PHYSICAL ACTIVITY LEVEL AND CARDIOVASCULAR RISK FACTORS: CASE STUDY OF HIGH SCHOOL TEACHERS WITHIN MAKHADO MUNICIPALITY

BY

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DECLARATION

I, **RatselaneTondani,** declare that the mini dissertation proposal titled **"*Physical activity and cardiovascular risk factors: case study of high school teachers within Makhado Municipality*"**hereby submitted for the degree Master of Public Health at the University of Venda has not been submitted previously by me at this university or any other institution; that it is my own work in design and in execution, and that the sources that I have quoted have been indicated and acknowledged by means of complete references

Signature  **Date 24 February 2022**

(Ratselane T)

PREFACE

This mini-dissertation is presented in article format and comprises three sections: Section A gives the mini-dissertation overview, Section B provides the manuscripts/articles with their journal guidelines for authors, and Section C shows the conclusion, limitations and recommendations of the min-dissertation.

Section A: Mini-Dissertation Overview

This paper presents the study protocol that details the background, problem statement, and objectives of this study. The section further offers a detailed outline of the research methods used to gather and interrogate the data. The paper was published in the African journal for physical activity and health sciences.

Section B: Paper/Article/Manuscript

This section has a total of one manuscript submitted to as detailed below:

Tondani Ratselane, Lufuno Makhado, Ntsieni Stella Mashau. 2021. Physical activity level and cardiovascular risk factors among high school teachers within Makhado Municipality. **African Journals online review**- ***African Journal for Physical Activity and Health Sciences(Under review)***

Section C: Conclusion, Recommendation and Mini-Dissertation Limitations

This last section presents conclusions from this mini-dissertation, makes dynamic recommendations and presents the study limitations reflecting in all that was presented within each section and is informed by the whole research process

PUBLICATIONS

Tondani Ratselane, Lufuno Makhado, Ntsieni Stella Mashau. 2021. Physical activity level and cardiovascular risk factors among high school teachers within Makhado Municipality. **African Journals online review**- ***African Journal for Physical Activity and Health Sciences (Under review)***

DEDICATIONS

The study is dedicated to my dearest mother Mrs Makhetha A.E, my daughter Masindi and my siblings (Ephodia, Lorraine, Khathutshelo, Nigel, Alonia and Ronewa).

Lastly, to all the readers, May God of Mount blesses you, peace be unto you.

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To the Department of education, school principals, circuit managers, thanks a million for permitting me to conduct my study within Makhado Municipality. Without your approval, it would have been impossible to complete my study.

I would like to thank all the high school teachers who participated in my study. Peace be unto you.

LIST OF ACRONYMS AND ABBREVIATION

ACSM	American College of Sports and Medicine
AHA	American Heart Association
CVD	Cardiovascular Disease
HBM	Health Belief Model
DHDSS	Dikgale Health and Demographic Surveillance Site
IPAQ	International Physical Activity Questionnaire
PAL	Physical Activity Level
SECA	Southeast Clown Association
WHO	World Health Organization
BMR	Basal Metabolic Rate
BMI	Body Mass Index
WC	Waist Circumference
MET	Metabolic equivalents
HBP	High Blood Pressure

ABSTRACT

Risk factors for cardiovascular diseases are particular habits, behaviours, circumstances that increase a person's risk for developing CVD. The study aimed to determine physical activity level and cardiovascular risk factors among high school teachers within Makhado Municipality. A Predictive correlational design was used in this study. The total population sampling procedure was used. Questionnaire and anthropometric instruments were used to collect data. The SPSS was used to analyze data. Descriptive statistics were used to describe variables in this study: logistic regression was used to establish demographic characteristics of teachers to predict physical activity level and cardiovascular risk factors, and the relationship between physical activity level and cardiovascular risk factors was determined by correlation coefficient. Results: a total of 278 participants were selected. Most teachers were not active; only 11.2% had high physical activity levels. Gender was the most predictor for physical activity level males were more active than females, while age and gender was the predictor for basal metabolic rate. Age was a predictor for both BMI and waist circumference, and gender was a predictor for PAL and BMR. There was a positive association between WC and body mass index, between starch intake and salt intake, another association was between HBP and WC, lastly between salt and fruits intake. Recommendations: Department of Education organize wellness day/sports for teachers where health practitioners like dietician and biokineticist can educate them about dietary patterns and benefits of exercises and how lifestyles choices impact the risk of developing CVD.

Keywords: Cardiovascular disorders, Physical activity level, Teachers, Makhado Municipality

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SECTION 1: OVERVIEW OF THE STUDY

1. INTRODUCTION

This section of the study presents the background, problem statement, rationale of the study, the purpose of the study, including research objectives, the significance of the study and definition of terms. It also entails methodology of the study, which include the following: research approach, research designs, study setting, target population, sampling, sample size, criteria for inclusion, exclusion, data collection methods, pre-test, validity and reliability, data analysis methods, ethical considerations and plans for dissemination and implementation of the results.

1.1. Background to the study

Cardiovascular disease is a major health problem and the leading cause of mortality, morbidity, and economic burden accounting for up to 17 million deaths in both developed and developing countries (Akintunde, Salawu & Opadijo, 2014). In the South-East Asia region, 62% of all death is due to cardiovascular diseases, 48% of all cardiovascular deaths in this region are below 70 years of age (WHO, 2015). Worldwide the primary risk factors (age, family history of cardiovascular disease, hypertension, obesity, physical inactivity, poor diet, alcohol consumption and smoking) increase because of urbanization (Juma, Nyabera, Mbugua, *et al*., 2019).

China has experienced a rapid increase in cardiovascular diseases, especially in rural China, in addition to a dramatic increase in energy intake; the decrease in physical activity may be the reason (Ding, Lawson, Kolbe-Alexander, *et al*., 2016). Modernization and Urbanization have led to lifestyle changes and increasing risks for chronic disease in China especially in rural areas (Anjana, Pradeepa, Das, *et al*., 2014).

Report from National Health and Morbidity Survey 2015 (NHMS) have shown the prevalence of risk factors for cardiovascular disease (CVD) in 2015 in Malaysia. There were increases in CVD risk factors in that year compared to the study in 2011, especially in diabetes and hypercholesterolemia IPH 2015. Past studies that have been conducted on secondary school teachers elected in Nigeria shows the level of physical activity of the population of participants that low was 4.3%, while the population showing the level of moderate physical activity was 29.1%, and 66.7% showed a high activity level (Udeh, Nwakasi & Fulton, 2020).

Cardiovascular diseases (CVD) broadly, including all heart, stroke, and blood vessel diseases, were the cause of 45,392 deaths of Australians in 2015 (Australian Bureau of Statistics, 2016). Cardiovascular conditions including stroke, ischemic heart disease and hypertensive heart disease constitute the leading category of non-communicable disease deaths in South Africa (Pillay-Van Wyk, Laubscher, Msemburi,

2014). However, different trends in cause-specific non-communicable diseases were observed; for example, tobacco-related mortality has declined, while deaths from diabetes and renal disease have increased (Dorrington, Bradshaw, Laubscher, *et al*., 2015).

The World Health Organization (WHO) highlighted that more than 60% of the global population is not sufficiently active. The prevalence of self-reported physical inactivity is high in both developed countries like the United States, where 32% of adults are physically inactive (O'Leary, Jemmott, Stevens, *et al.*, 2014). Other African countries also report a high prevalence of physical inactivity among adults, 49.1% and 52% in Swaziland and Mauritania, respectively (Phaswana, Peltzer & Pengpid, 2018). If one is physically active, one increases their life span, regardless of adverse inherited factors (Sabale, Irani, Jatoo, 2016). Physical activity protects an individual by regulating their weight and improving one's body use of insulin (WHO, 2017).

These cardiovascular risk factors are detrimental to an individual's health and can also be attained passively, and it is important to point out and describe these factors. One of the cardiovascular risk factors is diet, which is the sum of food consumed by a person or organism. A healthy diet is a diet that helps to maintain or improve overall health; furthermore, an unhealthy diet is one of the major risk factors for a range of chronic diseases, including cardiovascular diseases and other conditions linked to obesity (WHO, 2018). A diet high in saturated fat increases the risk of obesity; it is estimated to cause about 31% of coronary heart disease and 11% of stroke worldwide, while being overweight or obese is associated with an increased risk of cardiovascular disease (Armstrong,2015).

Recent Research confirms the health risks associated with a sedentary lifestyle; studies have now consistently demonstrated that leading a sedentary lifestyle can contribute to obesity, type 2 diabetes, cardiovascular diseases, and early death (Bonifonte, 2015). Extended periods of inactivity can reduce metabolism and impair the body's ability to control blood sugar levels, regulate blood pressure and break down fat (AHA, 2015). In addition, a sedentary lifestyle also appears to have a negative impact on mental well-being (WHO, 2014). In South Africa, cardiovascular disease is the leading cause of death after HIV and AIDS, and over a quarter of men (27.9%) and almost half of women (45%) are physically inactive (Statistics South Africa, 2015).

Although the world health organization (WHO) has implemented strategies to reduce the time spent being inactive. Diaz andFerrante(2015)and Seravalle and Grassi (2016) emphasize that people can reduce the amount of time they spend being physical inactive by walking to work, taking walks during lunch breaks, setting a reminder to stand up every 30 minutes when working at a desk, investing in a standing desk or

asking the workplace to provide one, making an excuse to leave the office or move around the building, taking stairs instead of using elevators.

These interventions are failing in the school setting because the focus of policymakers is on students. Hence, they are provided with courts and sports fields for physical education classes and feeding schemes, but it is difficult for teachers to focus on their health when at work (Taylor & Fraulkner, 2018). Teachers always motivate students to contribute to sports, physical activities, and academic education programmes. Furthermore, they always direct and instruct them, in sports and physical activity are a vital part of academic education.

1.2 Problem Statement

Teachers' high prevalence of cardiovascular disease is a worldwide problem, and South Africa is no exception. According to previous research, South African teachers are at a reasonable risk of developing non-communicable diseases (Joseph, 2018). In pilot research in Cape Town, teachers proved a high risk of chronic non-communicable diseases, particularly cardiovascular disease. The findings of this study projected 18.7% of 454 participants to be at high risk of having a heart attack or stroke during the following 10 years, which was indicated to necessitate extensive lifestyle modifications because it was allegedly linked to an unhealthy lifestyle (Laurence, Volmink, Esterhuizen, Dalal & Holmes, 2016).

According to Sania and Naila (2017), other prominent cardiovascular risk factors among teachers, include job conflicts, curricular issues, parental complaints, pupil misbehavior, work pressure, a less welcoming working atmosphere, and income-related unhappiness. Moreover, a variety of cardiovascular risk factors are thought to be responsible for a drop in job productivity and attendance, resulting in financial loss and a poor quality of life for teachers in both urban and rural settings (Domingo et al., 2015). The disease profile of 2017-2019 for Limpopo province documented physical inactivity, obesity, and an unhealthy diet as significant contributors to non-communicable diseases, including cardiovascular conditions, with 36% of females and 32% of males affected in the province (Limpopo department of health 2018; Vhembe district health plan, 2018/19-2020/21).

Furthermore, most South African schools have weekly and annual wellness days, as well as sports and health screening days, yet the researcher has observed high school teachers in Makhado municipality in Limpopo province to rarely partake in such activities. Based on this concern, as well as the absence of known research regarding this issue in the study area, the current study was necessitated, which aimed to determine physical activity level and risk of cardiovascular disorders among high school teachers in Makhado municipality of South Africa.

1.3 Rationale of the study

Studies conducted were focused on primary teachers, lecturers, and other professions. Fikret (2017) did the study focused on primary teachers' attitudes towards playing games that involve physical activity. In addition, Aderibigbe (2017) focused on knowledge and practice of sedentary lifestyle among bankers. Previous studies did not emphasize the job types, how the jobs inhibit or facilitate physical activity and cardiovascular disease risk factors. Hence, to fill the identified gap, this study focuses on physical activity level and cardiovascular risk factors in High school teachers.

1.4 Significance of the study

The study findings might add further knowledge and inform policy and guideline holders on strategies to improve physical activity levels in the workplace (schools), contribute to implementing and developing the guidelines for physical activity, and bring awareness and increase knowledge on cardiovascular health risk factors among teachers.

1.5 Study purpose and objectives

1.5.1 Study purpose

To determine physical activity level and risk of cardiovascular disorders among high school teachers within Makhado municipality, South Africa.

1.5.2 Study objectives

The following objectives were followed to meet the purpose mentioned above:

- To assess physical activity level, dietary pattern, waist circumference and body mass index (BMI) among high school teachers in Makhado municipality, South Africa
- To establish if the physical activity level is associated with cardiovascular risk factors (dietary pattern, MI, and waist circumference).
- To establish if demographic characteristics predict physical activity level and cardiovascular risk factors among teachers in Vhembe District.

1.6 Definition of key concepts

The key concepts that are used in the study are defined as follows:

- **Cardiovascular risk factor**

Cardiovascular risk factors are associated with an increased risk of developing cardiovascular disease. In this study, risk factors will be physical inactivity, obesity, and poor diet (WHO, 2017). This study will be factors that contribute to heart and lung-related disease development.

- **Physical activity level**

It is a way to express a person's daily physical activity as a number and estimate a person's total energy expenditure (ACSM, 2011).In this study, it will be used to describe the level of body movement produced by skeletal muscles that require energy expenditure.

- **Teachers**

Teachers help others acquire knowledge, competencies, or values and educate students in schools (James, 2014). In this study, teachers will be participants of the study.

1.8 LITERATURE REVIEW

1.8.1 Introduction

In this chapter, the international and national relevant literature on physical activity levels and cardiovascular risk factors (age, gender, stress, physical inactivity, unhealthy and obesity) will be discussed. It will also focus on the relationship between these physical activity levels and cardiovascular risk factors.

1.8.2 Physical activity level

Physical activity is defined as any bodily movement produced by skeletal muscles that require energy expenditure: including activities undertaken while working, playing, carrying out household chores, travelling, and engaging in recreational pursuits (WHO, 2018)

The term "physical activity" should not be confused with "exercise", a subcategory of physical activity that is planned, structured, repetitive, and aims to improve or maintain one or more components of physical fitness. Beyond exercise, any other physical activity is done during leisure time, for transport to get to and from places, or as part of a person’s work, has a health benefit. Furthermore, moderate and vigorous-intensity physical activity improves health (ACSM, 2017).

Globally, around 23% of adults aged 18 and over were not active enough in 2010 (men 20% and women 27%). In high-income countries, 26% of men and 35% of women were insufficiently physically active

compared to 12% of men and 24% of women in low-income countries (WHO, 2017). Low or decreasing physical activity levels often correspond with a high or rising gross national product. The drop in physical activity is partly due to inaction during leisure time and sedentary behaviour on the job and at home. Likewise, an increase in "passive" modes of transportation also contributes to insufficient physical activity.

Globally, 81% of adolescents aged 11-17 years were insufficiently physically active in 2010. Adolescent girls were less active than adolescent boys, with 84% vs 78% not meeting World Health Organization recommendations for at least 60 minutes per day.

The Physical Activity Guidelines for Americans10 recommends that all adults should avoid inactivity and do at least 150 minutes a week (5 days x 30 minutes per day) of moderate-intensity, or 75 minutes a week of vigorous-intensity aerobic physical activity for substantial health benefits.

1.8.3 Cardiovascular risk factors

Cardiovascular diseases are the number one cause of death globally: more people die annually from cardiovascular diseases than any other cause. An estimated 17.9 million people died from CVDs in 2016, representing 31% of all global deaths, 85% are due to stroke and heart attack, over three-quarters of CVD deaths occur in low-income and middle-income countries. Out of the 17 million premature deaths (under the age of 70) due to non-communicable diseases in 2015, 82% are in low and middle-income countries, and 37% are caused by cardiovascular diseases (WHO, 2016).

Using population-wide strategies, most CVDs can be prevented by addressing behavioural risk factors such as smoking, unhealthy diet and obesity, physical inactivity using population-wide strategies. People with CVD or who are at high cardiovascular risk due to the presence of one or more risk factors such as hypertension, diabetes, hyperlipidemia or already established disease) need early detection and management using counselling and medicine as appropriate. (WHO, 2017)

Several risk factors contribute to the risk for an individual developing cardiovascular disease. The risk factors include social, lifestyle, metabolic risk factors.

1.8.3.1 Social risk factors

Several social risk factors contribute to the development of cardiovascular disease. In this study, the social factors are discussed under the following sub-headings: socioeconomic status, age, gender and stress

Age and Gender

Age is a non-modifiable risk factor for cardiovascular disease. The increased risk for cardiovascular disease parallels an increase in age. High mortality rates from CVDs are seen in both genders with increasing age. Being older than 45 years of age is considered a risk factor for women (ACSM, 2017). For men, the increased risk comes after the age of 55 years, cardiovascular disease prevalence, incidence and mortality rates tend to be higher for men than for women. A study conducted by Warburton (2016) shows that higher levels of physical activity were associated with a decreased risk of developing the cardiovascular disease, while regular aerobic exercise was associated with reduced rates of cardiovascular disease in women (Manson, 2017). Interestingly, swimming was linked with increased resting blood pressure in women (Cox, 2016). Furthermore, walking or cycling reduced the risk of coronary heart disease in females; however, no such reduction was evident in males (Hu, 2015).

Stress

Stressful situations because of personal preserves, low self-esteem, and failure to cope under stressful situations have been shown to have an effect on increased cardiovascular disease. A job that is demanding is associated with stress (Tehrani et al., 2018), job-related variables include work schedule, machine work, time pressure and repeated activities; physical conditions include lightning, heat, noise and active and inactive tasks, contact with the public such as talking to people, unfair treatment, and role overload. Stress at the workplace and strenuous jobs, which result in a lack of balance between the job demands and job control, has been often associated with cardiovascular disease aetiology at a psychological and physiological level (Rosenthal & Alter, 2012).

Research suggests that chronic psychological stress is linked to cardiovascular diseases, including hypertension and cholesterol (Dimsdale, 2018). Unfortunately, prolonged exposure to stress can affect an individual's emotional, physiological and behavioural responses and may result in medical problems (Miller, 2019). Evidence suggests a relationship between physical exercise and mental health and the effects that regular exercise can have on stress management levels (Salmon, 2011).

Estimates made by the World Health Organization are that 154 million people globally suffer from depression, and mental illnesses affect and are affected by chronic conditions such as cancer, heart and other cardiovascular diseases, diabetes and HIV/AIDS (Taylor & Faulkner, 2018)

1.8.3.2 Lifestyle risk factor

Lifestyle risk factors are discussed under the following subheadings: Physical inactivity and unhealthy diet.

Physical inactivity

Physical inactivity has been identified as the fourth leading cause of death globally. About 3.2 million deaths globally have been associated with insufficient physical activity (WHO, 2018). It is independently responsible for 12.2% of the global burden of acute myocardial infarction as well as 6% of deaths that occur worldwide. Physical inactivity is a global health problem, especially in countries such as North America and Europe. Physical inactivity has progressively increased over the past decades.

Physical inactivity is a major risk factor for Non-Communicable Diseases and disorders, which is also a contributory factor for cardiovascular diseases and mortality (Knight, 2012). Physical inactivity has been associated with many risks factors for chronic diseases such as cardiovascular diseases, obesity, fibromyalgia and diabetes. In 2008 physical inactivity, has contributed to about 9% of premature deaths (Aliyu et al., 2015).

Physical inactivity is a major contributory factor for many chronic diseases. In a study conducted among bus drivers and bus conductors, the prevalence of CVD was high in bus drivers. Among bus conductors, the prevalence was lower by 30%. The high prevalence among bus drivers was due to physical inactivity (Booth et al., 2015).

Unhealthy diet

An unhealthy diet fails to provide your body with the correct amounts and types of nutrients for maximum health. The average American diet contains too many calories and not enough fruits and vegetables. In addition, certain types of foods (too many calories, high in fat, too much sugar) are more likely to cause medical problems than others (Majem & Andrellucchi, 2018). Unhealthy diets are linked to four of the world's top ten leading risk factors causing death: high blood pressure, high blood glucose, overweight and obesity and high cholesterol. Inadequate consumption of fruits and vegetables increases the risk of cardiovascular disease and some cancers and accounts for some 1.7 million deaths a year (Chacón-Cuberos et al., 2019).

1.8.3.3 Metabolic risk factors

Obesity

Obesity is one of the leading risk factors for premature death. It was linked to 4.7 million deaths globally; 8% of global deaths were attributed to obesity in 2017. There are large differences in death rates from obesity across the world, 13% of adults are obese, and 39% of adults are overweight. One in five children

and adolescents global are overweight. Across many middle-incomes, countries-particularly across Eastern Europe, Central Asia, North Africa and Latin America more than 15% of deaths were attributed to obesity in 2017.Across low-income countries, especially across Sub-Saharan Africa, obesity accounts for less than 5% of deaths (Na et al.,2010). In classification of BMI; <18.5 kg.m² is referred to as underweight; 18.5-24.9 kg.m² is normal; 25-29.9 kg.m² overweight; 30-34.9 kg.m² obesity class I; 35-39.9 kg.m² obesity class II and ≥40 kg.m² obesity class III.

Table 1 Classification of BMI

Classification of overweight and obesity by BMI

Underweight	<18.5
Normal	18.5-24.9
Overweight	25-29.9
Obese 1	30-34.9
Class 2	9 35-39.9
Class 3	≥40

1.8.4 Association between physical activity level and cardiovascular risk factors

Obesity is a significant health problem all over the world for all ages. Genetics can play a role in the possibility that a person will become obese, the condition occurs when the number of calories consumed exceeds the number of calories expended over a long period. The more you exercise, the easier it is to keep your weight under control. Excess calories are stored as fat in the body, and with long-term caloric excess, an individual eventually becomes obese.

Physical inactivity is among the most important causes of the increase in obese people. In addition, there is a close relationship between obesity and cardiovascular diseases, diabetes, osteoporosis, some types of cancer, mental problems, and many health problems in studies conducted (Topothai et al., 2016).

According to (Santana,) cardiovascular risk factors related to the teaching profession occur mainly due to inadequate diet, physical inactivity and lack of leisure, justified by the excessive workload, which extends until outside working hours, all to achieve or maintain the quality indicators of the courses in which it is taught and enrichment of the curriculum.

The teaching profession was related to the presence of cardiovascular risk factors, because it was found that the extensive workload, associated with the daily activities of the teacher, provide for an inadequate diet and lack of physical activity, which consequently these factors associated with other risk factors already present, only enhance the chances of developing a cardiovascular event, such as: changes in the levels of cholesterol, family history and DM, consumption of alcoholic beverages(Carvalho et al, 2015).

1.8.5 The impact of demographic characteristics on physical activity level and cardiovascular risk factor.

The level of physical activity is very significant where it is closely related to ethnicity, gender, age, and occupation and education level (Tam et al., 2016). Furthermore, the Malaysian government is also actively promoting a campaign to cultivate healthy lifestyles through physical activity among Malaysians, especially the youth and aims to raise awareness and increase the interest of youth for active life (Ministry of Health, 2015)

One study conducted in Nigeria observed that family history of hypertension, marital status, and occupational status is associated with an increase in blood pressure, and an increase in age may be positively associated with hypertension and a cardiovascular risk factor (Ibekwe, 2015).

Some assumptions have been made that poor people who reside in urban areas are more likely to eat an unhealthy diet than rich people because of inability to afford a healthy diet, which makes them prone to cardiovascular diseases (Olack et al., 2015).

Socioeconomic determinants of cardiovascular diseases are complex and vary by sex, likely due to health behaviours. The WHO STEPs survey, conducted in a rural Vietnamese community, showed that men with a lower educational and occupational status, but a higher economic status, are more likely to be hypertensive than men in other categories. In contrast, lower occupational and economic status women are more likely to be hypertensive than their higher-status counterparts (Minh et al., 2016).

1.8.6 Benefits of physical activities

Regular physical activity of moderate intensity, such as walking, cycling, or doing sports – has significant benefits for health. The benefits of being physically active outweigh potential harm, for example, through accidents at all ages. Some physical activity is better than doing none. By becoming more active throughout the day in relatively simple ways, people can quickly achieve the recommended activity levels.

1.8.6.1 Reduce stress and anxiety

Stress relief is one of the most common mental benefits of exercise. Regular physical activity can help manage physical and psychological stress and increase concentrations of norepinephrine, a chemical that can moderate the brain's response to stress. Being active greatly causes a reduction in stress levels. Aerobic and anaerobic physical training is helpful for overall health. The study suggests that 30 Minutes of Exercise for five or more days in a week helps lower desperation and mental stress. On the other hand, Physical activity makes you more tired, so you're more ready to sleep.

Good quality sleep helps improve overall wellness and can reduce stress. Regarding anxiety, the warmth and chemicals released during and after any physical exercise can help people with anxiety disorders calm down (Rhodes et al., 2017).

1.8.6.2 Boost happy chemicals

It releases endorphins, which create feelings of happiness and euphoria. Studies have shown that exercise can even improve symptoms among the clinically depressed (Broman-Fulks et al., 2014). For this reason, doctors recommend that people suffer from depression or anxiety. In some cases, exercise can be just as effective as antidepressant pills in treating depression. Higher energy levels resulting from exercise help a person remain fresh and happy. Following a suitable exercise program can add fun and brightness to the day. Working out for just 30 minutes a few times a week can instantly boost overall mood (Elmagd et al., 2015)

1.8.6.3 Improves muscles and bones strength

It involves a series of sustained muscle contractions, of either long or short duration, depending on the nature of the physical activity. Muscle-strengthening activities can help you increase or maintain your muscle mass and strength. Strong muscles and ligaments reduce your risk of joint and lower back pain by keeping joints in proper alignment. Additionally, exercise improvements to the circulatory and respiratory systems can facilitate better delivery of oxygen and glucose to the muscle (Ajmer, 2017)

1.8.6.4 Reduce the Risk of Heart Diseases

The heart is a muscle and needs exercise to stay in shape. The heart can pump more blood through the body and continue working at optimal efficiency with little strain when it's exercised. This will likely help it to stay healthy longer. Regular exercise also helps to keep arteries and other blood vessels flexible, ensuring good blood flow and normal blood pressure. A daily routine helps in strengthening heart muscles. It helps

maintain desired cholesterol levels. Daily physical activity reduces one's chances of stroke and the risk of heart disease. According to the American Heart Association (AHA), exercising 30 minutes a day, five days a week, will improve your heart health and help reduce your risk of heart disease. You can even break it up into quick and manageable 10minute sessions, three times a day (Fletcher et al., 2016).

1.8.6.5 Preventing Obesity

Obesity and overweight are associated with increased risk for hypertension, osteoarthritis, abnormal cholesterol and triglyceride levels, type 2 diabetes, coronary heart disease, stroke, gallbladder disease, sleep apnea, respiratory problems and some cancers (Nayera et al., 2015). Physical activity can help prevent excess weight gain or help maintain weight loss. When you engage in physical activity, you burn calories. The more intense the activity, the more calories you burn. Regular exercise (and proper nutrition) can help reduce body fat. Weight loss will achieve most effectively when we follow a cardiovascular exercise of moderate-intensity activity accumulated over 5-7 days per week (WHO, 2018)

Diabetes and exercise go hand in hand, at least when managing your diabetes. Exercise can help you improve your blood sugar control, boost your overall fitness, and reduce your risk of heart disease and stroke. But diabetes and exercise pose unique challenges, too. To exercise safely, it's crucial to track your blood sugar before, during and after physical activity. You'll learn how your body responds to exercise, which can help you prevent potentially dangerous blood sugar fluctuations. Effects of physical activity on your blood glucose will vary depending on how long you are active and many other factors. Physical activity can lower your blood glucose up to 24 hours or more after your workout by making your body more sensitive to insulin (McTiernan, 2016).

2. RESEARCH METHODOLOGY

Research methodology refers to the process of data collection, data analysis and interpretation of data Creswell (2014). This section focuses on the study design, setting, population, sampling, exclusion criteria, instrumentation, instrument pre-testing, validity and reliability, data collection, analysis, ethical considerations, and dissemination.

2.1 Study approach

A quantitative approach is an approach that tests objective theory by evaluating if there is any association among variables (Creswell, 2014). This approach was chosen because it is more reliable and objective, can use statistics to generalize findings and assumes that sample size can be used to represent the population. In addition, the quantitative approach is concerned with detailed observation, describing, comparing,

discovering, and analyzing the characteristic attributes and dimensions of a phenomenon; the researcher counts and analyses data statistically. It is advantageous as it minimizes the researcher's bias compared to the qualitative approach wherein there is interaction with the participants in the process of data.

2.2 Study design

Predictive correlational design was used in this study, which is descriptive, correlative, and predictive; the advantage of the predictive correlational design is that it allows the researchers to determine the strength and direction of a relationship so that later studies can narrow the findings down and if possible, assess causation experimentally and enable the researcher to collect more data than experiments. In addition, predictive correlational study usually takes place outside of the lab; the results tend to be more applicable to everyday life. Study design refers to the procedure and research plans that span the decisions from the broad assumptions to the data collection and analysis (Creswell, 2014).

2.3 Study setting

The study was conducted at Makhado municipality, Limpopo province, South Africa. Makhado local municipality is in the Vhembe District Municipality of Limpopo Province, South Africa. It is in the northern parts of Limpopo Province, approximately 100km from the Zimbabwean border along the N1 route. Its territory covers an area of 8567.38km^2. It shares borders with the following local municipalities: Blouberg, Musina, Molemole, Greater Letaba, Greater Giyani, Mutale and Thulamela. At least 2.6% of municipality is urban, whereas 97.4% is rural.

The municipality comprises four formal towns, namely, Louis Trichardt, Vleifontein, Waterval and Dzanani, with more than 200 villages. The main administrative office is in Louis Trichardt town with two supporting administrative offices, Dzanani and Waterval. The municipality has 38 ward councillors and 37 proportional councillors. Makhado has the second biggest economy in Vhembe District; agriculture is one of the most economic sectors in Makhado, and medium and small-scale companies currently dominate the mining sector in the area. The tourism sector has become increasingly important in the municipality.

There is a developed network of pre-schools primary and secondary schools. In 2011 there were about 244 primary schools and 114 secondary schools, two special schools, five combined schools and two satellite campuses of Vhembe Further Education and Training College (one in Mashamba village and the other one in Mavhoi). There are no formal sports and recreational facilities in the rural areas except for Rabali and Vhuilafuri villages with soccer stadiums.

2.4 Study population and sampling

2.4.1 Target population

The Population is described as the entire group of persons or objects of interest to the researcher, meeting the criteria that the researcher is interested in studying (Creswell, 2014). The Total population of teachers in Makhado Municipality is 922, with 502 females and 420 male teachers. The target population will be high school teachers.

2.4.2 Sample and sampling

Simple random sampling was used to select the municipality within the Vhembe District wherein Makhado Municipality was selected. In Makhado Municipality, one circuit was selected using simple random sampling, within which Nzhelele Circuit (consisted East, West and Central). Total population sampling was used to select all schools falling within the Nzhelele circuit of Makhado municipality. Total population sampling is the purposive sampling technique to examine the entire population. The use of total population sampling made it possible to make an analytical generalization about the population being studied. It involves all members within the population of interest; it is possible to get deep insights into the phenomenon the researcher is interested in.

The sample size was calculated using the Raosoft sample calculator with a 95% confidence level and a 5% margin of error to verify if the sample size represents the Makhado municipality. The total sample size from a population of 922 was 272, and 6 more participants were added to cover for default, making it 278.

2.4.3 Criteria for inclusion

For the study, the participants would be all teachers, including different age groups, gender, and the willingness to participate and reside at the selected circuit and municipality.

2.4.4 Exclusion criteria

The researcher excluded all pregnant women.

2.5 Data collection Instrumentation

The study was used as a self-administered and researcher-administered questionnaire to collect data that will be composite of some sections that the research will complete.

2.5.1 Questionnaire

A self-administered questionnaire was used to assess demographic information, physical activity level, dietary patterns, and anthropometric measurements: participants were handed questionnaires with questions derived from the WHO STEPS instrument adapted from World Health Organization. This tool is used to collect data and measure non-communicable diseases (NCDs) risk factors within the WHO STEPwise approach to surveillance is called STEPs instrument. The STEPS instrument covers three levels of risk factor assessment: Step 1 (questionnaire), step 2 (physical measurements), and the researcher will modify it by adding more questions on physical activity level. The questionnaire was subdivided into four sections, namely:

- **Section A: demographic information**

This section comprised race, ethnicity, gender, age, education, profession, income level and marital status.

- **Section B: physical activity level**

Physical activity was assessed using the International Physical Activity Questionnaire (IPAQ) long-form through an interview session. This instrument is composed of 5 sessions which consist of the physical activity during the last seven days. Information for the length of time (the number of sessions and average time per session) spent on walking moderate or vigorous-intensity physical activities on both weekdays and weekends were obtained using this questionnaire.

- **Section C: Dietary patterns**

This questionnaire is designed to allow teachers to assess the nutritional value of their diet; it comprises questions that will require a yes or no answer. Checking eating habits, fruits and vegetable intake, fatty products, starchy foods, sugary and salty food, drinks, and alcohol

- **Section D: Anthropometric measurements**

Results for measurement such as body weight, height and waist circumference were recorded in this section

2.5.2 Anthropometric instruments

Body height- participant's body height was measured using a stadiometer (SECA 206) to the precision of 0.5cm. Bodyweight was measured by SECA weighing scale to the precision of 0. 1kg.Waist circumference was measured at the lower margin of the last palpable rib in the midaxillary line and the highest point of the iliac crest at minimal respiration to the nearest of 0.5cm at the end of normal expiration. Body mass index (BMI)was then be calculated as weight in kilograms divided by height squared in meters (kg m^{-2}) and was categorized according to ACSM guideline cut-off points as (<18.5 kg m^{-2}), normal (18.5 -24.9 kg m^{-2}), overweight as (25-29.9 kg m^{-2}) and obesity as (≥30 kg m^{-2}).

2.6 Pre-test of the instruments

Pre-testing refers to a collection of techniques and activities which allow researchers to assess survey questions, the questionnaire and/or other survey procedures before the actual data collection process (James & Storm, 2019). The researcher chose to participate from a different municipality for the pre-test. The main aim was to evaluate if the respondents understood the questionnaire and for the researcher to familiarize herself with the instruments. After the pre-test, respondents gave feedback on the questionnaire, stating whether the questions were easy to understand or difficult.

2.7 Plan for data collection

Data collection is a systematic way of gathering information relevant to the research purpose or question (Creswell, 2014). The researcher visited the selected schools, spent three days in each school, distributed questionnaires for teachers to complete and measure anthropometric measurement during free periods or break time. Only those who agreed to participate formed part of the study.

Appointments were made with the participants at least one week before data collection. The researcher met with the participants at a flex room or principal's office to save time and ensure privacy. The researcher gave the questionnaire to participants to complete and then measured their weight and height on the following day. Data collection was approximately 5-10 minutes for each participant and the process of data collection for six weeks.

2.8 Validity and reliability

The validity of an instrument refers to the relevance. It was used to determine whether an instrument can measure what it is supposed to measure. The instrument's validity is an important aspect of the development and assessment of the instrument (Cohen, Manion& Morrison, 2017). All instruments (stadiometer and

weighing scale) were calibrated before data collection. A validated weighing scale and stadiometer were used. Known mass was used to determine the validity of the SECA weighing scale, such as putting a packet of 5 kg rice on the scale to determine if the scale results were 5 kg. This process was undertaken during the piloting of the study, where the researcher was able to determine if the instrument is relevant to the context and any identified gaps identified before confirming the instrument. Furthermore, appropriate adjustments were made to accommodate the requirements of the study.

Reliability of the instrument refers to the consistency, accuracy, and precision of the instrument's measurement. It was taken to ensure that the instrument used could obtain the same results each time the measurement was used (Lane, 2013). Two measurements of weight were taken on the respondents to ensure the reliability of a SECA weighing scale, based on repeated tests. The results obtained were analyzed for consistency. The researcher also used test-retest reliability method through pilot testing using the questionnaires intended for use for the study. This was achieved through validating whether the answers provided by the same questionnaire at different intervals were the identical, or closely similar to those from the previous questionnaire. According to Babbie (2013), test-retest refers to taking the same measurement more than once. To minimize bias, the environmental conditions, time given and constructs under study were all equal across test-takers, for both human and non-human subjects used during the piloting process.

2.9 Data analysis

Statistical analysis was performed using the latest version of the Statistical Package for Social Sciences Software. Descriptive statistics were used to describe demographic characteristics, physical activity level, dietary patterns, and anthropometric variables using percentage, frequency, mean and standard deviation. Inferential statistics for objectives 2 and 3 thus correlation coefficient (r) was used to establish if physical activity level was associated with cardiovascular risk factors, establish the relationship between physical activity level and risk of cardiovascular risk factors and logistic regression analysis was used to establish if the demographic characteristics of teachers contributed to the prediction of physical activity level, body mass index, dietary patterns, and waist circumference.

2.10 Ethical consideration

2.10.1 Ethical clearance

The proposal was presented to the School of Health Sciences for evaluation and then submitted to the University of Venda Higher Degree Committee for approval. The proposal was further submitted to the University of Venda research ethics committee to apply for ethical clearance.

2.10.2 Permission

The researcher wrote a formal letter to the Department of Education, circuit managers of Makhado municipality to seek permission to conduct the study in Makhado municipality high school teachers.

2.10.3 Informed Consent

An Informed written consent form was obtained after the respondents had been fully informed about the respondent's expectations and the nature of the study. An information letter was attached (Annexure A) to the consent form to inform respondents about the study aim, objectives and the benefits of participating in the study. The researcher informed participants that participation in this study was voluntary, and there was no reward or payment attached. The participants can withdraw at any time from the study without getting penalties.

2.10.4 Privacy

Privacy refers to an individual's right to be free from intrusion or interference by others. It is a fundamental right in a free and democratic society. Individuals have privacy interests concerning their bodies, personal information, expressed thoughts and opinions, personal communications with others, and spaces they occupy (Bhattacherje, 2012). In this study, privacy was ensured by allowing participants to complete the questionnaire without interruptions or in groups and during anthropometric measurements conducted for this study.

2.10.5 Confidentiality

Confidentiality includes obligations to protect information from unauthorized access, disclosure, modification, loss, or theft. Fulfilling the ethical duty of confidentiality is essential to the trust relationship between the researcher and participant and the research project's integrity (Bhattacherjie, 2012). Anonymity, on the other hand, the researcher should put in place a mechanism that cannot link participants with information that comes from them.

2.11 Plan for dissemination and implementation of results

The results would be presented at the appropriate conference and submitted to the physical activity and health sciences journal and publication. A research report will be presented to the Makhado Department of Education sports programme.

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SECTION 2: MANUSCRIPT

2.1: Author Guidelines

The manuscript was prepared based on the **African Journal for Physical Activity and Health Sciences (AJPHES)** guidelines as presented hereunder.

Author Guidelines

Original manuscript and all correspondence should be addressed to the Editor-In-Chief:

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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 specialization should be provided.
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Abstract

An abstract of 200-250 words is required with up to a maximum of 5 keywords 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 also using single line spacing: 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 it 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.

Methods

This section should provide sufficient and relevant information regarding study participants, ethics/informed consent, 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 *systeme internationale (SI) units*. Colour printing of figures and tables is expensive and could be done upon request at 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).

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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:

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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:

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* (2nd ed.) (pp. 39-45). Makhado, South Africa: Leach Printers.
For edited references: Amusa, L.O. &Toriola, A.L. (Eds.) (2003). *Contemporary Issues in Physical Education and Sports* (2nd ed.) (pp. 20-24). Makhado, South Africa: Leach Printers.
For chapter references in a book: Adams, L.L. &Neveling, IA (2004). Body fat characteristics of sumo wrestlers. In J.K. Manny & F.O. Boyd (Eds.), *Advances in Kinanthropometry* (pp. 21-29). Johannesburg, South Africa: The Publishers Company Ltd.

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eISSN: 1117-4315

2.2 MANUSCRIPT

Title of the manuscript: Physical Activity Level and Cardiovascular Risk Factors among High School Teachers within Makhado Municipality. Submitted to African Journal for Physical Activity and Health Sciences (***Under Review)***

PHYSICAL ACTIVITY LEVEL AND CARDIOVASCULAR RISK FACTORS AMONG HIGH SCHOOL TEACHERS WITHIN MAKHADO MUNICIPALITY

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Abstract

Risk factors for cardiovascular diseases are particular habits, behaviours, and circumstances that increase a person's risk of developing cardiovascular disease. The study aims to determine the level of physical activity and cardiovascular risk factors among high school teachers in Makhado Municipality. A Predictive correlational design was used in this study. The total population sampling procedure was used. Questionnaire and anthropometric instruments were used to collect data. The SPSS was used to analyze data for this study, and descriptive statistics were used to describe variables in this study; logistic regression was used to establish demographic characteristics of teachers predict physical activity level and cardiovascular risk factors. The correlation coefficient determined the relationship between physical activity level and cardiovascular risk factors. A total of 278 participants were selected. Most teachers were not active. Only 11.2% had high physical activity levels. Gender was the most predictor for physical activity level, and males were more active than females, while age and gender was the predictor for basal metabolic rate. Age was a predictor for body mass index and waist circumference, and gender was a predictor for physical activity level and basal metabolic rate. There was a positive association between waist circumference and body mass index, starch and salt intake, high blood pressure and waist circumference, as well as salt and fruits intake and body mass index. As per the findings, it is conclusive that a deterministic relationship exists between health-related lifestyle patterns and risk for cardiovascular diseases. Maintaining healthy habits such as physical exercise, keeping up a nutritious diet, and having regular medical check-ups are envisaged ways to reduce the risk of cardiovascular diseases.

Keywords: Cardiovascular risk factors, Physical activity level, Teachers, Makhado Municipality

Introduction

Physical inactivity has a deterministic implication on many chronic diseases, especially cardiovascular conditions (Ozemek, Laddu &Lavie, 2018). The continuous advancement in technology and industrialization affects living conditions and introduces unhealthy lifestyles worldwide and locally. The latter amplifies the rise in the prevalence of cardiovascular diseases and other lifestyle conditions (Chhaya et al., 2015).

Globally, low levels of physical activity have been highlighted as one of the major predisposing factors for the disease burden, with an estimated 1.4 million fatalities annually that were attributed to low levels of physical activity in 2016, which escalated by 18.4% since 2006 (De Vos et al., 2017). The World Health Organization (WHO) has recorded more than 60% of the world's population as insufficiently active, with well industrialized and developed countries such as the United States having over 32% of physically inactive individuals (Jemmott et al., 2014).

This reality is not unique to Africa, as physical inactivity is common in some African countries. Research indicates Swaziland has 49.1% and Mauritania, 52% of the population being physically inactive (Phaswana et al., 2018), while in South Africa, over a quarter of men (27.9%) and almost half of women (45%) are physically inactive (Statistics South Africa, 2015). Subsequently, more research has highlighted the health risks associated with inactivity, including obesity, type 2 diabetes, cardiovascular disease, and premature death (Bonifonte, 2015).

As a common repercussion of physical inactivity, cardiovascular disease is a significant public health issue and primary cause of mortality, morbidity, and economic tension in developed and developing countries, accounting for up to 17 million fatalities on annual records (Akintunde et al., 2017). In South-East Asia, cardiovascular diseases account for 62% of all deaths, with 48% of the deaths occurring amongst people under the age of 70 (WHO, 2015), while a range of cardiovascular diseases, including all heart, stroke, and blood vessel diseases, were recorded as the cause of 45,392 deaths in Australia in 2015 (Australian Bureau of Statistics, 2016).

On a global scale, factors such as age, family history of cardiovascular disease, hypertension, obesity, physical inactivity, poor diet, alcohol consumption and smoking are accentuated as the primary risk factors for cardiovascular diseases (Juma*et al.*, 2019). According to Armstrong

(2015), a diet high in saturated fat increases the risk of obesity and is known to cause about 31% of coronary heart disease and 11% of stroke worldwide. China is reported to experience a rapid increase in cardiovascular diseases, especially in rural regions, where excessive food consumption and energy intake are common (Ding et al., 2016). Furthermore, overweight and obesity are associated with an increased risk of cardiovascular diseases. Low activity can slow down metabolism and decrease the body's capacity to regulate blood sugar, blood pressure, and fat breakdown (AHA, 2015).

South Africa records cardiovascular disease as the leading cause of death after HIV and AIDS (Statistics South Africa, 2015). These estimates suggest that the current rate will almost be double by 2030 and that ischaemic heart disease and stroke will surpass HIV and AIDS in death count across sub-Saharan Africa by 2030. Meanwhile, cardiovascular conditions including stroke, ischemic heart disease and hypertensive heart disease constitute the leading category of non-communicable disease deaths in South Africa (Pillay-Van Wyk et al., 2014).

The level of risk of cardiovascular diseases among South African teachers is worrying. According to an evaluation study by Adeniyi*et al.* (2017), a high prevalence of Cardiovascular disease risk factors were discovered in a sample of 489 educators in Cape Town. In the same study, results reported a mean BMI in the obese range of 31.6 ± 7.0 kg/m2 for these teachers (Adeniyi*et al*., 2017). In sustenance, a study by Senekal *et al.* (2015) reported that 46% of South African educators from low and high socioeconomic areas were hypertensive, with over 30% having high waist circumferences and cholesterol levels. Based on Taylor *et al.* (2018), this problem in the school setting is perpetuated by the attention of policymakers regarding physical activity. Fewer teachers are oriented and more focused on students, as they are provided with courts and sports fields for physical education and nutrition-conscious feeding schemes, which is a unique case for the teachers.

In improvisation against this concern, Diaz & Ferrante (2015) have suggested that people remain physically active by walking to work, walking purposelessly during lunch breaks and standing up every 30 minutes when working at a desk. Seravalle and Grassi (2016) also suggested that teachers leave the office, move around school premises during free periods, and use the stairs instead of elevators.

Problem Statement

The high prevalence of cardiovascular disease amongst teachers is a worldwide predicament, and South Africa is not exempted. Previous studies indicate South African teachers as a population at risk of non-communicable illnesses (Joseph, 2018). Teachers in a Cape Town pilot study exhibited a high risk of chronic Non-Communicable Diseases, particularly cardiovascular disease. According to projections in this particular study, 18.7% of 454 respondents were highly at risk of developing a heart attack or stroke by the next ten years, which was suggested to require intensive lifestyle interventions as it was supposedly connected to an unhealthy lifestyle (Laurence, Volmink, Esterhuizen, Dalal& Holmes, 2016).

SaniaandNaila (2017) highlighted other common cardiovascular risk factors amongst teachers: work conflicts, challenges with the curriculum, parents' complaints, pupils' ill-conduct, work pressure, less friendly working environment, and income-related dissatisfaction. Moreover, diverse cardiovascular risk factors are believed to owe to the decline in workplace productivity and attendance, further leading to economic loss and low quality of life for teachers in urban and rural areas (Domingo et al., 2015).

In Limpopo province, physical inactivity, obesity and unhealthy diet have been documented as significant contributors to non-communicable diseases, including cardiovascular conditions, with 36% of females and 32% of males being affected as per the disease profile of 2017-2019 (Limpopo department of health 2018; Vhembe district health plan, 2018/19-2020/21). However, Wednesdays of every week and annual wellness days are typical in most South African schools and sports and health screening days. The researcher has observed that high school teachers in Makhado municipality, Limpopo province, seldom participate in such physical activities. Also, health screening is uncommon in schools in the area.

Based on this concern, this study was necessitated to determine physical activity level and risk of cardiovascular disorders among high school teachers within Makhado municipality in South Africa. The study objectives included: to assess physical activity level, dietary pattern and body mass index (BMI); to assess waist-hip circumference among teachers in Makhado Municipality, South Africa; to establish if the physical activity level is associated with cardiovascular risk

factors (dietary pattern and BMI); to establish if demographic characteristics predict physical activity level and cardiovascular risk factor among teachers in Vhembe District.

Materials and Methods

Study design

The quantitative approach was used in this study to allow for a statistically based generalization of findings. The predictive correlational design was used to guide the study, which was descriptive, correlative, and predictive in nature. This design has allowed for the description while predicting the likelihood of a cardiovascular disease using related risk factors, ranging from lifestyle patterns to medical conditions. The design has also allowed for clarifying relationships between variables in this study. This design is advantageous for use as it enables the researchers to determine the strength and direction of a relationship so that later studies can narrow down the findings, determine causation experimentally, and allow the researchers to collect more data than experiments.

Study setting

The study was conducted in high schools in Makhado, Limpopo province, South Africa. The Makhado Municipality is made up of 4 formal towns, namely, Louis Trichardt, Vleifontein, Waterval and Dzanani. The school's system in the area is formed of a network of pre-schools, primary and high-schools. The year 2011 recorded 244 primary schools, 114 secondary schools, two special schools, five combined schools and two satellite TVET campuses. The use of this area was influenced by the researcher's observation of the lack of physical activity-related infrastructure and school activities in the area. One high school was selected for data collection due to its large number of teachers compared to other schools in the area. The selected high school has normal grades from grade 8 to 12.

Study population and sampling

A sampling of a municipality under Vhembe District was done through Simple Random sampling. In Makhado Municipality, one circuit was selected using simple random sampling, within which Nzhelele Circuit (consisted east, west and central). Total population sampling was used to select all schools falling within the Nzhelele circuit of Makhado municipality. Total population sampling is the purposive sampling technique to examine the entire population. The

use of total population sampling made it possible to make an analytical generalization about the population being studied. It involves all members within the population of interest; it is possible to get deep insights into the phenomenon the researcher is interested in.

According to the Department of Basic Education, the consolidated list of schools per district total number of teachers was 920. Raosoft Sample size calculator was used to get a sample size representative of the total population of teachers in Makhado municipality. A total population sampling was used to select all the high school teachers within selected schools within Makhado Municipality. The sample size of the high school teachers was 278. The criteria for inclusion in this study were all teachers willing to participate at the selected municipality, while the exclusion criteria applied to all pregnant women.

Measurement instruments

The study used a self-administered questionnaire to collect data; it was used to assess demographic characteristics, physical activity level, dietary pattern, and anthropometric measurements. WHO developed the Global Physical Activity Questionnaire (GPAQ) for physical activity surveillance in countries (WHO, 2004). It collected information on sedentary behaviour and physical activity participation in three settings or domains: activity at work, travel to and from places, and recreational activities. The researchers used a stadiometer to measure the height, a SECA weighing scale for body weight and tape for waist circumference.

The validity and reliability

Before data collection, the researchers calibrated all instruments (stadiometer and weighing scale). A validated weighing scale and stadiometer were used. Reliability was ensured by using Cronbach alpha to test the consistency of the questionnaire given to teachers from non-participating schools to complete and wait for two weeks and shared the same questionnaires to teachers to complete. Researchers validated whether the answers provided were the same as those from the previous questionnaire.

Ethical considerations

Ethical clearance was sought and obtained from the University of Venda Human and Clinical Trial Research Ethics Committee. Permission was sought and granted from the Limpopo Province Department of Education and the school principals of every school that was part of the study. Participation in this study was voluntary, and at any given time, a person can choose to withdraw if they wish not to continue. Informed consent: The researcher obtained written informed consent from the participants and was informed about their right to withdraw at any time. Confidentiality was assured in the signed agreement between the researcher and participant, Anonymity and privacy, and every participant has the right to privacy and anonymity; names of the participants were not written on questionnaires, one staff room was used to respect participants' privacy. Beneficence, the researcher, ensured that their actions were ethical and conducted the study in a professional to maximize benefits and minimize probable harms. The researcher acted in the best interest of the participants.

Data analysis

Statistical analysis was performed using the statistical social science software latest version. Descriptive statistics were used to describe demographic characteristics, physical activity level, dietary patterns, and anthropometric variables using %age, frequency, mean and standard deviation. The correlation coefficient was used to determine the relationship between physical activity level and cardiovascular risk factors. Logistic regression analysis will be used to establish if the demographic characteristics of teachers contribute to the prediction of physical activity level and risk of cardiovascular disorders.

Results

Demographic characteristics of high school teachers within Makhado Municipality include age, gender, race, marital status, and educational level. A total of 278 respondents were selected, their ages ranged from 22 to 65 regarding gender, females140 (50.4%) and males (49.6%), majority of teachers had degrees (41.4%) on educational level, and on marital status, only teachers were married (48.6%) and were permanent (91.4%) employees (Table 1).

Table 1: Demographic characteristics of the participants

		Mean (SD)/Frequency (%)
Age	22-65 years	41.14 (12.187)
Gender	Male	138 (49.6%)
	Female	140 (50.4%)
Ethnicity	African	278 (100.0%)
Marital status	Single	99 (35.6)
	Married	135 (48.6)
	Divorced	27 (9.7)
	Widow	10 (3.6)
	Widower	7 (2.5)
Education level	Certificate	10 (3.6)
	Diploma	68 (24.5)
	Degree	115 (41.4)
	Postgraduate degree	85 (30.6)
Employment status	Part-time	24 (8.6)
	Full-time	254 (91.4)

Table 2 shows that most teachers had moderate physical activity levels (59.9%), followed by teachers with low physical activity levels (36.0%), and the lowest number of teachers had high physical activity levels (11.2%).Regarding dietary patterns (94.3%) do not skip meals, on fruits and vegetable intakes most teachers take fruits and vegetables regularly (65.9%). Most teachers had an excellent starch intake (90.3%). High salt (98.3%) and Sugar intake (91.8%) was also marked among teachers. Only 35.1% of teachers were at risk of having blood pressure. On fluids intake, fewer teachers are well hydrated (15.4%).

Table 2 on body mass index results shows that majority of teachers' BMI was out range overweight (34.5%) and obese (21.6%) made a total of 56.1%, followed by (40.3%) had normal weight, and 10 (3.6%) teachers were underweight. Basal metabolic rate shows that only 1(0.4%) out of 278 had average BMR. Females had a higher waist circumference (54.3%) than males (26.8%).

Table 2: Descriptive statistics for physical activity level, dietary pattern, body mass index, basal metabolic rate, and waist circumference.

	Attributes	N	%
Physical Activity level			
PAL	Low PAL	100	36.0%
	Moderate PAL	147	52.9%
	High PAL	31	11.2%
Dietary Patterns			
Skipping Meals	Do not skip meals	15	5.4%
	Skip Meals	264	94.3%
Fruits and vegetables intake	Irregular intake	34	12.2%
	Regular intake	245	87.8%
Fats intake	low intake	95	34.1%
	High intake	184	65.9%
Starch intake	Poor intake	26	9.3%
	Good intake	253	90.3%
Sugar intake	low intake	23	8.2%
	High intake	256	91.8%
Salt intake	Low intake	2	0.7%
	High intake	277	98.3%
High blood pressure	Low risk	181	64.9%
	High risk	98	35.1%
Fluid Intake	well hydrated	43	15.4%
	poorly hydrated	236	84.6%
Body Mass Index			
BMI	Underweight	10	3.6%
	Normal Weight	112	40.3%
	Overweight	96	34.5%
	Obese	60	21.6%
BMR			
BMR	Low BMR	277	99.6%
	Normal BMR	1	0.4%
Waist Circumference			
Females	Normal WC	64	45.7%
	Very High WC	76	54.3%
Males	Normal WC	101	73.2
	Very High WC	37	26.8

Table 3 shows an association between demographic statistics, and there was a strong association between waist circumference and body mass index r= 0.46. However, there was a weak association between starch and fat intake r=0.20. Another association was found between salt and fruits intake r=0.25. High blood pressure was associated with waist circumference r=0.185, and there was also an association between fluid intake and salt intake r=0.19.

Table 3: Correlation Coefficient for PAL, BMR, BMI, WC and demographic characteristics

		1	2	3	4	5	6	7	8	9	10	11
1 BMR	**R**	1										
	Sig.											
2 PAL	**R**	-.115	1									
	Sig.	.179										
3 BMI	**R**	-.084	-.062	1								
	Sig.	.329	.469									
4 WC	**r**	-.052	.122	**.461****	1							
	Sig.	.547	.154	**.000**								
5 Skipping Meals	**R**	.017	.021	-.060	.117	1						
	Sig.	.847	.808	.486	.170							
6 Fruits & vegetables intake	**R**	.029	.006	-.073	-.122	-.065	1					
	Sig.	.738	.940	.397	.155	.448						
7 Fats intake	**R**	-.110	-.157	.069	-.103	.009	.036	1				
	Sig.	.200	.066	.423	.228	.914	.676					
8 Starch intake	**R**	-.137	-.004	.026	.027	-.013	.118	**.198***	1			
	Sig.	.109	.962	.760	.757	.881	.169	**.020**				
9 Sugar intake	**R**	.024	.030	.022	-.020	.095	-.094	-.044	-.159	1		
	Sig.	.781	.726	.799	.815	.266	.273	.606	.063			
10 Salt intake	**R**	.007	-.017	-.026	.052	-.017	**.254****	.110	.137	-.024	1	
	Sig.	.932	.841	.759	.547	.847	**.003**	.200	.109	.781		
11 HBP	**R**	.107	.070	.056	**.185***	-.083	.073	-.081	.004	.110	.069	1
	Sig.	.214	.415	.516	**.030**	.334	.397	.343	.965	.201	.425	
12 Fluid Intake	**R**	.037	-.149	.044	.040	.127	.116	.070	.021	.031	**.196***	.025
	Sig.	.665	.081	.605	.640	.136	.176	.416	.811	.718	**.021**	.774

Table 4 shows the predictions using logistic regression statistics. Gender significantly predicted physical activity level scores β=0.16, t= -2.72, p<0.008 and explained a significant proportion

variance with adjusted r^2=0.034, F= 4.80 P<0.008.

Table 4: Model Summary PAL						
Model	**R**	**R^2**	**Adjusted R^2**	**SE**	**F**	**Sig.**
4 (PAL)	.184[d]	.034	.027	1596.65	4.806	.009e
4 (BMR)	.267[d]	.071	.064	168.89	10.526	.000[e]
5 (BMI)	.185[e]	.034	.031	5.45	9.746	.002[f]
5 (WC)	.169[e]	.029	.025	14.69	8.099	.005[f]
Coefficients[a]						
Model		**Unstandardized Coefficients**		**Standardized Coefficients**	**T**	**Sig.**
		B	**SE**	**Beta**		
4 (A) (PAL)	Gender	-521.75	191.96	-.161	-2.718	.007
4 (B) (BMR)	Age	1.89	.84	.132	2.254	.025
	Gender	85.84	20.37	.246	4.213	.000
5 (A) (BMI)	Age	.21	.08	0.169	2.846	.002
5 (B) (WC)	Age	.09	.03	.185	3.122	.005
Model 4 (A). Dependent Variable: Physical Activity Level (PAL). Model 4 (B). Dependent Variable: Basal metabolic rate (BMR) Model 5 (A). Dependent Variable: Body Mass Index (BMI) Model 5 (B). Dependent Variable: Waist Circumference (WC)						

Age and gender significantly predicted basal metabolic rate scores β=0.13, t= 2.25, p<0.25 and explained a significant proportion variance with adjusted r^2=0.07, F= 10.53 P<0.001. Age significantly predicted body mass index scores β=0.16, t= -2.85, p<0.003 and explained a significant proportion variance with adjusted r^2=0.03, F= 9.74, P<0.003. Age significantly predicted waist circumference scores β=0.18, t= 3.12, p<0.006 and explained a significant proportion variance with adjusted r^2=0.02, F= 8.09, P<0.006.

Discussion

According to the study's findings, physically active teachers (11.2%) were less active than those who were not. Most teachers were not physically active. This is slightly greater than South Africa's previously predicted levels (Micklesfield, Pedro & Kahn, 2014). This is significantly lower than activity levels reported from other parts of the world, including Southeast Asia, the Americas, and the eastern Mediterranean. (Hallal, Bauman, Heath, Kohl, Lee, & Pratt, 2012)

Most teachers spend more than an hour seated in a motor vehicle for a maximum of seven days, which raises the risk of cardiovascular disease because physical inactivity or sedentary is also a risk factor for CVD. When compared to other studies, the findings imply that a high level of PA lessens the risk of developing risk. Obesity, high blood pressure, high cholesterol, and diabetes

are all risk factors. Physical activity can help to minimize your risk of heart disease (Buehler, Pucher, Merom & Bauman, 2011)

The study's findings reveal that demographic factors influence physical activity levels and cardiovascular risk factors, and that age was a predictor of BMI (overweight and obesity) and basal metabolic rate, and this was similar to the findings of this study Mohsen & Arjumand (2002). Thus, females were significantly more obese than males in all age categories. At the same time, overweight was more prevalent in the females 20-29 years of age when compared to men, but a higher prevalence of overweight was between 30-49 years' males (Mohsen & Arjumand, 2002). When females 20-29 years old were compared to men, the prevalence of overweight was higher in males 30-49 years old. Increasing age, particularly in females over 45 and males over 55, is a risk factor for cardiovascular disease (American College of Sports Medicine (ACSM), 2015).

The finding of the study show risk factors for cardiovascular disease are particular habits like sedentary lifestyle or behaviours such as physical inactivity, unhealthy diet and circumstances like age, a family of hypertension that increases a person's of developing cardiovascular diseases. Heart attacks can hit individuals of both sexes as they get older. Thus, men are more likely than women to have a heart attack, and men experience attacks earlier in life. Women's risk of heart attack is lower than men's even after they approach menopause when their mortality rate from heart disease rises (AHA, 2017). Gender was found to be the significant predictor of physical activity levels, and men were more active than women. Caspersen, Pereira and Currn (2002) and Martínez et al. (2012) concurred with these findings women were less likely than men to participate in physical activities. Although other studies provide that marital status and education level can predict physical activity levels, studies in South Africa have shown that marriage reduces physical activity and that educated people are more likely to be active physically (McVeigh, Norris& de Wet, 2004). In contrast, the results of this study did not show any predictions of marital status and education level towards physical activity.

The findings of the study show relationship between salt intake and high blood pressure. The higher the salt intake, the higher the chance of developing high blood pressure. When water accumulates in tissues, salt helps regulate the fluid balance in the body; one of the most effective ways to get rid of it is to reduce the salt content in the diet (WHO, 2012). The WHO recommends

reducing salt intake to reduce blood pressure and the risk of cardiovascular disease, stroke, and coronary heart disease in adults. These recommendations apply to everyone with or without high blood pressure. Diets high in saturated fat, trans fat, and cholesterol have been linked to related diseases like heart disease and atherosclerosis. Also, too much salt (sodium) in the diet can increase blood pressure. A healthy diet is one of the best weapons against cardiovascular disease. What you eat (and how much you eat) affects other controllable risk factors such as cholesterol, blood pressure, diabetes, and overweight (Feng & Macgregor, 2011).

The study's findings show that waist circumference is associated with high blood pressure. The higher the readings of WC for both males and females put the artery walls at pressure to pump more blood, which leads to high blood pressure. Waist circumference represents health benefits. Several studies have studied the relationship between waist circumference, heart disease, and diabetes. As waist circumference increases for each unit of BMI, the risk of death will also increase significantly (James, Cerhan, Steve, Moore& Gonzalez, 2014). Waist circumference is one of the most relevant anthropometric indicators for blood pressure r=0.185. Overweight and obesity are recognized risk factors for hypertension (Stamler, Riedlinger, Algera, Robers, 1978). Central body fat accumulation is related to hypertension (Anderson, Critchley, Chan, Cockram, Thomas).

The findings of this study show a positive correlation between body mass index and waist circumference r = 0.461, but not all overweight is equal in terms of health risks. Compared to people with heavier hips and thighs (fitted pear-shaped body), people with the heavier abdomen (apple-shaped body) have a higher risk of heart disease, type 2 diabetes, and premature death, even if your BMI is normal within range. Disease risk may increase (ACSM, 2015). Overweight and obese adults with cardiovascular disease risk factors such as high blood pressure, high cholesterol, or high blood sugar can make lifestyle changes to reduce weight and significantly reduce risk factors such as triglycerides, sugar blood and type 2 diabetes risk (Esmaillzadeh, Mirmiran & Azizi, 2006).

Conclusion and recommendation

This study discovered a positive correlation between waist circumference and body mass index, starch intake, and salt intake, as well as high blood pressure with waist circumference, fluid intake, salt intake, also with salt and fruit intake. Furthermore, an inverse dose relationship was

discovered between physical activity level and cardiovascular risk factors. Physical exercise, a regulated diet, and regular medical check-ups are recommended for the school teachers to reduce cardiovascular diseases risk.

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SECTION 3: CONCLUSIONS, LIMITATIONS AND RECOMMENDATIONS

3.1 Introduction

This section concludes the mini-dissertation titled: Physical activity level and cardiovascular risk factors among high school teachers within Makhado Municipality. The study aimed at determining and describing physical activity levels and cardiovascular risk factors among high teachers. This would include the general conclusion of the overall thesis, limitation, and summary.

3.2 Conclusions

This section provides the manuscript conclusion and the overall general conclusion of the mini-dissertation.

3.2.1 Conclusion Manuscript: Physical Activity Level and Cardiovascular Risk Factors among High School Teachers within Makhado Municipality

This study discovered a positive correlation between waist circumference and body mass index, starch intake, and salt intake, as well as high blood pressure with waist circumference, fluid intake, salt intake, also with salt and fruit intake. Furthermore, an inverse dose relationship was discovered between physical activity level and cardiovascular risk factors. Physical exercise, a regulated diet, and regular medical check-ups are recommended for the school teachers to reduce cardiovascular diseases risk.

3.2.2 General conclusion of the mini-dissertation.

The objectives of this study were achieved. As per the findings of the study, the majority of respondents reported as married, held a degree, and were employed on a permanent basis. Furthermore, a dose inverse relationship between physical activity and cardiovascular risk factors was discovered. The demographic characteristics of the respondents proved to predict physical activity level and cardiovascular risk factors. The findings further showed a correlation between physical activity level and cardiovascular risk factors. Ageing and family illnesses history were discovered to increase the risk for cardiovascular diseases, especially for female respondents. Based on the findings, when females reach age 45 and males 55, there is an increased risk for cardiovascular diseases.

Managing or changing modifiable risk factors such as unhealthy diet, smoking, sedentary lifestyle, or physical inactivity is encouraged in light of these risks. Moreover, the World health organisation suggests 150 minutes of physical activity weekly and salt reduction to reduce blood pressure and the risk of cardiovascular diseases, stroke, and coronary heart disease in adults. The impact of a

low level of Physical activity is claimed to include heart-related conditions even for people who have no other risk factors and increase the likelihood of developing other risk factors, including obesity, high blood pressure, high cholesterol, and type to diabetes. It is further highlighted that when teachers start to suffer from these conditions, work absenteeism increases, loss of productivity is noticed, and learners' academic performance deteriorates, affecting school performance.

3.3 Limitations of the study

The study targeted high school teachers' physical activity level and cardiovascular risk factors within Makhado Municipality. The limitation is that the study focus only on high school teachers does not include primary teachers, and the study was also conducted on selected schools within Makhado Municipality.

3.4 Recommendations

The study recommends a proper health screening that includes blood pressure, cholesterol level, blood glucose level and anthropometry measurements (weight, height, body mass index, body fat %age and waist circumference) to follow the WHO recommendations based on the results. For the general health of high school teachers, the school policymakers should make walking, cycling and other forms of exercise a habit. Labour and workplace policies should encourage active commuting and opportunities to be physically active during the workday. The Department of Education must ensure that schools provide supportive and safe spaces and facilities for teachers to spend their free time to improve their physical activity actively. In addition, to improve the dietary patterns of teachers, Dieticians/Nutritionists should assist with diet education, health talks on healthy and unhealthy foods, and provide interested teachers and learners with an ideal dietary plan to follow. Biokineticist should assist with exercise education, prescription and exercise supervision, and psychologists should offer those services to those with mental health-related problems, as the study findings revealed that the teaching profession is a highly stressful occupation due to enhanced psychosocial stress at the workplace. This will assist teachers in improving their own health and well-being, improve the quality of life, reduce unceasing visitation to healthcare facilities, and enhance productivity. When these transpire, school learners will be motivated to imitate a similar behaviour and improve their own health eventually.

3.5 Summary of the study

The purpose of the study was to determine physical activity level and cardiovascular risk factors among high school teachers within Makhado Municipality. The objectives of the study included assessing physical activity level, dietary pattern, waist circumference and body mass index (BMI) among high school teachers to establish if the physical activity level is associated with cardiovascular risk factors (dietary pattern, BMI, and waist circumference), and to establish if demographic characteristics predict physical activity level and cardiovascular risk factors among teachers within Makhado Municipality.

Chapter one focused on the nature of the research problem, purpose of the study, objectives of the study, the definition of terms and significance of the study. The health belief model guided the study. In chapter 3, the methodology of the study was discussed in detail. A quantitative approach was used, following a predictive study design that was descriptive, correlative and predictive in nature. With the support of the RaoSoft Sample size calculator, simple random sampling was used to select a total of 278 participants. Data were collected using self-administered questionnaires and anthropometry equipment. With the digital support of SPSS, descriptive and inferential statistical analysis was used to analyse the data. Chapter 4 presents and discusses the analysed data and literature and findings based conclusion. Recommendations were also discussed in this chapter.

Given the use of an article format mini-dissertation approach, section 1 includes the overview of the study, which encompasses the introduction, background of the study, problem statement, purpose of the study, methods, results and discussion. Section 2 is the manuscript prepared based on African Journal for Physical Activity and Health Sciences (AJPHES) guidelines. Section 3 presents the conclusion, which was subdivided according to the manuscript and the overall mini-dissertation, as well as the limitations and recommendations established based on the study's findings.

Annexures

Annexure A: Ethical Clearance Certificate

ETHICS APPROVAL CERTIFICATE

RESEARCH AND INNOVATION
OFFICE OF THE DIRECTOR

NAME OF RESEARCHER/INVESTIGATOR:
Ms T Ratselane

STUDENT NO:
11632469

PROJECT TITLE: **Physical activity level and cardiovascular risk factors among high school teachers within Makhado Municipality, South Africa.**

PROJECT NO: SHS/20/PH/11/2505

SUPERVISORS/ CO-RESEARCHERS/ CO-INVESTIGATORS

NAME	INSTITUTION & DEPARTMENT	ROLE
Dr L Makhado	University of Venda	Supervisor
Dr NS Mashau	University of Venda	Co - Supervisor
Ms T Ratselane	University of Venda	Investigator – Student

Type: Masters Research
Risk: Straightforward research without ethical problems
Approval Period: May 2020 – May 2022

The Human and Clinical Trails Research Ethics Committee (HCTREC) hereby approves your project as indicated above.

General Conditions
While this ethics approval is subject to all declarations, undertakings and agreements incorporated and signed in the application form, please note the following.

- The project leader (principle investigator) must report in the prescribed format to the REC:
  - Annually (or as otherwise requested) on the progress of the project, and upon completion of the project
  - Within 48hrs in case of any adverse event (or any matter that interrupts sound ethical principles) during the course of the project.
  - Annually a number of projects may be randomly selected for an external audit.
- The approval applies strictly to the protocol as stipulated in the application form. Would any changes to the protocol be deemed necessary during the course of the project. The project leader must apply for approval of these changes at the REC. Would there be deviated from the project protocol without the necessary approval of such changes, the ethics approval is immediately and automatically forfeited.
- The date of approval indicates the first date that the project may be started. Would the project have to continue after the expiry date; a new application must be made to the REC and new approval received before or on the expiry date.
- In the interest of ethical responsibility, the RECs retains the right to:
  - Request access to any information or data at any time during the course or after completion of the project.
  - To ask further questions; Seek additional information; Require further modification or monitor the conduct of your research or the informed consent process.
  - withdraw or postpone approval if:
  - Any unethical principles or practices of the project are revealed or suspected.
  - It becomes apparent that any relevant information was withheld from the REC or that information has been false or misrepresented.
  - The required annual report and reporting of adverse events was not done timely and accurately.
  - New institutional rules, national legislation or international conventions deem it necessary

ISSUED BY:
UNIVERSITY OF VENDA, RESEARCH ETHICS COMMITTEE
Date Considered: May 2020

Name of the HCTREC Chairperson of the Committee: Prof Sonto Maputle

Signature: [signature] Date: 26 May 2020

UNIVERSITY OF VENDA
DIRECTOR
RESEARCH AND INNOVATION
Private Bag X5050
Thohoyandou 0950

Director Research and Innovation

Signature: [signature] Date: 26 May 2020

University of Venda
PRIVATE BAG X5050, THOHOYANDOU, 0950, LIMPOPO PROVINCE, SOUTH AFRICA
TELEPHONE (015) 962 8504/8313 FAX (015) 962 9060
"A quality driven financially sustainable, rural-based Comprehensive University"

ANNEXURE B: PERMISSION TO CONDUCT THE STUDY

LIMPOPO
PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF
EDUCATION

CONFIDENTIAL

Ref: 2/2/2 Enq: Mabogo MG Tel No: 015 290 9365 E-mail: MabogoMG@edu.limpopo.gov.za

Tondani RT
P O Box 2187
Dzanani
0955

RE: REQUEST FOR PERMISSION TO CONDUCT RESEARCH

1. The above bears reference.

2. The Department wishes to inform you that your request to conduct research has been approved. Topic of the research proposal: **"PHYSICAL ACTIVITY LEVEL AND CARDIOVASCULAR RISK FACTORS AMONG HIGH SCHOOL TEACHERS WITHIN MAKHADO MUNICIPALITY,SOUTH AFRICA"**

3. The following conditions should be considered:

3.1 The research should not have any financial implications for Limpopo Department of Education.

3.2 Arrangements should be made with the Circuit Office and the School concerned.

3.3 The conduct of research should not in anyhow disrupt the academic programs at the schools.

3.4 The research should not be conducted during the time of Examinations especially the fourth term.

3.5 During the study, applicable research ethics should be adhered to; in particular the principle of voluntary participation (the people involved should be respected).

REQUEST FOR PERMISSION TO CONDUCT RESEARCH: TONDANI RT

Cnr. 113 Biccard & 24 Excelsior Street, POLOKWANE, 0700, Private Bag X9489, POLOKWANE, 0700
Tel: 015 290 7600, Fax: 015 297 6920/4220/4494

The heartland of southern Africa - development is about people!

Annexure C: Informed consent form

RESEARCH ETHICS COMMITTEE

UNIVEN Informed Consent

LETTER OF INFORMATION

Title of the Research Study: Physical activity level and cardiovascular risk factors among high school teachers in Makhado municipality, South Africa

Principal Investigator/s/ researcher: (Ratselane T, Bsc in Biokinetics)

Supervisor: Dr L. Makhado

Co-Investigator: Dr N.S Mashau

Brief Introduction and Purpose of the Study:

As technologies and industrialization continue to progress rapidly, in the 21st-century, conditions of life have changed in many countries, including South Africa. The sedentary lifestyle, unhealthy diet, excessive alcohol consumption and smoking, which is the potential negativity of these changes, causes the development of the disease, which has been associated with cardiovascular disease (Chhaya, Devalia, &Kedia, 2015). The purpose of the study is to determine and describe physical activity level and cardiovascular risk factors among high school teachers within Makhado municipality, South Africa

Outline of the Procedures :

The study approach is quantitative, and Predictive correlational design will be used in this study, which is descriptive, correlative, and predictive. The study will be conducted at secondary schools in Makhado Municipality, Vhembe District, Limpopo Province. Two hundred seventy-eight teachers will be selected using cluster sampling techniques from the population. Descriptive statistics will be used to describe demographic characteristics, physical activity level, dietary patterns and anthropometric variables by use of %age, frequency, mean and standard deviation. Inferential statistics for objectives 2 and 3 thus correlation coefficient (r) will be used to establish if physical activity level is associated with cardiovascular risk factors, establish the relationship

between physical activity level and cardiovascular risk factors and logistic regression analysis will be conducted to establish if the demographic characteristics of teachers contribute to the prediction of physical activity level and cardiovascular risk factors

Risks or Discomforts to the Participant:

There are no risks that are anticipated during data collection.

Benefits:

The study will help teachers know more about risk factors associated with cardiovascular diseases and modify their lifestyle behaviour. Information from this study will assist policymakers in the Department of education to also provide health screening for teachers and come up with strategies that will not only focus on the health of students but schools teachers as well. The study will bring awareness and increase knowledge on cardiovascular risk factors among teachers

The results will be presented at an appropriate conference and submitted to a peer review and publication journal. A technical research report will be presented to the Department of Education

Reason/s why the Participant May Be Withdrawn from the Study:

The participant will be ensured that if they feel like they do not want to participate, they are free to withdraw and female teachers who are pregnant women will be withdrawn from the study and no any action that would be taken against them

Remuneration:

Participants will not receive any monetary or other types of remuneration during or after study.

Costs of the Study:

Participants will not be liable to cover any cost regarding the study.

Confidentiality:

Confidentiality will be ensured to the participant whereby the researcher will not use the real names of the participants any need of identity document. The researcher will also ensure to the participant that the information shared will not be used against them and will be kept in a safe place.

Research-related Injury: No

Persons to Contact in the Event of Any Problems or Queries:

(Supervisor: Prof L. Makhado) Please contact the researcher (0726238086), my supervisor (0611472002) or the University Research Ethics Committee Secretariat on 015 962 9058. Complaints can be reported to the Director: Research and Innovation, Prof GE Ekosse on 015 962 8313 or Georges Ivo.Ekosse@univen.ac.za

General:

Potential participants must be assured that participation is voluntary and the approximate number of participants to be included should be disclosed. A copy of the information letter should be issued to participants. The information letter and consent form must be translated and provided in the primary spoken language of the research population

CONSENT

Statement of Agreement to Participate in the Research Study:

- I hereby confirm that I have been informed by the researcher, (*Tondani Ratselane*), about the nature, conduct, benefits and risks of this study - Research Ethics Clearance Number: 0726238086
- I have also received, read and understood the above written information (*Participant Letter ofInformation*) regarding the study.
- I am aware that the results of the study, including personal details regarding my sex, age, date of birth, initials and diagnosis will be anonymously processed into a study report.
- In view of the requirements of research, I agree that the data collected during this study can be processed in a computerized system by the researcher.
- I may, at any stage, without prejudice, withdraw my consent and participation in the study.
- I have had sufficient opportunity to ask questions and (of my own free will) declare myself prepared to participate in the study.
- I understand that significant new findings developed during the course of this research which may relate to my participation will be made available to me.

Full Name of Participant Date Time Signature

I, ……..… …… …… ……..

(*Name of researcher*) herewith confirm that the above participant has been fully

Informed about the nature, conduct and risks of the above study.

Full Name of Researcher

…….. Date**……** Signature**……**

Full Name of Witness (If applicable)

…… Date **……** Signature**……..**

Full Name of Legal Guardian (If applicable)

……Date**……** Signature**……..**

Please note the following:

Research details must be provided in a clear, simple and culturally appropriate manner and prospective participants should be helped to arrive at an informed decision by use of appropriate language (grade 10 level- use Flesch Reading Ease Scores on Microsoft Word), selecting of a non-threatening environment for interaction and the availability of peer counseling (Department of Health, 2004)

If the potential participant is unable to read/illiterate, then a right thumb print is required and an impartial witness, who is literate and knows the participant e.g. parent, sibling, friend, pastor, etc. should verify in writing, duly signed that informed verbal consent was obtained (Department of Health, 2004).

If anyone makes a mistake completing this document e.g. a wrong date or spelling mistake, a new document has to be completed. The incomplete original document has to be kept in the participant's file and not thrown away, and copies thereof must be issued to the participant.

References:

Department of Health: 2004. *Ethics in Health Research: Principles, Structures and Processes*

http://www.doh.gov.za/docs/factsheets/guidelines/ethnics/

Department of Health. 2006. *South African Good Clinical Practice Guidelines*. 2nd Ed. Available at:

http://www.nhrec.org.za/?page_id=14

ANNEXURE D: DATA COLLECTION TOOL- QUESTIONNAIRE

Participant No. _____

Date of data collection ……. / ……/…….

Section A: Demographic details

Date of birth	/ /				
Gender	M		F		
Race	African	Coloured	White	Indian	
Marital status	Single	Married	divorced	Widow	Widower
Educational level	Certificate	Diploma	Degree	postgraduate	
Employment status	Part-time		Permanent		

Section B: Dietary pattern

	EATING HABITS	**Yes**	**No**
1	Do you skip breakfast more than once a week?		
2	Do you skip lunch more than once s week?		
3	Do you skip evening meals more than once per week?		
4	Do you skip meals and snack instead on most days?		
	Fruits and vegetables		
5	Do you eat more than 5 portions of fruit or vegetables?		
6	Do you eat more 4 different varieties of fruits each week?		
7	Do you eat more than 4 different varieties of vegetables per week		
	FAT	**Yes**	**No**
8	Do you choose low-fat products when available?		
9	Do you choose baked, steamed or grilled options when available, rather than fried foods (such as crisps and snacks, or fish and chips)		
10	Do you opt for lean cuts of meat or remove visible fat- for example, removing the skin on chicken or rind on bacon?		

11	Did you eat any oily fish last week? Examples of oily fish include salmon, mackerel, herring, sardines, trout and fresh tuna?		
12	Do you include some unsalted nuts and seeds in your diet?		
	STARCHY FOODS	**Yes**	**No**
13	Do you base your main meals around starchy foods?		
14	Do you regularly eat wholemeal bread or rolls rather than whites?		
15	Do you regularly eat wholegrain cereals with no added sugar?		
16	Do you regularly include pulses in your diet? For example, beans and lentils		
	SUGAR	**Yes**	**No**
17	Do you regularly eat sugar-coated breakfast cereals or add sugar to your breakfast cereals?		
18	Do you add sugar to your drinks?		
19	Do you regularly drink sweet fizzy drinks?		
20	Do you regularly eat cakes, sweets, chocolate or biscuits at work?		
	SALT	**Yes**	**No**
21	Do you regularly add salt to food during cooking?		
22	Do you regularly add salt to the meal at the table?		
23	Do you regularly eat savoury snacks at work?		
24	Do you regularly eat pre-prepared meals? For example pre-prepared sandwiches, ready meals or canned soups		
25	Do you regularly eat processed meat such as ham or bacon or smoked fish?		
26	Has your GP advised you that you have high blood pressure?		
	DRINKS AND ALCOHOL	**Yes**	**No**
27	Do you drink plenty of fluids at regular interval?		
28	Do you opt for a variety of different drinks, including water at work?		
29	Do you avoid sugar fizzy drinks?		
30	Do you drink less than 2-3 units of alcohol if you're a woman or less than 3-4 units of alcohol a day if you're a man?		

Section C: Physical Activity Level

Part 1: Transportation physical activity

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

1. During the last 7 days, on how many days did you travel in a motor vehicle like a train, bus, car, or tram?

_____ Days per week

No traveling in a motor vehicle Skip to question 02

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

_____ Hours per day

_____ Minutes per day

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

_____ Hours per day

_____ Minutes per day

4. 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 02

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

_____ Minutes per day

Part 02: 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.

6. 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 heavy lifting, chopping wood, shovelling snow, or digging in the garden or yard?

_____ Days per week

No vigorous activity in garden or yard Skip to question 07

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

_____ Hours per day

_____ Minutes per day

08. 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 08

09. 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 03

Part 03: Recreation, sport and leisure-time physical activity

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

_____ Hours per day _____ Minutes per day

Social determinants

Do you experience stress?	Yes	No
Do you feel nervous?	Yes	No
Do you feel worthless?	Yes	No
Do you feel restless?	Yes	No
Do you feel sad that nothing could cheer you up?	Yes	No

Section D: Anthropometric measurements

Height		M
Weight		Kg
BMI		$Kg.m^{-2}$
Waist circumference		Cm

ANNEXURE E: LANGUAGE EDITION CERTIFICATE

Editorial letter

This serves to confirm that I, Dr T.E. Sikitime, attached to University of Venda, Department of English, Media Studies and Linguistics have proofread a dissertation titled: **PHYSICAL ACTIVITY LEVEL AND CARDIOVASCULAR RISK FACTORS: CASE STUDY OF HIGH SCHOOL TEACHERS WITHIN MAKHADO MUNICIPALITY**

Editorial work focused mainly on technical precision and common errors relating to syntax, diction, word order and formulation of ideas. Corrections and suggestions were made for the student to effect before submission.

BY

Ratselani Tondani

STUDENT NO: 11632469

Signature **Date 24/02/2022**

Ext: 015 962 8288

Email: Emmanuel.sikitime@univen.ac.za

BA (ed), BA (Hons) English, Univen, BA Communication Science UNISA, MA (SLS) Stellenbosch University, PhD Univen

Physical activity and Cardiovascular Risk Factors among High School Teachers

ORIGINALITY REPORT

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SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	E C Laurence, J Volmink, T M Esterhuizen, S Dalal, M D Holmes. "Risk of cardiovascular disease among teachers in Cape Town: Findings of the South African PaCT pilot study", South African Medical Journal, 2016 Publication	1%
2	Erin Hoare, Bill Stavreski, Bronwyn A. Kingwell, Garry L. Jennings. "Australian adults' behaviours, knowledge and perceptions of risk factors for heart disease: A cross-sectional study", Preventive Medicine Reports, 2017 Publication	1%
3	Submitted to Grand Canyon University Student Paper	1%
4	Submitted to University College Birmingham Student Paper	1%
5	Submitted to South University Student Paper	<1%