity levels of adults in South Africa and found that less than one-third of South Africans met the American College of Sport Medicine (ACSM) and Center for Disease Control’s (CDC) prevention recommendations for health-enhancing physical activity, while 46% of all South Africans adults were reported to be inactive (WHO, 2009). This emerging chronic disease epidemic in developing countries can be explained largely by social and economic changes (Yusuf *et al.*, 2001:2746); evidence also shows that a large proportion of chronic disease cases are preventable. The more that is known about today’s chronic disease risk factors, the better able to conduct or prevent future chronic disease epidemics (Bonita *et al.*, 2002).

Vietnam (a developing country with a population of more than 83 million) is undergoing a rapid epidemiological transition characterised by an increase in the prevalence of chronic disease (Vietnam Health Statistics Year Book, 2003).

As highlighted recently, the incidence of chronic disease including obesity, diabetes, and cardiovascular disease within **Australia** has increased, resulting in growth health expenditure (Australia Institute of Health and Welfare, 2010). A significant contribution to this increased

incidence includes smoking, poor nutrition, physical inactivity and increased sitting time at work (Australia Institute of Health and Welfare, 2010).

In **South Africa** NCDs account for 37% out of all the causes of mortality, and 16% of disability-adjusted life years. Ischaemic heart disease, stroke, diabetes mellitus, and COPD account for 6.6%, 6.5%, and 2.5% of all deaths respectively. The burden varies significantly between population groups, for example, the age standardised cardiovascular disease mortality rate is 606.9 per 100000 for Asians and 375.3 for Africans (Norman *et al.*, 2007:637).

In selected African countries (**Nigeria, Kenya & Botswana**), Thangavhuelo *et al.* (2013:999) indicated that the low levels of leisure-time physical activity amongst top executive employees was 71.6%, and middle employees 62.9%, with few (3%) top level managers, and 10.1% middle level managers in the high physical activity category. This supports the study by Mohlala *et al.* (2012:369-383) which indicated that top level and middle managers who have low levels of physical activity were more prone to developing coronary heart disease, together with poor lifestyle and health status-index, compared to those in the moderate and high leisure time physical activity index.

In **Tanzania**, 19% of the population studied in 2007 had a low prevalence of activity (WHO, 2002). Physical activity reduces the risk of CVD and Type 2 diabetes by improving glucose metabolism, reducing body fat, and lowering blood pressure. Although the health benefits of regular physical activity are widely recognised on the one hand, a sedentary lifestyle is predominant in urban areas worldwide on the other hand, and is reported as one of the top five major risk factors for CVD (Giannuzzi *et al.*, 2003:319).

India too illustrates a health transition which positions non-communicable disease as a major public health challenge of growing magnitude in the 21st century (Maria, 2006:15). In India the prevalence of non-communicable disease is high among its urban population (Shah & Mathur, 2005). Different working conditions and unhealthy lifestyles associated with different services and products, expose the urban population to health risk factors, which lead to various non-communicable diseases in the population (Wahdan, 1996:8-20).

In the **US**, CHD is the leading cause of death for both men and women. According to the US National vital statistics report, roughly an equal number of men and women died of CHD in 2006, which accounted for approximately 26% of all deaths for both sexes (Heron, 2010). Chronic diseases also accounted for 7 of the 10 leading causes of deaths and affects the quality of life of 90 million Americans (Kung *et al.*, 2008:1).

In 2000, an estimated 119000 deaths were attributed to inactive lifestyles in **Latin America**; this makes physical inactivity one of the two most important causes of ill health leading to early or premature death and constitutes a substantial risk factor for non-communicable disease (Jacoby *et al.*, 2003:226). Due to the increased risk of chronic diseases and mortality as a results of physical inactivity, it is essential to emphasise the importance of physical activity (WHO, 2003).

In **Asia**, chronic diseases, such as heart disease, stroke, cancer, chronic respiratory disease, and diabetes are diseases of long duration and generally show progression, they are the leading cause of mortality globally claiming almost 60% of all deaths (WHO, 2005). Chronic diseases are becoming increasingly common in Asia, affecting both rich and poor and people of all groups. This is partly a consequence of an unhealthy lifestyle including poor sleeping habits, inadequate exercise, imbalanced diet, excessive consumption of alcohol and smoking (Tsui, 2008:123). Patients with chronic disease are expected to rise from 3.78 million in 1990 (40.4% of all deaths) to 7.63 million in 2020 (66.7% of all deaths) in Asia and India (Price Waterhouse, 2007).

2.5 RELATIONSHIP BETWEEN PHYSICAL ACTIVITY AND RISK FACTORS

Health-enhancing physical activity is inversely related to body mass index (BMI), waist circumference (WC) and blood pressure (BP), among the general population (Chan *et al.*, 2003:1563; Luke *et al.*, 2011:387; Muhihi *et al.*, 2012:11).

Studies show that increased physical activity is associated with lower waist circumferences and HDL-cholesterol levels in women, and that physical activity is inversely associated with body mass index (BMI) and percentage body fat (Draper *et al.*, 2010:398). Physical activity is also associated with lower mortality rates for both older and younger adults, a decreased risk of

cardiovascular disease mortality in general, and coronary heart disease in particular (Bloemhoff, 2010:25; Peltzer & Phaswana-Mafuya, 2012:447).

A study conducted by Sobnwi *et al.* (2002) on physical activity and its relationship with obesity, hypertension and diabetes in rural and urban **Cameroon**, found that inactivity was associated with higher BMI, due to lower occupational walking-related activity in the urban population; this was true for both sexes. It is clear that although the increase in activity levels will have an effect on BMI the impact thereof should be seen in combination with healthy dietary recommendations. The ACSM (2010) also recommended that physical activity and sound eating habits should form the basis of obesity prevention and treatment. Research has indicated that physical activity of one hour per day, in combination with a natural food diet which is high in fibre and consisting of fruits, vegetable and whole grains, and naturally low fat, along with high levels of vitamins and minerals, could result in the prevention of chronic diseases, including obesity (Roberts & Barnard, 2005:3-30).

Physical activity is also associated with total fat reduction in a dose-response manner. Studies that focused on the containment of dietary intake, showed a direct relationship between physical activity and total body fat reduction (Ross & Jansen, 2001). The ACSM (2010) states that the degree to which an individual compensates in change in energy intake and physical activity during the remaining non-exercising periods of the day will determine the weight loss experienced with exercise.

A meta-analysis by Whelton *et al.* (2002:500) showed that moderate intensity (40-70% VO_{2max}) aerobic exercise is associated with a reduction in blood pressure in hypertensive participants, as well as overweight and normal weight participants, but an exercise intensity above 70% VO_{2max} did not have additional benefits in terms of blood pressure reduction. Fagard (2005:523) suggested that all forms of exercise appear to be effective in reducing blood pressure, and that aerobic exercise should be an important strategy for the treatment and prevention of high blood pressure, combined with dietary recommendations. The recommended minimal frequency of exercise for blood pressure reduction is three sessions per week, and the importance of physical activity on blood pressure should be obvious by the impact it will have on the reduction of body weight/fat (Chaudhary *et al.*, 2010:177-84). Sufficient physical activity has been negatively

associated with contributors to CVD, including blood pressure, body mass index and waist circumference (Chan *et al.*, 2003:1563-1570; Aderibiybo *et al.*, 2011:249-256).

2.6 CHAPTER SUMMARY

It is evident from the reviewed literature that physical activity is associated with many health and psychological benefits (Warburton *et al.*, 2006:801). The role of physical activity in the prevention and reduction of certain diseases is well established in the literature (Hsia *et al.*, 2005:24). According to Berlin *et al.* (2006:1137), 30 minutes of moderate intensity in most, if not all, the days of the week is necessary to achieve health benefits. Physical activity participation among people from developed and developing countries remains lower than the minimum requirements (Walker *et al.*, 2001:368). This in turn increases the risk of obesity and other related chronic diseases (Vorster *et al.*, 2000:506). Physical inactivity poses almost as much risk for heart diseases as cigarette smoking, high blood pressure, or high cholesterol levels, but is more prevalent than any of those other risk factors (Dubbert & Carithers, 2002:116; Nickolic *et al.*, 2011). The reviewed studies attributed the current trends of reduced physical activity at work to the advent of modern electronic equipment and computers (Laaksonen *et al.*, 2002:1612).

In the corporate environment, physical inactivity may result in poor health status which is linked to higher health care costs, lower work output, higher rates of disability, higher absenteeism, higher workers' compensation, and a higher rate of injuries (Bunn *et al.*, 2005:941). Employees become more confined to their work in order to keep up with the fast-growing economy and the demands of the industry, thus have less time available for physical activity.

The increase in marketplace competition results in a more stressful worksite (Edington, 2006:425). As such, it was apparent from the reviewed literature that more studies investigating the physical activity and prevalence of some selected health risk factors of chronic diseases in government employees in South Africa are needed.

Part of the reviewed literature will be integrated in the research article which is presented in Chapter 3.

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CHAPTER 3: Physical activity and selected health risk factor profiles among local government employees in Vhembe District, Limpopo Province

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Physical activity and selected health risk factor profiles among local government employees in Vhembe District, Limpopo Province of South Africa

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3.1 ABSTRACT

Physical inactivity has become a global health concern, which is associated with non-communicable diseases of lifestyle apparently affecting people from different walks of life, including employees. The purpose of this study was two-fold: to determine the prevalence of physical inactivity and risk factors of chronic diseases, and to investigate the relationship between physical activity and risk factors of chronic diseases among local government employees in the Vhembe district. A cross-sectional study design on an available sample of 533 (Men=251 and Women=282) local government employees (age 24–65 years) in the Vhembe district in Limpopo province voluntarily participated in this study. A standardised physical activity questionnaire by Sharkey was used to determine the physical activity index (PAI) of the participants. Additionally, height and weight; and the clinical measures of waist circumference (WC) and blood pressure (BP) were assessed according to the American College of Sports Medicine standard procedures. Subsequently, body mass index (BMI) was calculated as weight divided by height squared ($\text{weight}/\text{height}^2$). The results showed high (72%) prevalence of physical inactivity among employees. The high prevalence of physical inactivity was more pronounced in women (84%) as compared to men (72%), and also varies by age groups. Additionally, the results show the prevalence's of both overweight and obesity (26.6%; 35.1%) and a high risk of WC (48%) in the total sample. Women (49.6%) accounted for a higher percentage of obesity as compared to the men (18.7%). For the total group, the prevalence of pre-hypertension for SBP was 20.5% and 13.3% for DBP, and hypertension for SBP was 49.3% and 24.2% for DBP, respectively. Women showed a high prevalence of systolic hypertension (50%) as compared to men (48.6%), and these differ by levels of PA and age groups. BMI was highly associated with WC. Furthermore, the results indicated that there was significant relationship between measures of abdominal fatness and blood pressure, especially in women. The PAI was negatively related with age ($r = -0.15$; $p = 0.000$), fatness (BMI) ($r = -0.14$; $p = 0.01$). PAI showed inverse relationship with SBP ($r = 0.09$; $p = 0.03$) and DBP ($r = -0.10$; $p = 0.02$). It can be concluded that there were high prevalence of physical inactivity, overweight, obesity and hypertension among the employees especially in women. PAI was negatively associated with measures of fatness (BMI and WC) and blood pressure (SBP and DBP). The study therefore recommends an urgent intervention programme, focusing on intervention campaigns about lifestyle diseases and their risk factors.

Keywords: Physical inactivity, health risk, local government employees, overweight.

3.2 INTRODUCTION

Physical inactivity is a global public health concern affecting all people from different walks of life, including employees (Lee & Paffenbarger, 2000; Allman-Farinell, Chey, Merom & Bauman, 2010). The World Health Organization (WHO, 2013) rates physical inactivity as one of the leading risk factors of death in the world. Physical inactivity levels are rising in many countries with major implications for the prevalence of non-communicable diseases (NCDs) and the general health of the population worldwide (Kolbe-Alexander, Conradie & Lambert, 2013). Physical inactivity therefore, is positively associated with other health risk indicators which, among others, include obesity, dyslipidaemia and hypertension (Ehrman, Gordon, Visich & Keteyian, 2009). The high prevalence of health risks in an individual, the greater the risk for morbidity and mortality (Loock, Wilders, Strydom & Ellis, 2011). An estimated 3.2 million people die every year due to lack of physical activity (WHO, 2013). This trend is also evident in South Africa, where 37% of all deaths are linked to non-communicable diseases (Bradshaw, Groenewald, Laubscher, Nannan, Bournier, Nojilana, Norman, Pieterse, Schneider, Timaeus, Dorrington & Johnson, 2003). In South Africa, 76% of adult men and 86% of adult women do not participate in physical activity (Department of Health & Medical Research Council, 2007). Marais (2008) reported that in South Africa only 13.2% of the corporate environments participate in physical activity (9.7% female and 20.0% males) more than three days a week for longer than 30 minutes at a time.

Obesity is increasing in all age groups, including older persons throughout the world (Kopelman, 2000). Studies show that BMI (as a measure of obesity) gradually increases throughout adult life and reaches peak values at 50-59 years of age in both men and women (Flegal, Carroll, Ogden & Johnson, 2002). Data from population surveys in the United States have shown that obesity increases progressively from 20-60 years of age and decreases after the age of 60 years (Mokdad, Bowman, Ford, Vinicor, Marks & Kaplan, 2001). Obesity represents a health risk for most populations and the risk levels may vary with race and age (NHLBI, 1998). Age has been found to impact on the association of body mass index and cardiovascular disease mortality among men and women aged 30-74 years, with a greater body weight associated with increased risk of death from CVD (Stevens, Cai, Pamuk, Williamson, Thun & Wood, 1998). The prevalence of overweight and obesity varied with age and gender, it was

found to be greater in middle age respondents 40-59 years than in younger adults 20-40 years and older 60 years (Abell, Wilson, Egan, Lackland, Lipsitz & Woolson, 2007).

WC is also a widely recognised measure, used to identify those with a health risk arising out of being overweight. Waist circumference (WC) has been proposed as a relatively inexpensive measure of visceral adiposity. The recommended cut-off points used in WC are 80cm in women and 94cm in men, with excessive WC being 88cm in women and 102cm in men (Han, Van Leer, Seidell & Lean, 1995; Okosun, Liao, Rotimi, Choi & Cooper, 2000). It is well-known that an elevated WC is one of five criteria that define the metabolic syndrome (Dalton, Cameron, Zimmet, Shaw, Jolley & Dunstan, 2003; Eckel, Grundy & Zimmet, 2005; Batsis, Nieto-Martinez & Lopez-Jimenez, 2007). Additionally, increased metabolic risk in adults is found to be associated with functional decline in quality of life and disability (Koster, Patel, Visser, van Eijk, Kanaya, de Rekeneire, Newman, Tyllavsky, Kritchevsky, Alley & Harris, 2007; Chambers, Guo, Siervogel, Hall & Chumlea, 2002). Furthermore, in epidemiological studies, increased WC has also been associated with the progression of osteoarthritis (Janssen & Mark, 2006; Sanghi, Srivastava, Singh, Kumari, Mishra & Mishra, 2011).

In industrialised societies, increased blood pressure (BP) is being found at epidemic levels, thereby favoring an increase in the risk of development of several cardiovascular pathologies (ACSM, 2010). The increase in BP in older people is usually linked with the development of atherosclerosis, increased incidence of coronary artery disease, congestive heart failure and stroke (ACSM, 2010). A study by Chobanian, Bakris, and Black (2003) reported that 20-60 minutes of dynamic cardiorespiratory exercise, 3-5 days per week at 40-70% intensity yields significant positive effects on hypertension. Additionally, it was reported that the accumulation of moderate physical activity on most, if not all, days of the week, plays a significant role in the prevention of prehypertension progressing to hypertension (Pescatello, Franklin, Fagard, Farquhar, Kelley & Ray, 2004; Juraschek, Blaha, Whelton, Blumenthal, Jones, Kateyinan & Al-Mallah, 2014; Porebska & Mazurek, 2014; Reed, Prince, Cole, Fedor, Hiremathis, Mullen & Reid, 2014). Kokkinos (2008), indicated that the increase in physical activity can be associated with a reduction in elevated BP levels and high HDL-C, and reduces the incidence of diabetes.

Physical activity is widely recognised as a key health behavior associated with reduced all-cause of morbidity and mortality, as well as with chronic diseases of lifestyle (Lambert &

Kolbe-Alexander, 2006); to such extent that exercise is even referred to as medicine (Haskell, Lee & Pate, 2007).

It is a known fact that full-time employees spend eight or more hours per day at work, with one-third to one-half of their workday spent sitting (Jans, Proper & Hildebrandt, 2007). Steeves, Bassett, Thompson & Fitzhugh (2012) described occupational physical activity as a determinant of daily energy expenditure, which may have a protective effect on the physical health of workers. It is apparent from research findings that employee studies at the workplace are imminent (Bonauto, Lu & Fan, 2014), in order that strategic intervention geared toward employees at risk can be instituted. There is limited available data from South African municipalities reporting about the physical activity and selected health risk factors amongst their employees, therefore the purpose of this study was twofold: to determine the prevalence of physical activity and risk factors of chronic diseases among local government employees in the Vhembe district, and to investigate the relationship between body mass index, waist circumference, physical activity index and blood pressure among these employees.

3.3 METHODOLOGY

Research Design

The research study was based on a cross-sectional design, on an available population sample of local government employees in the Vhembe District of the Limpopo Province.

Participants

In this study, local government employees in the age group 24-65 years in the Vhembe District were targeted. A total number of 533 (Men= 251 and Women =282) participants were recruited from the available population comprising both males and females ranging from 24-65 years. Three age groups were categorised as: 24-29; 30-44 and 45-65 of which age group 24-45 years, primarily representing the sub-clinical horizon and pre-menopause population group and 46-65 years representing the post-clinical horizon and post-menopausal population group (Rowland, 1990). Participants were included in the study if they were within the age ranges and healthy. Nieman (1998), defined healthy as the presence of sufficient energy and vitality to accomplish daily tasks and active recreational pursuits without undue fatigue .A total of 466 (87%) were not

taking medication while 67 (13%) did (i.e, The primary complaint for medicine usage was for hypertension).

Measuring Instruments

The physical activity index (PAI) questionnaire of Sharkey (1997) was used to determine physical activity index of the participants. The training principles, namely frequency, duration, and intensity, were reported by each respondent retrospectively and these were used to calculate the physical activity index, and were used to stratify the level of physical activity participation (Laubscher, Strydom & Dreyer, 2002). Respondents were then classified into three categories namely; low active (PAI=<16), moderately active (PAI 17-44) and highly active (PAI =>45) (Swanepoel, 2001).

Height and body mass

Standing height was measured to the nearest 0.1 cm, using a stadiometer. Body mass was measured using a portable calibrated scale and recorded to the nearest 0.5 kg. Body mass index (BMI) was calculated as body mass (kg) divided by height (m) squared (kg/m²).

Waist circumference

Waist circumference was measured using a standard tape measure and in accordance with procedure recommended by the American College of Sports Medicine (ACSM, 2010). *For men*, low waist circumference in this classification is defined as less than 94cm, high as 94-102cm, and very high as greater than 102cm. *For women*, low waist circumference is less than 80cm, high is 80-88cm, and very high is greater than 88cm (National Institutes of Health, National Heart Lung, and Blood Institute, 1998; International Day for the Evaluation of Abdominal obesity (IDEA), 2007).

Blood pressure

Blood pressure was measured by using an automated sphygmomanometer (Omron, Health care, Inc., USA). The participants were seated and the blood pressure was determined according to the protocol as suggested by ACSM (2010).

BMI and Blood pressure Classifications

The American College of Sports Medicine has identified thresholds (obesity and hypertension) above which individuals will be at increased risk for cardiovascular diseases (ACSM, 2010); these thresholds which are used to describe risk, include the following:

- Obesity – BMI $\geq 30\text{kg/m}^2$ or waist girth > 102 cm for males, and > 88 cm for females.
- Hypertension – systolic blood pressure ≥ 140 mmHg, and for diastolic blood pressure ≥ 90 mmHg as well as for participants on hypertension treatment.

3.4 PROCEDURE

The aims of the study were explained to the participants and their employers. The participants and the employers were informed that the data will be treated confidentially and will only be used for research purposes. The participants were requested to complete and sign the informed consent form before participation in the study. The measurements took place during week days per arrangement with the participants. The measurements were conducted by the principal investigator with the assistance of well-trained research assistants. The anthropometric measurements of height, body mass, waist, and hip circumference were measured in separate rooms for males and females. The measurement for blood pressure was performed by the principal investigator and the trained research assistants. After all the participants had completed the anthropometric measurements and blood pressure tests, the principal investigator and research assistants assisted them in the completion of the questionnaires. The study received ethical approval (NWU-00125-13-S1) from the North-West University's ethics committee.

3.5 STATISTICAL ANALYSIS

The SPSS Version 21 (SPSS, Inc., Chicago) was used for data analysis. Descriptive statistics (mean, minimum, maximum and standard deviations), and frequencies for continuous variables were performed for the total sample, and separated by gender. Independent *t* test was performed to determine the differences between men and women for continuous variables. To detect whether data were normally distributed, Kolmogorov-Smirnov normality tests were used. Chi-square was calculated for categorical variables to determine the differences between

variables. ANOVA was calculated to determine the differences among the physical activity groups and blood pressure. Pearson correlation coefficients were calculated to determine the relationship between BMI, waist circumference, and blood pressure among local government employees. Furthermore, Partial correlation coefficients (r) adjusted for gender and medication were calculated for the relationship between physical activity and BMI, WC and BP of local government employees in Vhembe District. Significant differences between gender was found for the relationship between PAI, BMI, BP and therefore analyses were calculated separately for men and women. Significance difference was set at $p \leq 0.05$.

3.6 RESULTS

Out of 533, 9% (49) (Table 3.1) were general clerks; 2% (12) were accounting clerks; 85% (452) grounds men; 2% (12) municipality managers; and 2% (8) councillors, with a mean age of 53 ± 8.74 and no significant age differences ($p \leq 0.05$). When the data was analysed separately for the three age group categories; the results show that 5.8% (31) are in the age group 24-29 years; 9.2% (49) in age group 30-44 years, and 85% (453) are in the age group 45-65 years (see Table 3.4). The results show that the majority of the employees have no formal education (70%) and are working as grounds men.

The results show that 78.2% of the total sample falls in the category of low physical activity group (Table 3.1). When data was analyzed separately by gender, 84% of the woman falls in the low activity category when compared to men 72%, whereas 28% men and 15% women falls in moderately active category. One women (1%) falls in the category of highly active.

Table 3.1: Description of physical activity index, education, and occupation of the participants

Characteristics	Total (N=533) n (%)	Men (N=250) n (%)	Women (N=283) n (%)	p-value ^a
PAI				
Low activity (PAI< 16)	417(78.2)	180(72)	237(84)	≤0.05
Moderately active (PAI between 17-46)	112(21)	70(28)	42(15)	
Highly active (PAI >45)	4(0.8)	-	4(1)	
Educational status				
No education	375 (70)	178 (70.9)	197 (70)	≤0.05
Std 8	26 (5)	17 (6.8)	9 (3)	
Matric	50 (9)	20 (8)	30 (11)	
Diploma	48 (9)	20 (8)	28 (10)	
Degree 1	8 (2)	5 (2)	3 (1)	
Degree2	2 (0.4)	1 (0.4)	1 (0.3)	
Degree 3	12 (2)	5 (2)	7 (2)	
Degree4	9 (2)	4 (1.6)	5 (2)	
Certificate	3 (0.6)	1 (0.4)	2 (0.7)	
Occupation				
General Clerk	49 (9)	27 (10.8)	22 (8)	≤0.05
Accounting Clerk	12 (2)	2 (1)	10 (4)	
Grounds man	452 (85)	215 (85.7)	237 (84)	
Municipality manager (MM)	12 (2)	6 (2)	6 (2)	
Councillor	8 (2)	1 (0.4)	7 (2.5)	

^ap-value based on Chi-square statistics; PA= physical activity

Figure 3.1 represents the percentages of BMI categories for the total group. The results show that 3.4% of the total group were classified as underweight, 34.9% as normal weight, with only 26.6% of the total group classified as overweight and 35.1% as obese.

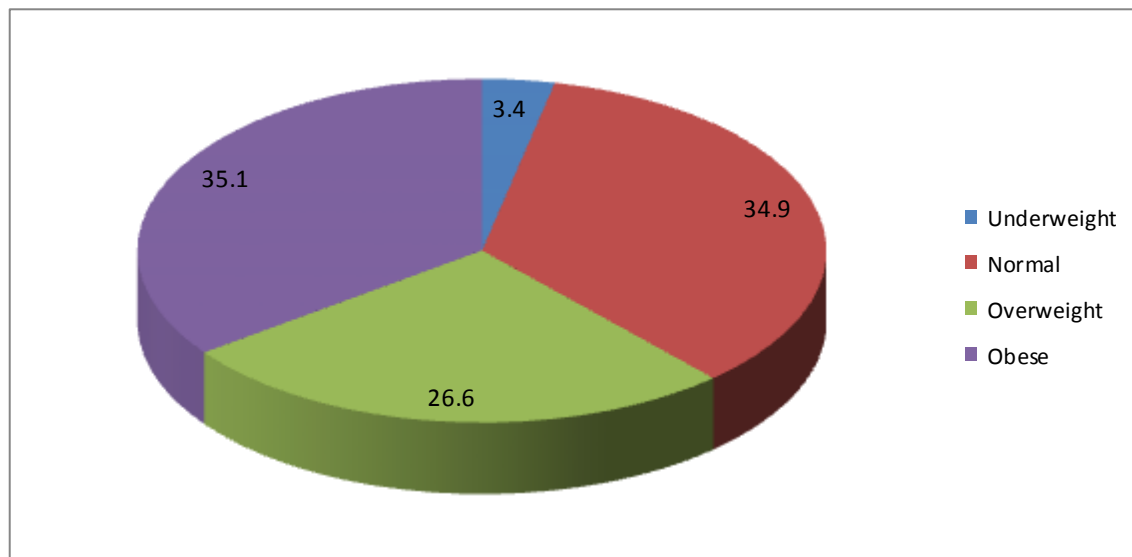
**Figure 3.1:** Percentages (%) of BMI categories for the total group

Figure 3.2 presents the percentage of BMI categories by gender. The results show that 6.8% for men were in the underweight category compared to 0.4% for women. 51% of men and 20.6% for women were in the normal weight category, while women (29.4%) showed a higher percentage of overweight when compared to men (23.5%). Women (49.6%) also showed high prevalence of obesity compared to men (18.7%).

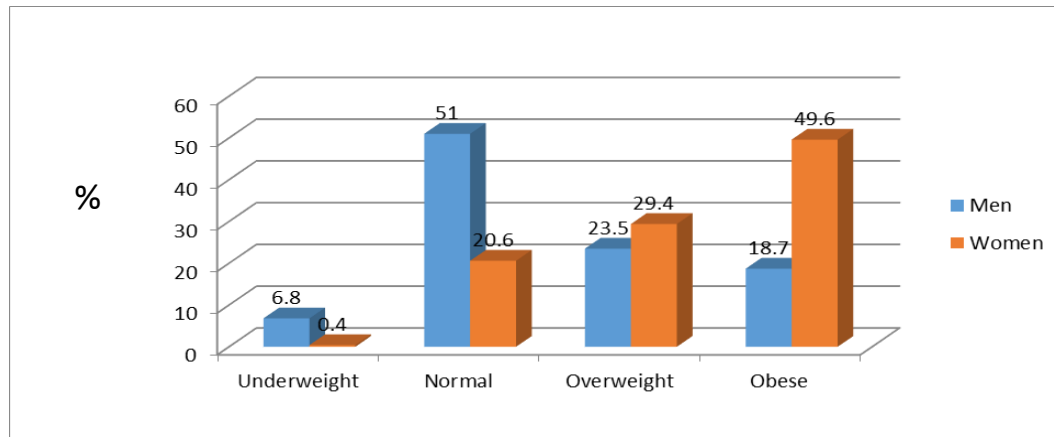


Figure 3.2: Percentage (%) of BMI categories for men and women

Figure 3.3 presents the percentages for SBP and DBP for the total group. The results show the normal DBP and SBP in 64.8% and 29.2% of total group respectively with pre-hypertension in DBP in 10% and 22.4% in DBP and SBP respectively. Furthermore, 48.4% SBP and 25.2% DBP falls within hypertension category for the total group.

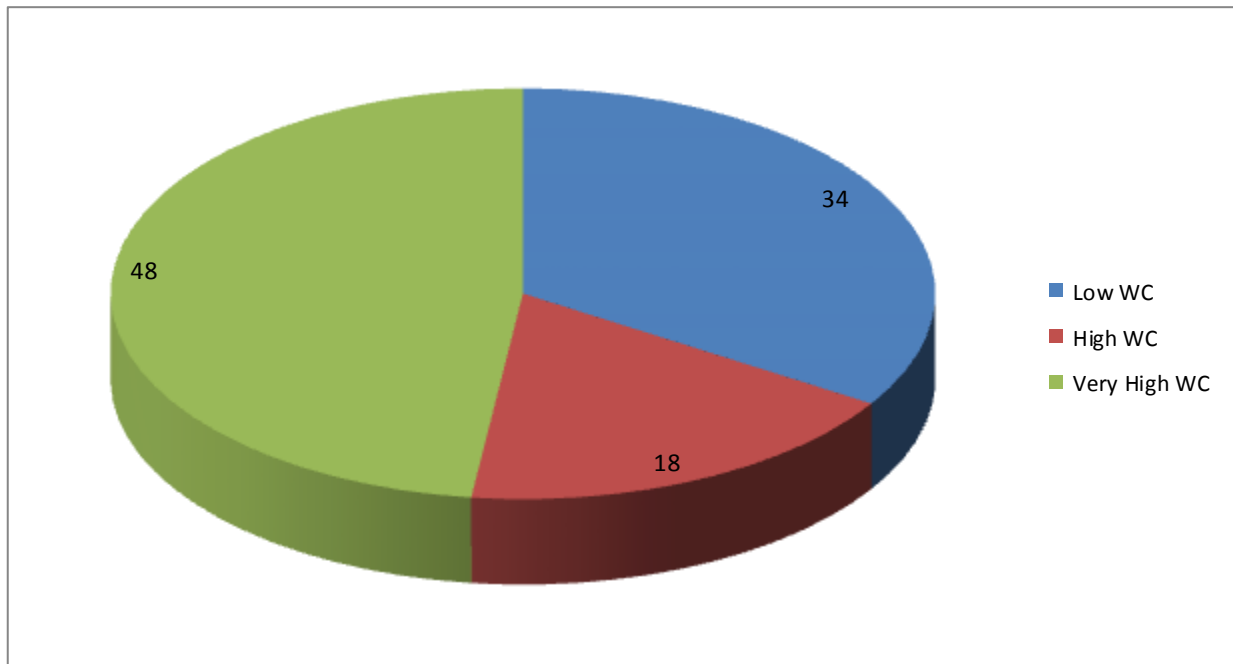


Figure 3.3: Percentage (%) of WC for the total group

Figure 3.3 presents the percentage scores for WC for the total group. The results indicate that 34% of total group have a low waist circumference, with 18% showing a high waist circumference, and 48% showing very high waist circumference.

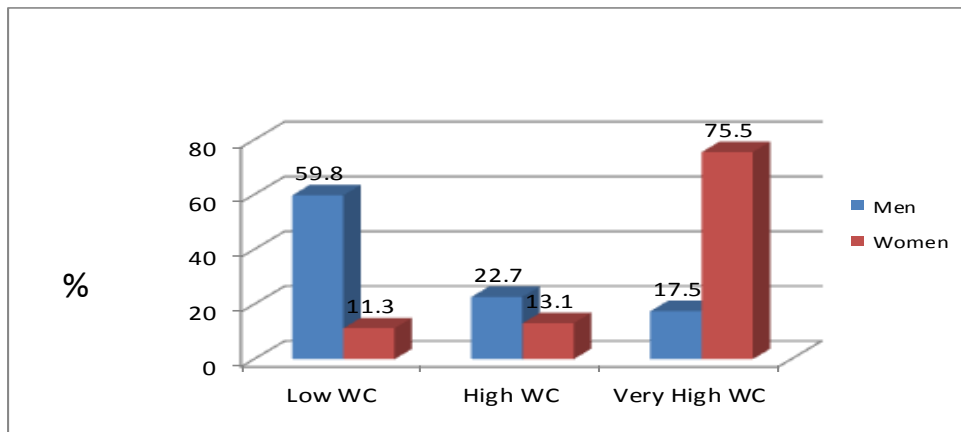


Figure 3.4: Percentages (%) WC for men and women

Figure 3.4 presents the WC for men and women separately. The results indicate that 22.7% of men shows high waist circumference compared to the 13.1% of women with 75.5% showing a very high waist circumference in women compared to 17.5% in men.

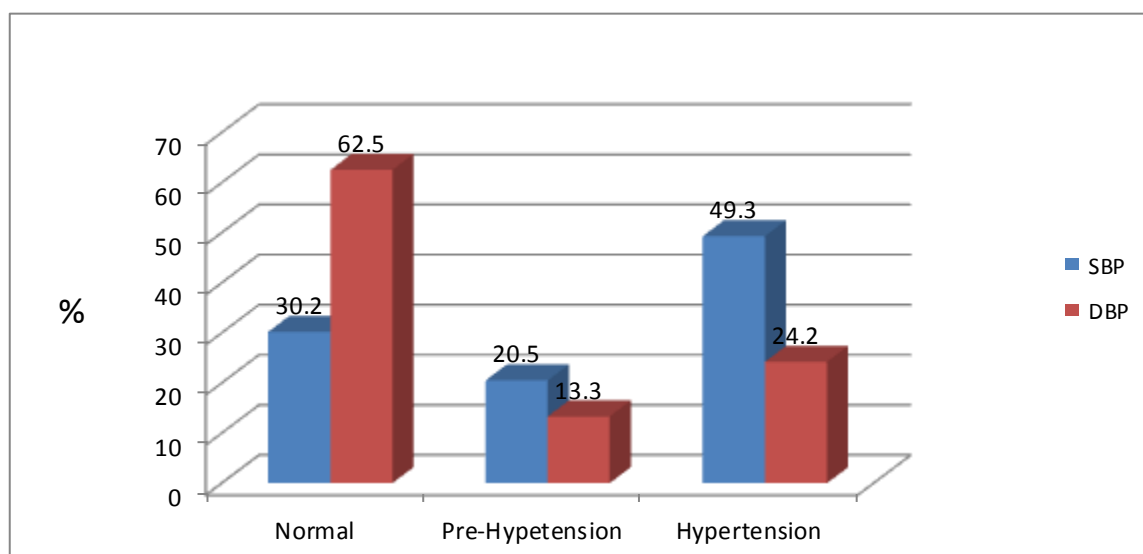


Figure 3.5: Percentage (%) of SBP and DBP for the total group

Figure 3.5, presents percentage score for the blood pressure of the total group. Out of 533, 109 (SBP, 20.5%) and 71 (DBP, 13.3%), and 263 (SBP, 49.3%) and 129 (DBP, 24.2%) are pre-hypertension and hypertension respectively.

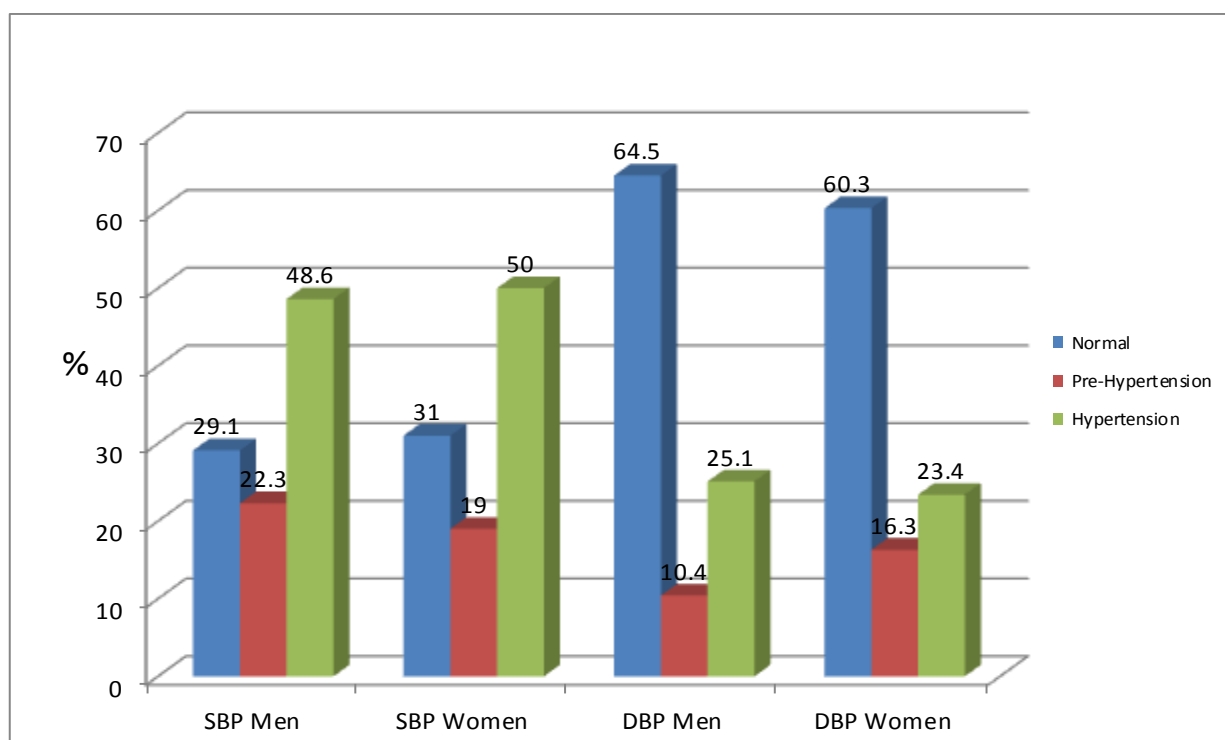


Figure 3.6: Percentage (%) of SBP and DBP for men and women

Figure 3.6 presents SBP and DBP stratification for men and women. The results shows that 29.1% men has normal SBP compared to 31% in women, whereas for SBP 50% of the women falls in the hypertension category compared to the 48.6% of men. Regarding the DBP 60.5% of the woman has normal DBP compared to the 64.5% in men with 25.1% of the men falls in the hypertension category compared to the 23.4% in women.

Table 3.2: Descriptive data of age, physical activity and selected health risk factor profiles of the total participants

	Minimum	Maximum	Mean	SD
Age (Years)	24.0	65.0	53.00	8.74
Height (cm)	133.0	191.0	164.65	9.80
Body mass (kg)	34	136	77.74	16.95
BMI (kg/m ²)	14.12	51.0	29.00	6.92
WC (cm)	39	170	94.90	15.64
SBP (mmHg)	79.0	229.0	143.28	24.59
DBP (mmHg)	48.0	141.0	81.67	13.23
PAI	0.0	64.0	7.66	10.84

BMI= Body mass index; WC = waist circumference; SBP = systolic blood pressure; DBP = diastolic blood pressure; PAI=Physical Activity Index

Table 3.2 indicates the descriptive data (mean, minimum, maximum and SD) of the total participants. The mean age of the participants in the study was 53.0±8.74 years, with the mean height 164.65±9.80 cm, and the mean body mass 77.74±16.95 kg. The mean BMI of the total group was 29.00±6.92 kg/m² with the mean WC (cm) 94.90±15.64 cm. The mean SBP of the total participants was 143.28±24.59 mmHg with a mean DBP of 81.67±13.23 mmHg. The mean PAI of the total participants was 7.66±10.84.

Table 3.3: The descriptive characteristics (mean and SD) for blood pressure for the total group, by gender, three age groups and by three PAI groups

Blood pressure for the three PAI group for the total group												
	Low physical active		Moderately active		Highly active		P-values of the differences					
	Mean	SD	Mean	SD	Mean	SD						
SBP (mmHg)	144.18	24.85	140.60	23.73	129.25	16.60	0.23					
DBP (mmHg)	82.40	13.63	79.08	11.60	79.50	4.20	0.06					
Blood pressure for the three PAI group by gender												
	Men (n=250)						Women (n=283)					
	Low physical active		Moderately active		Highly active		Low physical active		Moderately active		Highly active	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
SBP (mmHg)	144.01	23.27	140.56	22.51	-	-	144.32	26.03	140.67	25.91	129.25	16.67
DBP (mmHg)	82.10	13.60	78.17	12.41	-	-	82.63	13.66	80.59	10.05	79.50	4.20
Blood pressure for the total group by three age groups												
	24-29 years				30-44 years				45-65 years			
	Mean		SD		Mean		SD		Mean		SD	
SBP (mmHg)	119.69		25.50		131.04		24.70		145.35		24.82	
DBP (mmHg)	75		12.25		82.18		15.23		81.54		13.83	
Blood pressure for three age groups and by gender												
	Men (n=8)		Women (n=23)		Men (n=25)		Women (n=24)		Men (218)		Women (n=235)	
	Mean	SD	Mean	(SD)	Mean	SD	Mean	SD	Mean	SD	Mean	SD
SBP (mmHg)	122.22	43.23	118.69	15.28	136.64	25.41	125.21	23.02	143.48	22.34	147.08	24.75
DBP (mmHg)	76.22	11.32	75.04	12.83	84.44	11.93	79.83	18.02	80.33	14.15	82.66	13.47

P≤0.05; BP=blood pressure; SBP=systolic blood pressure; DBP=diastolic blood pressure; SD=standard deviation

Table 3.3 presents the mean and SD for the total group and by gender and for the blood pressure by three PAI groups. The results shows that the mean SBP for the total group of participants in the low physical active group is 144.18±24.85 mmHg, for the moderate active group 140.60±23.73 mmHg and for highly active group is 129.25±16.67 mmHg. The mean DBP for the total group of participants in the low physical active group is 82.40±13.60 mmHg, for the moderately active group 79.08±11.60 mmHg and for highly active 79.50±4.20 mmHg. The results also showed the mean SBP and DBP by gender in low physical activity group for men (144.01±23.27; 82.10±13.60 mmHg) and women (144.32±26.03; 82.63±13.66 mmHg), moderately active group for men (140.56±22.51; 78.17±12.41 mmHg) and women (140.67±25.91; 80.59±10.05 mmHg) with only women showing a mean SBP and DBP in the highly active category (129.25±16.67; 79.50±4.20 mmHg). The results show that normal blood pressure ranges were in the age group 24-29 years whilst variations of elevated blood pressure were found in the age group 30-44 years age and age group 45-65 years, in both men and women.

Table 3.4: Percentage (%) distribution of BMI, WC and PAI for men and women by three age groups

		24-29 years		30-44 years		45-65 years	
		Men (N=8)	Women (n=23)	Men (n= 25)	Women (N=24)	Men (N=217)	Women (N=236)
		n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
BMI (kg/m²)	Underweight	-	-	2(8)	-	15(7)	1(0.4)
	Normal weight	5 (62.5)	13(57)	9(36)	6(25)	114 (52)	39(16.6)
	Overweight	1 (12.5)	7(30)	10(40)	5(21)	48 (22)	71(30.2)
	Obese	2 (25)	3(13)	4(16)	13(54)	41(19)	124(52.8)
WC (cm)	Low WC	7(87.5)	10(44)	13(52)	2(8)	130(60)	20(8)
	High WC	-	6(26)	9(36)	3(13)	48(22)	28(12)
	Very high WC	1(12.5)	7(30)	3(12)	19(79)	40(18)	187(80)
PAI	Low physical activity	1(12.5)	15(65)	17(68)	21(88)	162(75)	201(85)
	Moderately active	7(87.5)	8(35)	8(32)	2(8)	55(25)	32(14)
	Highly active	-	-	-	1(4)	-	3(1)

BMI= Body mass index; WC = waist circumference; PAI = Physical activity index

Table 3.4 presents the percentage (%) distribution of BMI, WC and PAI for men and women by three age groups. The results show that women in the age group 30-44 years have a higher percentage of obesity (54%) with 79% in the high risk for WC compared 16% obese and 12% high risk for WC respectively in men. Women in the age group 45-64 years show a high percentage of obesity (52.8%) and very high WC (80%) when compared to their men counterparts showing 19 % of obesity and 18% of very high WC respectively. Sixty five percent (65%) of women in the age group 24-29 years fall in the low physical activity category comparing to the 12.5% of men. In the age group 30-45 years 88% of women falls in the low activity category when compared to 68% of men. Furthermore the results show that 85% women in the age group 45-65 years fall in the low physical activity category compared to the 75% of men whereas 25% men falls in the moderately active category compared to the 14% of women in the same age group.

Table 3.5: Descriptive (mean, SD and p-value) data of age, physical activity and selected health risk factor employees by gender

	Gender	N	Mean	SD	P-value of the differences
Age (Years)	Men	251	53.32	7.89	0.86
	Women	282	52.72	9.43	
BMI (kg/m ²)	Men	251	25.98	5.79	≤0.05
	Women	282	31.47	6.60	
WC (cm)	Men	251	91.87	14.83	≤0.05
	Women	282	97.60	15.88	
SBP (mmHg)	Men	251	143.05	23.02	0.97
	Women	282	143.48	25.94	
DBP (mmHg)	Men	251	81.03	13.35	0.17
	Women	282	82.24	13.11	
PAI	Men	251	9.09	10.59	≤0.05
	Women	282	6.39	10.93	

P≤0.05; BMI= Body mass index; WC = waist circumference; SBP = systolic blood pressure; DBP = diastolic blood pressure; PAI = Physical activity index

Table 3.5 presents the descriptive statistics of the study's sample of men and women. Women were significantly ($p \leq 0.05$) heavier than the men. Both men and women show relatively high, but non-significant differences in SBP. Significant ($p \leq 0.05$) gender difference was found between men and women (BMI, WC and PAI).

Table 3.6: Correlation matrix for Age, BMI, WC, BP, and PAI for the total group

		Age	BMI	WC	SBP	DBP
Age (Year)	r	-	-.01	.09*	.31**	.08
	p	-	.85	.04	.000	.07
BMI (kg/m ²)	r	-.01	-	.67**	.18**	.26**
	p	.85	-	.000	.000	.000
WC (cm)	r	.09*	.67**	-	.28**	.26**
	p	.04	<.00	-	<.00	<.00
PAI	r	-.15**	-.14**	-.04	-.09*	-.10*
	p	.000	.001	.31	.03	.02

**P = 0.01; *P = 0.05; BMI= Body mass index; WC=Waist circumference; SBP=systolic blood pressure; DBP=Diastolic blood pressure; PAI=Physical Activity Index.

Table 3.6 showed that BMI and WC were significantly ($p=0.01$) associated with SBP and DBP. BMI was highly correlated ($p < 0.01$) with waist circumference. A significant relationship between measures of adiposity (BMI and WC) and blood pressure (SBP and DBP) was found. The PAI was negatively related with age ($r = -.15$; $p = 0.000$), surrogated measures of fatness (BMI) ($r = -.14$; $p = 0.01$). PAI showed inverse relationship with SBP ($r = -.09$; $p = 0.03$) and DBP ($r = -.10$; $p = 0.02$).

Table: 3.7: Correlation coefficients between measures of fatness (BMI and WC), Blood pressure and PAI controlled for gender and medication

Control Variables			BMI	WC	SBP	DBP	PAI
Gender	Age (Year)	<i>r</i>	.01	.10	.31	.08	-.16
		<i>p</i>	.88	.028	.000	.07	.000
	BMI (kg/m ²)	<i>r</i>	-	.66	.19	.26	-.10
		<i>p</i>	-	.000	.000	.000	.02
	WC (cm)	<i>r</i>	.66	-	.28	.25	-.02
		<i>p</i>	.000	-	.000	.000	.61
	PAI	<i>r</i>	-.10	-.02	-.09	-.09	-
		<i>p</i>	.02	.61	.03	.03	-
Taking Medication use	Age (Year)	<i>r</i>	-.03	.07	.29	.06	-.14
		<i>p</i>	.46	.14	.000	.20	.001
	BMI (kg/m ²)	<i>r</i>	-	.65	.13	.23	-.13
		<i>p</i>	-	.000	.002	.000	.003
	WC (cm)	<i>r</i>	.65	-	.233	.22	-.03
		<i>p</i>	.000	-	.000	.000	.52
	PAI	<i>r</i>	-.13	-.03	-.08	-.09	-
		<i>p</i>	.003	.52	.08	.05	-

*P value =0.01; **P value=0.05; BMI= Body mass index; WC=Waist circumference; SBP=systolic blood pressure; DBP=Diastolic blood pressure; PA=Physical activity.

Table 3.7 presents the correlation coefficients measures of fatness, blood pressure and PAI controlled for gender and medication. Significant gender relationships were found between PAI with BMI, and blood pressure, and subsequently data was analysed separately for men and women. When the use of medication was controlled in the model no significant changes in the correlation coefficients (*r*) values in the relationship when compared with the unadjusted analyses between PAI and selected risk factors.

Table: 3.8: Correlation coefficients between age, measures of fatness (BMI and WC), Blood pressure and PAI separately for men and women

Men							
		Age	BMI	WC	SBP	DBP	PAI
Age	<i>r</i>	-	-.13*	-.04	.25**	.01	-.25
	<i>p</i>	-	.04	.52	.000	.87	0.000
BMI	<i>r</i>	-.13*	-	.64**	.013	.09	-.10
	<i>p</i>	.04	-	.000	.85	.14	0.099
WC	<i>r</i>	-.04	.64**	-	.20**	.17**	.02
	<i>p</i>	.52	.000	-	.002	.008	0.76
PAI	<i>r</i>	-.25**	-.09	.010	-.10	-.12	-
	<i>p</i>	.000	.18	.87	.13	.07	-
Women							
Age	<i>r</i>	-	.09	.19**	.35**	.13*	-.08
	<i>p</i>	-	.12	.001	.000	.03	0.17
BMI	<i>r</i>	.09	-	.68**	.31**	.39**	-.11
	<i>p</i>	.12	-	.000	.000	.000	0.05
WC	<i>r</i>	.19**	.68**	-	.34**	.33**	-.04
	<i>p</i>	.001	.000	-	.000	.000	0.40
PAI	<i>r</i>	-.09	-.11	-.05	-.09	-.08	-
	<i>p</i>	.13	.058	.42	.12	.20	-

*P value =0.01; **P value=0.05; BMI= Body mass index; WC=Waist circumference; SBP=systolic blood pressure; DBP=Diastolic blood pressure; PA=Physical activity.

Table 3.8, presents correlation coefficients between age, measures of fatness (BMI and WC), BP and PAI separately for men and women. BMI was positively associated with WC across the gender. In both men and women age was positively associated with blood pressure measures. Measure of fatness (BMI and WC) was significantly associated with blood pressure, especially in women. Furthermore, age was negatively associated with BMI and WC in men, whilst BMI was positively associated with WC in women. Age also showed a significant correlation with SBP and PAI in men, whilst in women; age was positively associated with WC, SBP and DBP. In both men and women PAI was negatively associated with age, BMI, SBP and.

3.7 DISCUSSION

The purpose of this study was to determine the prevalence of inactivity and risk factors of chronic diseases among local government employees and to investigate the relationship between body mass index, waist circumference, physical activity index, and blood pressure among local government employees in the Vhembe district. The results show high prevalence (78.2%) physical inactivity among the Vhembe district municipality employee with 84% women been mostly inactive as compared to men (72%). Additionally, the prevalence of both pre-hypertension and hypertension were found with women been mostly affected than the men counterparts.

The results also show that employees with low level of physical activity had elevated blood pressure, overweight/obesity and high waist circumference as compare to those who have had moderate and high level of physical activity; and these differ by gender, levels of PA and age groups. Furthermore, PAI was negatively related with the measures of adiposity (BMI and WC) and blood pressure (SBP and DBP) with significant relationship with BMI.

The observed prevalence physical inactivity among employees in the current study appears to be higher when compared to a study conducted in South Africa, which reported that 48% of adult men and 63% of adult women were categorised as physically inactive (Department of Health & Medical Research Council, 2007; Shisana, Labadarios D, Rehle, Simbayi, Zuma, Dhansay, Reddy, Parker, Hoosain, Naidoo, Hongoro, Mchiza, Steyn, Dwane, Makoe, Maluleke, Ramlagan, Zungu, Evans, Jacobs, Faber & SANHANES-1 Team, 2013). This trend of inactivity could have serious consequences due to the fact that physical inactivity is regarded

as a risk factor for the development of cardiovascular diseases and other chronic illnesses (Jackson, Morrow, Hill & Dishman, 2004; Nieman, 2007; Matfin, 2009 & ACSM, 2010). It is assumed that low level of physical activity is associated with loss of functional capacity (Bouchard et al., 2007), of which the Vhembe municipality employee are not immune to, and as such their functional capacity may be affected. The lack of regular physical activity and a sedentary lifestyle have been considered one of the most worrisome public health concerns in the world, hence the negative effect on workers' productivity (Labuschagne, Strydom, & Wilders, 2007).

Additionally, the results showed high prevalence of both overweight (26.6%) and obesity (35.1%) of the total group. Women showed significantly higher prevalence of obesity (49.6%) compared to the men (18.7%). The observed prevalence of both overweight and obesity in the current study are comparable to the study by SANHANES-1(2013)(Sisane et al., 2013), which reported that overall, 25% of adult women were overweight and 40.1% obese, while 19.6% of adult men were overweight and 11.6% obese. The prevalence of overweight and obesity varied with age and gender (Dua et al., 2014; Lategan et al., 2014). Of which similar trend was observed in the current study on the Vhembe district employees. Abell *et al.* (2007) revealed high prevalence of overweight and obesity in middle aged respondents aged 40-59 years than both younger adults 20-40 years and older adults of 60 years. In the present study, therefore the high prevalence of overweight and obesity was more pronounced in the age groups 30-44 and 45 to 65 years, with women been mostly affected compared to the men. Women in this study had high waist circumference compared to their men counterpart. A greater body weight was associated with an increased risk of death from CVD, but the risk with excess weight was greater in younger people (Stevens et al., 1998). The observed high mean BMI (31.47 kg/m² for women and 25.98 kg/m²) for men in the present study is worrisome given the estimates that within the group of people of 30 years or older, 32 men, and 68 women per day die because of the impact of higher BMI (Joubert, Norman, Lambert, Groenewald, Schneider, Bull & Bradshaw, 2007). Burton, Chen, Conti, Schultz & Edington (2003) reported that a greater BMI was associated with other health risk factors and short-term disability on the one side, while on the other hand Pronk, Martinson, Kessler, Beck, Simon & Wang (2004) indicated that severe obesity was related to a higher number of lost work days. It is therefore important to institute urgent strategic intervention because persistent obesity can deregulate the metabolic processes and can severely affect processes controlling blood glucose, blood pressure and lipid

metabolism (Oyeyemi & Adeyemi, 2013). Studies revealed that results of this nature often leads to a cluster of conditions known as metabolic syndrome, with dire public health consequences (Alberti, Eckel, Grundy, Zimmet, Cleeman & Donato, 2009; Misra & Khurana, 2008; Oyeyemi & Adeyemi, 2013).

It is been indicated that age is a known risk factor for high blood pressure (Gardner & Poehlman, 1995; Jervase, Barnabas, Emeka & Osondu, 2009; Mungreiphy, Kapoor & Sinha, 2011; Dua et al., 2014). Such trend was found in the current study whereby elevated blood pressure were evident in the age group 30-44 years age (SBP=131.04±24.70; DBP=82.18±15.23) and age group 45-65 years (SBP=145.35±24.82; DBP=81.54±13.83). Furthermore, the results show that 50.2% women falls in the systolic hypertension when compared to women 48.4% and 25.2% men falls within diastolic hypertension when compared to 23.5% women. The observed high prevalence of hypertension (SBP) in men are comparable to the previous findings from Delhi, India (Dua et al., 2014) and industrialised economies (Wang et al., 2010; Wolf-Maier et al., 2003). The observed systolic hypertension in the present study possess serious health concern, since it is been indicated that systolic hypertension may have a particular important determinant of cerebrovascular disease in older populations (Amery, Brixho, Clement, De Schaepdryver et al. 1985; Rutan, Kuller, Neaton et al., 1988; Reed, Prince, Cole, Fedor, Hiremathis, Mullen & Reid, 2014).

Significant positive relationships were found between measures of blood pressure, BMI and WC. The observed positive relationship between BMI and blood pressure in this sample is in congruent with the findings from the urban Free State community (Lategan et al., 2014). The observed relationship between WC and blood pressure could mean that it carries the burden of hypertension risks among the non-obese employees in the study (Sharaye, Olorunshola, Ayo & Dikki, 2014). Furthermore, it is been indicated that being overweight is associated with two- to six- fold increase in the risk of developing hypertension. Of which an increase of 2-3 mmHg in systolic and 1-3 mmHg in diastolic blood pressure has been shown for each 10 kg increase in weight in western population (WHO, 1996). In a study conducted in Australian adults BMI and WC were equally related with hypertension (Dalton et al., 2003). Similar findings on the significant positive relationship between BMI and WC with systolic and diastolic blood pressure was reported in Wardha district in central India (Deshmukh, Gupta, Dongre, Bharambe, Maliye, Kaur & Garg, 2006). Obesity is reported to be related to elevated SBP and

DBP (Yusuf, Hawken, Ounpuu, Bautista, Franzosi, Commerford, et al. INTERHEART, 2005; Dua et al., 2014).

PAI was negatively associated with fatness (BMI), and blood pressure (SBP and DBP). The results are somewhat similar to the study conducted in rural and urban settings in Cameroon by Sobnwi, Mbanya, Unwin, Kenyne, Fezeu, Minkoulou, Aspray & Alberti (2002), which revealed that inactivity was negatively associated with a higher body mass index (BMI) due to a lower occupational walking-related activity in the urban population. Furthermore, health-enhancing physical activity was inversely related to body mass index, waist circumference and blood pressure (Chan, Spangler, Valcour & Tudor-Locke, 2003). The current findings on the inverse association between PAI and blood pressure are also similar to the findings from a review study in which thirteen papers reported that physical activity was inversely related to blood pressure and/or was associated with a reduced risk of hypertension (Milton, Macnivenb and Bauman, 2014). Studies reported that blood pressure and anthropometric variables like body mass index and waist circumference are good markers and predictors of CVD and have been found to be strongly associated with risk factors of CVD and chronic diseases including coronary heart disease, Type 2 diabetes and obesity (Smith & Bird, 2004; De Oliveira, Melo, Mota & Kubrusly, 2012). The results of this study also compare with the study by Saeed (2003) which indicated that there was a significant association between obesity and hypertension. Central obesity was significantly associated with hypertension in the current findings, and these findings are somewhat similar to previous studies (Deshmukh et al., 2006; Oyeyemi & Adeyemi, 2013; Lategan et al., 2014).

In this results age was positively associated with blood pressure measures, and these findings are in line with the known factor that elevated blood pressure increases with age (Jervase, Barnabas, Emeka & Osondu, 2009; Mungreiphy, Kapoor & Sinha, 2011; Dua et al., 2014). The adjustments of medication use in the correlation model did not yield any significant changes in the correlation coefficients (r) values for the relationship between PAI and selected risk factors when compared with the unadjusted analyses. The reasons for no significant changes in the correlation coefficients (r) after the adjustments for medication use may be explain by the already observed elevated blood pressure among the participants as shown in table 3.2. It was evident in the present study that fatness (BMI and WC) was significantly associated with hypertension, especially in women, and the observed results were similar to studies done in

Angola (Pires, Sebastião, Langa & Nery, 2013) and India (Meshram, Arlappa, Balkrishna, Rao, Laxmaiah, Brahman, 2012).

3.8 LIMITATIONS OF THE STUDY

The current study, despite having some limitations the study has provided useful baseline information for policy development and strategic intervention programs. However, this study illustrated for the first time the prevalence of inactivity, overweight/obesity and blood pressure amongst employees in the Vhembe district municipality of the Limpopo province of South Africa. The major limitation of the study was not receiving the necessary permission from some local municipalities in the Vhembe district (Makhado, Mutale, and Musina) to conduct this study. If all municipalities had participated, the results of the health and wellness status of the employees of them Vhembe district would have been more reliable as a bigger sample would have been investigated. The high level of no education may have affected the results one way or the other in the answering of the questionnaire, but participants were assisted by the principal investigator and well trained field workers who interpreted and explain the questions. Items such as duration, intensity and frequencies might have been difficult concepts for the participants to take note of them while performing activities and to comprehend during data collection.

The participants of the study were regarded as healthy though there were few who used medication for blood pressure which may somewhat have masked the expected relationship between outcome variables. Nevertheless, it was clear from the data that when adjustments were made in the analyses or data analysed separately for those who take medication and the ones who do not take medication, no major significant differences were inferred. The strength of the study though is that it was the first of its kind to have assessed the physical activity and selected risk factors of CVD among employees in the Vhembe district of the Limpopo province of South Africa.

3.9 CONCLUSION

It can be concluded that high (78.2%) prevalence of physical inactivity with women (84%) been mostly inactive as compared to men (72%) was evident. Additionally, the prevalence of overweight, obese and at high risk of waist circumference and elevated pre-hypertension as well

as hypertension were high among women as compared to men; and these also differ by levels of PA and age groups. Moreover, the results also show that employees with low level of physical activity had elevated blood pressure, overweight/obesity and high waist circumference as compare to those who have had moderate and high level of physical activity. Fatness (BMI and WC) was significantly associated with hypertension, especially in women. PAI was negatively associated with BMI and BP (SBP and DBP), with significant relationship with BMI. Furthermore age was negatively associated with WC, SBP and DBP. Based on these findings, the results therefore warrant an intervention programme focusing on awareness campaigns about lifestyle diseases and their risk factors in employees' health and the importance of physical activity. This could be under the umbrella of a general wellness programme among employees in local government employees of the Vhembe district.

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CHAPTER 4

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4.1 SUMMARY

Physical inactivity is one of the risk factors evident in the corporate setting (Haskell *et al.*, 2007:1082), and is also positively associated with other risk factors, including obesity, dyslipidaemia and hypertension (Ehrman *et al.*, 2009). Strydom (2000) also indicated that lack of physical activity could result in the development of hypokinetic diseases that would affect the employee's health status and thus lead to an increased cardiovascular risk within the corporate environment. The overarching aim of the study was therefore to investigate the physical activity and some selected health risk factors among local government employees in the Vhembe district, Limpopo province.

In order to reach the aim of the study the following objectives were posed to determine:

1. The prevalence physical inactivity and some selected risk factors (hypertension, waist circumferences and obesity) profile of local government employees of Vhembe district.
2. The relationship between body mass index, waist circumferences, physical activity index and blood pressure among local government employees in the Vhembe district.

Chapter One provided a brief introduction and outline of the problem statement which underlined the research questions, objectives and hypothesis that form the basis of the study. The dissertation is submitted in article format and therefore includes a literature review (Chapter Two) and one research article (Chapter Three) to be presented to an accredited peer-reviewed journal.

Chapter Two presented a literature review on physical activity and some selected risk factors of chronic disease in employees. The literature review focused on physical activity and selected health risk factors, global health trends and effects of NCDs among employees and the relationship between physical activity and risk factors. From the reviewed literature it was found that physical inactivity is a leading cause of risk factors of chronic diseases, and there is an inverse relationship between physical activity and the risk factors. Physical inactivity is a behavioural risk factor that is associated with several chronic diseases such as coronary heart disease, non-insulin dependent diabetes mellitus, osteoporosis, hypertension, obesity, and cancer (Warburton *et al.*, 2006:801). Chronic disease of lifestyle, also called non-communicable diseases, are a group of diseases accounting for millions of death globally each year. In 2005, Statistics South Africa revealed that 20% of deaths in the age group of 34-64 years of age resulted from chronic diseases of lifestyle (STSA, 2005). The increase in the prevalence of NCDs is accompanied by an increase in risk factors for these diseases such as insufficient physical activity, smoking and poor nutritional habits (Mayosi *et al.*, 2009:934). Employers and employees throughout the world are facing immense challenges with an ongoing economic crisis, an increasingly fast-paced business environment, growing demands for productivity, and a global rise in chronic diseases (WHO, 2008). Lack of physical activity is one of the central risk factors especially for CVD and diabetes, contributing to 2-3% of the global burden of diseases (WHO, 2002). It has been shown that at least 60% of the world population does not undertake sufficient physical activity to gain health benefits (WHO, 2002, Bull *et al.*, 2005:729). Health-enhancing physical activity was inversely related to body mass index (BMI), waist circumferences and blood pressure, consistently health-related physical activity levels have been related to risk factors of cardiovascular diseases, including body mass index, waist circumference, blood pressure, high density-lipoprotein (HDL) and blood cholesterol levels in

occupational groups (Chan *et al.*, 2003:1563-1570), as well as in the general population (Luke *et al.*, 2011:387 & Muhihi *et al.*, 2012:11).

This chapter end with a summary.

Chapter Three was presented in the form of a research article. The literature review, method of research, research design, results, discussion and conclusion were presented in the article. The title of the article is as follows:

'Physical activity and selected health risk factors profiles among local government employees in Vhembe District, Limpopo Provincé.

4.2 CONCLUSION

The conclusions drawn from this research are in accordance with the hypothesis set in Chapter One.

Hypothesis 1: A high prevalence of physical inactivity and risk factors of chronic disease among local government employees in Vhembe District will be found. The results showed high (72%) prevalence of physical inactivity among employees. The high prevalence of physical inactivity was more pronounced in women (84%) as compared to men (72%), and also varies by age groups. Additionally, the results show the prevalence's of both overweight and obesity (26.6%; 35.1%) and a high risk of WC (48%) in the total sample. Women (49.6%) accounted for a higher percentage of obesity as compared to the men (18.7%). For the total group, the prevalence of pre-hypertension for SBP was 20.5% and 13.3% for DBP, and hypertension for SBP was 49.3% and 24.2% for DBP, respectively. Women showed a high prevalence of systolic hypertension (50%) as compared to men (48.6%), and these differ by levels of PA and age groups. Hypothesis (1) can therefore be accepted.

Hypothesis 2: A significant relationship between physical activity, BMI, waist circumference and blood pressure among local government employees in Vhembe District will be found. The results indicated that there was significant positive relationship between measures of abdominal

fatness and blood pressure, especially in women. The PAI was negatively related with age ($r = -0.15$; $p = 0.000$), fatness (BMI) ($r = -0.14$; $p = 0.01$). PAI showed inverse relationship with SBP ($r = -0.09$; $p = 0.03$) and DBP ($r = -0.10$; $p = 0.02$). Hypothesis (2) is therefore, partially accepted.

4.3 LIMITATIONS

The present study has several limitations which should be noted when interpreting the results and which could be overcome in future research. The limitations are as follows:

The exclusion of other local municipalities within the Vhembe district which didn't participate in this study due to permissions not being granted: inclusion of more municipalities would have provided more reliable data about the health status of the government employees within the Vhembe district. The other major limitation was lack of knowledge about physical activity and its relationship with risk factors of chronic disease, which may have resulted in some participants not understanding how to answer the questions about physical activity and refusing to participate in some of the clinical measurements. The paucity of research about health risk factors in South African municipality employees leads to a limited review of literature.

4.4 FUTURE RESEARCH

From this study it appears that there is a specific need for further research on the following aspects so as to expand the knowledge of the physical activity and selected health risk factors among local government employees in Vhembe district, viz.

- To determine the effects of physical activity on risk factors of chronic diseases among employees of local government.
- To assess the effectiveness of physical activity in the management of non-communicable diseases among local government employees.
- To determine the perception about physical activity participation and its benefits among local government employees.
- To determine the relationship between physical activity and non-communicable diseases among employees in municipalities.

- Longitudinal study in this region is highly required.

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Appendix A:
**Guidelines for Authors, the African Journal
for Physical, Health Education, Recreation
and Dance (AJPHERD)**

GUIDELINES FOR AUTHORS

The African Journal for Physical, Health Education, Recreation and Dance (AJPHERD) is a peer-reviewed journal established to:

- i) Provide a forum for physical educators, health educators, specialists in human movement studies and dance, as well as other sport-related professionals in Africa, the opportunity to report their research findings based on African settings and experiences, and also to exchange ideas among themselves,
- ii) Afford the professionals and other interested individuals in these disciplines the opportunity to learn more about the practice of the disciplines in different parts of the continent,
- iii) Create awareness in the rest of the world about the professional practice in the disciplines in Africa.

GENERAL POLICY

AJPHERD publishes research papers that contribute to knowledge and practice, and also develops theory either as new information, reviews, confirmation of previous findings, application of new teaching/coaching techniques and research notes. Letters to the editor relating to the materials previously published in AJPHERD could be submitted within 3 months after publication of the article in question. Such letter will be referred to the corresponding author and both the letter and response will be published concurrently in a subsequent issue of the journal.

Manuscripts are considered for publication in AJPHERD based on the understanding that they have not been published or submitted for publication in any other journal. In submitting papers for publication, corresponding authors should make such declarations. Where part of a paper has been published or presented at congresses,

seminars or symposia, reference to that publication should be made in the acknowledgement section of the manuscript.

AJPHERD is published quarterly, i.e. in March, June, September and December. Supplements/Special editions are also published periodically.

SUBMISSION OF MANUSCRIPT

Three copies of original manuscript and all correspondence should be addressed to the Editor-In-Chief:

Professor L. O. Amusa

Centre for Biokinetics, Recreation

and Sport Science, University of Venda for Science and Technology,

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Thohoyandou 0950

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Fax: +27 15 9628076/9628035

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Articles can also be submitted electronically, i.e. via e-mail attachment. However, the corresponding author should ensure that such articles are virus free. AJPHERD reviewing process normally takes 4-6 weeks and authors will be advised about the decision on submitted manuscripts within 60 days. In order to ensure anonymity during the reviewing process authors are requested to avoid self-referencing or keep it to the barest minimum.

PREPARATION OF MANUSCRIPT

Manuscripts should be type written in fluent English (using 12-point Times New Roman font and 1½ line-spacing) on one side of white A4-sized paper justified fully with 3cm margin on all sides. *Guidelines for Authors* 317

In preparing manuscripts, MS-Word, Office 98 or Office 2000 for Windows should be used. Length of manuscripts should not normally exceed 12 printed pages (including tables, figures, references, etc.). For articles exceeding 10 typed pages US\$ 10.0 is charged per every extra page. Longer manuscripts may be accepted for publication as supplements or special research reviews. Authors will be requested to pay a publication charge of US\$ 350.0 to defray the very high cost of publication. The pages of manuscripts must be numbered sequentially beginning with the title page. The presentation format should be consistent with the guidelines in the publication format of the American Psychological Association (APA) (4th edition).

Title page:

The title page of the manuscript should contain the following information:

Concise and informative title.

Author(s') name(s) with first and middle initials. Authors' highest qualifications and main area of research specialisation should be provided.

Author(s') institutional addresses, including telephone and fax numbers.

Corresponding author's contact details, including e-mail address.

A short running title of not more than 6 words.

Abstract

An abstract of 200-250 words is required with up to a maximum of 5 words provided below the abstract. Abstract must be typed on a separate page using single line spacing, with the purpose of the study, methods, major results and conclusions concisely presented. Abbreviations should either be defined or excluded.

Text

Text should carry the following designated headings: Introduction, materials and methods, results, discussion, acknowledgement, references and appendices (if appropriate).

Introduction

The introduction should start on a new page and in addition to comprehensively giving the background of the study should clearly state the problem and purpose of the study. Authors should cite relevant references to support the basis of the study. A concise but informative and critical literature review is required.

Materials and Methods

This section should provide sufficient and relevant information regarding study participants, instrumentation, research design, validity and reliability estimates, data collection procedures, statistical methods and data analysis techniques used. Qualitative research techniques are also acceptable.

Results

Findings should be presented precisely and clearly. Tables and figures must be presented separately or at the end of the manuscript and their appropriate locations in the text indicated. The results section should not contain materials that are appropriate for presentation under the discussion section. Formulas, units and quantities should be expressed in the *systeme318 Guidelines for Authors internationale (SI)* units. Colour printing of figures and tables is expensive and could be done upon request authors' expense.

Discussion

The discussion section should reflect only important aspects of the study and its major conclusions. Information presented in the results section should not be repeated under the discussion. Relevant references should be cited in order to justify the findings of the study. Overall, the discussion should be critical and tactfully written.

References

The American Psychological Association (APA) format should be used for referencing. Only references cited in the text should be alphabetically listed in the reference section at the end of the article. References should not be numbered either in the text or in the reference list.

Authors are advised to consider the following examples in referencing:

Examples of citations in body of the text:-

For one or two authors; Kruger (2003) and Travill and Lloyd (1998). These references should be cited as follows when indicated at the end of a statement: (Kruger, 2003); (Travill& Lloyd, 1998).

For three or more authors cited for the first time in the text; Monyeki, Brits, Mantsena and Toriola (2002) or when cited at the end of a statement as in the preceding example; (Monyeki, Brits, Mantsena&Toriola, 2002). For subsequent citations of the same reference it suffices to cite this particular reference as: Monyeki et al. (2002).

Multiple references when cited in the body of the text should be listed chronologically in ascending order, i.e. starting with the oldest reference. These should be separated with semi colons. For example, (Tom, 1982; McDaniels&Jooste, 1990; van Heerden, 2001; de Ridder et al., 2003).

Reference List

In compiling the reference list at the end of the text the following examples for journal references, chapter from a book, book publication and electronic citations should be considered:

Examples of onejournal references:

Journal references should include the surname and initials of the author(s), year of publication, title of paper, name of the journal in which the paper has been published, volume and number of journal issue and page numbers.

For one author: McDonald, A.K. (1999). Youth sports in Africa: A review of programmes in selected countries. *International Journal of Youth Sports*, 1(4), 102-117.

For two authors: Johnson, A.G. & O'Kefee, L.M. (2003). Analysis of performance factors in provincial table tennis players. *Journal of Sport Performance*, 2(3), 12-31.

For multiple authors: Kemper, G.A., McPherson, A.B., Toledo, I. & Abdullah, I.I. (1996). Kinematic analysis of forehand smash in badminton. *Science of Racket Sports*, 24(2), 99-112.

Examples of book references: *Guidelines for Authors* 319

Book references should specify the surname and initials of the author(s), year of publication of the book, title, edition, page numbers written in brackets, city where book was published and name of publishers. Chapter references should include the name(s) of the editor(s) and other specific information provided in the third example below:

For authored references: Amusa, L.O. & Toriola, A.L. (2003). *Foundations of Sport Science* (1st ed.) (pp. 39-45). Mokopane, South Africa: Dynasty Printers.

For edited references: Amusa, L.O. and Toriola, A.L. (Eds.) (2003). *Contemporary Issues in Physical Education and Sports* (2nd ed.) (pp. 20-24). Mokopane, South Africa: Dynasty Printers.

For chapter references in a book: Adams, L.L. & Neveling, I.A. (2004). Body fat characteristics of sumo wrestlers. In J.K. Manny and F.O. Boyd (Eds.), *Advances in Kinanthropometry* (pp. 21-29). Johannesburg, South Africa: The Publishers Company Ltd.

Example of electronic references:

Electronic sources should be easily accessible. Details of Internet website links should also be provided fully. Consider the following example:

Wilson, G.A. (1997). Does sport sponsorship have a direct effect on product sales? *The Cyber-Journal of Sport Marketing (online)*, October, 1(4), at <http://www.cad.gu.au/cjasm/wilson.html>. February 1997.

PROOFREADING

Manuscript accepted for publication may be returned to the author(s) for final correction and proofreading. Corrected proofs should be returned to the Editor-In-Chief within one week of receipt. Minor editorial corrections are handled by AJPHERD.

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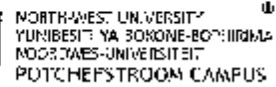
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Appendix B:

Ethical approval



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Faculty of Health Sciences
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Email: Marie.Groeninger@wva.ac.za

File reference: 44-38861-25-1351

APPENDIX C:
LETTER TO VHEMBE DISTRICT

P.O.BOX
THOHOYANDOU
0950
27 JUNE 2013

THE MUNICIPAL MANAGER
P.O.BOX
THOHOYANDOU
0950

Dear sir/madam

Re: Permission to do research in the Vhembe District municipalities

I hereby respectfully request permission to conduct/undertake a research project as stated above.
Please find attached of the concise outline of the motivation and details of the proposal.

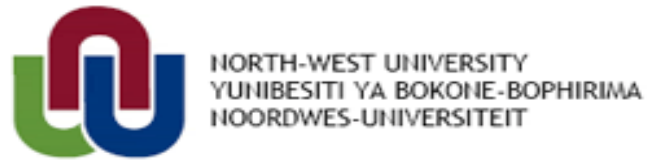
I hope that my request will receive your positive response

Yours faithfully

T.Muluvhu

APPENDIX D:

**INFORMATION LEAFLET,
INFORMED CONSENT, DATA
PROFORMA AND
QUESTIONNAIRES**



School of Biokinetics, Recreation and Sport Science

Private Bag x6001,

Potchefstroom

2520

South Africa

INFORMATION LEAFLET, INFORMED CONSENT, DATA PROFORMA AND QUESTIONNAIRES

PROJECT TITLE: Physical activity and selected health risk factors among local government employees in Vhembe District, Limpopo Province

Primary investigators: Prof. M.A. Monyeki and Mr T. Muluvhu [Biokineticists and a lecturer at University of Venda]

Study leader: Prof M.A. Monyeki, PHASReC; School of Biokinetics, Recreation and Sport Science, Potchefstroom Campus of the North-West University, Potchefstroom

Co-study leader: Prof. G.L. Strydom [Biokineticists]

Dear Potential research participant,

You are invited to participate in a research study that forms part of my formal MSc-studies. It is envisaged that this degree will be taken at the North-West University as University of Venda does not offer this at present. This information leaflet will help you to decide if you would like to participate. Before you agree to take part, you should fully understand what is involved. You should not agree to take part unless you are completely satisfied with all aspects of the study.

WHAT IS THE STUDY ALL ABOUT?

Physical inactivity is a global, public health concern affecting all people in different walks of life, including employees (Lee & Paffenbarger; 2000:293-299, Allman_Farinell *et al.*, 2010:14). It is also well documented that physical inactivity is positively associated with other health risk indicators which include obesity, dyslipidaemia and hypertension (Ehrman *et al.*, 2009). The higher the prevalence of health risks in an individual, the greater the risk for morbidity and mortality (Looock *et al.*, 2011:624-635).

Research on high level employees in the South African corporate sector indicates that the working environment is not always beneficial for good health of employees (Boshoff, 2000:256), and that almost 97% of the management already shows some definite risk factors for the development of coronary heart diseases (Jacobs, 1991). Van Zyl (1995) found that 62% of employees in middle management positions has elevated total cholesterol. Those findings are not surprising, especially when considering the low levels of participation in physical activities typical of this population. In support of this, Uys and Coetzee (1989:4) found that only 12% of male managers in South Africa considered physical activity a priority in their schedule while Dreyer (1991) reported that only 14.3% of male managers participated in regular and adequate physical activity to render any significant health benefits. The presence of lifestyle related chronic diseases and indeed their associated risk factors may contribute to a decline in workplace productivity and hence in economic loss and may lead to a decline in quality of life of employees. Therefore, employers should be mindful of the health status of their employees (Sealy *et al.*, 2010).

It is against this background that the following research questions are posed: What is the physical activity; some selected risk factors of chronic diseases and lifestyle profiles of local government employees in Vhembe District of Limpopo Province? And what is the relationship between physical activity and selected risk factors of chronic diseases among local government employees in Vhembe District of Limpopo Province? Answers to these questions may provide the professionals working in the field of endeavour and companies with scientifically researched information regarding the importance of physical activity and its beneficial effects. Additionally, the results will provide biokineticists with valuable information in the design of physical activity training programs, hence strategic programs geared towards the management of chronic diseases of lifestyle through the use of physical activity. The objectives of this research are to determine: 2.1) The physical activity, some selected risk factors of chronic diseases (hypertension, hyperlipidaemia, diabetes and obesity) and lifestyle profiles of local government employees in Vhembe District, and 2.2) The relationship between physical activity and some selected risk factors of chronic diseases (hypertension, hyperlipidaemia, diabetes and obesity) among local government employees in Vhembe District.

WHAT WILL YOU BE REQUIRED TO DO IN THE STUDY?

1) The procedures that will be performed on/with the research participants,

Upon agreeing to take part in the study you will be requested to complete an informed consent. Subsequently, you will be taken through to complete demographic questionnaire (i.e. name, age, gender, occupation, locality, medical history). You will also be requested with the help of the researchers to complete an International Physical Activity Questionnaire made out of 27 questions which seeks to gather information on the activities you do at work, as part of your house and yard work, to get from place to place, and in your spare time for recreation, exercise or sport. The long form of the IPAQ will be requiring about 20 minutes to complete. The IPAQ assessed moderate and vigorous physical activity in four life domains: job-related work done outside the home (paid jobs, farming, volunteer work, and course work), house and yard work (outside and inside the home), recreation, and transportation (to locations such as work by bicycle or automobile, train, or other motor vehicle) among young and middle-aged adults (Craig *et al.* 2003). It includes a separate measurement of time spent sitting at a desk, visiting friends, reading, or watching television. Walking will be assessed as part of occupation, transportation, and recreational activities but its intensity was not measured. Moderate physical activity is

described as activities that made you breathe somewhat harder than normal; vigorous physical activity was described as activities that made you breathe much harder than normal. Physical activity was measured in a frequency-by-duration format on a per week basis. The long form of the IPAQ instrument is available online at <http://www.ipaq.ki.se> website.

The **Lifestyle Questionnaire** by Belloc and Breslow (1972) will be used to determine the lifestyle index (LSI) of the respondents. This questionnaire is based on the 7 basic healthy lifestyles as described by Belloc and Breslow (1972:46-64). The respondents will indicate which of the following lifestyles they are following: not smoking, moderate physical activity 2-3 times per week, moderate or no alcohol intake, 7-8 hours sleep per night, manage a moderate body weight, eat breakfast daily and taking 3 meals per day. For the purpose of this study, the respondents will be classified into those following a bad lifestyle (<3), moderate (4-5) and good lifestyle (>6) (Kriel, 2004).

The **Coronary Risk Index Questionnaire** by Björstöm and Alexiou (1978) will be used to determine the risk of the participants to develop coronary heart disease. The questionnaire contains 14 risk factors which carry a certain weight depending on the presence or severity of the risk factor. For instance, non-smoking is weighted 0 while smoking more than 30 cigarettes is weighted 10. The weight of the 14 risk factors are calculated and express a coronary risk index (CRI). A total CRI of ≤ 21 is described as a low risk, while an index of 22-30 and ≥ 31 will be described as moderate and high risk respectively.

Anthropometric measurements

Standing height will be measured to the nearest 0.1 cm, using a stadiometer. Body mass will be measured using a portable calibrated scale and recorded to the nearest 0.5 kg according to standard procedures of ISAK (Stewart et al. 2011).. Body mass index (BMI) will be calculated as body mass (kg) divided by height (m) squared (kg/m^2). Waist and hip circumferences will be measured using a standard tape measure and in accordance with procedure recommended by the American College of Sports Medicine (ACSM, 2010). In performing these measurements you will be requested to take out your shoes and minimise your clothes; for example by requesting you to taking out jackets and anything heavy in your pockets.

Cholesterol and glucose screening

Total blood cholesterol and glucose levels will be determined after a fasting period of ten hours using capillary blood sample obtained using finger prick. The sample will be placed on the PTS panels glucose and lipids test strips and analysed using cardiocheck®PA Analyser (Polymer technology systems, Inc., USA).

Blood pressure

Blood pressure will be measured by using an automated sphygmomanometer (Omron, Health care, Inc., USA). You will be requested to be seated for 10 minutes; and the blood pressure will be determined according to the protocol as suggested by ACSM (2010).

Cut-off points

The American College of Sports Medicine has identified thresholds above which individuals will be at increased risk for cardiovascular diseases (ACSM, 2010), these thresholds that will be utilised to describe risk include the following:

- Obesity – BMI $\geq 30 \text{ kg/m}^2$ or waist girth $> 102 \text{ cm}$ for males and $> 88 \text{ cm}$ for females.

- Blood pressure – systolic blood pressure ≥ 140 mmHG and for diastolic blood pressure ≥ 90 mmHG or patient on hypertension treatment.
- Total cholesterol- ≥ 5.18 mmol/l or patient using lipid lowering drugs.
- Impaired fasting glucose - ≥ 5.5 mmol/l or patient using diabetic medication

The project will take place at your own workplace at a venue to be arranged with you council management and will be given to you a day before the actual measurements. Measurements will be performed separately for men and women.

NB: There will be no total or full blood sample (e.g. 10ml via venipunctures from the vein in the fold of the elbow) will be drawn from you.

ARE THERE ANY CONDITIONS THAT MAY EXCLUDE YOU FROM THE STUDY?

You will not be eligible to participate in this study if you currently suffer from any of the following conditions extremely sick. Also, if you are below 25 and 66 years old and not leaving in Vhembe District around Thulamela, Makhado, Musina and Mutale Municipalities, you will be excluded from the study.

CAN ANY OF THE STUDY PROCEDURES RESULT IN PERSONAL RISK, DISCOMFORT OR INCONVENIENCE?

Questionnaires: The study and procedures involve no foreseeable physical discomfort or inconvenience to you or your family. Due to the personal nature of the questions, you may experience some emotional discomfort. The information to be provided by you will be kept confidential in the sense that your name will not be used but the research ID number.

Finger prick: These devices are used to collect a drop of blood for sampling. Most finger-pricking devices resemble a ball point pen and contain a sharp, spring loaded lancet which momentarily pierces the skin. These have both a disposable lancet and disposable plastic tip surrounding the lancet, so that all parts, which come into contact with the patient's skin, can be discarded to minimise the risk of transmission of disease. Both lancet and plastic tip should be safely disposed of after use. Each will be used to one individual and not shared among you as a means to control risk transmission of diseases. The device is used in hospital clinics, laboratories and rest homes.

We will at all cost minimise the risk/ discomfort or inconvenience by ensuring that the measurements are performed according to prescribed procedures and the study protocol.

WHAT ARE THE POTENTIAL BENEFITS THAT MAY COME FROM THE STUDY?

The benefits of participating in this study are:

- You will make a contribution towards establishing a profile of physical inactivity and risk factors of life amongst employees in the Vhembe District Municipality.
- You will receive personal information on your physical activity classification, cholesterol; glucose and cardiovascular disease risk classification; and lifestyle and coronary risk profile.
- You will be invited to attend an information session presented by a Biokineticists,

Physical Activity Epidemiologist; nutritionist and sport scientist.

WILL YOU RECEIVE ANY FINANCIAL COMPENSATION OR INCENTIVE FOR PARTICIPATING IN THE STUDY?

Please note that you **will not** be paid to participate in the study. However, you will receive refreshments after completion of the study protocol.

You will receive a once-off cash payment of R50-00 at the end of the interview session.

WHAT ARE YOUR RIGHTS AS A PARTICIPANT IN THIS STUDY?

Your participation in this study is entirely voluntary. You have the right to withdraw at any stage without any penalty or future disadvantage whatsoever. You don't even have to provide the reason/s for your decision. Your withdrawal will in no way influence your continued care and relationship with the health care team. Note that you are not waiving any legal claims, rights or remedies because of your participation in this research study.

(The formulation of the above paragraph should be adapted to suit the context of each specific study)

HOW WILL CONFIDENTIALITY AND ANONYMITY BE ENSURED IN THE STUDY?

(Possible formulations for this section, depending on the type of study, follow below.)

All information obtained during the course of this study is strictly confidential. The study data will be coded so that it will not be linked to your name. Your identity will not be revealed while the study is being conducted or when the study is reported in scientific journals. All the data sheets that have been collected will be stored in a secure place of the North-West University. Any information that is obtained in connection with this study and that can be identified with you will remain confidential and will be disclosed only with your permission or as required by law. The information received during the project will only be used for research purposes and will not be released for any employment-related performance evaluation, promotion and/or disciplinary purposes.

IS THE RESEARCHER QUALIFIED TO CARRY OUT THE STUDY?

The researcher is a qualified Biokineticists who has extensive industrial experience and knowledge about doing research. Furthermore, the team involved in the study is made out of the experts in the field of Biokineticists, Physical Activity Epidemiology who have track record in field research. The primary researcher comes from the same geographical region as you. This means that he/she deeply understands your cultural context and can fluently speak the local languages. The field workers will be students from the University of Venda who also understand the language and cultural practice in the area.

HAS THE STUDY RECEIVED ETHICAL APPROVAL?

Yes. The Ethic Committee of North-West University have approved the formal study proposal (NWU-00125-13-51). All parts of the study will be conducted according to

internationally accepted ethical principles.

WHO CAN YOU CONTACT FOR ADDITIONAL INFORMATION REGARDING THE STUDY?

The primary investigator, Mr T. Muluvhu, can be contacted during office hours at on her cellular phone at 0734325234. The study leader, Prof M.A. Monyeki, can be contacted during office hours at Tel (018) 2991790. Should you have any questions regarding the ethical aspects of the study, you can contact the chairperson of the NWU Research Ethics Committee, Prof. M. Greeff, during office hours at Tel (018) 2992092, E-mail minrie.greeff@nwu.ac.za. Alternatively, you can report any serious unethical behaviour at the office of the Vice-Rector: Research and Planning at 018 299 2607.

DECLARATION: CONFLICT OF INTEREST

This research study will be jointly be under the collaborative discretions between NWU and UNIVEN. Any financial support towards the study will be from the two universities. No publication prohibitions, conditions or limitations were placed on the researcher.

A FINAL WORD

Your co-operation and participation in the study will be greatly appreciated. Please sign the informed consent below if you agree to participate in the study. In such a case, you will receive a copy of the signed informed consent from the researcher and an original copy will be kept locked until the entire duration of the study (i.e. writing of the report).

Research Project: Physical activity and selected health risk factors among local government employees in Vhembe District, Limpopo Province

CONSENT

I hereby confirm that I have been adequately informed by the researcher about the nature, conduct, benefits and risks of the study. I have also received, read and understood the above written information. I am aware that the results of the study will be anonymously processed into a research report. I understand that my participation is voluntary and that I may, at any stage, without prejudice, withdraw my consent and participation in the study. I had sufficient opportunity to ask questions and of my own free will declare myself prepared to participate in the study.

Research participant's name: _____ (Please print)

Research participant's signature: _____

Date: _____

Researcher's name: _____ (Please print)

Researcher's signature: _____

Date: _____

Research Project: Physical activity and selected health risk factors among local government employees in Vhembe District, Limpopo Province

VERBAL CONSENT

(Applicable when participants cannot read or write)

I hereby declare that I have read and explained the contents of the information sheet to the research participant. The nature and purpose of the study were explained, as well as the possible risks and benefits of the study. The research participant has clearly indicated that he/she is aware of the right to withdraw from the study at any time, for any reason and without jeopardizing his/her relationship with the research team. I hereby certify that the research participant has verbally agreed to participate in this study.

Research participant's name: _____ (Please print)

Researcher's name: _____ (Please print)

Researcher's signature: _____

Date: _____

ANTHROPOMETRIC AND PHYSIOLOGICAL MEASUREMENTS

Participants Number				
Age				
		<u>1</u>	<u>2</u>	Average
	Height (cm)			
	Weight (kg)			
	Waist circumference (cm)			
	Blood pressure			
	Cholesterol and Glucose			

QUESTIONNAIRES

INTERNATIONAL PHYSICAL ACTIVITY QUESTIONNAIRE (October 2002)

LONG LAST 7 DAYS SELF-ADMINISTERED FORMAT

FOR USE WITH YOUNG AND MIDDLE-AGED ADULTS (15-69 years)

The International Physical Activity Questionnaires (IPAQ) comprises a set of 4 questionnaires. Long (5 activity domains asked independently) and short (4 generic items) versions for use by either telephone or self-administered methods are available. The purpose of the questionnaires is to provide common instruments that can be used to obtain internationally comparable data on health-related physical activity.

Background on IPAQ

The development of an international measure for physical activity commenced in Geneva in 1998 and was followed by extensive reliability and validity testing undertaken across 12 countries (14 sites) during 2000. The final results suggest that these measures have acceptable measurement properties for use in many settings and in different languages, and are suitable for national population-based prevalence studies of participation in physical activity.

Using IPAQ

Use of the IPAQ instruments for monitoring and research purposes is encouraged. It is recommended that no changes be made to the order or wording of the questions as this will affect the psychometric properties of the instruments.

Translation from English and Cultural Adaptation

Translation from English is encouraged to facilitate worldwide use of IPAQ. Information on the availability of IPAQ in different languages can be obtained at www.ipaq.ki.se. If a new translation is undertaken we highly recommend using the prescribed back translation methods available on the IPAQ website. If possible please consider making your translated version of IPAQ available to others by contributing it to the IPAQ website. Further details on translation and cultural adaptation can be downloaded from the website.

Further Developments of IPAQ

International collaboration on IPAQ is on-going and an ***International Physical Activity Prevalence Study*** is in progress. For further information see the IPAQ website.

More Information

More detailed information on the IPAQ process and the research methods used in the development of IPAQ instruments is available at www.ipaq.ki.se and Booth, M.L. (2000). *Assessment of Physical Activity: An International Perspective*. Research Quarterly for Exercise and Sport, 71 (2): s114-20. Other scientific publications and presentations on the use of IPAQ are summarized on the website.

INTERNATIONAL PHYSICAL ACTIVITY QUESTIONNAIRE

We are interested in finding out about the kinds of physical activities that people do as part of their everyday lives. The questions will ask you about the time you spent being physically active in the **last 7 days**. Please answer each question even if you do not consider yourself to be an active person. Please think about the activities you do at work, as part of your house and yard work, to get from place to place, and in your spare time for recreation, exercise or sport.

Think about all the **vigorous** and **moderate** activities that you did in the **last 7 days**. **Vigorous** physical activities refer to activities that take hard physical effort and make you breathe much harder than normal. **Moderate** activities refer to activities that take moderate physical effort and make you breathe somewhat harder than normal.

PART 1: JOB-RELATED PHYSICAL ACTIVITY

The first section is about your work. This includes paid jobs, farming, volunteer work, course work, and any other unpaid work that you did outside your home. Do not include unpaid work you might do around your home, like housework, yard work, general maintenance, and caring for your family. These are asked in Part 3.

1. Do you currently have a job or do any unpaid work outside your home?

☐

Yes

☐

No



Skip to PART 2: TRANSPORTATION

The next questions are about all the physical activity you did in the **last 7 days** as part of your paid or unpaid work. This does not include traveling to and from work.

2. During the **last 7 days**, on how many days did you do **vigorous/ hard** physical activities like heavy lifting, digging, heavy construction, or climbing up stairs **as part of your work**? Think about only those physical activities that you did for at least 10 minutes at a time.

_____ **days per week**

☐

No vigorous job-related physical activity



Skip to question 4

3. How much time did you usually spend on one of those days doing **vigorous/ hard** physical activities as part of your work?

_____ **hours per day**
_____ **minutes per day**

4. Again, think about only those physical activities that you did for at least 10 minutes at a time. During the **last 7 days**, on how many days did you do **moderate** physical activities like carrying light loads **as part of your work**? Please do not include walking.

_____ **days per week**

☐

No moderate job-related physical activity



Skip to question 6

5. How much time did you usually spend on one of those days doing **moderate** physical activities as part of your work?

_____ **hours per day**
_____ **minutes per day**

6. During the **last 7 days**, on how many days did you **walk** for at least 10 minutes at a time **as part of your work**? Please do not count any walking you did to travel to or from work.

_____ **days per week**

☐

No job-related walking



Skip to PART 2: TRANSPORTATION

7. How much time did you usually spend on one of those days **walking** as part of your work?

_____ **hours per day**
_____ **minutes per day**

PART 2: TRANSPORTATION PHYSICAL ACTIVITY

These questions are about how you traveled from place to place, including to places like work, stores, movies, and so on.

8. During the **last 7 days**, on how many days did you **travel in a motor vehicle** like a bus, car etc.?

_____ **days per week**

☐

No traveling in a motor vehicle



Skip to question 10

9. How much time did you usually spend on one of those days **traveling** in a bus, car or other kind of motor vehicle?

_____ **hours per day**
_____ **minutes per day**

Now think only about the **bicycling** and **walking** you might have done to travel to and from work, to do errands, or to go from place to place.

10. During the **last 7 days**, on how many days did you **bicycle** for at least 10 minutes at a time to go **from place to place**?

_____ **days per week**

☐

No bicycling from place to place



Skip to question 12

11. How much time did you usually spend on one of those days to **bicycle** from place to place?

_____ **hours per day**
_____ **minutes per day**

12. During the **last 7 days**, on how many days did you **walk** for at least 10 minutes at a time to go **from place to place**?

_____ **days per week**

☐

No walking from place to place



***Skip to PART 3:
HOUSEWORK,
HOUSE
MAINTENANCE, AND
CARING FOR FAMILY***

13. How much time did you usually spend on one of those days **walking** from place to place?

_____ **hours per day**
_____ **minutes per day**

PART 3: HOUSEWORK, HOUSE MAINTENANCE, AND CARING FOR FAMILY

This section is about some of the physical activities you might have done in the **last 7 days** in and around your home, like housework, gardening, yard work, general maintenance work, and caring for your family.

14. Think about only those physical activities that you did for at least 10 minutes at a time. During the **last 7 days**, on how many days did you do **vigorous/hard** physical activities like heavy lifting, chopping wood, shoveling, or digging **in the garden or yard**?

_____ **days per week**

☐

No vigorous activity in garden or yard



Skip to question 16

15. How much time did you usually spend on one of those days doing **vigorous/hard** physical activities in the garden or yard?

_____ **hours per day**
_____ **minutes per day**

16. Again, think about only those physical activities that you did for at least 10 minutes at a time. During the **last 7 days**, on how many days did you do **moderate** activities like carrying light loads, sweeping, washing windows, and raking **in the garden or yard**?

_____ **days per week**

☐

No moderate activity in garden or yard



Skip to question 18

17. How much time did you usually spend on one of those days doing **moderate** physical activities in the garden or yard?

_____ **hours per day**
_____ **minutes per day**

18. Once again, think about only those physical activities that you did for at least 10 minutes at a time. During the **last 7 days**, on how many days did you do **moderate** activities like carrying light loads, washing windows, scrubbing floors and sweeping **inside your home**?

_____ **days per week**

☐

No moderate activity inside home



***Skip to PART 4:
RECREATION, SPORT
AND LEISURE-TIME
PHYSICAL ACTIVITY***

19. How much time did you usually spend on one of those days doing **moderate** physical activities inside your home?

_____ **hours per day**
_____ **minutes per day**

PART 4: RECREATION, SPORT, AND LEISURE-TIME PHYSICAL ACTIVITY

This section is about all the physical activities that you did in the **last 7 days** solely for recreation, sport, exercise or leisure. Please do not include any activities you have already mentioned.

20. Not counting any walking you have already mentioned, during the **last 7 days**, on how many days did you **walk** for at least 10 minutes at a time **in your leisure time**?

_____ **days per week**

☐

No walking in leisure time



Skip to question 22

21. How much time did you usually spend on one of those days **walking** in your leisure time?

_____ **hours per day**
_____ **minutes per day**

22. Think about only those physical activities that you did for at least 10 minutes at a time. During the **last 7 days**, on how many days did you do **vigorous** physical activities like aerobics, running, fast bicycling, or fast swimming **in your leisure time**?

_____ **days per week**

☐

No vigorous activity in leisure time



Skip to question 24

23. How much time did you usually spend on one of those days doing **vigorous / hard** physical activities in your leisure time?

_____ **hours per day**
_____ **minutes per day**

24. Again, think about only those physical activities that you did for at least 10 minutes at a time. During the **last 7 days**, on how many days did you do **moderate** physical activities like bicycling at a regular pace, swimming at a regular pace, and doubles tennis **in your leisure time**?

_____ **days per week**

☐

No moderate activity in leisure time



***Skip to PART 5: TIME
SPENT SITTING***

25. How much time did you usually spend on one of those days doing **moderate** physical activities in your leisure time?

_____ **hours per day**
_____ **minutes per day**

PART 5: TIME SPENT SITTING

The last questions are about the time you spend sitting while at work, at home, while doing course work and during leisure time. This may include time spent sitting at a desk, visiting friends, reading or sitting or lying down to watch television. Do not include any time spent sitting in a motor vehicle that you have already told me about.

26. During the **last 7 days**, how much time did you usually spend **sitting** on a **weekday**?

_____ **hours per day**
_____ **minutes per day**

27. During the **last 7 days**, how much time did you usually spend **sitting** on a **weekend day**?

_____ **hours per day**
_____ **minutes per day**

**This is the end of the questionnaire, thank you for
participating.**

1. Demographic information

1.1 Surname: Initials:

Gender: Male Female

1.2 What was your age at your last birthday? (Full years)

1.3 Name of your company: _____

1.4 Your residential address:

[illegible]

1.5 What is your current job description?

What is your current job description?

Management level:	Top level	1	Middle level	2		
Race / Ethnic group*:						
Religious group*:						

* For the purpose of this study, this information is needed to determine the origin of certain dietary and lifestyle practices/patterns.

Mark the appropriate box with a ✓

1.6 What is your company's primary field of activity? ☐

Civil service	1
Motor industry	2
Steel and engineering	3
Finance	4
Academic	5
Building industry	6
Mining	7
Electricity	8
Other: <i>Please indicate</i>	9

1.7 How long have you been in your current position? ☐

< 6 months	1
6 – 12 months	2
1 – 2 years	3
2 – 5 years	4
5 – 10 years	5
> 10 years	6

1.8 In your opinion, are you sufficiently educated/trained to do your current job efficiently? ☐

Not at all	1
To a certain extent	2
Definitely	3

c1.9 What is your highest academic qualifications? ☐

Grade 11	1
Grade 12	2
Diploma (1 year study)	3
Diploma (2 year study)	4
Diploma (3 year study)	5
Diploma (> 3 year study)	6
Degree (3 year study)	7
Post-graduate degree (Hons., M.A., M.Sc., etc.)	8
3 year and diploma	9
Other	10

1.10 What is your nationality?

Mark the appropriate box with a ✓

2. Physical activity index

2.1 Do you participate in sport or any other kind of physical activity or physical recreation on a regular basis? ☐

Yes*	1
------	---

No	2
----	---

* If yes, please complete the table below. Please indicate how tired you get from participating (intensity), for how long you participate (duration) and how many times you participate per week (frequency).

Example:

Walking	✓				✓			✓	
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[illegible]

Mark the appropriate box with a ✓

3. Lifestyle

3.1 Daily habits

For each of the following statements mark the choice (Yes or No) that indicates your habits.

1. Do you eat 3 meals a day at regular times with no in-between snacking?
2. Do you eat breakfast every day?
3. Do you participate in moderate exercise two or three times a week?
4. Do you get adequate sleep (7 – 8 hours a night)?
5. Are you a non-smoker*?
6. Have you been able to maintain your body weight at a moderate level during the last 10 years?
7. Do you consume little or no alcohol?

Yes	No	
1	0	
1	0	
1	0	
1	0	
1	0	
1	0	
1	0	

- For the purpose of this study, ex-smokers who have stopped smoking for more than 1 year qualify as non-smokers.

3.2 Nutritional evaluation

3.2.1 Eating behaviour pattern

Indicate if the following is a reflection of your eating behaviour (Sometimes or Never).

1. Have you ever been on a weight reduction diet?
2. When watching TV, do you usually snack on different snack foods?
3. Do you tend to eat when you are bored?
4. Is your appetite usually reduced when you are emotionally upset?
5. Have you ever used appetite suppressants to help you control your weight?
6. Do you usually have cravings for starchy or sugary foods?
7. Do you tend to eat less when under stress?
8. Do you usually choose rich or creamy foods?
9. Do you tend to eat more when emotionally upset?
10. Do you usually wake up at night for something to eat?

1 = Sometimes	2 = Never

Mark the appropriate box with a ✓

3.2.2 Weekly food intake

Indicate how often you eat the following foods:

	< 1 per week	1 - 3 per week	> 3 per week
	1	2	3
1. Dark green and leafy vegetables, e.g. spinach, green beans, peas, etc.			
2. Dark yellow and orange vegetables and fruit, e.g. pumpkin, carrots and paw paw.			
3. Citrus fruits, e.g. orange, grapefruit, lemon, etc.			
4. Eggs			
5. Red meat, e.g. beef, pork, mutton, veal, etc.			
6. Fish or chicken			
7. Broccoli, cabbage, brussels sprouts, cauliflower			
8. Dairy products like cheese, milk and yoghurt			
9. Legumes, lentils, dried beans and baked beans			
10. Snack foods, e.g. chips, nuts, biltong, pies, etc.			
11. Sweets, chocolates, cakes, sweetened cooldrinks, sweet biscuits			

Mark the appropriate box with a ✓

4. Illness and coronary risk profile

4.1 Risk factors for coronary heart disease

Complete the table below by marking the appropriate space. Read from left to right.

Age	10 – 20 years	21 – 30 years	31 – 40 years	41 – 50 years	51 – 60 years	61+ years	8
Hereditary*: Parents and family	1 No family history of CVD	2 1 with CVD over 60 yrs	3 2 with CVD over 60 yrs	4 1 death from CVD under 60 yrs	5 2 deaths from CVD under 60 yrs	6 3 deaths from CVD under 60 yrs	7
Weight	0 5 kg under standard weight	1 Standard weight	2 1 – 5 kg overweight	3 11 – 15 kg overweight	4 16 – 20 kg overweight	5 21+ kg overweight	7
Smoking	0 No smoking	1 Occasional cigar/pipe	2 1 – 10 cigarettes per day	3 11 – 20 cigarettes per day	4 21 – 30 cigarettes per day	5 > 30 cigarettes per day	10
Exercise	0 Intensive occupational and recreational exercise	1 Moderate occupational and recreational exercise	2 Sedentary occupational and intensive recreation	3 Sedentary occupational and moderate recreation	4 Sedentary occupational and light recreation	5 Sedentary occupation and no exercise or recreation	8
Cholesterol	1 < 5.2 mmol/l ¹	2 Don't know	3 5.2 – 6.0 mmol/l ¹	4 6.1 – 6.6 mmol/l ¹	5 6.7 – 7.3 mmol/l ¹	6 7.4+ mmol/l ¹	7
Systolic bloodpressure	0 111 – 130 mm Hg.	1 131 – 140 mm Hg.	2 Don't know	3 141 – 160 mm Hg.	4 161 – 180 mm Hg.	5 > 180 mm Hg.	7
Diastolic bloodpressure	0 80 – 85 mm Hg.	1 86 – 90 mm Hg.	2 Don't know	3 91 – 95 mm Hg.	4 96 – 100 mm Hg.	5 > 101 mm Hg.	9
Gender	1 Female	2 Female over 45 yrs	3 Male	4 Bald male	5 Bald, short male	6 Bald, short, stocky male	7
Stress	1 No stress	2 Occasional mild stress	3 Frequent mild stress	4 Frequent moderate stress	5 Frequent high stress	6 Constant high stress	7
Present CVD* symptoms	0 None	1 Occasional tachycardia** and/or irregular rhythm	2 Frequent tachycardia** and/or irregular rhythm	3 Dyspnea on exertion***	4 Occasional angina***	5 Frequent angina***	10
Past personal history of CVD*	0 Completely benign	1 CVD symptoms not medically confirmed	2 History of CVD symptoms, examined by doctor	3 Mild CVD, no present symptoms	4 CVD under symptoms	5 Hospitalised for CVD	10
Diabetes	0 No family history	1 Positive family history	2 Diagnosed pre-diabetic	3 Diabetes: dietary control	4 Diabetes: oral control	5 Diabetes: insulin control	9
Gout	0 No family history	1 Family history	2 Elevated uric acid. No symptoms.	3 New onset gout: early detected	4 Repeated chronic gouty attacks	5 Gout with renal and ostea complications	8

* CVD = Cardiovascular disease (example: heart disease, heart attack, bypass, etc.)

** Tachycardia = Fast heartbeat (e.g. seen in normal persons after climbing stairs)

*** Dyspnea = Difficulty in breathing ("out of breath")

**** Angina = Pain in the chest

Circle the number/s

4.2 Illness rating scale

Circle the number indicating all the illnesses that you have experienced during the last year.

- | | | |
|------------------------------|--------------------------------------|----------------------------------|
| 1. Dandruff | 43. Hay fever | 85. Accidental poisoning |
| 2. Warts | 44. Low blood pressure | 86. Slipped disk |
| 3. Cold sore, cancer sore | 45. Eczema | 87. Hepatitis |
| 4. Corns | 46. Drug allergy | 88. Kidney stones |
| 5. Hiccups | 47. Bronchitis | 89. Peptic ulcer |
| 6. Bad breath | 48. Hyperventilation | 90. Pancreatitis |
| 7. Sty | 49. Shingles | 91. High blood pressure |
| 8. Common cold | 50. Glandular fever | 92. Smallpox |
| 9. Farsightedness | 51. Infected eye | 93. Deafness |
| 10. Nosebleed | 52. Bursitis | 94. Collapsed lung |
| 11. Sore throat | 53. Whooping cough | 95. Shark bite |
| 12. Nearsightedness | 54. Lumbago | 96. Epilepsy |
| 13. Sunburn | 55. Fibroids of the uterus | 97. Chest pain |
| 14. Constipation | 56. Migraine | 98. Nervous breakdown |
| 15. Astigmatism | 57. Hernia | 99. Diabetes |
| 16. Laryngitis | 58. Frostbite | 100. Blood clot in blood vessels |
| 17. Ringworm | 59. Goitre | 101. Hardening of the arteries |
| 18. Headache | 60. Abortion | 102. Emphysema |
| 19. Scabies | 61. Ovarian cyst | 103. Tuberculosis |
| 20. Boils | 62. Heatstroke | 104. Alcoholism |
| 21. Heartburn | 63. Gonorrhoea | 105. Drug addiction |
| 22. Acne | 64. Irregular heart beats | 106. Coma |
| 23. Abscessed tooth | 65. Overweight | 107. Cirrhosis of the liver |
| 24. Colour blindness | 66. Anemia | 108. Parkinson's disease |
| 25. Tonsillitis | 67. Anxiety reaction | 109. Blindness |
| 26. Diarrhoea | 68. Gout | 110. Mental retardation |
| 27. Carbuncle | 69. Snake bite | 111. Blood clot in the lung |
| 28. Chickenpox | 70. Appendicitis | 112. Manic depressive psychosis |
| 29. Menopause | 71. Pneumonia | 113. Stroke |
| 30. Mumps | 72. Depression | 114. Schizophrenia |
| 31. Dizziness | 73. Frigidity | 115. Muscular dystrophy |
| 32. Sinus infection | 74. Burns | 116. Congenital heart defects |
| 33. Bed sores | 75. Kidney infection | 117. Tumor in the spinal cord |
| 34. Increased menstrual flow | 76. Inability for sexual intercourse | 118. Cerebral palsy |
| 35. Fainting | 77. Hyperthyroid | 119. Heart failure |
| 36. Measles | 78. Asthma | 120. Heart attack |
| 37. Painful menstruation | 79. Glaucoma | 121. Brain infection |
| 38. Infection of middle ear | 80. Sexual deviation | 122. Multiple sclerosis |
| 39. Varicose veins | 81. Gallstones | 123. Bleeding in brain |
| 40. Psoriasis | 82. Arthritis | 124. Uremia |
| 41. No menstruation | 83. Starvation | 125. Cancer |
| 42. Hemorrhoids | 84. Syphilis | 126. Leukemia |

Mark the appropriate box with a ✓

5. Stress

Indicate how your behaviour matches the following statements.

	Often 2	A few times a month 1	Rarely 0
1. I have indigestion			
2. I have difficulty finding enough time to relax			
3. I smoke when I feel tense			
4. I sleep badly			
5. I find it difficult to concentrate on what I am doing because of worrying about other things			
6. I feel anxious			
7. I eat more when I am anxious			
8. I have headaches			
9. People at work make me feel tense			
10. I have aches and pains in my neck or shoulders			
11. Even if I find time, it is hard for me to relax			
12. People at home make me feel tense			
13. I drink alcoholic beverages when I feel tense			
14. My day is made up of many deadlines			
15. I can't turn off my thoughts for long enough at night or weekends to feel relaxed/refreshed the next day			
16. I take tranquillisers (or drugs) to relax			
17. I feel my heart beating fast			
18. My legs feel wobbly			
19. I perspire without even exercising			
20. I get angry/irritated quickly			
21. I am impatient and become frustrated with others			
22. I do things in a hurry			
23. I talk quickly			
24. I worry that there are so many things that I can do nothing about			
25. I cannot sit still for long			

Mark the appropriate box with a ✓

6. Emotional well-being

How often do you have any of the following experiences? Please use the following scale. ☐

	Never	Once	Rarely	Sometimes	Often	Usually	Always
	1	2	3	4	5	6	7
1. Being tired							
2. Feeling depressed							
3. Having a good day							
4. Being physically exhausted							
5. Being emotionally exhausted							
6. Being happy							
7. Feeling "wiped out"							
8. Feeling burnout							
9. Being unhappy							
10. Feeling rundown							
11. Feeling trapped							
12. Feeling worthless							
13. Being weary							
14. Being troubled							
15. Feeling disillusioned and resentful about people							
16. Feeling weak							
17. Feeling hopeless							
18. Feeling rejected							
19. Feeling optimistic							
20. Feeling energetic							
21. Feeling anxious							

$$32 - B = C + A = D/21$$

$$32 - \boxed{} = \boxed{} + \boxed{} = \boxed{}/21$$

Mark the appropriate box with a ✓

7. Happiness, well-being and quality of life

Read each statement and decide how often the feeling was present over the past few weeks. Please use the following response scale.

☐

	Not at all	Occasionally	Sometimes	Often	All the time
	1	2	3	4	5
1. My life is on the right track					
2. I wish I could change some part of my life					
3. My future looks good					
4. I feel as though the best years of my life are over					
5. I like myself					
6. I feel there must be something wrong with me					
7. I can handle any problem that comes up					
8. I feel like a failure					
9. I feel loved and trusted					
10. I seem to be left alone when I don't want to be					
11. I feel lose to people around me					
12. I have lost interest in other people and don't like them					
13. I feel I can do whatever I want to					
14. My life seems to be in a rut					
15. I have energy to spare					
16. I can't be bothered doing anything					
17. I smile and laugh a lot					
18. Nothing seems very much fun anymore					
19. I think clearly and creatively					
20. My thoughts go round in useless circles					

☐ - ☐ = ☐

Mark the appropriate box with a ✓

8. Company culture

Rate the following statements with regard to the way they match your experience at work each day.

	Doesn't fit my job at all	Fits my job in some way	Fits my job more or less	Strongly fits the way it is at work
	0	1	2	3
1. People feel free to take risks and experiment at work				
2. Creativity is affirmed daily				
3. A few key advisors take responsibility for projects as opposed to the assignment of projects to committees				
4. People feel that they make a powerful difference and are involved in experiences that prove it				
5. Salaries meet basic needs and also provide incentives				
6. People are rewarded and recognized for excellent performance				
7. Conflicts are resolved with win/win solutions or are mediated by non affected third parties				
8. People are constructively confronted when negative behaviour occurs				
9. People avoid blame placing and finger pointing as a method of problem solving				
10. The decision-making process is highly participatory				
11. People emphasize co-operation over competition among members of the organization				
12. People set their own work objectives and work method				
13. People's beliefs are congruent with their actions				
14. People understand how their work relates to the goals or values of the organization				
15. People seek out the ideas and opinions of others				
16. Leaders follow up on problems and new ideas swiftly				
17. Leaders show a balanced concern between the quality of work that has to be done and the people who are doing it.				
18. Leaders are actively involved in providing quality services and they model the behaviour they expect of others				
19. Some meetings focus on nothing but individual and/or group achievements				
20. Support for and caring of associates is strongly emphasized				
21. People are concerned about the success of the work group				
22. The work environment is relaxing and families are included in some of the organization's programmes				
23. Fitness facilities and programmes are available and their use is encouraged				
24. The organization provides the necessary staff, programmes or other resources to assist people under stress or who are experiencing personal problems.				
25. Change and/or efforts focus on measurable results				
26. Quality is something upper management not only talks about but also does something about				
27. Management acts quickly and decisively on quality improvement suggestions				