DEVELOPMENT OF HEALTH PROMOTION GUIDELINES FOR WEIGHT MANAGEMENT AMONG PRIMARY HEALTH CARE NURSES IN THE EASTERN CAPE PROVINCE, SOUTH AFRICA

BY

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Student Number: 201317426

A THESIS SUBMITTED IN FULFILMENT OF THE REQUIREMENTS FOR THE DOCTOR OF PHILOSOPHY DEGREE IN NURSING SCIENCE STUDIES

DEPARTMENT OF NURSING SCIENCE

FACULTY OF HEALTH SCIENCES

Supervisor: Professor D. Goon

Co-supervisor: Professor E. Seekoe

JANUARY 2018
PLAGIARISM DECLARATION

I, Sizeka Monakali, Student number 201317426, hereby declare that I am fully aware of the University of Fort Hare’s policy on plagiarism and I have taken every precaution to comply with the requirements.

I also hereby declare that I am fully aware of the University of Fort Hare’s policy on research ethics and I have taken every precaution to comply with the regulations. I have obtained an ethical clearance certificate from the University of Fort Hare’s Research Ethics Committee and my reference number is the following:
GOO031SMON01.

Permission to conduct this research was also obtained from the Eastern Cape Department of Health and Primary Health Care (PHC) facilities. My reference number is EC-2015RP10-426.

My supervisor is Professor Daniel Goon and the co-supervisor, Professor Eunice Seekoe.

Signature : Date..............................
CERTIFICATION

This thesis entitled “development of health promotion guidelines for weight management among primary health care nurses in the Eastern Cape, South Africa” meets the regulation governing the award of the degree Doctor of Philosophy of the University of Fort Hare and is approved for its contribution to scientific knowledge and literary presentation.

Prof. DT Goon Date
Supervisor

Prof. E. Seekoe Date
Co- Supervisor
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• Authors whose works have been cited.
DEDICATION

This thesis is dedicated to my husband and friend

Zolani Monakali

With love and gratitude for all his valued support, encouragement and faith in my ability to complete this project and the ability to overcome challenges encountered along the way. May the good Lord richly bless you.
<table>
<thead>
<tr>
<th>Acronym</th>
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<tbody>
<tr>
<td>ADA</td>
<td>American Diabetes Association</td>
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<tr>
<td>AIDS</td>
<td>Acquired Immune Deficiency Syndrome</td>
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<td>AUR</td>
<td>Area Under the Curve</td>
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<tr>
<td>BCMM</td>
<td>Buffalo City Metropolitan Municipality</td>
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<tr>
<td>BMI</td>
<td>Body Mass Index</td>
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<tr>
<td>BP</td>
<td>Blood Pressure</td>
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<tr>
<td>CDC</td>
<td>Centre for Disease Prevention and Control</td>
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<tr>
<td>Cm</td>
<td>Centimetre</td>
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<tr>
<td>DHIS</td>
<td>District Health Information System</td>
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<tr>
<td>DM</td>
<td>Diabetes Mellitus</td>
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<tr>
<td>EC</td>
<td>Eastern Cape</td>
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<td>ECDoH</td>
<td>Eastern Cape Department of Health</td>
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<tr>
<td>HIC</td>
<td>High-Income Countries</td>
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<tr>
<td>HIV</td>
<td>Human Immune Deficiency Virus</td>
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<tr>
<td>HPGWM</td>
<td>Health Promotion Guidelines for Weight Management</td>
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<tr>
<td>HPM</td>
<td>Health Promotion Model</td>
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<tr>
<td>HTN</td>
<td>Hypertension</td>
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<td>IDF</td>
<td>International Diabetes Federation</td>
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<tr>
<td>Kg</td>
<td>Kilogram</td>
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<tr>
<td>LMICs</td>
<td>Low-and-Middle-Income Countries</td>
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<tr>
<td>MONW</td>
<td>Metabolically Obese Normal Weight</td>
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<tr>
<td>Acronym</td>
<td>Full Form</td>
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<tr>
<td>NCDs</td>
<td>Non-communicable Diseases</td>
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<td>NCEP</td>
<td>National Cholesterol Education Programme</td>
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<tr>
<td>NHS</td>
<td>National Health System Information Centre’s Lifestyles Statistics</td>
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<td>NHBLI</td>
<td>National Heart, Blood and Lung Institute</td>
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<tr>
<td>NIAAA</td>
<td>National Institute of Alcohol Abuse and Alcoholism</td>
</tr>
<tr>
<td>NICE</td>
<td>National Institute for Health Care Excellence</td>
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<td>NIDDKD</td>
<td>National Institute of Diabetes and Digestive and Kidney diseases</td>
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<td>NIH</td>
<td>National Institute of Health</td>
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<tr>
<td>O.R</td>
<td>Oliver Reginald Tambo</td>
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<tr>
<td>PA</td>
<td>Physical Activity</td>
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<tr>
<td>PHC</td>
<td>Primary Health Care</td>
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<tr>
<td>PI</td>
<td>Physical Inactivity</td>
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<tr>
<td>PN</td>
<td>Professional Nurse</td>
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<tr>
<td>ROC</td>
<td>Receiver Operating Characteristic</td>
</tr>
<tr>
<td>SA</td>
<td>South Africa</td>
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<td>SAMRC</td>
<td>South African Medical Research Council</td>
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<td>SANC</td>
<td>South African Nursing Council</td>
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<tr>
<td>SPSS</td>
<td>Statistical Package for Social Sciences</td>
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<td>SSA</td>
<td>Sub-Saharan Africa</td>
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<td>UK</td>
<td>United Kingdom</td>
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<td>US</td>
<td>United States</td>
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<tr>
<td>USA</td>
<td>United States of America</td>
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<tr>
<td>WBOT</td>
<td>Ward Based Outreach Team</td>
</tr>
<tr>
<td>Acronym</td>
<td>Description</td>
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<td>---------</td>
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<tr>
<td>WC</td>
<td>Waist Circumference</td>
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<tr>
<td>WHO</td>
<td>World Health Organization</td>
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<tr>
<td>WHR</td>
<td>Waist-to-Hip Ratio</td>
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<tr>
<td>WHtR</td>
<td>Waist-to-Height Ratio</td>
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<tr>
<td>ZAR</td>
<td>South African Rand</td>
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ABSTRACT

Overweight and obesity have become significant public health threats both globally and in South Africa. PHC professional nurses are first contact to patients and the community as well as key stakeholders in the management and education of obese patients. However, anecdotal evidence seems to question their suitability as good models of the advocated healthy lifestyle behaviours and weight management, as overweight and obesity is also prevalent among the professional nurses. This study examines the prevalence and determinants of overweight and obesity among PHC professional nurses in the Eastern Cape (EC) Province of South Africa.

This was a workplace, cross-sectional study involving 203 PHC professional nurses conveniently selected across 41 PHC facilities in EC, South Africa. A WHO STEP wise questionnaire was used to collect demographic and behavioural data. Anthropometric (weight, height and waist circumference [WC]) measurements were taken following a standard protocol. Overweight and obesity was defined as a BMI of 25-29.9kgm⁻², and BMI ≥ 30kgm⁻², respectively.

Seventy six percent of the nurses were obese. An additional 18% were overweight. Age, gender, marital status, duration of practice, alcohol use and smoking were significantly associated with obesity. There was no association between physical activity and obesity. After adjusting for confounders, only age more than 30 years (OR=5.2, 95%CI=1.6-16.4) and not using alcohol (OR= 4.0 95%CI= 1.7-9.1) were significant and independent predictors of obesity among the nurses.
In conclusion is an alarmingly high prevalence of obesity among primary healthcare professional nurses in Eastern Cape, South Africa. This shows that PHC professional nurses in EC are not good models of the healthy behaviours, judge be BMI indicator, if they do advocates for healthy weight management to patients. This constitutes a future risk for an increased prevalence of chronic diseases and a handicapped healthcare workforce. There is a need to implement measures to promote healthy lifestyle behaviour and weight management among professional nurses in this setting.

**Keywords:** Obesity, professional nurses, primary healthcare, health promotion, Eastern Cape, South Africa
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CHAPTER ONE

INTRODUCTION, JUSTIFICATION AND DIVISION OF THE STUDY

1.1 Introduction

Overweight and obesity is a global public issue which is deleterious health. Overweight
and obesity are two of the leading risks for global deaths (World Health Organisation
(WHO), 2011). Currently, more than 1.9 billion adults are overweight and over half a
billion are obese (WHO, 2016; Finucane et al., 2011) with an inevitable increase in the
nearest future, if action is not taken. Across 199 countries, 502 million adults are
reported to be obese (Finucane et al., 2011). The National Health System (NHS)
Information Centre’s Lifestyles Statistics (2010) predicted that, by 2025, the prevalence
of overweight and obesity would rise to 47% and 36% respectively. Undoubtedly, these
risks are preventable as they are largely driven by unhealthy lifestyle behaviours
involving dietary practices and physical inactivity (WHO, 2014; Nnyepia et al., 2015).
The epidemiology of obesity has made it clear that the role of genetics, socio-economic
status, ethnicity, food marketing and physical environment cannot be overruled (Aryee
et al., 2013). Therefore, efforts aimed at promoting healthy lifestyles will go a long way
in the reduction of obesity and its associated co-morbidities.

An estimated 205 million men and 297 million women were reported as obese over 20
years (WHO, 2017) and around 34% among United States adults (Ogden & Carrol,
2010). Overweight and obesity affect about 20% of Australian children leading to
serious health, social and psychological problems.
In a cross-sectional analysis of patterns of obesity in a cohort of 5000 working nurses and midwives in Australia, New Zealand and United Kingdom, Bogossian, Hepworth Leong, Flaws, Benefer and Turner (2012) found that 60% of nurses in all three countries were outside the healthy weight range. In a previous study by Miller, Alpert and Cross (2008) involving 720 nurses in North America, 30% of nurses were overweight and 18% obese. Overweight nurses have lived, felt and remain subjected to the same stigma and derogatory stereotyping as overweight patients (Pranda & McGreevy, 2014).

The study by Goon, Maputle, Olukoga, Lebese, Khoza and Ayanwu (2013) on overweight, obesity and underweight nurses in South Africa, identified a high prevalence of overweight and obesity among nurses, a rate comparable with that of the general population in South Africa, which is echoed by Bogossian et al. (2012) in a cross-sectional analysis of patterns of obesity in a cohort of working nurses and midwives in Australia, New Zealand and United Kingdom. Another study by Goon et al. (2014) documented a higher prevalence of abdominal obesity among nurses in the Vhembe and Capricorn Districts of Limpopo in South Africa.

Overweight and obesity are predisposing factors to chronic diseases such as cardiovascular diseases, diabetes and cancers. Each year chronic diseases cause more than 36 million deaths globally which is equivalent to 63% of all mortality (United Nations, 2012b). Individuals that are obese or overweight are always associated with negative stereotypes such as being morally weak, lazy, slow, stupid, unattractive, non-complaint, lacking self-discipline and being vulnerable to ill-health (Poon & Tarrant, 2009; Hansson, Resmussen & Ahlstron, 2011).
Obesity also has a negative impact on workforce participation and is linked to high risk of occupational injuries (Janssen, Bacon & Pickett, 2011). Obese workers’ records reflect high rates of absenteeism, due to short- and long term sick leave. Overweight and obesity among nurses may reduce the workforce, thus leading to a shortage of qualified health professionals. This scenario might hold true for overweight and obese South African nurses. However, this is only speculative as no empirical study has been conducted to ascertain the truth or falsity of this assumption.

Technological advancement, which has brought about the use of several types of equipment in healthcare resulting in limited personal energy expenditure, has also been advanced as another contributing factor to physical inactivity and consequently, obesity among nurses (Ogunjimi et al., 2010). Overweight and obesity among nurses is deleterious to the health of the nurses and may affect the healthcare workforce. For example, overweight and obese nurses may not be active at work and such an attitude might affect the healthcare system if the supposed caregivers eventually become care receivers. Also, overweight and obese nurses have been shown to have less confidence in health education of their patients on weight management because they do not seem to practise what they preach (Kyle, Neall & Atherton, 2016).

The South African government’s pledge of a long and healthy life for all its citizens is threatened by the grievous burden of overweight and obesity. Healthy lifestyle education and advocacy plays a significant role in the reduction of overweight and obesity (Steyn, 2004). Given this, health professionals can be outlined as essential
stakeholders in fostering the reduction of the obesity burden and the achievement of the pledged healthy life for all South Africans. Nurses, in particular, who constitute the larger proportion of the healthcare workforce (Aryee et al., 2013; Ogunjimi et al., 2010) have major roles to play in health education and health promotion activities towards weight management.

Primary Health Care (PHC) professional nurses are patients’ first point of contact in the healthcare system, and in most cases, independent health decision makers (South African Nursing Council (SANC), 2005). Likewise, health education on health promotion activities for weight management forms part of the core activities conducted at this level of care (SANC, 2005). Thus, this group is an important healthcare group, yet a high risk group also because of their physical inactivity and obesity resulting from prolonged sitting during consultations, which mainly constitute their work.

In studies reviewing records for obesity screening, obesity diagnoses and treatment, Bleich, Pickett and Copper (2011), Counterweight Project (2004) maintains that obesity is under-recognised and undertreated. Previously the main focus of public health programmes in Sub – Saharan countries was on the eradication of under nutrition and infectious diseases rather than obesity and non-communicable diseases (Kruger, Pouane, Senekal & van der Merwe, 2005), while, there are very few studies (Kruger et al., 2005; Goon et al., 2013; Goon et al., 2014) examining overweight and obesity in nurses in South Africa.

Weight reduction with lifestyle modification can lower blood pressure levels and thus the risk of developing cardiovascular diseases (CVDs) (Svetkey et al., 2005; Neter et al.,
Different cut-off points have been applied in diagnosing or predicting risk factors associated with total- and abdominal obesity. Traditionally, the body mass index (BMI) has been widely used to identify overweight and obesity in populations, notwithstanding its limitations. The primary assumption of BMI guidelines is that BMI is linked with body fatness and its associated morbidity and mortality (Gallagher, Heymsfield, Jebbs, Murgatroyd & Sakamoto, 2000). Nevertheless, it is possible for an individual to be obese yet lacking in the metabolic markers of adverse health risk. This raises questions about the validity of BMI as a universal indicator of excess body fat. It has not been established what proportion of the PHC nurses' population is “metabolically obese normal weight” (MONW) and/or ‘metabolically healthy obese” (MHO).

Similarly, the waist circumference (WC), waist-to-hip ratio (WHR) and waist-to-height ratio (WHTR), all indicators of central obesity, have been proposed for predicting cardiovascular risk (Browning, Hsieh & Ashwell, 2010; Norfazilah, Julaina & Azmawati, 2015; Rodea-Montero, Evia-viscarra & Apolinar-Jimenez, 2014; Nadeem, Naveed, Hussain & Raza, 2013; Rajput et al., 2015), and the accuracy of BMI (On’kin, Longo-Mbenza, Okwe & Kabangu, 2007; Sarry El Din et al., 2014), WC (Sarry El Din et al., 2014; On’kin, Longo-Mbenza, Okwe & Kabangu, 2007; Tulloch-Reid et al., 2010; Motala, Pirie, Esterhuizen & Omar, 2011; Rajput et al., 2015), WHR (Rajput et al., 2015; Sarry El Din et al., 2014) and WHtR (Rajput et al., 2015; Sarry El Din et al., 2014) have been reported in different populations and countries with varying cut-off values. Despite the reported advantages and the ease of computing these anthropometrical variables, a suitable cut-off for the population from Africa, and more specifically, among
nurses has yet to be determined. It is important to document ethnic specific cut-off points in diagnosing total and central obesity, given the different geographical, socio-economic and cultural conditions inherent in different countries.

In terms of the healthy living styles, health care professionals should differ from the general health population, because health care professionals have the potential to be influential role models. This is exemplified in the pre-school graduation saying “when I grow older I want to be a nurse”. Primary prevention offered by PHC nurses includes advising about healthy eating, physical activity levels, avoidance of tobacco and substance abuse. Therefore, it is expected that nurses act as role models in maintaining the desired body weight status as a health behavioural indicator for the public to emulate.

However, the majority of studies on obesity among healthcare professionals are conducted at either the secondary or tertiary level of care (Goon et al., 2013; Skaal & Pengpid, 2014; Aryee et al., 2013; Ogunjimi et al., 2010; Kyle, Neall & Artherton, 2016), neglecting the primary healthcare givers. In this perspective, the present study was conducted on the health professional population (nurses) which shares a particular obligation to health promotion and primary prevention.

It would be advisable to design or develop health promotion guidelines for weight management among PHC nurses in Eastern Cape Province, South Africa.

1.2 Statement of the Problem

Non-communicable diseases (NCDs) are increasingly the main cause of death in South Africa and with the higher prevalence of obesity and diabetes, NCDs are the leading
threats to human health and development in South Africa (Shisana et al., 2013). According to WHO (2014), the total deaths in 2012 in South Africa were 608,000; of these, NCDs accounted for 43% of the total deaths. NCDs also account for 16% of disability-adjusted life years (South Africa Medical Research Council (SMRC), 2015). Not only do NCDs constitute a public health concern, but also an economic challenge in South Africa. The WHO estimated the annual cost of addressing NCDs in South Africa to be more than 1 billion South African Rands (ZAR) (Healthbiz Informa, 2015).

In South Africa, as in other countries, overweight and obesity are prevalent among primary health care nurses as in the general population (Goon et al., 2013; Bogossian et al., 2012 & Miller et al., 2008). This is contradictory and worrisome, given that nurses play a key role in counselling and assisting patients to lose weight and in caring for patients who are obese or overweight. Also, health education on obesity and related conditions, diet, exercise and healthy life style is the primary focus of PHC nurses. Treatment costs drain already over-stretched resources, and increasing emphasis is needed on prevention, particularly targeting those at high risk. Efficiently identifying those at risk is therefore important. The BMI, WC, WHR and WHtR are now widely used anthropometric indicators of disease risks and metabolic syndrome (MS).

The MS is the clustering of metabolic risk factors, which increase the risk of heart disease, diabetes and other non-communicable diseases (Grundy et al., 2005). Given the inherent limitations in the use of universal cut-off levels in diagnosing total and central obesity among populations across various ethnic and gender groups may misclassify some patients. The differing body fat distribution and ratios to lean muscle mass need to be taken into consideration (Deurenberg & Deurenberg, 2001) because
they explain the underlying variations that exist between countries’ people. Thus applying the universal cut-off values for obesity may misclassify some persons of the risk factors, given the population specific cut-off for determining obesity. As such, it is imperative to identify action points relevant for PHC nurses in South Africa. There is hardly any study so far to determine the ethnic specific cut-offs for determining total and central obesity in the South African nurse population. Profiling such information will be relevant to health policy planners when developing cardiovascular disease prevention programmes, since universal criteria do not apply to all races.

Nurses are always claiming patient education and wellness as being among their most important missions. Primary health care nurses, therefore, should play an important role in the national effort to manage obesity and prevent obesity-related diseases. If these health service practitioners, as role models of the community, are not responding to obesity interventions, it may be difficult to expect the general public to do so. After all, one should lead by example. It then behoves PHC nurses to exhibit exemplary behaviour in weight management as part of their promotive health care approach. The researcher, being involved in this field, thus feels it is important at national and agency level to prioritise weight prevention and management.

A better understanding of primary health care nurses’ body size has two-fold implications. Firstly, it is imperative for the individual’s health and well-being plus the organisational interest in promoting a healthy workforce; and secondly, gauges nurses’ potential of serving as role models to the patients. Given that there is limited information available on overweight and obesity among nurses in South Africa, it is important to investigate this phenomenon. This can be done by accurately using ethnic specific cut-
off values in determining its prevalence, aetiology and a possible health guideline strategy tailored to weight prevention and management among the South African primary health care nursing population.

1.3 Aim of the Study

The study seeks to ascertain the prevalence and correlates of overweight and obesity among PHC nurses in the Eastern Cape Province; to diagnose cut-off points for predicting obesity; and to further develop health promotion (HP) guidelines for weight management for obese patients.

1.4 Objectives of the Study

The objectives of the study are to:

- Determine the prevalence and determinants of overweight and obesity among PHC nurses in the Eastern Cape Province.
- Examine the impact of lifestyle behaviours (physical activity, smoking, alcohol consumption and dietary habits) on the PHC nurses’ role in the management of obese patients in the Eastern Cape Province.
- Determine the role of PHC nurses in weight management in the general population of the Eastern Cape Province.
- Develop health promotion guidelines for weight management of obese patients in PHC in the Eastern Cape Province.
- Identify the optimal cut-off points in defining total and central obesity using different anthropometric indicators (BMI, WC, WHR, and WHTR) among PHC nurses in the Eastern Cape Province.
1.5 Research Questions

The research questions of the study are:

- What is the prevalence and determinants of overweight and obesity in PHC nurses in the Eastern Cape Province?
- What are the lifestyle behaviours (physical activity, smoking, alcohol consumption and dietary) impacting on the nurses’ role of managing the obese patients in the Eastern Cape Province?
- What role(s) do PHC nurses in the Eastern Cape Province play concerning weight management in the general population?
- Which and what kind of health promotion guidelines could possibly help in weight management among nurses?
- Would the universal cut-off points of BMI, WC, WHR, and WHTR in defining total and central obesity be applicable to PHC nurses in the Eastern Cape Province?
1.6 **Significance of the Study**

The findings from this study is important to gauge intervention, given the scarcity of data on the management of overweight and obesity among nurses rendering PHC services to patients in PHC health facilities. The finding of this study aids the facilitation and management of health care problems associated with overweight and obesity. Better understanding of nurses’ own body size is important in order to determine the individual’s health and well-being to meet the organisation’s interest in fostering a healthy workforce and ensure nurse’s potential to serve as role models in relation to overweight and obesity management. The finding from this study would help public health policy in designing strategies aimed at curbing the increasing upsurge in the prevalence of overweight and obesity among nurses.

1.7 **Delimitations of the Study**

The study was delimited to professional nurses (21 years and above) working in primary health care facilities from four randomly selected districts (OR Tambo, Buffalo City Metropolitan, Chris Hani and Sarah Baartman) of the Eastern Cape Province. Variables of interest were overweight- and obesity management of patients by professional nurses.
1.8 Theoretical Framework

The health promotion model (HPM) proposed by Pender (1992) and revised in 1996 was used as the theoretical framework in this study to understand weight management behavioural and attitudinal disposition geared towards counselling and interventions.

Figure 1.1: Adapted from Pander Theory of Health Promotion (1982)

The health promotion model is envisaged as applicable to this study because it might assist primary health nurses to understand overweight and obesity as the major determinants of health behaviours; it could also foreground behavioural counselling as a way of promoting healthy life styles.

The model has three components:
1.8.1 Individual characteristics and experiences

Personal factors: Personal factors refer to psychological and psychological plus sociocultural factors. Biological age can influence the acceptance and sustainability of a healthy lifestyle for obesity management and self-motivation toward a healthy lifestyle can reduce obesity and delay or prevent the occurrence of chronic illnesses.

1.8.2 Behaviour-specific cognition and affect

Perceived benefits of action: Normal body weight can benefit oneself by minimising the chances of suffering from non-communicable diseases such as hypertension and diabetes type 2.

Perceived barriers to action: Health professionals report several barriers that block screening and intervention for overweight and obesity, such as lack of time during consultation to address weight (Klein et al., 2010; Sesselberg, Klein, O’Connor & Johnson, 2010; Tham & Young, 2008); lack of referral options (Sesselberg et al., 2010); feelings of discomfort approaching the weight status (Bardia, Holtan, Slezak & Thompson, 2007; Jay et al., 2008; Jay et al., 2009; Sesselberg et al., 2010; Tham & Young, 2008); concerns of offending patients and their family members (Bardia et al., 2007; Sesselberg et al., 2010) and a belief that they have inadequate training/competency in weight loss techniques.
**Perceived self-efficacy**: In this study, perceived self-efficacy refers to the determination of PHC nurses to convincingly offer obesity interventions.

**Activity related affect**: Preparedness of PHC nurses to maintain normal body weight.

**Interpersonal influences**: PHC nurses may be influenced by other professionals, friends, family members who have been using or are still on obesity interventions.

**Commitment to Action**: PHC nurses will accept and continue obesity interventions irrespective of time constraints.

**Health Promoted Behaviour**: Acceptance and continuation of obesity interventions.

### 1.8.3 The application of the health promotion model to the study

As the individuals seek to regulate their behaviour, interacting with the environment in all of their bio-physiological complexity, they can either be transformed positively or negatively. Healthcare professionals, especially nurses, play an advocacy role in the care of individuals, families and communities because they are part of the interpersonal environment which exerts an influence on people throughout their lifespan. Certain perceived barriers, such as the ease of access to harmful substances such as alcohol and cigarettes, the costs of procuring a healthy diet and lack of physical activity facilities could reduce an individual’s willingness to engage in health promoting behaviours.

However, if there are supportive health policies, consistent health education and health screening to detect individuals at risk, the perceived benefits of the health promoting behaviours will increase. A modelling of the desired lifestyle and health-promoting behaviours by primary health care workers that are providing the first level of care to the communities would re-inforce the effects of the policies, education and screening.
The popular adoption of desirable behaviours would ultimately lead to a reduction of overweight and obese people and perpetually reduce the prevalence and burden associated with NCDs. No doubt the quality of life could be improved also.

1.9 Operational Definition of Terms

**Primary health care nurses**: Nurses working at the first level continuum of care are responsible for promotive and preventive care, given their frequent contact with clients and families.

**Primary health care facilities**: In this study, primary health care facility refers to fixed clinics and community health centres that are rendering primary health care package.

**Health promotion**: Any deliberate combination of educational, political, regulatory and organizational support for activities and conditions of living conducive to the health of individuals, groups and communities (Green & Kreuter, 2005).

**Health Promotion Model**: Is health as "a positive dynamic state, not merely the absence of disease".

**Guidelines**: Statements that give general advice about how something should be done.

**Obesity**: Obesity in this study refers to a body mass index (BMI) calculated as weight in kilograms divided by height in square meters rounded to one decimal place which is greater than or equal to 30 in adults (Ogden et al., 2012).

**Body Mass Index (BMI)**: BMI is a measure of the weight status at an individual level and takes account of the expected difference in weight in adults of different heights. BMI is calculated as the person's weight in kilograms divided by the square of his height in meters kg/m² (WHO, 1995).
**Weight Management**: refers to activities done by PHC nurses to assess for obesity and overweight, to counsel and support overweight and/or obese persons to lose weight through BMI assessment and waist circumference advice about physical activities and healthy eating.

### 1.10 Chapters’ Outline

**Chapter One**: The background to the study, problem statement, aim, objectives, and research questions, significance of the study, theoretical framework and the definitions of key operational terms are described and presented. The chapter also describes the layout of the study.

**Chapter Two**: It concerns the literature review. Obesity and overweight are covered; the burden of overweight and obesity; the causes of overweight and obesity; life style behaviours of nurses; obesity management; health consequences of being overweight and obese; nurses as role models for health promotion; intervention strategies to curb overweight and obesity and then finally measures of determining obesity are described.

**Chapter Three**: Describes the research methodology applied for this study. The chapter focuses on the research design and setting; population; sampling and sample size; the research instruments; the validity and reliability of the instruments and ethical considerations. This is followed by a description of the data collection procedure. Finally, the research data analysis is described.

**Chapter Four**: Presents the results of the study and the discussion of the research findings.
Chapter Five: Concerns the development of health promotion guidelines for managing obese patients in PHC; the rationale for developing guidelines; persons affected; abbreviations; criteria for health promotion guidelines; guiding principles, roles and responsibilities of persons affected in obesity management and procedures to be followed when implementing health promotion guidelines. Finally, a summary of health promotion guidelines for obesity management in PHC is presented.

Chapter Six: A summary of the pertinent findings, together with the limitations and strengths of the study, are presented. This is followed by the conclusions and recommendations.
CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter discusses the relevant literature pertaining to the prevalence and determinants of overweight and obesity among PHC nurses. This procedure obliges the reviewer to develop an understanding of the state of knowledge in a given area and a critical understanding of the information available in the area.

2.2 Definition of Overweight and Obesity

Overweight and obesity refer to a weight that is above the recommended healthy weight for a particular height (CDC, 2012; NIDDKD, 2012), and as the excessive accumulation of fat in such a manner that is detrimental to health (Navaneelan & Janz, 2014; WHO, 2015d). This accumulation of fat is due to the energy imbalance between calories consumed and calories expended (Hartemink et al., 2006; Mathieu et al., 2010; McCormick et al., 2007; Mendis, Puska & Norrving, 2011; NIDDKD, 2012). In clinical, research, and public health domains, body mass index (BMI) is commonly used to define total obesity (Wu et al., 2014). Notwithstanding the drawback of body mass index (BMI) in differentiating between fat mass and fat-free mass, this anthropometric indicator has been widely used to screen for health risk in populations because it is inexpensive, non-invasive and suitable for large-scale surveys (Goon et al., 2017). An increase in BMI is associated with increased risk of mortality, cardiovascular disease and some cancers (Huxley et al., 2010; Flegal et al., 2013). Conversely, lower BMI is
associated with an increased risk of mortality, post-surgical complications, infection and length of hospital stay (Cereda et al., 2011; Gupta et al., 2011).

Globally, overweight and obesity have increased; more than 1.9 billion adults 18 years and above were overweight in 2016. Of these, 650 million were obese, 39% adults 18 years and above were overweight and in 2016 and 13% were obese. Between 1980 and 2013, an estimated increase of 81% and 8.2% respectively in the proportion of overweight and obesity were recorded among men and women, however, there is no significant progress recorded in curtailing the obesity epidemic worldwide in the past 33 years (Klein, 2014; Murray & Ng, 2016; Ng et al., 2014).

2.3 Burden of Overweight and Obesity

2.3.1 Global burden of overweight and obesity

Currently, more than 1.9 billion adults are overweight and over half a billion are obese (WHO, 2016; Finucane et al., 2012) with an inevitable increase in the nearest future, if actions are not taken. The United States had the highest proportion of obese people (13%) in 2014. Contrary to what was observed some decades ago, overweight and obesity have transformed from being public health problems of predominantly rich nations to those found in developing nations, even among the poor. The prevalence of overweight and obesity has been reported in developing countries (Abubakari et al., 2008; Addo et al., 2015; Adeniyi et al., 2015; Barquera et al., 2013; Benkeser, Biritwum & Hill, 2012; Bovet et al., 2008; Goon et al., 2013a; Kirunda et al., 2015; Lloyd et al., 2014; Musaiger, 2011; Okoh, 2013; Seidell & Halberstadt, 2015; Skaal & Pengpid, 2011; Van den Berg et al., 2012; Webber et al., 2012).
The prevalence of overweight and obesity is not the same in all countries: a study conducted among 32 countries in sub-Saharan Africa (SSA) found that Madagascar had the lowest rate of overweight (1.1%) and obesity (5.6%) and that Swaziland had the highest—23.0% for overweight and 27.7% for obesity. The pooled data on the prevalence of overweight in the 32 SSA countries is 15.9% (Neupane, Prakash & Doku, 2016). Currently, the majority of countries in the low and middle group are challenged with the double burden of undernutrition and over-nutrition (Bassett et al., 2014; Doku & Neupane, 2015; Kroker-lobos et al., 2014; WHO Western Pacific Regional Office, 2016; World Bank, 2015).

2.3.2 Burden of overweight and obesity in South Africa

Like other Low and Middle Income Countries (LMICs), South Africa is faced with the burden of overweight with a documented higher prevalence of obesity compared to many other African and developing countries (Dalal et al., 2011; Murray & Ng, 2016). The highest obesity prevalence (42%) in sub-Saharan Africa was found among South African women, with an overall age-adjusted prevalence of overweight and obesity at 53%. There was a significant gender variation, with men having a significantly lower rate than women (Murray & Ng, 2016; Ng et al., 2014). Several factors are responsible for overweight and obesity in South Africa, such as consumption of low fibre, high fat or oil, salt and sugar-sweetened beverages as a result of demographic and epidemiologic transition and urbanisation (Consumer Food Service, 2016; Goon et al., 2011; Wild et al., 2004:3; WHO, 2014c). Overweight and obesity are preventable as they are largely driven by unhealthy lifestyle behaviours involving dietary practices and physical inactivity (WHO, 2014; Nnyepia et al., 2015). The epidemiology of obesity has made it
clear that the role of genetics, socio-economic status, ethnicity, food marketing and physical environment cannot be overruled (Aryee et al., 2013).

2.3.3 Burden of Overweight and Obesity among Nurses

Obesity has reached a pandemic level worldwide, not only affecting the general population but health professionals at large including nurses. South Africa is no exemption. A high prevalence of total obesity among nurses has been reported in several studies across different countries:

South Africa (Goon et al., 2013), Nigeria (Ogunjimi et al., 2010), Ghana (Aryee et al., 2013) Scotland (Kyle, Neall & Artherton, 2016), Australia, New Zealand, United Kingdom (Bogossian et al., 2012) and Poland (Peplonska et al., 2015). Also several studies conducted in different countries have revealed a high prevalence of abdominal obesity among nurses, in South Africa (Goon et al., 2014), Ghana (Aryee et al., 2013) and Poland (Peplonska et al., 2015). Factors such as an unhealthy lifestyle and dietary practices (Phiri et al., 2014), work-related stress and burnout (Khamisa, Peltzer & Olderburg, 2013) plus physical inactivity (Goon et al., 2013) have been reported to be associated with obesity among nurses. Technological advancement, which has brought about the use of several pieces of equipment in healthcare which result in limited personal energy expenditure, has also been advanced as another contributing factor to physical inactivity, and consequently, obesity among nurses (Ogunjimi et al., 2010). Being overweight or obese is deleterious both to the nurses’ health and the healthcare workforce at large. Obesity predisposes nurses to chronic illnesses, renders them less active at work (Ogunjimi et al., 2010) and might paralyse the healthcare system if the supposed caregivers eventually become care receivers. Also, overweight and obese
nurses have been shown to have less confidence in the health education of their patients on weight management (Kyle, Neall & Atherton, 2016).

2.4 Causes of Overweight and Obesity

Overweight and obesity are caused by the following environmental factors:

2.4.1 Dietary practices

A healthy diet does not only contribute to prevention of malnutrition, but it has a longer term benefit of reducing the chances of developing NCDs later in life if one has been overweight or obese (WHO, 2017). Unhealthy diets refer to meals with high fat content, free sugars and salts.

Worldwide, 2.7 million deaths are accredited to diets low in fruits and vegetables and estimated to cause 19% of intestinal cancer, 31% of coronary heart disease and 11% of strokes (WHO, 2009). Around the world, dramatic changes have been taking place in dietary practices and food choices. This is due to a range of factors such as kitchen appliances, food transportation, media, government and trade migration (Newson et. al, 2015). Unhealthy eating is the most popular dietary pattern around the world, especially in developing countries. This unhealthy eating results in the development of nutrition-related NCDs, and predominantly, obesity (Imamura et al., 2010; Medical Research Council).

In the South African context, particularly among the Xhosa people of the Eastern Cape, culture predicts the eating habits of people, especially in social gatherings such as a circumcision event (Umgidi) during the June and December holidays. There is the tendency of people to overindulge in food offered abundantly at many cultural events.
Subsidized agriculture and multinational companies which provide cheap, highly refined fats, oils, and carbohydrates predisposition people towards high consumption of these highly dense energy foods such as fats, sugars and salts which are poor in essential micro nutrients (Malaza, Mossong Barninghousen & Newel, 2012; Tathiah, Moodley, Mbulawa & Taylor 2013; Ellulu et al., 2014). Studies have shown that in South Africa, certain foods are associated with social status, such as luxurious foods high in fat and energy, meat, animal fat chocolates, biscuits, soft drinks and fired foods are popular amongst the rich (Kruger, Paoane, Senekal & Van der Merwe, 2005).

In a study done by Poon and Tarrant (2009) on attitudes of undergraduate and registered nurses on obesity, participants perceived obese people to be more likely to overeat (Poon & Tarrant, 2009). Wong et al. (2010) also identified abnormal eating in nurses during night shifts.

Hoppe and Ogden (1997), Lim, Hepworth and Boggossian (2011) in a qualitative study analysing stress uplifts and coping mechanisms in the personal and professional lives of Singaporeans, reported nurses to eat snacks as a way of coping with stress.

2.4.2 Cultural factors, perceptions and beliefs about body weight

Different races respond differently to overweight and obesity. Black, overweight and obese women often do not view themselves as overweight, because overweight women are admired by the community and regarded as attractive. In this ethnic group, overweight and obesity is associated with respect, dignity and affluence (Malaza et al., 2012; Kruger et al., 2005; Okop et al., 2016. In areas where there is a high prevalence of HIV, losing weight is often associated with positive HIV status (Malaza et al., 2012;
Kruger et al. (2005). Malaza et al. (2012) in their study on hypertension and obesity in adults living in a high prevalence rural area in South Africa revealed that obesity in low and middle income groups is associated with higher socio-economic status, whilst in developed countries is associated with poverty. Adeniyi et al. (2015) highlighted the female gender, poverty, educational attainment, unemployment and unhealthy lifestyles as the underlying factors contributing to overweight and obesity among South Africans. Cois and Day (2015) confirmed the effect of socio-economic and behavioural risk factors, including physical inactivity, on overweight and obesity in South Africa.

2.4.3 Decrease in physical activities

Physical inactivity is becoming a public health problem and it is named as the fourth leading risk factor for global mortality (WHO, 2010). Physical activity plays a vital role in prevention of non-communicable diseases such as type 2 diabetes mellitus, cardiovascular diseases, chronic respiratory diseases and cancer, but it also plays a protective role in guarding against overweight and obesity.

Physical inactivity is not limited to the general population; several studies have shown that nurses do not meet the recommended amounts of physical activity (Blake et al., 2016, Dal et al., 2016; Naidoo et al., 2007). Physical inactivity has been reported as one of the factors associated with obesity among nurses (Goon et al., 2013). Also, urbanisation and westernisation are contributory factors to overweight and obesity which have led to the adoption of sedentary lifestyles and unhealthy dietary practices (Hall et al., 2011; IDF, 2013).
Physical activity in all age groups is critically important in the prevention of disease, maintenance of independence and improved quality of life (While, 2014). Sedentary life styles can be attributed to a shift of work towards less physically active demanding work, increased urbanization and changed modes of transport (Ellulu et al., 2014). Tathiah, Moodley and Mubaiwa (2013) in a study on South Africa’s transition, overweight, obesity, underweight and stunting in female primary school learners in rural kwaZulu Natal indicated that the lesser the time spent in physical activity than the sleeping time resulted in increased overweight. The National Development Plan (NDP) Vision 2030 also highlights the need for healthy lifestyles and dietary options among learners, to reduce overweight and obesity thus increasing the likelihood of high school completion (Tathiah et al., 2013).

In a study of overweight, obesity and underweight Goon et al. (2013) found that the majority of nurses who were overweight and obese were not participating in physical activity; similar findings were found in a study of anthropometrically determined abdominal obesity among nurses in Limpopo (Goon et al. (2014). Fei, Norman and While (2013) found in a systematic review of the relationship between physicians’ and nurses’ physical activity habits and their health promotion practices that there was a relationship between personal activity levels and physical promoting practices whereby health care professionals with positive attitudes towards physical activity were more likely to promote physical activity to their patients.

2.5 Life Style Behaviours of Nurses and Obesity Management

Nurses play significant roles in health promotion and health education of individuals and communities about healthy lifestyle practices.
As such, they are considered role models of healthy lifestyle behaviours (non-smoking, low or non-alcohol use and appropriate physical activity). Smoking, alcohol use and physical activity have been identified as the underlying factors responsible for as much as 80% of the burden of non-communicable diseases (WHO, 2017). The general belief is that healthcare workers are more knowledgeable about NCDs and associated lifestyle behaviours than the general public (Blake et al., 2013; Skaal & Pengpid, 2011). However, their knowledge might not necessarily translate into practice as a high prevalence of unhealthy behaviours, overweight and obesity has been reported among nurses (Skaal & Pengpid, 2011; Phiri et al., 2014; Blake et al., 2017; Malik et al., 2011; Mo et al., 2011; Blake et al., 2012; Goon et al., 2013). Several studies among nurses in various countries have highlighted a high burden of NCDs, overweight, obesity and unhealthy lifestyle behaviours such as alcohol use, smoking, physical inactivity and poor dietary practices (Phiri et al., 2014; Naidoo et al., 2007; Miller et al., 2008; Skaal & Pengpid, 2011; Blake et al., 2013; Thoma, 2017).

In 2015, over 1.1 million people smoked tobacco (WHO, 2017). Although it is declining in many countries worldwide, in the Eastern Mediterranean and African regions, smoking seems to be increasing in popularity (WHO, 2017). Cigarette smoking is the second leading preventable risk factor for mortality globally, responsible for about 9% of all mortality (WHO, 2009). Cigarettes kill 50% of their users and are responsible for about 6 million deaths annually, including 600 000 deaths resulting from secondary smoking, with a projected increase to 8 million by 2030 if continuous, successful actions are not taken to curb its growth (WHO, 2016). Several studies have reported high prevalence of cigarette smoking among nurses ranging from 40% to 45% (Adamek et
al., 2012; Sezer et al., 2007). In contrast, other studies have reported low prevalence rates ranging from 8% to 18.6% (Ohida et al., 1999; Sarna et al., 2010). However, a paucity of data exists on the prevalence of cigarette smoking among South African nurses.

Alcohol use is a global public health concern. It is estimated that 6.2 litres of pure alcohol is consumed yearly per person (World Health Organisation [WHO], 2014). The problem of alcohol consumption and binge drinking is not only associated with the risk of non-communicable diseases, tuberculosis (TB) and human immune virus (HIV), but also has public health implications such as violence, crime and premature death due to road traffic accidents. The prevalence of ever consuming alcohol among nurses and health care professionals has been reported among Kenyan (Mokaya et al., 2016), Norwegian (Edvardsen et al., 2014) and South African (Okeke et al., 2012) nurses. The problem of alcohol consumption by health professionals has been revealed by several studies (Nash et al., 2010; Issa et al., 2012; Joos et al., 2013). Alcohol consumption rates among nurses is expected to increase due to working conditions that expose them to stress, for example, shortages of staff and job insecurity (Norstrom & Ramstedt, 2005; Stuckler et al., 2009; Stuckler et al., 2010). Consumption of alcohol by nurses will not only result in poor health outcomes such as chronic diseases and injuries, but can also affect the quality of life of these nurses (Centre for Disease Prevention and Control, 2010, WHO, 2000). This might also affect their work performance and the care rendered to the patients and communities, who may see them as role models.
According to the World Health Organization (2016), physical activity entails bodily movement brought about by skeletal muscles which require energy to be expended. Physical activity plays an essential role in health promotion. Physical inactivity is the fourth leading risk factor for mortality worldwide, associated with approximately 3.2 million deaths globally. Adequate physical activity - particularly moderate-intensity - is vital in weight control as well as the reduction in the risk of cardio-metabolic diseases. Studies have documented the prevalence of physical inactivity among student nurses in the United Kingdom (Blake, 2016), United States (68%) (Fitzgerard, 2015) and among nurses in South Africa (Phiri et al., 2014; Goon et al., 2013).

A high burden of non-communicable diseases due to unhealthy lifestyle practices among nurses could constitute a significant threat to the individual and the healthcare system and thereby adversely affect practice (Department of Health, 2009; Melynk et al., 2013; Phiri et al., 2014). Also, nurses with poor health behaviour may have a lesser likelihood of offering advice on the benefits of healthy lifestyle behaviours (McDowell et al., 1997; Seir & Osler, 2002). Likewise, it may be unrealistic to expect patients and communities to be committed to plans on living a healthy lifestyle when the health educator advocating such behaviours does not model it (Miller et al., 2008).

### 2.6 Health Consequences of Overweight and Obesity

Overweight and obesity have deleterious health consequences associated with cardiovascular diseases, diabetes, hypertension, chronic respiratory disease, musculoskeletal problems such as arthritis, and reproductive health problems such as infertility and impotence (Haslam & James, 2005; WHO, 2003).
Barbero, Lopez de Mesa and San Julian (2015), in a study on the influence of overweight on health-related quality of life (HRQoL) in adolescents, indicated a worse HRQoL: those who were overweight had less resilience, lower capacity for physical activity, less family involvement and greater peer influence. Obesity also increased the risk of occupational injuries and conditions (Janssen et al., 2011; Schulte et. al, 2007).

In a comparative study done by Banjade, Naik and Narasannavar (2015) on the Centre for Disease Control (CDC), World Health Organisation (WHO) and International Obesity Task Force’s (IOTF) growth reference in relation to overweight and obesity in college adolescents of North Karnataka, India, it was found that excess weight on adolescents led to short and long term health risks which included hypertension, hyperinsulinemia, glucose intolerance, type II diabetes, dislipidemia and increased risk of early cardiac diseases and psychosocial difficulties.

2.6.1 Hypertension

Hypertension is an independent and preventable risk factor for morbidity and mortality. Globally, in 2016, more than 22% of adults were reported to have hypertension (WHO, 2016). Hypertension affects one billion people worldwide and is responsible for 9.4 million individual deaths every year and 162 millions of years of life lost. This is as a result of its role in other diseases such as coronary heart disease, stroke and kidney failure, as well as premature mortality and disability (Kintscher, 2013; WHO, 2013). Contrary to what was observed some decades ago, hypertension has transformed from being a disease of the predominantly rich nations to that found in developing nations, even among the poor.
Currently, more than 80% of hypertension cases are seen in low and middle-income countries with a variance across different countries, gender, age and socio-economic categories (Kearney et al., 2005, Kishore et al., 2016). In 2010, hypertension was identified as the single leading risk factor for the global burden of disease (GBD) in terms of disability-adjusted life years (Modesti, Perruolo & Parati, 2015).

The burden of hypertension is a public health problem even in African countries, with a prevalence rate of 30% (WHO, 2014; Tibazarwa & Damasceno, 2014). The prevalence of hypertension in sub-Saharan Africa has been documented by several studies: It prevails in Nigeria (Adeloye et al., 2015; Akinlua et al., 2015; Akpan et al., 2015; Ekwunife, Udeogaranya & Nwatu, 2010; Ogah et al., 2012), Ghana (Agyei-Mensah & De-Graft Aikins, 2010; Aikins et al., 2012; Bosu, 2010; Williams et al. (2013), Botswana (African Health Observatory, 2014) and in South Africa (Day et al., 2014; Owolabi et al., 2017; Peer et al., 2013). The problem of hypertension does not only affect the general population, but also the health professionals, such as nurses. Several studies have documented the prevalence of hypertension among nurses in different countries: in South Africa (20%) (Skaal & Pengpid, 2011), Brazil (32%) (Urbanetto et al., 2015) and health workers in Nigeria (20.1%).

A study assessing lifestyle behaviour among nurses in South Africa has documented a high prevalence of unhealthy lifestyle behaviour among South African nurses which might predispose them toward diseases like hypertension (Phiri et al., 2014). This, coupled with work-related stress and long sitting hours, as reported in other studies, puts them at risk (Skaal & Pengpid, 2011; Khamisa, Peltzer & Oldenburg, 2013).
The burden of hypertension in Africa is complicated by under-diagnosis, poor treatment and control, as a result of its asymptomatic nature (Addo, Smeeth & Leon, 2007). This is, however, a risky adventure as undiagnosed and uncontrolled hypertension potentially increases the chance of developing target organ damage and other life threatening conditions; whereas early diagnosis could afford an opportunity for prompt intervention (Addo, Smeeth & Leon, 2007). Several factors are responsible for the development of hypertension. Harmful alcohol and tobacco use, poor diet, work related factors such as stress and sedentarism have also been implicated in the aetiology of hypertension. The working conditions of nurses predispose them to stress, long hours of work, shift duties and unhealthy diets which are drivers of hypertension (Phiri et al., 2014; Skaal & Pengpid, 2011; Urbanetto et al., 2013).

2.6.2 Diabetes Mellitus

Diabetes mellitus (DM) is a chronic condition characterised by an increased concentration of glucose in the blood (American Diabetes Association, 2011; Da-Vita, 2016; WHO, 2016). Initially DM starts as pre-diabetes which is a stage characterised by an increase in blood sugar up to point where the blood sugar level is higher than normal, but not high enough to be diagnosed as DM (Da-Vita, 2016). This is a warning sign for the development of DM which can be dangerous (Kufe et al., 2015, Murad et al., 2014).

The prevalence of diabetes has doubled since 1980, rising from 4.7% to 8.5% in the adult world population which indicates an increase in associated factors such as overweight and obesity (WHO, 2016).
Globally, an estimated 422 million adults were living with diabetes in 2014. DM caused 1.5 million deaths in 2012, and 4.3% of these (3.7 million deaths) occurred before the age of 70 years, mostly in low to middle-income countries (WHO, 2016; IDF, 2013). The Middle East and Northern Africa had the highest prevalence of diabetes (10.3%), followed by North America and the Caribbean (9.1%), with the lowest prevalence being in Africa (5.9%) [International Diabetes Federation (IDF), 2013].

Several studies have reported an increase in the prevalence and burden of DM and prediabetes in developed countries such as the USA (Mason, 2011; CDC, 2011), UK (Hex et al., 2012), and other European countries—Spain, Germany, Italy and France (Kanavos et al., 2012). DM prevalence is slowly increasing remarkably in low to middle-income countries (Anja et al., 2013; Dassapa et al., 2015; Hwang et al., 2012; WHO, 2016). The majority of people living with diabetes are currently in LMICs, with a projected increase in the burden expected in LMICs (IDF, 2014; Shen et al., 2016). The prevalence of DM increased from 1.8% in the period 1985 – 1989, to 5.1% in 1990 – 1994, 5.2% in 1995 – 1999, 6.4% in 2000 – 2004 and 8.6% in 2005 – 2010. The overall rural prevalence of DM in the LMICs was 5.6% (Hwang et al., 2012). The larger portion of the burden of DM arises as a result of CMRFs, such as physical inactivity, unhealthy diets leading to overweight and obesity (Da-Vita, 2016) and urbanisation (Mbanya et al., 2010).

Diabetes Mellitus is the most significant risk factor for CVDs (Dokken, 2008; Ganda, 2016). An increased incidence of high blood pressure, dyslipidemia, and obesity is seen among individuals with diabetes, which collectively lead to the development of CVDs (National Diabetes Education Program, 2007).
Several cross-sectional studies have reported a positive association between obesity and type 2 diabetes (Hartz et al., 1983; Shaten et al., 1993; Skarfors et al., 1991). Smokers have a 30%–40% increased chance of developing type-2 DM and are linked to diabetes as both individuals with normoglycaemia and those with hyperglycaemia (Willi, Bondenmann & Ghali, 2007).

### 2.6.3 Reproductive Disorders

During pregnancy, women are expected to gain weight; however, excess weight gain is associated with serious consequences for mothers and infants. For example, among the mothers, there is likelihood of miscarriage, caesarean section with delayed wound healing, development of diabetes mellitus, pregnancy induced hypertension, postpartum overweight retention (Chang, Llanes, Gold & Fetters, 2013). Parity is an entry point towards body composition and body shape for women. Women who have given birth have lower or less body fat and greater WC (Lassek & Gaulin, 2006). Gaulin (2006) in a follow up study from the Coronary Artery Risk Development in Young Adults (CARDIA) reported that first and higher order birth were associated with an increase in waist circumference.

### 2.6.4 Cancer risk

Obesity is also associated with a wide range of cancers such as endometrial, breast, ovarian, prostate, liver, gall bladder, kidney and colon cancers (WHO, 2017; Renehan, Tyson, Egger Heller & Zwahlen, 2008). Shown in Figure 2.1 below, is the diagrammatical illustration of the complex interplay of overweight and obesity with various health conditions, detrimental to the health and well-being of an individual.
Given the adverse health implications of overweight and obesity, there is need to prevent and manage individuals pre-dispositioned toward this condition. This requires an individual and a stakeholder approach.

![Figure 2.1: Interrelation of obesity with health comorbidities adapted from Kyrou et al., 2014](http://creativecommons.org/licenses/by-nc-nd/2.0). Accessed on 9th

2.7 Nurses as Role Models for Health Promotion

The South African government has committed to “strengthening the effectiveness of health systems”, highlighting the need to overhaul the health services’ delivery platform from one that is based on a large curative, high cost model, to one that promotes cost effective, thorough, primary health care services delivered to the household community and which encourages health promotion, prevention and community involvement (Ward Based Primary Health Care Outreach Team Policy, 2015). Thus, the primary health care nurses as role models for positive behaviours, are key to this commitment as they need to practise what they preach. There is evidence that nurses adopting unhealthy life
styles are portrayed as extremely poor role models (Wells, Lever & Austin, 2006; Carlson & Warne, 2007; Hensel, 2011).

Nurses have a professional responsibility to model healthy behaviours and support the idea that a nurse’s credibility is based on more than simply practising healthy life styles (Borchardt, 2000; Clarke & Connor, 2002).

The transformation of the national health care delivery system has resulted in the re-engineering of the Primary Health Care (PHC), which focuses on prevention and promotion of health. This is supported by MacDemott and While (2013) in a systematic review indicating that maximizing the health care environment can prove very beneficial. It has been shown that patients are at their most receptive when they are receiving health care, so nurses need to maximise the potential of these contacts to enable patients to minimize hospital use and avoid ill health and further health decline.

### 2.8 Intervention Strategies to Curb Overweight and Obesity

Overweight and obesity, as well as their related non-communicable diseases, are highly preventable (WHO, 2009). Experts on obesity consultation proposed the following principles upon which obesity prevention could be based: Intervention that focused on education and addressed environmental and social factors to promote and support behaviour change; increased physical activity; programme sustainability to ensure positive changes in diet, physical activity and obesity levels overtime; and political support inter-sectoral collaboration and community are essential for success.

Environments and communities are important backdrops for people’s decision-making and choices of healthier food and regular physical activity. Politically, the choices should
be made accessible and affordable to the people; at individual level, people are expected to limit their intake of total fat and sugars, whilst increasing their consumption of fruit and vegetables and engaging in regular physical exercise of 150 minutes spread throughout the week for adults and at societal level, there should be support for individuals on decisions taken throughout (WHO Report October, 2017).

Food industries should be encouraged to promote a healthy diet by reducing the fat, sugar, salt and processed food manufactured and by ensuring the availability and affordability of healthy and nutritious foods. Marketing of foods high in sugar, salts and fats, especially those directed at children and adolescents should be restricted. Regular exercise should also be supported at the workplace (WHO, 2017).

The prevention of overweight and obesity focuses on universal prevention for the general population, selective prevention aimed at the high risk population group and targeted prevention for individuals diagnosed as overweight (Van Niekerk, 2014). For children and adolescents, prevention of obesity includes promotion of an active, healthy lifestyle; limitation of television viewing and use of electric gaming devices; promotion of fruits’ consumption and vegetable intake as well as the restriction of energy-dense foods, and micronutrient-poor foods (Ellulu et al., 2014).

### 2.9 Cut-Off Points Measures of Determining Obesity

Obesity is a preventable condition that is characterised by an abnormal accumulation of fat that may impair health (Navaneelan et al., 2014). The causative factors of obesity are the intake of energy-dense foods, physical inactivity and genetic susceptibility. According to WHO (2017), the worldwide obesity nearly tripled between 1975 and 2016,
more than 1.9 billion people age 18 years and older were overweight in 2016. The magnitude of obesity in developing countries is of great concern (Adeniyi et al., 2015; Popkin, 2014) and the prevalence of obesity is higher in South Africa than in most other developing countries (Dalal et al., 2011).

The increase of obesity, specifically abdominal obesity, is associated with many conditions such as insulin resistance, dyslipidemia, hypertension and diabetes (Prinsloo et al., 2011). Anthropometric indicators such as waist circumference (WC), waist-to-hip ratio (WHR) and waist-to-height ratio (WHTR) are used to assess central fat distribution. Studies have shown that these measures are strongly associated with all-cause CVD and cancer mortality, independently of BMI (Licata et al., 2006; Liu et al., 2007; Czernichow et al., 2011; Sidney et al., 2007). Ideally, imaging techniques such as the computed tomography scan and magnetic resonance imaging are used to diagnose abdominal obesity (Onuoha et al., 2016).

However, these gold-standard techniques are expensive, time-consuming and impractical in resource-limited settings such as South Africa, and in large epidemiological surveys (WHO, 2011). The waist circumference (WC) has been identified as one of the criterion for diagnosing metabolic syndrome (METs) by different organizations such as the International Diabetes Federation (IDF) (Zimmet et al., 2007) and the National Cholesterol Education Program – Audit Treatment Program (NCEP-ATP) (Cook et al., 2003). The reason is that WC is an easy, inexpensive and non-invasive measure that can be applied in clinical practice. Currently, the validated WC cut-points (≥94 cm in men and ≥80 cm in women) for European populations are used by researchers and clinicians due to the absence of preferred country-specific WC cut-offs.
The WHtR has been proposed as the alternative to WC for assessment of central obesity MetS (Hsieh et al., 2005).

A dichotomy exists in the pattern of fat distribution between Caucasians and black Africans (Katzmarkzyk et al., 2010; Desiles et al., 2016), and controversies exist concerning the correct anthropometric values relative to ethnicity, genetic background, sex, and sociocultural context (He et al., 2017). In the South African context, such studies are conducted on high-income and urban settings (Crother et al., 2012; Prinsloo et al., 2011; Kalk et al., 2011; Hoebel et al., 2014; Matsha et al., 2013; Mabchour et al., 2015) and few studies are reported in low-income and rural settings (WHO, 2011; Czernichow et al., 2011).

In a study done among urban South African women in Soweto WC of 91.5 cm was reported (Crowther et al., 2012); while another study reported a WC of 92 cm as optimal for women (Motala et al., 2011) and yet, a WC of 98 cm for African women has been reported (Prinsloo et al., 2011). This confirms the inconsistencies in WC cut-off points in sexes and races as reported in the literature (Flegal et al., 2013; NHLBI, 2013; Baistein et al., 2014; Cameron et al., 2012; Zhang et al., 2008). Optimal ethnic-specific WC cut-off points are an important screening tool that provides benefits in the detection of obesity and assessing the risks of other related diseases such as diabetes and cardiovascular disease (Murphy et al., 2014). However, women have higher proportions of total subcutaneous fat distribution compared to men (Owolabi et al., 2017). Overweight and obesity could be detected much sooner in EC of SA.
Those in nursing profession could be diagnosed earlier, monitored and managed using the proposed guidelines so that the individuals and the workforce would not be impacted negatively.
CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

Chapter 3 discusses the methods used to conduct this research. It specifically addresses the research design, settings, sample and sampling technique, research instruments, the validity and reliability of the instruments, the pilot, data collection procedure, ethical considerations and data analysis.

3.2 Design of the Study

This was a cross-sectional of quantitative research design to determine the prevalence and determinants of overweight and obesity among primary health care professional nurses. Questionnaires were used by interviewers as the tool to predict cut-off points for obesity. Based on the findings of the study concerning the management of obese patients by the PHC professional nurses, a guideline would be developed for weight management in the setting.

3.3 Setting of the Study

This study was conducted in the Eastern Cape Province which is the second largest deep rural province in South Africa. The Eastern Cape is divided into two metropolitan municipalities and six districts with a population of 6, 562,054 million people (DHIS 2013; Stats SA, 2007) distributed across these districts. The Eastern Cape is one of the nine provinces of South Africa, with its capital in Bisho where the Eastern Cape Department of Health (ECDoH) is situated.
It was created in 1994 from the Xhosa homelands of Transkei and Ciskei together with the eastern segment of the Cape Province. It is the traditional home of the Xhosa people. The province is made up of two metropolitan municipalities; Buffalo City Metropolitan Municipality (BCMM) and Nelson Mandela Metropolitan Municipality and six districts; Amathole, Joe Gqabi, O.R Tambo, Sarah Baartman, Chris Hani and Alfred Ndzo (Wikipedia, 2017). This research was conducted across 41 PHC facilities from Buffalo City Metropolitan Municipality (BCMM), Oliver Reginald Tambo (O.R. Tambo), Chris Hani and Sarah Baartman Districts of the Eastern Cape Province, South Africa.

Buffalo City Metropolis is an urban district situated in the southern region of the Eastern Cape; has no sub district with 76 primary health care facilities distributed within district OR Tambo is a deep rural district situated in the eastern region of the Eastern Cape; it has three sub-districts and 145 primary health care facilities (135 clinics and 10 community health centres) distributed within the sub-districts.

Chris Hani is situated in the northern part of the Eastern Cape; this rural area has six sub-districts and 158 primary health care facilities distributed within the sub-districts.

Sarah Baartman district is situated in the western region of the Eastern Cape; this rural area comprises 3 sub-districts characterised by farms. The district has 58 primary health care facilities distributed within the sub-districts.

3.4 Target Population

The target population was primary health care professional nurses (male and female) aged 21 and above, working in any primary health care facilities from the four districts (Chris Hani, Buffalo City Metropolis, Sarah Baartman and OR Tambo).
The desired sample was 300 professional nurses. However, only 203 professional nurses were interviewed due to a shortage of staff and PHC facilities and non-permission to survey other facilities.

3.5 Inclusion and Exclusion Criteria
Participants were included in the study if they were professional nurses, practising in the primary health care facilities, aged 21 years and above. However, participants were excluded from the study if they were pregnant, debilitated or handicapped in any form such that obtaining anthropometric measurements would be difficult.

3.6 Sample and Sampling Technique
Of the eight districts in the Eastern Cape Province, four districts were randomly selected by a simple, random sampling technique. The names of the districts were written and placed in a box to be selected by simple random balloting to avoid bias. A random sample was obtained by requesting an independent person to write down the names of the eight districts on separate strips of paper; with a “Yes” and “No” inscription. Eight persons were then asked to each pick a paper. Only those with the “Yes” option were selected to participate in the study, namely: Buffalo City Metropolitan Municipality, O.R Tambo, Chris Hani and Sarah Baartman Districts. In each of the districts, a convenience sampling technique was applied to select the health facilities. As such, 41 PHC facilities were selected to participate in the study. A total of 203 nurses were accessible and purposively included in the study due to short staffing of the clinics (Figure 3.1). The study was conducted between February and May 2017.
3.7 Data Collection Instrument

The WHO STEPwise questionnaire comprising three major items, namely, demographic data, behavioural data and measurements was used for data collection (WHO, 2011). The instrument consisted of four sections. Section A focused on the demographic profile (age, gender marital status, number of children, level of education, work experience and salary income) of the participants. Section B comprised behavioural information obtained through self-reporting on smoking, alcohol use, dietary intake and physical activity. Section C covered anthropometric measurements (weight, height waist circumference, hip circumference) and blood pressure.
Section D solicited participants’ information concerning weight management and the availability of weight management guidelines. Based on the findings from this section, the guidelines for weight management were developed.

3.8 Data Reliability

Reliability examines within-subject variability related to factors other than measurement error variance or physiologic variation (Moreno et al., 2003). Reliability was determined by examining technical error of measurements (TEM) and interclass correlation coefficient (r) (Pearson’s method) (Malina, Hamill & Lemeshow, 1973) by measuring and re-measuring a small sample of participants (pilot group) that were not part of the study (n=20).

The TEM refers to the squared differences of replicates divided by twice the number of pairs:

\[ \sigma_e = \frac{\sqrt{\sum d^2}}{2N} \] (Malina, Hamill & Lemeshow, 1973).

It is also known as the measurement error standard deviation; and the coefficient of reliability is based on the ratio of within-subject (r) and inter-subject (s) variances:

\[ R = 1 - \frac{r^2}{s^2} \] (Malina & Martorell, 1988).

Higher coefficient values indicate greater reliability of the measurements. The technical errors and reliability coefficients for this current study are presented in Table 3.1. The reliability data fell within acceptable ranges when compared with those published in other research studies (Lohman et al., 1988).
Table 3.1: Intra-tester reliability results of anthropometric measurements

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Value</th>
<th>Percentage (%)</th>
<th>ICC (r)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight (kg)</td>
<td>0.17</td>
<td>0.86</td>
<td>0.93</td>
</tr>
<tr>
<td>Height (cm)</td>
<td>0.19</td>
<td>0.51</td>
<td>0.92</td>
</tr>
<tr>
<td>Waist circumference (cm)</td>
<td>0.90</td>
<td>1.73</td>
<td>0.90</td>
</tr>
<tr>
<td>Hip circumference (cm)</td>
<td>0.62</td>
<td>0.71</td>
<td>0.89</td>
</tr>
</tbody>
</table>

ICC: Intra-class correlation coefficients; p < 0.0001

3.9 Data Validity

The WHO STEPwise questionnaire was validated through several studies in which researchers used the same standardised questions and protocol in different regions and countries (Kingsley, 2003; Virgin Island Ministry of Health and Social Development, 2010; WHO, 2015). Likewise, the said questionnaire has been prepared to suit various settings. Validity was ascertained by making sure all the research measurement instruments were checked for functionality and accuracy before data collection. The instruments were constantly calibrated to maintain accurate values in measurement. A pilot study was conducted to ascertain the logistical and technical procedures for data collection. Also, it served to ensure that question formats and sequences were appropriate for the participants’ cognitive abilities.

3.10 Selection and Training of Research Assistants

One week of training of the research assistants was organised before embarking on data collection. This was done to enable research assistants to become competent in all aspects of the study (questionnaire administration, anthropometric and blood pressure measurements). The study involved two research assistants, who were both qualified
professional nurses from the University of Fort Hare. The other one is from the University of Fort Hare and the one from Buffalo City Metropolitan district selected from a pool curriculum vitae submitted to the university for part time jobs. During training each one was allocated a specific task. The research assistants were trained to take anthropometric measurements by the supervisor (Professor DT Goon), who is a Level Two anthropometrist belonging to the International Society for the Advancement of Kinanthropometry (ISAK).

3.11 Data Collection procedure

Participants who agreed and were eligible to participate in the study were interviewed by the research assistants using the WHO STEPwise questionnaire. Interviews were conducted in a separate consulting room provided by the management team of the PHC.

Demographic variables included items on sex, age, marital status, level of education, average monthly income, and work experience. Marital status was assessed by asking the participants whether they were single, married, divorced, separated and a widow/widower. The level of education was obtained by self-reporting of the highest educational qualification attained and was categorised as diploma, degree, post-graduate diploma and master’s degree. Monthly income was categorised as R10,000-15,000 and above R15,000. The level of work experience was assessed by the duration of professional practice ranging from one to above 31 years.

The following behavioural and dietary variables were obtained by self-reporting: cigarette smoking, alcohol use, intake of fruit, dairy products, meat, fast food, sugar, and the vegetable consumption pattern. Participants were asked about their daily
serving of fruit, dairy products, meat, fast food, sugar, and vegetables. Smoking enquiry included being a primary smoker (directly smoking) or secondary smoker (staying with someone who is smoking) or a non-smoker.

The physical activity level of participants was also obtained through self-reporting and categorised based on type (walking, running, swimming etcetera, and the binaries ‘yes’ or ‘no’) and frequency (daily/weekly/monthly and for how long each time).

### 3.12 Anthropometric Measurements

The anthropometric measurements were obtained in accordance with International Society of Advancement of Kinanthropometry (ISAK) recommendations (Marfe- Jones, Olds & Stew, 2016). The procedure was explained to all participants before measurements were taken.

#### 3.12.1 Height

The height of participants, without shoes, in standing position and closed feet was measured using a stadiometer. The mobile part of the stadiometer was adjusted to just touch the participants’ heads. The perpendicular distance between the vertex and the head and the feet was recorded as the participant’s height to the nearest 0.1 centimetres (cm).

#### 3.12.2 Weight

Weight was measured to the nearest 0.5 kilogram (kg) with participants being lightly dressed (in underwear and a T-shirt) using a portal digital scale (Tanita HD 309, Creative Health Products, MI USA).
3.12.3 Waist Circumference

Waist circumference was measured at the level of the narrowest point between the lower costal (10\textsuperscript{th} rib) border and the iliac crest. If there was no obvious narrowing then the measurement was taken at the mid-point between those two landmarks. The measurement was taken at the end of a normal exhalation with the arms relaxed at the sides (with a required accuracy of one millimetre).

3.12.4 Hip Circumference

Using a Lufkin non-extensible flexible steel anthropometric tape (W606PM), the hip circumference was measured at the maximal circumference of the buttocks to the nearest 0.1 cm. The circumference was measured with the cross-hand technique, with the tape at a right angle to the body and the readings were done on the right hand side. Only one field worker took the measurements to ensure uniformity and avoid inter-variation in the circumference measurements.

3.12.5 Blood Pressure

Participants were allowed to rest for at least 5 minutes before their blood pressure was taken. Participants were allowed to sit in a chair with the back and feet well supported, legs not crossed. A proper cuff was placed around the bare upper arm with the artery marker over the brachial artery. The cuff was applied snuggly, allowing room for no more than two fingers. Then participants were allowed to sit quietly for a few minutes. The cuff was inflated rapidly to 30mm Hg above the estimated systolic pressure. The valve was partially opened, deflated at a rate of 2 to 3 mm Hg per second. As the pressure fell, the observer noted the systolic pressure detected with a stethoscope.
Then the remaining pressure was rapidly released. After a minimum of 30 seconds, the above steps were repeated for a second reading which was the diastolic pressure.

An appropriate cuff for each participant was wrapped snugly around the upper arm and maintained in place with Velcro on the cuff. Blood pressure (systolic and diastolic) was measured in accordance with standard protocols (Seedat et al., 2014) with a validated Microlife BP A100 Plus model blood pressure apparatus which provided an average of two readings for each participant.

3.12.6 Obesity management guidelines

Self-structured questions were developed to solicit participants’ information pertaining to the availability of weight management guidelines. The questions framed were: “Do you have guidelines for management of obese patients in the facility?” (Yes/No). How do you manage obese patients with the available options (health education, diet, physical activity participation, constant weight monitoring, in-service training for nurses on obesity management etcetera) provided?

3.13 Derived Measurements

3.13.1 Body Mass Index

Body mass index (BMI) was calculated using the formula weight (kg)/height (m²).

Overweight and obesity was defined as $\text{BMI} \geq 30 \text{ kg m}^{-2}$, overweight 25-29.9, normal weight 18.5-24.9 and underweight BMI $<18.5 \text{ kg m}^{-2}$ based on international criteria (WHO, 2000; Expert Panel on the Identification, Evaluation, and Treatment of Overweight and Obesity in Adults, 1998).
3.13.2 Waist-to-Hip Ratio

Waist circumference cut-off was based on WHO action levels. Action level II (substantially increased risk for metabolic syndrome) WC ≥102 cm for men and ≥88 cm for women was used (WHO, 2000b).

3.13.3 Waist-to-Height ratio

The diagnostic criteria for WHR were: WHR ≥1.0 in men and ≥0.85 in women (World Health Organization, 1998; Han, Van Leer, Seldell & Leah, 1995). A WHtR ≤ 0.50 was used to determine abdominal obesity (Ashwell, 2009).

3.13.4 Pre-hypertension and hypertension

Hypertension was defined as systolic blood pressure >140 mmHg and/or diastolic blood pressure ≥ 90 mmHg and/or concomitant use of antihypertensive medications (Giles, Materson, Cohn & Kostis, 2009). Hypertension was classified based on JNC 7, that is, Stage I SBP = 140-159 and/or DBP = 90 mmHg, and Stage II SBP ≥ 160 and/or DBP ≥ 100 mmHg (Chobanian et al., 2003).

Hypertension was defined as an average of two systolic blood pressures of ≥ 140 mmHg and diastolic of ≥ 90 mmHg in accordance with the Eight Joint National Committee or a history of hypertension or antihypertensive medication use (James et al., 2014).

3.13.5 Physical inactivity

Physical Inactivity was defined according to the WHO’s recommendations for physical activity.
Study participants with less than 150 minutes of moderate-intensity or 75 minutes of vigorous-intensity aerobic physical activity throughout the week were considered physically inactive (WHO, 2010).

3.14 Ethical Considerations

3.14.1 Permission

Ethical clearance was obtained from the Research and Ethics Committee of the University of Fort Hare ethical committee (Ref: GOO031SMON01 Appendix 2). Permission to conduct the study was obtained from Eastern Cape Department of Health (Ref: EC-2015RP10-426, Appendix 3), Eastern Cape sub district and PHC facility managers.

3.14.2 Right to self determination

Participants were approached and asked to participate after receiving essential information about the study in order to make an informed decision. Consent forms were provided to all participants, after which they were read to the participants, signed and returned to the researcher as a way of agreeing to take part in the study. Participants were informed that they may withdraw at any time during the study without any negative repercussions.

3.14.3 Principle of beneficence

The participants were protected from harm by research assistants carefully structuring the questions and monitoring the participants for any signs of distress.
Should any distress have been exhibited, the researcher would have facilitated a debriefing by giving participants the opportunity to ask questions and, if necessary, would have referred them for counselling.

3.14.4 **Principle of justice**

The principle of justice refers to the participants’ right to fair selection and treatment. The researcher needed to fairly select the study population in general and the participants in particular. It must be noted that the researcher selected the participants for reasons directly related to the research problem, not because they were readily available (Brink et al. 2012: p.36).

3.14.5 **Right to privacy and confidentiality**

In this study, participants were told during the information session that only information would be shared, not their names. To ensure anonymity, the participants were provided with code names or numbers which were used when discussing the data. A master list of participants’ names and matching codes was kept in a safe place and the list with real names was destroyed.

3.15 **Data Analysis**

After data collection, the questions were transferred into codes for data entry. Descriptive statistics (percentages, means and standard deviations) was applied to the data. Logistic regressions, with adjustments where relevant, were applied to determine the demographic and haemodynamic variables which predicted obesity among nurses. In the univariate analysis, missing responses were excluded from the computation of the percentages. In the bivariate analysis, cases with missing responses were deleted.
using listwise deletion. Using Receiver Operating Characteristics (ROC) curve analysis, the specificity and sensitivity of BMI, WC, WHTR and WHR were calculated to identify the cut-offs that truly diagnosed overweight and obesity among the PHC nurses. The area under the curve (AUC) was used to assess and compare the ability of the BMI, WC, WHTR and WHR to predict the presence of any two components of metabolic syndrome with AUC comparisons through non-parametric methods (Delong, Delong & Clarke-Pearson, 1988). The optimal BMI, WC, WHTR and WHR were determined by applying both the Youden’s index approach (Youden, 1950) and the closest top left point approach (Perkins & Schisterman, 2006). Youden’s index (J) was estimated as J = sensitivity + specificity -1. When this index was maximised, the ROC curve, an optimal cut-off point independently from the prevalence was located. A statistical significance was set at p<0.05. All analysis was conducted using the Statistical Package for Social Sciences (SPSS) version 22.0.
CHAPTER FOUR

DATA ANALYSIS AND PRESENTATION OF FINDINGS

4.1 Introduction

Chapter 3 discussed the method in which the research was conducted. It addressed the research design sample and sampling technique. The chapter further explained the procedure followed when implementing the research, the data gathering instruments used and the plan for the analysis. This chapter presents the results of the study and discussion of the findings.

4.2 Socio Demographic Characteristics of the Participants

Table 4.1 presents the socio-demographic characteristics of the participants. A total of 203 participants were included in the analysis. The average age of the study participants was 45.17 (SD±11.26) years, while the average duration of practice was 15.98 (SD±11.07) years. The majority of participants were black (96.1). Almost half of the participants were married (49.8%) and the majority (65%) have a diploma certificate in nursing and are earning more than R15, 000 (60.6%) per month.
Table 4.1: Socio-demographic characteristics of participants by gender

<table>
<thead>
<tr>
<th>Variables</th>
<th>All n(%)</th>
<th>Female n(%)</th>
<th>Male n(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age (years)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21 to 30</td>
<td>26(12.8)</td>
<td>19(10.6)</td>
<td>7(29.2)</td>
</tr>
<tr>
<td>31 to 40</td>
<td>50(24.6)</td>
<td>41(22.9)</td>
<td>9(37.5)</td>
</tr>
<tr>
<td>41 to 50</td>
<td>42(20.7)</td>
<td>39(21.8)</td>
<td>3(12.5)</td>
</tr>
<tr>
<td>51 to 60</td>
<td>74(36.5)</td>
<td>69(38.5)</td>
<td>5(20.8)</td>
</tr>
<tr>
<td>61 to 70</td>
<td>11(5.4)</td>
<td>11(6.1)</td>
<td>0(0.0)</td>
</tr>
<tr>
<td><strong>Marital status</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>83(40.9)</td>
<td>71(39.7)</td>
<td>12(50.0)</td>
</tr>
<tr>
<td>Married</td>
<td>101(49.8)</td>
<td>90(50.3)</td>
<td>11(45.8)</td>
</tr>
<tr>
<td>Divorced</td>
<td>9(4.4)</td>
<td>9(5.0)</td>
<td>0(0.0)</td>
</tr>
<tr>
<td>Separated</td>
<td>1(0.5)</td>
<td>1(0.6)</td>
<td>0(0.0)</td>
</tr>
<tr>
<td>Widow/Widower</td>
<td>9(4.4)</td>
<td>8(4.5)</td>
<td>1(4.2)</td>
</tr>
<tr>
<td><strong>Number of children</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>37(20.4)</td>
<td>33(20.4)</td>
<td>4(21.1)</td>
</tr>
<tr>
<td>2</td>
<td>61(33.7)</td>
<td>58(35.8)</td>
<td>3(15.8)</td>
</tr>
<tr>
<td>3</td>
<td>58(32.0)</td>
<td>49(30.2)</td>
<td>9(47.4)</td>
</tr>
<tr>
<td>4</td>
<td>18(9.9)</td>
<td>16(9.9)</td>
<td>2(10.5)</td>
</tr>
<tr>
<td>5</td>
<td>5(2.8)</td>
<td>5(3.1)</td>
<td>0(0.0)</td>
</tr>
<tr>
<td>6</td>
<td>1(0.6)</td>
<td>1(0.6)</td>
<td>0(0.0)</td>
</tr>
<tr>
<td>7</td>
<td>1(0.6)</td>
<td>0(0.0)</td>
<td>1(5.3)</td>
</tr>
<tr>
<td><strong>Level of education</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diploma</td>
<td>132(65.0)</td>
<td>117(65.4)</td>
<td>15(62.5)</td>
</tr>
<tr>
<td>Degree</td>
<td>67(33.0)</td>
<td>58(32.4)</td>
<td>9(37.5)</td>
</tr>
<tr>
<td>Post-graduate Diploma</td>
<td>3(1.5)</td>
<td>3(1.7)</td>
<td>0(0.0)</td>
</tr>
</tbody>
</table>
Eighteen percent of the participants were overweight. The prevalence of obesity among the study participants was 76%; 29% for obesity grade III, 24% for obesity grade 1 and 23% obesity grade II (Figure 4.1).

4.3 Prevalence and Determinants of Overweight and Total Obesity

Eighteen percent of the participants were overweight. The prevalence of obesity among the study participants was 76%; 29% for obesity grade III, 24% for obesity grade 1 and 23% obesity grade II (Figure 4.1).
Obesity was significantly associated with gender, marital status, age, duration of practice, alcohol use and smoking among the study participants (Table 4.2).

**Table 4.2: Demographic associates of overall obesity**

<table>
<thead>
<tr>
<th>Variables</th>
<th>All n(%)</th>
<th>Obese n(%)</th>
<th>Not Obese n(%)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21 to 30</td>
<td>26(12.8)</td>
<td>9(34.6)</td>
<td>17(65.4)</td>
<td>0.000</td>
</tr>
<tr>
<td>31 to 40</td>
<td>0(24.6)</td>
<td>37(74.0)</td>
<td>13(26.0)</td>
<td></td>
</tr>
<tr>
<td>41 to 50</td>
<td>42(20.7)</td>
<td>33(78.6)</td>
<td>9(21.4)</td>
<td></td>
</tr>
<tr>
<td>51 to 60</td>
<td>74(36.5)</td>
<td>65(87.8)</td>
<td>9(12.2)</td>
<td></td>
</tr>
<tr>
<td>61 to 70</td>
<td>11(5.4)</td>
<td>9(81.8)</td>
<td>2(18.2)</td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>24(11.8)</td>
<td>11(45.8%)</td>
<td>13 (54.2)</td>
<td>0.001</td>
</tr>
<tr>
<td>Female</td>
<td>179(88.2)</td>
<td>142(79.3)</td>
<td>37(20.7)</td>
<td></td>
</tr>
</tbody>
</table>

**Figure 4.1: Prevalence of obesity using body mass index**

The prevalence of obesity varied significantly across different age groups, with highest prevalence in the 51 to 60 age group. Gender also played a role, with females having a higher prevalence of obesity compared to males.
<table>
<thead>
<tr>
<th>Marital status</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Single</td>
<td>83(40.9)</td>
<td>53(63.9)</td>
<td>30(36.1)</td>
<td>0.006</td>
</tr>
<tr>
<td>Married</td>
<td>101(49.8)</td>
<td>87(86.1)</td>
<td>14(13.9)</td>
<td></td>
</tr>
<tr>
<td>Divorced</td>
<td>9(4.4)</td>
<td>5(55.6)</td>
<td>4(44.4)</td>
<td></td>
</tr>
<tr>
<td>Separated</td>
<td>1(0.5)</td>
<td>1(100.0)</td>
<td>0(0.0)</td>
<td></td>
</tr>
<tr>
<td>Widow/Widower</td>
<td>9(4.4)</td>
<td>7(77.8)</td>
<td>2(22.2)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Number of children</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>One child</td>
<td>37(20.4)</td>
<td>29(78.4)</td>
<td>8(21.6)</td>
<td>0.501</td>
</tr>
<tr>
<td>More than one child</td>
<td>144(79.6)</td>
<td>115(79.9)</td>
<td>29(20.1)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Level of education</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Diploma</td>
<td>132(65.0)</td>
<td>106(80.3)</td>
<td>26(19.7)</td>
<td>0.062</td>
</tr>
<tr>
<td>Degree</td>
<td>67(33.0)</td>
<td>45(67.2)</td>
<td>22(32.8)</td>
<td></td>
</tr>
<tr>
<td>Post-graduate diploma</td>
<td>3(1.5)</td>
<td>2(66.7)</td>
<td>1(33.3)</td>
<td></td>
</tr>
<tr>
<td>Masters</td>
<td>1(0.5)</td>
<td>0(0.0)</td>
<td>1(100.0)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Race</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Black</td>
<td>195(96.1)</td>
<td>147(75.4)</td>
<td>48(24.6)</td>
<td>0.628</td>
</tr>
<tr>
<td>Coloured</td>
<td>8(3.9)</td>
<td>6(75.0)</td>
<td>2(25.0)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Duration of practice</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1 to 10 years</td>
<td>72(40.7)</td>
<td>42(58.3)</td>
<td>30(41.7)</td>
<td>&lt;0.000</td>
</tr>
<tr>
<td>11 to 20 years</td>
<td>41(23.2)</td>
<td>34(82.9)</td>
<td>7(17.1)</td>
<td></td>
</tr>
<tr>
<td>21 to 30 years</td>
<td>44(24.9)</td>
<td>40(90.9)</td>
<td>4(9.1)</td>
<td></td>
</tr>
<tr>
<td>31 and above</td>
<td>20(11.3)</td>
<td>18(90.0)</td>
<td>2(10.0)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Income</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>10000 to 15000</td>
<td>65(39.4)</td>
<td>46(70.8)</td>
<td>19(29.2)</td>
<td>0.154</td>
</tr>
<tr>
<td>Above 15000</td>
<td>100(60.6)</td>
<td>79(79.0)</td>
<td>21(21.0)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Alcohol use</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>17(8.4)</td>
<td>9(52.9)</td>
<td>8(47.1)</td>
<td>0.031</td>
</tr>
</tbody>
</table>
After adjusting for confounders (gender, marital status, physical activity, dietary practices and smoking), only age (p=0.005) and alcohol use (p=0.001) were significant predictors of total obesity among the study participants (Table 4.3).

Table 4.3: Logistic regression showing predictors of total obesity

<table>
<thead>
<tr>
<th>Variables</th>
<th>Beta</th>
<th>S.E</th>
<th>Wald</th>
<th>OR(95%CI)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;30years</td>
<td>1.65</td>
<td>0.59</td>
<td>7.83</td>
<td>5.2(1.6-16.4)</td>
<td>0.005</td>
</tr>
<tr>
<td>≤30years</td>
<td>(Reference)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Duration of practice</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;10 years</td>
<td>0.826</td>
<td>0.45</td>
<td>3.45</td>
<td>2.3(1.0-5.5)</td>
<td>0.063</td>
</tr>
<tr>
<td>≤10 years</td>
<td>(Reference)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alcohol use</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>1.38</td>
<td>0.45</td>
<td>10.48</td>
<td>4.0(1.7-9.1)</td>
<td>0.001</td>
</tr>
<tr>
<td>(Reference)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
4.4 Prevalence and Determinants of Abdominal Obesity

The prevalence of abdominal obesity, using various anthropometric indicators among the study participants, revealed varying results. The prevalence of abdominal obesity ranged from 50%, 87% to 90%, using waist-to-hip ratio, waist circumference and waist-to-height ratio, respectively (Figures 4.2, 4.3 and 4.4).

![Figure 4.2: Prevalence of central obesity by waist circumference](image)

Centrally obese (WC) 87%
Not centrally obese (WC) 13%
Figure 4.3: Prevalence of central obesity using waist-to-hip ratio

Figure 4.4: Prevalence of central obesity using waist-to-height ratio
As shown in Table 4.4, gender, level of education, age and duration of practice were the socio-demographic factors associated with abdominal obesity (derived from WC) among the study participants.

Table 4.4: Association between abdominal obesity and socio-demographic variables

<table>
<thead>
<tr>
<th>Variables</th>
<th>Abdominally obese</th>
<th>Not obese</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n(%)</td>
<td>n(%)</td>
<td></td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>13 (54.2)</td>
<td>11 (45.8)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Female</td>
<td>164 (91.6)</td>
<td>15 (8.4)</td>
<td></td>
</tr>
<tr>
<td><strong>Level of education</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diploma</td>
<td>12 (9.1)</td>
<td>120 (90.9)</td>
<td>0.011</td>
</tr>
<tr>
<td>Degree</td>
<td>12 (17.9)</td>
<td>55 (82.1)</td>
<td></td>
</tr>
<tr>
<td>Post-grad diploma</td>
<td>1 (33.3)</td>
<td>2 (66.7)</td>
<td></td>
</tr>
<tr>
<td>Masters</td>
<td>1 (100.0)</td>
<td>0 (0.0)</td>
<td></td>
</tr>
<tr>
<td><strong>Age (years)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than 30</td>
<td>15 (57.7)</td>
<td>11 (42.3)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>More than 30</td>
<td>162 (91.5)</td>
<td>15 (8.5)</td>
<td></td>
</tr>
<tr>
<td><strong>Duration of practice</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>More than 10 years</td>
<td>57 (79.2)</td>
<td>15 (20.8)</td>
<td>0.005</td>
</tr>
<tr>
<td>Less than 10 years</td>
<td>98 (93.3)</td>
<td>7 (6.7)</td>
<td></td>
</tr>
<tr>
<td><strong>Income categories</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10000 to 15000</td>
<td>54 (83.1)</td>
<td>11 (16.9)</td>
<td>0.144</td>
</tr>
<tr>
<td>Above 15000</td>
<td>90 (90.0)</td>
<td>10 (10.0)</td>
<td></td>
</tr>
<tr>
<td><strong>Marital status</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never married</td>
<td>69 (83.1)</td>
<td>149 (16.9)</td>
<td>0.111</td>
</tr>
<tr>
<td>Ever married</td>
<td>108(90.0)</td>
<td>12(10.0)</td>
<td></td>
</tr>
<tr>
<td>--------------------</td>
<td>-----------</td>
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<td></td>
</tr>
<tr>
<td>Physical activity</td>
<td></td>
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<tr>
<td>Inactive</td>
<td>60(90.9)</td>
<td>6(9.1)</td>
<td>0.256</td>
</tr>
<tr>
<td>Less active</td>
<td>69(88.5)</td>
<td>9(11.5)</td>
<td></td>
</tr>
<tr>
<td>Active</td>
<td>48(81.4)</td>
<td>11(18.6)</td>
<td></td>
</tr>
<tr>
<td>Alcohol consumption</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>30(83.3)</td>
<td>6(16.7)</td>
<td>0.069</td>
</tr>
<tr>
<td>No</td>
<td>13(61.9)</td>
<td>8(38.1)</td>
<td></td>
</tr>
<tr>
<td>Smoking</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>5(62.5)</td>
<td>3(27.5)</td>
<td>0.557</td>
</tr>
<tr>
<td>No</td>
<td>9(64.3)</td>
<td>4(30.8)</td>
<td></td>
</tr>
</tbody>
</table>

n=number; % = Frequency

Shown in Table 4.5 below, are the independent predictors of abdominal obesity. After adjusting for potential confounding variables, only gender (p=<0.001) and age (p=<0.001) were independent predictors of abdominal obesity among the study participants. Female nurses were eight times more likely to be obese than their male counterparts, and those above the age of 30 years were about seven times more likely to be abdominally obese compared to those below 30 years.

**Table 4.5: Logistic regression showing independent predictors of abdominal obesity**

<table>
<thead>
<tr>
<th>Variables</th>
<th>Beta</th>
<th>Wald</th>
<th>SE</th>
<th>OR(95%CI)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>2.1</td>
<td>15.4</td>
<td>0.5</td>
<td>7.9(2.8-22.3)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Male (reference)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Above 30 years</td>
<td>1.9</td>
<td>13.3</td>
<td>0.5</td>
<td>6.7(2.4-18.7)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>≤30 years (reference)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
4.5 Prevalence of hypertension among PHC nurses

About 29% of the participants had normal systolic BP, 37% were pre-hypertensive, 24% stage 1 systolic hypertension (HTN) and 10% stage 2 systolic HTN (Figure 4.5).

![Figure 4.5: Prevalence of systolic pre-hypertension and hypertension](image)

Normal diastolic BP occurred in 39% participants, 36% were diastolic pre-hypertensive, 16% had stage 1 diastolic hypertension (HTN) and 9% stage 2 diastolic HTN (Figure 4.6).
Figure 4.6: Prevalence of diastolic pre-hypertension and hypertension

Of all the participants, 52% were hypertensive (Figure 4.7). Of those who were hypertensive, 41% were unaware and of those who were aware and on treatment, only 38.1% were controlled.

Figure 4.7: Prevalence of hypertension among the participants
As shown in Table 4.6, only age, alcohol use, parity, duration of practice, income and obesity were associated with hypertension among the study participants.

**Table 4.6: Association of hypertension with demographics variables**

<table>
<thead>
<tr>
<th>Variables</th>
<th>Hypertension n(%)</th>
<th>Not hypertensive n(%)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21 to 30</td>
<td>2(7.6)</td>
<td>24(92.3)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>31 to 40</td>
<td>19(38.0)</td>
<td>31(62.0)</td>
<td></td>
</tr>
<tr>
<td>41 to 50</td>
<td>17(40.5)</td>
<td>25(59.5)</td>
<td></td>
</tr>
<tr>
<td>51 to 60</td>
<td>58(78.4)</td>
<td>16(21.6)</td>
<td></td>
</tr>
<tr>
<td>61 to 70</td>
<td>10(90.9)</td>
<td>1(9.1)</td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>14(58.3%)</td>
<td>10 (41.7)</td>
<td>0.338</td>
</tr>
<tr>
<td>Female</td>
<td>92(51.4)</td>
<td>87(48.6)</td>
<td></td>
</tr>
<tr>
<td>Marital status</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>37(44.6)</td>
<td>46(55.4)</td>
<td>0.234</td>
</tr>
<tr>
<td>Married</td>
<td>59(58.4)</td>
<td>42(41.6)</td>
<td></td>
</tr>
<tr>
<td>Divorced</td>
<td>4(44.4)</td>
<td>5(55.6)</td>
<td></td>
</tr>
<tr>
<td>Separated</td>
<td>0(0.0)</td>
<td>1(100.0)</td>
<td></td>
</tr>
<tr>
<td>Widow/Widower</td>
<td>6(66.7)</td>
<td>3(33.3)</td>
<td></td>
</tr>
<tr>
<td>Number of children</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>One child</td>
<td>15(40.5)</td>
<td>22(59.5)</td>
<td>0.028</td>
</tr>
<tr>
<td>More than One</td>
<td>86(59.7)</td>
<td>58(40.3)</td>
<td></td>
</tr>
<tr>
<td>Level of education</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diploma</td>
<td>74(56.1)</td>
<td>58(43.9)</td>
<td>0.307</td>
</tr>
<tr>
<td>Degree</td>
<td>30(44.8)</td>
<td>37(55.2)</td>
<td></td>
</tr>
<tr>
<td>Category</td>
<td>Yes</td>
<td>No</td>
<td>P-value</td>
</tr>
<tr>
<td>----------------------</td>
<td>---------</td>
<td>--------</td>
<td>---------</td>
</tr>
<tr>
<td>Post-graduate diploma</td>
<td>2(66.7)</td>
<td>1(33.3)</td>
<td></td>
</tr>
<tr>
<td>Masters</td>
<td>0(0.0)</td>
<td>1(100.0)</td>
<td></td>
</tr>
<tr>
<td>Race</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Black</td>
<td>102(52.3)</td>
<td>93(47.7)</td>
<td>0.589</td>
</tr>
<tr>
<td>Coloured</td>
<td>4(50.0)</td>
<td>4(50.0)</td>
<td></td>
</tr>
<tr>
<td>Duration of practice</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 to 10 years</td>
<td>17(23.6)</td>
<td>55(76.4)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>11 to 20 years</td>
<td>24(58.5)</td>
<td>17(41.5)</td>
<td></td>
</tr>
<tr>
<td>21 to 30 years</td>
<td>34(77.3)</td>
<td>10(22.7)</td>
<td></td>
</tr>
<tr>
<td>31 and above</td>
<td>18(90.0)</td>
<td>2(10.0)</td>
<td></td>
</tr>
<tr>
<td>Income</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10000 to 15000</td>
<td>28(43.1)</td>
<td>37(56.9)</td>
<td>0.043</td>
</tr>
<tr>
<td>Above 15000</td>
<td>58(58.0)</td>
<td>42(42.0)</td>
<td></td>
</tr>
<tr>
<td>Alcohol use</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>18(33.3)</td>
<td>36(66.7)</td>
<td>0.001</td>
</tr>
<tr>
<td>No</td>
<td>88(59.1)</td>
<td>61(40.9)</td>
<td></td>
</tr>
<tr>
<td>Smoking</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>7(41.2)</td>
<td>10(58.8)</td>
<td>0.242</td>
</tr>
<tr>
<td>No</td>
<td>99(53.2)</td>
<td>87(46.8)</td>
<td></td>
</tr>
<tr>
<td>Level of activity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inactive</td>
<td>32(48.5)</td>
<td>34(51.5)</td>
<td>0.580</td>
</tr>
<tr>
<td>Less active</td>
<td>40(51.3)</td>
<td>38(48.7)</td>
<td></td>
</tr>
<tr>
<td>Active</td>
<td>34(57.6)</td>
<td>25(42.2)</td>
<td></td>
</tr>
<tr>
<td>Obesity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>55(57.9)</td>
<td>40(42.1)</td>
<td>0.001</td>
</tr>
<tr>
<td>No</td>
<td>15(30.0)</td>
<td>35(70.0)</td>
<td></td>
</tr>
</tbody>
</table>

n= Number; %= Frequency
After adjusting for confounders (obesity, physical activities, dietary practices, parity, income and alcohol use), only age and duration of practice were the significant predictors of hypertension (Table 4.7).

Table 4.7: Multivariate logistic showing predictors of hypertension

<table>
<thead>
<tr>
<th>Variables</th>
<th>Beta</th>
<th>S.E</th>
<th>Wald</th>
<th>OR(95% CI)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duration of practice</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ 10 years (reference)</td>
<td>1.49</td>
<td>0.39</td>
<td>14.42</td>
<td>4.4(2.1-9.6)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>&gt; 10 years</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ 35 years (reference)</td>
<td>1.89</td>
<td>0.60</td>
<td>9.8</td>
<td>6.6(2.0-21.7)</td>
<td>0.002</td>
</tr>
<tr>
<td>&gt;35 years</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 4.6 Lifestyles Behaviours

#### 4.6.1 Alcohol consumption

Of all the participants, 27% had ever taken alcohol, while 67% of those who reported ever consuming alcohol (18 percent of the entire participants) still currently consumed it. The mean number of standard bottles of alcohol taken by the nurses was 4.31 bottles (SD±3.2), with a higher mean among males (5.62) compared to females (3.55).

Of all the socio-demographic characteristics, only male sex (p=<0.001), never married (p=0.019), younger age (21-30 years) (p=<0.001 were significantly associated with ever using alcohol among the study participants (Table 4.8).
Table 4.8: Association of lifetime alcohol consumption with socio-demographic characteristics

<table>
<thead>
<tr>
<th>Variables</th>
<th>Consume alcohol n(%)</th>
<th>Do not consume alcohol n(%)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>18(75.0)</td>
<td>6(25.0)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Female</td>
<td>36(20.1)</td>
<td>143(79.9)</td>
<td></td>
</tr>
<tr>
<td>Marital status</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never married</td>
<td>29(34.9)</td>
<td>54(65.1)</td>
<td>0.019</td>
</tr>
<tr>
<td>Ever married</td>
<td>25(20.8)</td>
<td>95(63.8)</td>
<td></td>
</tr>
<tr>
<td>Age (years)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21 to 30</td>
<td>19(73.1)</td>
<td>7(26.9)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>31 to 40</td>
<td>18(36.0)</td>
<td>32(64.0)</td>
<td></td>
</tr>
<tr>
<td>41 to 50</td>
<td>10(23.8)</td>
<td>32(78.2)</td>
<td></td>
</tr>
<tr>
<td>51 to 60</td>
<td>7(9.5)</td>
<td>67(90.5)</td>
<td></td>
</tr>
<tr>
<td>61 to 70</td>
<td>0(0.0)</td>
<td>11(100.0)</td>
<td></td>
</tr>
<tr>
<td>Income</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10000 to 15000</td>
<td>23(35.4)</td>
<td>42(64.6)</td>
<td>0.080</td>
</tr>
<tr>
<td>Above 15000</td>
<td>24(24.0)</td>
<td>76(76.0)</td>
<td></td>
</tr>
</tbody>
</table>

4.6.2 Smoking behaviour among nurses

Of the 203 participants, only 8% had ever smoked and of these, 47% (3% of the entire participants) currently smoke.
4.6.3 Physical activity pattern

Of all the participants, 33% do not engage in physical activities, and of the remaining 67%, only 29% of them met the WHO recommendation for being active. Most of them were aware of the benefits of physical activities concerning weight loss (93.1%), better sleep and alertness (95.5%), and for better heart function (96.5%). The majority of the participants cited lack of time (74.0%) and lack of commitment (63.3%) as barriers to physical activity and few of them cited health challenges (3.9%) (Figure 4.8).

![Figure 4.8: Barriers to physical activity participation](image)

4.6.4 Dietary patterns

The majority of participants reported frequently taking water (96.6%), salt (90%), vegetables (88%) and bread (63%) (Table 4.9).
<table>
<thead>
<tr>
<th>Type of foods</th>
<th>Not at all n(%)</th>
<th>Rarely n(%)</th>
<th>Moderately n(%)</th>
<th>Frequently n(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sweet</td>
<td>31 (15.3)</td>
<td>79 (38.9)</td>
<td>48 (23.6)</td>
<td>45 (22.2)</td>
</tr>
<tr>
<td>Chocolates</td>
<td>95 (46.8)</td>
<td>86 (42.4)</td>
<td>13 (6.4)</td>
<td>9 (4.4)</td>
</tr>
<tr>
<td>Cake</td>
<td>60 (29.6)</td>
<td>129 (63.5)</td>
<td>12 (5.9)</td>
<td>2 (1.0)</td>
</tr>
<tr>
<td>Biscuit</td>
<td>64 (31.5)</td>
<td>88 (43.3)</td>
<td>32 (15.8)</td>
<td>19 (9.4)</td>
</tr>
<tr>
<td>Cool drinks</td>
<td>23 (11.3)</td>
<td>45 (22.2)</td>
<td>39 (19.2)</td>
<td>96 (47.3)</td>
</tr>
<tr>
<td>Coffee creamer</td>
<td>152 (74.9)</td>
<td>17 (8.4)</td>
<td>10 (4.9)</td>
<td>24 (11.8)</td>
</tr>
<tr>
<td>Coffee</td>
<td>83 (40.9)</td>
<td>33 (16.3)</td>
<td>29 (14.3)</td>
<td>58 (28.6)</td>
</tr>
<tr>
<td>Tea</td>
<td>83 (40.9)</td>
<td>32 (15.8)</td>
<td>24 (11.8)</td>
<td>64 (31.5)</td>
</tr>
<tr>
<td>Sugar</td>
<td>76 (37.4)</td>
<td>12 (5.9)</td>
<td>27 (13.3)</td>
<td>88 (43.3)</td>
</tr>
<tr>
<td>Low fat milk</td>
<td>126 (62.1)</td>
<td>17 (8.4)</td>
<td>15 (7.4)</td>
<td>45 (22.2)</td>
</tr>
<tr>
<td>Egg</td>
<td>61 (30.0)</td>
<td>67 (33.0)</td>
<td>52 (25.6)</td>
<td>23 (11.3)</td>
</tr>
<tr>
<td>Peanut butter</td>
<td>82 (40.4)</td>
<td>61 (30.0)</td>
<td>35 (17.2)</td>
<td>25 (12.3)</td>
</tr>
<tr>
<td>Soya mince</td>
<td>174 (85.7)</td>
<td>17 (8.4)</td>
<td>9 (4.4)</td>
<td>3 (1.5)</td>
</tr>
<tr>
<td>Chicken</td>
<td>8 (3.9)</td>
<td>13 (6.4)</td>
<td>70 (34.5)</td>
<td>112 (55.2)</td>
</tr>
<tr>
<td>Meat</td>
<td>41 (20.2)</td>
<td>89 (43.8)</td>
<td>58 (28.6)</td>
<td>15 (7.4)</td>
</tr>
<tr>
<td>Fish</td>
<td>36 (17.7)</td>
<td>106 (52.2)</td>
<td>49 (24.1)</td>
<td>12 (5.9)</td>
</tr>
<tr>
<td>Bread</td>
<td>8 (3.9)</td>
<td>31 (15.3)</td>
<td>36 (17.7)</td>
<td>128 (63.1)</td>
</tr>
<tr>
<td>Porridge</td>
<td>34 (16.7)</td>
<td>28 (13.8)</td>
<td>27 (13.3)</td>
<td>114 (56.2)</td>
</tr>
<tr>
<td>Samp/Mealie rice</td>
<td>48 (23.6)</td>
<td>112 (55.2)</td>
<td>25 (12.3)</td>
<td>18 (8.9)</td>
</tr>
<tr>
<td>Rice</td>
<td>46 (22.7)</td>
<td>35 (17.2)</td>
<td>66 (32.5)</td>
<td>56 (27.6)</td>
</tr>
<tr>
<td>Fast foods</td>
<td>36 (17.7)</td>
<td>129 (63.5)</td>
<td>27 (13.3)</td>
<td>11 (5.4)</td>
</tr>
<tr>
<td>Fruit</td>
<td>4 (2.0)</td>
<td>20 (9.9)</td>
<td>20 (9.9)</td>
<td>159 (78.3)</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>----------------</td>
<td>-------</td>
<td>-------</td>
<td>------</td>
<td>-------</td>
</tr>
<tr>
<td>Vegetables</td>
<td>3(1.5)</td>
<td>2(1.0)</td>
<td>19(9.4)</td>
<td>179(88.2)</td>
</tr>
<tr>
<td>Salt</td>
<td>7(3.4)</td>
<td>0(0.0)</td>
<td>12(5.9)</td>
<td>184(90.6)</td>
</tr>
<tr>
<td>Alcohol</td>
<td>169(83.3)</td>
<td>22(10.8)</td>
<td>9(4.4)</td>
<td>3(1.5)</td>
</tr>
<tr>
<td>Water</td>
<td>2(1.0)</td>
<td>3(1.5)</td>
<td>2(1.0)</td>
<td>196(96.6)</td>
</tr>
<tr>
<td>Fatcake</td>
<td>164(80.8)</td>
<td>29(14.3)</td>
<td>9(4.4)</td>
<td>1(0.5)</td>
</tr>
<tr>
<td>Polony</td>
<td>142(70.0)</td>
<td>26(12.8)</td>
<td>25(12.3)</td>
<td>10(4.9)</td>
</tr>
</tbody>
</table>

n=number; % = Frequency

4.7 Presence or Absence of Obesity Management Guidelines for Patients

Of the entire participants, the majority (92.2%) stated that there were no obesity management guidelines for patients (Figure 4.9).

**Figure 4.9: Presence or absence of obesity management guidelines for patients**
4.7.1 Management of the obese patients

As shown in Table 4.10, overweight and obese patients were managed through health education on dieting (95.1%), physical activity (94.6%), and almost all participants did not receive health education on the importance of weight loss (91.9%).

**Table 4.10: Management of overweight and obese patients**

| Variables                                                      | Yes   | No    |
|                                                               | n(%)  | n(%)  |
| Health education on diets                                    | 193(95.1) | 1(0.5) |
| Health education on physical activity participation          | 195(94.6) | 4(2.0) |
| Constant weight monitoring                                   | 31(15.3)  | 143(70.4) |
| In-service training for nurses on the management of obesity  | 13(6.4)   | 152(74.9) |
| Organizing a gym at work                                     | 2(1.0)    | 3(1.5)    |
| Referral to dietician                                         | 29(14.3)  | 174(85.7) |
| Health education on the importance of weight loss            | 18(9.1)   | 185(91.9) |

n= Number; %= Frequency

Few other participants highlighted health education on stress, cholesterol check and referral to doctors (n=4).

4.8 Optimal Anthropometric Indices in Defining Obesity among Primary Health Care Professional Nurses in Eastern Cape

The areas under the ROC curves (AUCs) of various anthropometric indices and obesity are summarized in Table 4.11 and Figure 4.10. The AUCs of various anthropometric indices and nurses classified as obese using BMI were WC—0.950; WHR—0.963; WHtR—0.649. The cut-off values of various anthropometric indices found optimally to predict obesity using the ROC analysis is summarized in Table 4.12.
The optimal BMI cut-off values for predicting obesity using the Youden index were 94.5cm for WC, 0.53 for WHtR and 0.81 for WHR.

Table 4.11: Area under the curve for the anthropometric indices

<table>
<thead>
<tr>
<th>Variables</th>
<th>Area</th>
<th>95% Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>WC</td>
<td>0.950</td>
<td>0.922 0.979</td>
</tr>
<tr>
<td>WHR</td>
<td>0.649</td>
<td>0.555 0.743</td>
</tr>
<tr>
<td>WHtR</td>
<td>0.963</td>
<td>0.942 0.985</td>
</tr>
</tbody>
</table>

Figure 4.10: WC: waist circumference, WHR: Waist-to-hip ratio, WHtR: Waist-to-height ratio
Table 4.12: Optimal cut-off values, sensitivities and specificities for various anthropometric indices predictive of obesity

<table>
<thead>
<tr>
<th>Anthropometric Indices</th>
<th>Measure points</th>
</tr>
</thead>
<tbody>
<tr>
<td>WC</td>
<td></td>
</tr>
<tr>
<td>Sensitivity</td>
<td>0.85</td>
</tr>
<tr>
<td>Specificity</td>
<td>0.94</td>
</tr>
<tr>
<td>Cut-off point (cm)</td>
<td>94.5</td>
</tr>
<tr>
<td>WHtR</td>
<td></td>
</tr>
<tr>
<td>Sensitivity</td>
<td>0.88</td>
</tr>
<tr>
<td>Specificity</td>
<td>1.0</td>
</tr>
<tr>
<td>Cut-off point</td>
<td>0.53</td>
</tr>
<tr>
<td>WHR</td>
<td></td>
</tr>
<tr>
<td>Sensitivity</td>
<td>0.78</td>
</tr>
<tr>
<td>Specificity</td>
<td>0.52</td>
</tr>
<tr>
<td>Cut-off point</td>
<td>0.81</td>
</tr>
</tbody>
</table>

The areas under the ROC curves (AUCs) of various anthropometric indices for predicting hypertension are summarized in Table 4.13 and Figure 4.11. The cut-off values of various anthropometric indices found optimally to predict hypertension using the ROC analysis are summarized in Table 4.14. The optimal cut-off values for predicting hypertension using the Youden index were ≥94.5cm for WC, ≥0.53 cm for WHtR, ≥0.81cm for WHR and 34.6 for BMI.
Figure 4.11: Optimal cut off point for predicting hypertension

Diagonal segments are produced by ties.
Table 4.13: Optimal cut-off values, sensitivities and specificities for various anthropometric indices predictive of hypertension

<table>
<thead>
<tr>
<th>Anthropometric indices</th>
<th>Measure points</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Waist circumference</strong></td>
<td></td>
</tr>
<tr>
<td>Sensitivity</td>
<td>0.80</td>
</tr>
<tr>
<td>Specificity</td>
<td>0.53</td>
</tr>
<tr>
<td>Cut-off point</td>
<td>≥95.5</td>
</tr>
<tr>
<td><strong>Waist-to-height ratio</strong></td>
<td></td>
</tr>
<tr>
<td>Sensitivity</td>
<td>0.76</td>
</tr>
<tr>
<td>Specificity</td>
<td>0.54</td>
</tr>
<tr>
<td>Cut-off point</td>
<td>≥0.54</td>
</tr>
<tr>
<td><strong>Waist-to-hip ratio</strong></td>
<td></td>
</tr>
<tr>
<td>Sensitivity</td>
<td>0.75</td>
</tr>
<tr>
<td>Specificity</td>
<td>0.56</td>
</tr>
<tr>
<td>Cut-off point</td>
<td>≥0.84</td>
</tr>
<tr>
<td><strong>Body mass index</strong></td>
<td></td>
</tr>
<tr>
<td>Sensitivity</td>
<td>0.67</td>
</tr>
<tr>
<td>Specificity</td>
<td>0.61</td>
</tr>
<tr>
<td>Cut-off point</td>
<td>34.6</td>
</tr>
</tbody>
</table>
4.9 Discussion

4.9.1 Prevalence and determinants of overweight and obesity

Obesity has reached a pandemic level worldwide, and South Africa is no exemption. This study sought to examine the prevalence and determinants of obesity among the supposedly health promotors and healthy lifestyle advocators, which in this case were the PHC professional nurses in the Eastern Cape Province of South Africa. Surprisingly, 76% of the professional nurses were obese, with an additional 18% being overweight. These findings corroborated the widely documented high prevalence of obesity among nurses both in Africa [South Africa (Goon et al., 2013); Nigeria (Ogunjimi et al., 2010); Ghana (Aryee et al., 2013)] and outside Africa [Australia (Kyle, Neall & Atherton, 2016)]. However, the prevalence rate of overweight and obesity recorded among PHC nurses in this study was higher than the prevalence documented in other studies which ranged from 16.4% to 62.2%, and in another study conducted among nurses in Vhembe district, South Africa (44.4%) (Goon et al., 2013). The higher prevalence of obesity found among professional nurses in our study could be ascribed to their occupational work setting which entailed sitting for long hours during consultation with the assistant nurses. This sedentary lifestyle promotes obesity. When compared to obesity among the general population, the prevalence of obesity among nurses is higher than the prevalence recorded in various studies conducted among the general population in South Africa which ranged from 15% to 60.2% (Van den Berg et al., 2012; Skaal & Pengpid, 2011; Goon et al., 2013; Lloyd et al, 2014; Owolabi et al., 2017; Adeniyi et al., 2015).
This is worrying and points at the fact that nurses, who are supposed to be health promotion models and are knowledgeable about the health implications of overweight and obesity are more obese than the general population. Although, the profession is dominated by females, with a usually higher prevalence of obesity, even so, these findings suggest that nurses are not practising the healthy lifestyle they advocate. In other words, they are not living up to what they preach to patients about weight and health matters. This has significant health implications as the patients and the community might see them as role models, yet may feel reluctant to accept counsel from them. In addition, overweight and obese nurses have been documented to have lesser confidence in health educating patients on the need for weight control (Kyle, Neall & Atherton, 2016). Therefore, there is a possibility of shying away from such teachings, which portends poor health advocacy communication from the sender and the receiver, thus invariably accelerating the obesity burden.

Of all the demographic and behavioural factors, gender, marital status, age, duration of practice, alcohol use and smoking were found to be associated with obesity among the study participants. However, only age and non-alcohol use were the significant predictors of obesity. Female nurses were found to be more obese than their male counterparts. This is similar to the findings of Aryee et al. (2013) among nurses in Ghana. Studies among the general population have also documented a higher prevalence of obesity among females (Adeniyi et al., 2015; Owolabi et al., 2017, Agyemang et al., 2015) compared to males. Some studies among the general population outside Africa, however, reported a higher prevalence of obesity among males (Cai et al., 2011; Navaneela & Janz, 2014).
Although Jakicic, Otto and Loss (2005) and Chukwuonye et al. (2013) ascribed the higher prevalence of obesity among females to inadequate engagement in physical activity, the present study found no significant relationship between physical activity and obesity. In addition to physical inactivity, several other factors contribute to the obesity epidemic. A plausible reason for the higher prevalence among the female nurses could be the physiological changes which usually take place during the reproductive years of women (Gunderson, 2009). This could also be responsible for the higher prevalence found among the married participants as the study population were largely females.

Another important factor associated with obesity was ageing. Obesity was found to be higher among the older participants. This is similar to the Aryee et al. (2013) finding among Ghanaian nurses, but differs from the findings among the general populace in Uganda (Kirunda et al., 2015). Older adults might engage in lesser physical activity and this might be the reason behind the higher prevalence of obesity among the older participants surveyed. Also, the older nurses are more experienced and may be more involved in the consultations, involving long hours sitting, while the younger ones carry out other procedures and render care to the patients. This also applies to those with longer duration of practice as they constitute the higher age group.

Nurses who do not consume alcohol and do not smoke were found to have a higher prevalence of obesity. This finding needs to be interpreted with caution. The higher prevalence of obesity seen among those who do not smoke is similar with other studies (Gallus et al., 2015; Mackay, Gray & Pell, 2013) which documented inadvertent weight loss among smokers. Also, there is a complex inter-relation between obesity and alcohol use.
While some authors documented that alcohol consumption leads to weight gain (Traversy & Chaput, 2015; Shelton & Knott, 2014) following appetite stimulation, one study reported no definite relationship between alcohol use and obesity (Cready & Kyle, 2016). Nonetheless, the overall effect of smoking and harmful alcohol use is detrimental to health and should not be encouraged.

### 4.9.2 Abdominal obesity

This study revealed an alarming prevalence of abdominal obesity among these professional nurses, ranging from 50% to as high as 90% using various anthropometric measures. The prevalence documented among nurses in this setting is double the prevalence (25.4) recorded among nurses in Ghana (Aryee et al., 2013) and Poland (22%-31%) using various criteria (Peplonska et al., 2015). The finding in this setting is only comparable to the prevalence reported among nurses in Vhembe and Capricorn Districts in Limpopo Province, South Africa, which ranged from 56.5% to 80.5% (Goon et al., 2014). Given that abdominal obesity increases the likelihood of developing chronic illnesses and other conditions, this is worrisome as the health of these important stakeholders in this setting might be compromised in the nearest future, if not already compromised. Also, the self-confidence in counselling the abdominally obese patients would be questionable. Even if they do, the obese patients might not be receptive to their counselling tips.

Several underlying reasons have been postulated for the high burden of abdominal obesity among nurses. While some authors (Lee et al., 2016; Peplonska et al., 2015; Aryee et al., 2013, Kim et al., 2013) identified the nature of work of nurses, particularly, rotating and night shifts, some associated this with lesser participation in physical
activity and poor dietary practices of nurses while on duty (Aryee et al., 2013; Phiri et al., 2014). The current study did not obtain data on the previous work experiences of these primary healthcare nurses, therefore, one cannot categorically state that the recorded association between night shifts and obesity among nurses does not hold true among the participants in this current study, as they do not rotate or run night shifts. However, this finding suggests that the burden of abdominal obesity is a general problem among nurses and not just those who rotate or run night shifts. Other identified factors might also be responsible for the high prevalence of abdominal obesity among PHC nurses observed in this setting.

In this study, female sex and participants above 30 years were the significant and independent predictors of abdominal obesity among the study participants. Several studies have reported similar associations (Adeniyi et al., 2015; Aryee et al., 2013; Goon et al., 2013; Owolabi et al., 2017; Lee et al., 2016). The higher odds for developing abdominal obesity among females have been linked to engagement in lesser physical activities compared to men (Jakicic, Otto & Loss, 2005; Chukwuonye et al., 2013). Although, this study found no significant association between physical inactivity and abdominal obesity among the participants, notwithstanding the fact that participants who were considered active had a lesser prevalence of abdominal obesity. It should be noted that other factors such as genetics and diet also contribute to obesity development (Mathieu, Lemieux & Després, 2010), as well as physiological changes occurring during reproductive years might predispose the female nurses to abdominal obesity (Gunderson, 2009).
Female nurses who were above 30 years had a higher prevalence of abdominal obesity compared to those who were less than 30 years. This is similar to several other studies (Owolabi et al., 2017; Lee et al., 2016; Aryee et al., 2013). The higher prevalence found among the older nurses might be associated with the accompanying longer duration of practice as well as higher level of experience. Thus, they are more engaged in consultations with lesser participation in more strenuous activities compared to the younger nurses. Aside from the work environment, engagement in lesser physical activities might also be found among the older people, resulting in the development of abdominal obesity.

4.9.3 Lifestyle behaviours of primary health care professional nurses

This present study examined the lifestyle behaviours (smoking, alcohol use, and physical activity) of primary healthcare professional nurses in Eastern Cape, South Africa. These factors among others have been identified as the underlying factors responsible for as much as 80% of the burden of non-communicable diseases (WHO, 2017). Of the 203 nurses involved in this study, only eight percent had ever smoked or used any tobacco product and only three percent of the nurses currently smoke. This proportion of nurses who had ever smoked and are current smokers is a fair amount lower than the reported rate among nurses in Turkey (40%) (Adamek et al., 2012) and 45% (Sezer et al., 2007), Japan (18.6%) (Ohida et al., 1999) and the United States (8%) (Sarna et al., 2010). When compared to the general population, the prevalence reported in this study is lower than the 15% reported among adults in the same setting (Owolabi et al., 2017c).
This is commendable as this shows that the nurses in this setting detest smoking and this might have an influence on the health education they offer to patients concerning smoking. Also, a decline in the rate of smoking among nurses has been shown to be accompanied by a fall in the prevalence of smoking in the general population (Davis in Sarna et al., 2010). Various workplace policies, such as prohibition of smoking at workplace, especially at the healthcare settings, might have contributed to this. However, there is still a need to further encourage the nurses and assist those who still smoke to quit smoking.

Primary healthcare professional (PHC) nurses play a significant role in health educating patients and communities on harmful alcohol use; however, their disposition to alcohol use will significantly influence this role. Twenty-seven percent of the nurses in this study had ever consumed alcohol and only 18% currently consume alcohol. The comparison of alcohol consumption among nurses in South Africa is fraught with difficulty as scant data exists. The prevalence of ever consuming alcohol among these study participants is lower than the reported prevalence among Kenyan nurses (35.8%) (Mokaya et al., 2016). It is, however, higher than the prevalence (0.3%) reported among nurses in Norway (Edvardsen et al., 2014). The prevalence in this study is comparable to the reported prevalence (22%) among healthcare professionals, including nurses, in another province of South Africa (Okeke et al., 2012). Also, it is comparable to the reported prevalence (30.3%) among doctors in Nigeria (Obadeji et al., 2015). These evidences further affirm the fact that health workers, including the nurses, also participate in unhealthy lifestyle behaviours such as harmful alcohol use, and nurses in this settings are not an exception.
Their rate of alcohol consumption is slightly lower than the reported prevalence (32%) among the general population in the same setting (Owolabi et al., 2017d). Considering the important role of nurses, particularly the primary healthcare professional nurses, in the advocacy for healthy lifestyle behaviors, alcohol use among them might impede this role. Alcohol use among nurses might affect the quality of care rendered or even their sense of clinical judgement, although this association was not established in this study. Alcohol use among nurses might constitute a major threat for the healthcare system and even further increase the challenges of high litigations faced by the South African healthcare system.

In addition, given that harmful alcohol use predisposes to chronic illnesses, the health of these nurses might be compromised; and this might affect the healthcare workforce. In addition, the mean number of standard alcohol taken by the nurses in this study was 4.31 bottles with a higher mean among men compared to women. These recorded mean values are synonymous with the range for binge drinking (four or more standard drinks among women or five or more standard drinks among men at an occasion). This shows that those who consume alcohol among this cohort engage in binge drinking, a form of hazardous drinking. This will not only result in poor health outcomes such as chronic diseases and injuries, but can also affect the quality of life of these nurses (Centre for Disease Prevention and Control, 2010, WHO, 2000). This might also affect their work performance and the care rendered to the patients and their communities, which may see them as role models.

Male nurses had a higher prevalence of lifetime alcohol use.
This is not surprising as similar findings have been documented among other populations (Owolabi et al., 2017d; Reddy et al., 2010). Alcohol use seems to be more socially acceptable among men than women (Bratberg et al., 2016). Also, as observed in this study, the use of alcohol decreases with advancing age. This is similar to other studies (Obadeji et al., 2015; Reddy et al., 2010). As age advances, maturity and more responsibilities set in. Even in the absence of those, disease conditions might also begin to develop. These could collectively contribute to older adults’ decision to either reduce alcohol consumption or abstain from it. This might also be the underlying reason behind the higher prevalence found among the never married participants as they constitute those in the younger age groups. There was no significant difference between various income groups and alcohol. All the participants had a good purchasing power for alcohol as they all earned more than R10 000 per month and fewer earned R15 000. Aside from this, alcohol appears to be relatively cheap and easily accessible in this setting. Thus, irrespective of income, everyone has access to alcohol and can easily purchase it.

Considering the significant health implications of physical inactivity, this study assessed the physical activity patterns of the nurses in this setting. Of all the participants, 33% did not engage in physical activities, and of the remaining 67%, only 29% of them met the WHO recommendation for being active. Overall, the majority (71%) were either not active or insufficiently active. When compared to studies outside South Africa, the observed prevalence of physical inactivity in this study is higher than the documented prevalence of physical inactivity among student nurses in the United Kingdom (48%) (Blake, 2016);
United States (68%) (Fitzgerard, 2015) and among nurses in South Africa (Phiri et al., 2014), in which all the nurses were reported to have met the recommended physical activity level. This shows that the nurses in this setting are not modelling the healthy lifestyle in terms of physical activity they advocate for, and as a result of this, they might be at risk of developing non-communicable diseases. Nurses constitute a large percentage of the healthcare workforce; as such, a high burden of non-communicable diseases among them might paralyse the healthcare system. Even though lack of physical activity might not physically be observable, one of its side effects, namely, becoming obese, is apparent. As a result of this, patients with similar lifestyle behaviours might find it difficult to adhere to the advice given by nurses who themselves do not comply.

When asked about the perceived benefits of physical activity and barriers, the majority of the nurses were aware of the benefits. Some of the highlighted benefits included weight loss (93.1%), better sleep (95.5%) and alertness (96.5%). The listed benefits of physical activity are synonymous with the documented benefits, namely, a reduction in the risk of developing heart diseases, diabetes, cancer, injury, better mental health (CDC, 2015; NHLBI, 2016). However, this showed that the nurses’ knowledge about the benefits of physical activity did not translate into practice. In spite of being knowledgeable about the various benefits of physical activity, they still did not feel obliged to engage in such activities. This poor attitude towards physical activity among nurses in this setting warrants intervention. When asked about the perceived barriers to engaging in physical activities, the nurses highlighted lack of time (74.0%) and lack of commitment (63.3%) as the major barriers.
This is synonymous with the reported barriers among nurses in the UK (Blake et al., 2016), and reported evidence in Trost et al.’s (2002) review study. This is worrying as the nurses are knowledgeable and yet are not committed to participate in physical activity because of insufficient time. There is a need to create a work environment which will facilitate exercise at work and implement physical activity promoting initiatives among the nurses. Also, more emphasis should be laid on observing the wellness days at work and participation in physical activity should be incorporated in such days. This could motivate the nurses to be active, would promote their health and reduce their risk of developing NCDs, as shown in some interventional studies assessing the impact of physical activity on the health of nurses (Blake et al., 2015; Gartshore & Blake, 2014).

4.9.4 Prevalence of hypertension

Hypertension is a leading, preventable cause of morbidity and premature mortality. The prevalence rate of hypertension among the professional nurses was 52%. This prevalence is higher than the reported prevalence of hypertension among nurses in South Africa (20%) (Skaal & Pengpid, 2011), Brazil (32%) (Urbanetto et al., 2015) and health workers in Nigeria (20.1%) (Owolabi et al., 2014). This finding is also higher than the documented hypertension prevalence among adults in the general population in South Africa (Day et al., 2014; Owolabi et al., 2017; Peer et al., 2013) with prevalence ranging from 38.9% to 49.2%. This paradoxically means that the health of nurses who are salvaging the health of the general populace might be compromised, as they too are suffering from this ailment, and need to be salvaged. A study assessing lifestyle behaviour among nurses in South Africa has documented a high prevalence of unhealthy lifestyle behaviours among South African nurses (Phiri et al., 2014);
which could be linked to work-related stress and long hours sitting (Skaal & Pengpid, 2011; Khamisa, Peltzer & Oldenburg, 2013) that characterise the nursing profession. Also, the mean age of the study participants might have contributed to the high prevalence of hypertension.

Surprisingly, 41% of the hypertensive nurses were unaware of their hypertensive status. It, however, was unclear if this attitude could be attributed to work-related stress which is highly documented among this group (Urbanetto et al., 2015; Khamisa, Peltzer & Oldenburg, 2013) such that they had even forgotten to engage in health assessments, in which blood pressure measurement is a prime priority. Worryingly, hypertension is asymptomatic, does not give prior warning before creeping in, and silently affects several body organs. This, therefore, points to the need of enforcing workplace health screening even among this group who supposedly have health knowledge and awareness of the disease and its deleterious effects on health. Such screening should be organised at regular intervals in order to protect and prolong the lives of the health promoters.

Of those who were aware of their hypertension status and were on treatment, only 38.1% had a controlled blood pressure. The control rate in this study was higher than the reported control rate (25.5%) among adults in Mthatha, South Africa (Adeniyi et al., 2015) and Zimbabwe (32.8%) (Goverwa et al., 2012). The findings of this study are comparable to the reported rate (38.9%) among adults in Buffalo City Metropolis, South Africa (Owolabi et al., 2017) and in a household survey conducted among South African adults (36.4%) (Day et al., 2014).
In spite of the scientific successes recorded in anti-hypertensive drug discoveries, achieving treatment target remains a significant challenge in most developing countries. The nurses are not exempted from the burden of sub-optimal control of hypertension and efforts should be intensified towards better hypertension control in South Africa.

Only age and the duration of practice were the significant predictors of hypertension among the study population. The association between age and hypertension has been documented in several studies (Adeloye et al., 2014; Pires et al., 2009; Owolabi et al., 2017). Hypertension is inevitable among the elderly. This is as a result of the accompanying changes in the body systems, including the cardiovascular system. Changes such as arterial stiffness, inflammation and endothelial dysfunction which are associated with ageing (Sun, 2014; Burford, 2016) account for the greater burden of hypertension found among the older population, including the nurses. This was also the plausible reason for the documented higher odds among those with higher duration of practice as they constituted those in the higher age range. The older age group thus needs to be targeted for interventions aimed at reducing the burden of hypertension.

### 4.9.5 Obesity management guidelines

The present study sought to ascertain the availability of obesity management guidelines, if any, and the utilisation thereof by PHC professional nurses in selected health facilities in the Eastern Cape, South Africa. The study revealed that there are no guidelines for managing overweight and obese patients. The absence of guidelines for weight management might impact negatively on patient quality care and health care delivery.
A comparison of the results of this study with evidence-based guidelines or protocols on obesity management in South Africa is fraught with difficulty due to the scarcity of data on guidelines for obesity management. The findings of this study demonstrated that obese patients were managed through health education on diet (95.1%), physical activities (94.6%), and constant weight monitoring (15.3%). This means that there is no follow-up care to verify whether interventions carried out have been effective or not. Similar to Andre et al.’s (2000) study, the PHC nurses in this present study were not provided with in-service training on the management of obesity (74.9%); furthermore, without knowledge, nurses would be unable to promote behavioural changes that would contribute to weight reduction.

The study also revealed that health education on the importance of weight loss was poorly done (91.9%). This might have been due to the fact that nurses did not practise what they preached as it was revealed in several studies that nurses were obese across different countries: South Africa (Goon et al., 2013), Nigeria (Ogunjimi et al., 2010), Scotland (Kyle, Neall & Artherton, 2016), Australia, New Zealand and United Kingdom (Bogossian et al., 2012). Kyle, Neall and Atherton (2016) reiterated that overweight and obese nurses had been documented to have lesser confidence in health educating patients on the need for weight control. Therefore, there is a possibility of shying away from such teachings, which portends poor health advocacy communication from the sender and the receiver, thus invariably accelerating the obesity burden.
4.9.6 Optimal anthropometric cut-off points in defining obesity among primary health care professional nurses

This study also assessed for the optimal cut-off points for predicting obesity among nurses in this setting. The cut-off points which yielded the maximum Youden index for WC, WHTR and WHR were 94.5cm, 0.53 and 0.81, respectively. Currently, there are varying cut-points for the anthropometric indices used in predicting risky body weight for different races and population groups (WHO, 2011). However, for Africans, there is no consensus as to the optimal cut-off points applicable to this race. At the moment, the cut-off point for the Europeans residing in Africa is applied to black Africans (WHO, 2011), which several authors have queried due to the different body build of Africans (Agueh et al., 2015; Assaad-Khalil et al., 2015; Crowther & Norris, 2012; Mabchour et al., 2015).

The findings of this study suggest an increase in the cut-off point for WC, a new cut-off point of 94.5cm against the previously used 80cm, a slight increase in the WHtR, 0.53 against 0.50 and also, a slight reduction in the currently used cut-off point for WHR (0.85), to 0.81. The literature is fraught with studies aimed at determining the optimal cut-off point for anthropometric indices among nurses, thus making comparison difficult. As such, comparison could only be done with studies conducted among the general population. The optimal WC cut-off point derived for nurses in this study is higher than the optimal point (90cm) derived for Benin women (Agueh et al., 2015), slightly higher than the 94 cm cut-off point proposed for black women in Benin and Haiti (Mabchour et al., 2015), yet lower than the proposed cut-off points for Egyptian women, 96.25cm (Assaad-Khalil, et al., 2015).
When compared to the cut-off point (91cm) derived for black South African general population in Soweto, the current cut-off point for nurses is also higher (Crowther & Norris, 2012). There is scant documentation of WHtR and WHR cut-off points among the black African population. The only study (Mabchour et al., 2015) found proposed a higher cut-off point for WHtR (0.59) than the one derived in this current study. A high prevalence of obesity has being shown earlier among nurses in this study setting and even generally among nurses (Goon et al., 2013; Bogossian et al., 2012 & Miller et al., 2008 ). As such there is a need for a larger study aimed at determining the optimal cut-off point for the anthropometric indices used in predicting cardiovascular risks among nurses.
CHAPTER FIVE

DEVELOPMENT OF HEALTH PROMOTION GUIDELINES FOR WEIGHT MANAGEMENT IN PRIMARY HEALTH CARE

5.1 Introduction

The previous chapter covered the findings and discussions of the study. This chapter provides the background and theoretical framework underpinning this study. Subsequently, the justification for the development of the proposed guidelines for managing obese patients in health care facilities is highlighted. The finding of this present study demonstrated that there are no clear guidelines for managing obese patients in primary health care facilities. The default practice is that nurses provide health education on diets and physical activities based on incomplete and unavailable evidence-based guidance. It is against this background that the researcher developed health promotion guidelines for managing obese patient in primary health care. It is envisaged that the developed guidelines for managing obese patients will aid PHC nurses in providing action flow in the management of obese patients in the primary health care settings.

5.2 Construction of Health Promotion Guidelines

For the construction of the guidelines, the researcher used the health promotion model (HPM) by Nola J. Pender, which was proposed in 1982 and revised in 1996 (Figure 5.1). This model is directed at a client’s level of wellbeing, describing the multidimensional nature of persons as they interact within their environment for health issues.
5.3 Application of the Model to the Guidelines

The behaviour of individuals is regulated with interaction with the environment which can modify them positively or negatively. Healthcare professionals, because of their knowledge and experience, are part of the interpersonal environment which exerts influence on people’s lives. Perceived barriers such as easy accessibility and affordability of unhealthy food, lack of time and lack of commitment to physical activity reduce one’s willingness to engage in health promoting behaviours. The unavailability of health policies or guidelines for health education and health screening to identify individuals at risk of the perceived benefits of health promoting behaviour increase the risk of developing NCDs. Therefore, modelling of healthy lifestyles by health professionals would assist the government in the implementation of policies and guidelines.
5.4 Theoretical Framework

**Personal factors**: refers to psychological and sociocultural factors. Biological age can influence the acceptance and sustainability of healthy lifestyle for obesity management and self-motivation to healthy lifestyles can reduce obesity and delay or prevent the occurrence of chronic illnesses.

**Perceived benefits to action**: Obesity management will prevent one’s self from chronic illnesses thus increasing life expectancy.

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**Figure 5.1: Adapted from Pender Theory of Health Promotion (Pender, 1982 revised in 1996)**

- **Personal factors**: Refers to psychological and sociocultural factors. Biological age can influence the acceptance and sustainability of healthy lifestyle for obesity management and self-motivation to healthy lifestyles can reduce obesity and delay or prevent the occurrence of chronic illnesses.

- **Perceived benefits to action**: Obesity management will prevent one’s self from chronic illnesses thus increasing life expectancy.
**Perceived barriers to action:** Health professionals report several barriers that block screening and intervention for overweight and obesity, such as lack of time during consultation to address weight (Klein et al., 2010; Sesselberg, Klein & O’Connor & Johnson, 2010; Tham & Young, 2008), lack of referral options (Sesselberg et al., 2010), feeling of discomfort approaching the weight status (Bardia, Holtan, Slezak & Thompson, 2007; Jay et al., 2008; Jay et al., 2009; Sesselberg et al., 2010; Tham & Young, 2008), concerns of offending patients and their family members (Bardia et al., 2007; Sesselberg et al., 2010) and a belief that they have inadequate training/competency in weight loss techniques.

**Perceived self-efficacy:** In this study perceived self-efficacy refers to the determination of PHC nurses to put in place obesity interventions

**Activity related affect:** Preparedness of PHC nurses to maintain normal body weight

**Interpersonal influences:** PHC nurses may be influenced by other professionals, friends, family members who have been using or still are practising obesity interventions.

**Commitment to Action:** PHC nurses will accept and continue obesity interventions irrespective of time constraints.

**Health Promoted Behaviour:** Acceptance and continuation of obesity interventions

**Title:** Health Promotion Guidelines for Weight Management in Primary Health Care

**Institution:** Department of Health

**Reference Number:** HPGWM 1
5.5 Purpose

- Develop health promotion guidelines for weight management in PHC

5.6 Research Question

- Which and what kind of health promotion guidelines could possibly help with weight management in PHC?

5.7 Rationale for Developing Guidelines for the Management of Obese Patients

Guidelines may provide answers to questions about organizational or policy interventions in improving health care or health policy (WHO, 2008), and ultimately, improved patient outcomes. In this regard, guidelines must be based on evidence, be implemented, and then assessed for applicability (WHO, 2008). Guidelines are developed to summarize and synthesize knowledge and innovations in health, reduce variation in practice and promote evidence-based clinical practice (WHO, 2008).

It is envisaged that the proposed health promotion weight management guidelines (Figure 5.2), developed based on the paucity of weight management guidelines for obese patients in the primary health care settings in the Eastern Cape, might provide PHC nurses with principles, direction and support regarding obesity management.

5.8 Persons Affected

- Patient
- Health care worker
- Community
5.9 **Applicable Policy Reference**

Guidelines for weight management

5.10 **Abbreviations**

BMI: body mass index

Cm: Centimeter

HP: Health promotion

HPGWM: Health promotion guidelines for weight management

Kilogram: Kg

m²: square meter

NCD: Non-communicable diseases

NICE: National Institute for Health and Care Excellence

PHC: Primary health care

PA: Physical activity

WC: waist circumference

WT: Weight

5.11 **Criteria for health promotion guidelines weight management**

**Body Mass**: all patients with a BMI of $< 25 \text{ kg/m}^2$ - $> 30 \text{ kg/m}^2$

**Waist Circumference**: all patients with a WC of $> 94$ cm for men, $80$ cm for women - $> 108$ cm for men and $88$ cm for women.
5.12 Guiding Principles

This guide line is developed to help health care workers (PHC nurses) to:

- Identify patients who are at risk of developing NCDs due to overweight and obesity arising from unhealthy lifestyles.
- Monitor weights of those patients already diagnosed with NCDs to prevent complications.
- Create awareness on a healthy lifestyle.
Table 5.1: Highlights the roles and responsibilities of persons affected in weight management

<table>
<thead>
<tr>
<th>Clinician’s Role</th>
<th>Non-Clinician’s role</th>
<th>Patient’s role</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Screen all patients as recommended by health promotion guidelines to monitor commitment to healthy lifestyles</td>
<td>• Educate patients on overweight and obesity results and common causes</td>
<td>• Express barriers to healthy lifestyles and potential reasons for obesity management failure.</td>
</tr>
<tr>
<td>• Explain overweight and obesity to the patient</td>
<td>• Assess and address barriers to healthy living</td>
<td>• Review and adapt commitment plan with non-clinician</td>
</tr>
<tr>
<td>• Carefully review patient’s commitment history</td>
<td>• Assess misconceptions or beliefs about obesity</td>
<td>• Set objectives</td>
</tr>
<tr>
<td>• Emphasise the importance of healthy lifestyles</td>
<td>• Support patient and elaborate on strategies to overcome barriers, such as, consumption of unhealthy foods, physical</td>
<td>• Commit to adhering to a healthy lifestyle aimed at weight management</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Honour next appointment and inform the staff of any changes of contact numbers</td>
</tr>
<tr>
<td>Ensure effective communication in cases of referrals</td>
<td>Set new goals for next appointment, such as, weight loss of 5 -10kg maximum after 3 months and weekly weight loss of 0.5 -1kg</td>
<td>Encourage adherence to influence planned results</td>
</tr>
</tbody>
</table>
5.13 Procedure

Ensure availability of all the tools you need:

- Patients file
- PHC register
- Calibrated weighing scale
- Stadiometer
- Flexible steel anthropometric tape
- Healthy lifestyle pamphlets
- List of supporting organisation such as CBOs and dietician
- Pen

5.13.1 During the session

Explain the purpose of your session

- Measure the weight of the patient without shoes and in light clothing to the nearest 0.01 kilogram to determine overweight and obesity
- Measure height of the patient to the nearest 0.1 centimetres (cm).
- Measure waist circumference (WC) midway between the upper margin of the iliac crest and the lower margin of the last palpable rib in the mid-axillary region
- Calculate BMI and interpret with caution to determine degrees of overweight and obesity
- Develop with the patient a commitment to the weight reduction plan
5.13.2 Education about the results

- Find out what advice on obesity the patient has received before
- Find out what the patient knows about the importance of maintaining normal weight
- Explain in a supportive way that the most common reason for such results is unhealthy life style behaviours

5.13.3 Flexibility on obesity management

- Clear any myths and misconception about obesity
- Emphasise the importance of healthy eating behaviour and physical activity for managing obesity

5.13.4 Patient’s experiences

Ask: What makes it difficult for you to reduce weight?

Encourage the patient to be honest about personal issues that may affect obesity management such as lifestyles (diet & PA), psychosocial stress, environmental and social factors, including family history of overweight and obesity, psychological problems etcetera.

Identify strategies to ensure commitment to weight reduction

Ask which of the following could help the patient to reduce weight:

- Social support
- Role model
- Preferred places (home, work, community)
Inform the patient about follow-up visits as per weight management guidelines.

Overweight and obesity: adults

Screen all visiting patients to determine degree of overweight and obesity and calculate BMI & WC

BMI < 25 kg/m² • BMI > 30 kg/m²
WC > 94 cm/80 – WC 108/88 cm

• Assess presenting symptoms and underlying cause/s of overweight and obesity
• Eating behaviour
• Risk factors and comorbidities
• Lifestyles (diet and physical activity)
• Psychosocial stress
• Environmental and social factors including family history of overweight and obesity
• Willingness and motivation to change
• Potential of weight loss to improve health
• Psychological problems

Weight management

• Intensity of management depends on risk and the potential to gain health benefits (diet, behavioural interventions)
• Agreed upon weight management plan with the individual

Desired weight loss: 5-10kg maximum: 0.5kg Weekly

Desired weight loss goal met? Yes or no

Weight maintenance

• Follow up as agreed with the individual
• Revert to assessment and management if weight loss not maintained
5.14 Summary

This chapter began with the background as well as the theoretical framework underpinning this study. This was followed by the justification for the development of the proposed guidelines in order to manage obese patients.

The findings from this study indicated there were no guidelines for managing obese patients. The default practice was that nurses provided health education on dietary adjustments and physical activities based on incomplete and unavailable evidence-based guidelines. It is critical, therefore, that nurses be supported with relevant guidelines on obesity management. The proposed model will add to the knowledge of PHC nurses on obesity management. Various figures were developed to provide the reader with a visual appreciation of the theoretical factors that affect PHC nurses’ management of obese patients.
CHAPTER SIX

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

6.1 Introduction

A summary of the study, the conclusion, the study’s limitations and strengths, as well as recommendations are presented in this chapter.

6.2 Summary

Overweight and obesity are two of the leading risks for global deaths (World Health Organisation (WHO), 2011); and are preventable because they are largely driven by unhealthy lifestyle behaviours involving dietary practices and physical inactivity (WHO, 2014; Nnyepia et al., 2015). Overweight and obesity are predisposing factors toward chronic diseases such as cardiovascular diseases, diabetes and cancers. The increasing prevalence of obesity also has a negative impact on workforce participation and is also linked to high risk of occupational injuries (Janssen, Bacon & Pickett, 2011). High rates of absenteeism by obese workers are reported, due to short and long term sick leaves. Overweight and obesity among nurses may reduce the workforce, thus leading to a shortage of qualified health professionals. This scenario might hold true for overweight and obese South African nurses. However, this is only speculative as no empirical study has been conducted to ascertain the truth or falsity of this assumption.

The South African government’s pledge of a long and healthy life for all its citizens is threatened by the grievous burden of overweight and obesity.
Healthy lifestyle education and advocacy play a significant role in the reduction of overweight and obesity (Steyn, 2004). Given this, health professionals can be outlined as essential stakeholders in fostering the reduction of the obesity burden and the achievement of the pledged healthy life for all South Africans. Nurses, in particular, who constitute the larger proportion of the healthcare workforce (Aryee et al., 2013; Ogunjimi et al., 2010) have major roles to play in health education and health promotion activities toward weight management.

PHC professional nurses are patients’ first point of contact in the healthcare system, and in most cases, are independent health decision-makers (South African Nursing Council (SANC), 2005). Likewise, health education on health promotion activities for weight management forms part of the core activities conducted at this level of care. (SANC, 2005). However, there are very few studies (Kruger et al., 2005; Goon et al., 2013; Goon et al., 2014) examining overweight and obesity in nurses in South Africa.

Although abdominal obesity has been extensively reported in the South Africa general population, scant information exists on professional nurses. Abdominal obesity is a major component of metabolic syndrome, and a preclinical stage of diabetes and cardiovascular disease (Wang et al., 2011). In this regard, besides calculating BMI (total obesity), it is important to measure AO in order to improve cardiometabolic risk assessment (Lau et al., 2007) given that the pattern of fat distribution has a large influence on cardiometabolic risk (Amato et al., 2013).
Like BMI, several other anthropometric indicators of WC, WHR and WHtR have been used to screen for health risk in populations because they are inexpensive, non-invasive and suitable for large-scale surveys. However, the variation in the cut-off points for these anthropometric indicators is challenging, given different population contexts. Despite the reported advantages and the ease of computing these anthropometrical variables, a suitable cut-off point for the population from Africa and more specifically, among nurses has yet to be determined. It is important to document ethnic specific cut-off points in diagnosing total and central obesity, given the different geographical, socio-economic and cultural conditions inherent in different countries.

Notably, studies on obesity among healthcare professionals are conducted at either the secondary or tertiary level of care (Goon et al., 2013; Skaal & Pengpid, 2014; Aryee et al., 2013; Ogunjimi et al., 2010; Kyle, Neall & Artherton, 2016), neglecting the primary healthcare givers. It is important to develop weight management guidelines for professional nurses, who are responsible for health promotion. In South Africa, as in other countries, overweight and obesity is prevalent among primary health care nurses as in the general population (Goon et al., 2013). This is contradictory and worrisome, given that nurses play a key role in counselling and assisting patients to lose weight and in caring for patients who are obese or overweight. Also, health education on obesity and related conditions, diet, exercise and healthy life style is the primary focus of PHC nurses.

Nurses are always claiming patient education and wellness as being among their most important missions.
Primary health care nurses, therefore, should play an important role in the national effort to manage obesity and prevent obesity-related diseases. If these health service practitioners are not responding to obesity interventions as role models of the community, it may be far-fetched to expect the general public to do so. After all, leadership, it is said, is by example. It then behoves PHC nurses to exhibit exemplary behaviour in weight management as part of their promotive health care approach.

A better understanding of primary health care nurses’ body size has two-fold implications. Firstly, it is imperative for the individual’s health and well-being, plus the organisational interest in promoting a healthy workforce; and secondly, it gauges nurses’ potential serving as role models to the patients. Given that there is limited information available on overweight and obesity among nurses in South Africa, it is important to investigate this phenomenon accurately, using ethnic specific cut-off values in determining its prevalence and aetiology. The development of a possible health guideline strategy, tailored to weight prevention and management among South African primary health care nursing population, would heighten awareness and compliance, hopefully. This study sought to do just that by ascertaining the prevalence and correlates of overweight and obesity among PHC nurses in Eastern Cape Province; and further developing health promotion (HP) guidelines for weight management for obese patients.

The objectives of the study were to:

- Determine the prevalence and determinants of overweight and obesity among PHC nurses in the Eastern Cape Province.
• Examine the lifestyle behaviours (physical activity, smoking, alcohol consumption and dietary intake) impacting on the PHC nurses’ role in the management of obese patients in the Eastern Cape Province.

• Determine the role of PHC nurses in weight management in the general population of the Eastern Cape Province.

• Develop health promotion guidelines for weight management among nurses in the Eastern Cape Province.

• Identify the optimal cut-off points in defining total and central obesity using different anthropometric indicators (BMI, WC, WHR, and WHTR) among PHC nurses in the Eastern Cape Province.

The research questions framed for the study were:

• What is the prevalence and determinants of overweight and obesity in PHC nurses in the Eastern Cape Province?

• What are the lifestyle behaviours (physical activity, smoking, alcohol consumption and dietary intake) impacting on the nurses’ role in managing the obese patients in the Eastern Cape Province?

• What role(s) do PHC nurses in the Eastern Cape Province play concerning weight management in the general population?

• Which and what kind of health promotion guidelines could possibly help in weight management among nurses?

• Would the universal cut-off points of BMI, WC, WHR, and WHTR in defining total and central obesity be applicable to PHC nurses in the Eastern Cape Province?
This was a quantitative, descriptive, cross-sectional study carried out among 203 PHC professional nurses selected across 41 PHC facilities from four districts in the Eastern Cape Province, South Africa. Primary healthcare professional nurses were purposively selected across the Eastern Cape Province. From the six districts and two metropoles, four districts were randomly selected (Buffalo City Metropolis, Oliver Reginald [OR] Tambo and Chris Hani, Sarah Baartman districts).

The ethical clearance was obtained from the Research and Ethics Committee (REC) of the University of Fort Hare. Permission to conduct the study was obtained from the Eastern Cape Department of Health (ECDoH), district managers, sub-district managers and facility managers.

Demographic and the behavioural components of the WHO STEPwise questionnaire were used for data collection. Participants who agreed and were eligible to participate in the study were interviewed by the research assistants using the questionnaire. Interviews were done and recorded in a separate consulting room provided by PHC facility management.

Demographic variables included items on sex, age, and marital status, level of education, average monthly income, and work experience. Socio-economic factors were measured by accessing average monthly income, level of education and work experience.

Behavioural and dietary variables were obtained through self-reporting; cigarette smoking, alcohol use, fruit, dairy products, meat, fast food, sugar, and vegetable consumption pattern.
Participants were asked about their daily serving of fruit, dairy products, meat, fast food, sugar, and vegetables. Smoking enquiry included whether they were primary smokers (directly smoking) or secondary smokers (staying with someone who is smoking) or non-smokers. The physical activity level of participants was also obtained through self-reporting and was categorised based on activity type (walking, running, swimming etcetera) and frequency. Physical inactivity was defined according to the WHO’s recommendations for physical activity. Study participants with less than 150 minutes of moderate-intensity or 75 minutes of vigorous-intensity aerobic physical activity throughout the week were considered physically inactive (WHO, 2010).

The anthropometric measurements (height, weight, waist and hip circumferences) were obtained by a Level 11 anthropometrist in accordance with International Society of Advancement of Kinanthropometry (ISAK) recommendations (Marfe-Jones, Olds & Stew, 2016).

Blood pressure (BP) measurement was assessed twice, using OMRON Professional Portable BP Monitor (HBP-1300, OMRON, Kyoto, Japan), and the mean recording was calculated. A case which recorded both systolic blood pressure (SBP) of ≥ 140 and diastolic blood pressure (DBP) of ≥ 90 was considered hypertensive.

Descriptive statistics (percentages, means and standard deviations) were applied to the data. Students’ t-test was used to determine gender differences between the variables. A comparison of proportions was performed with Chi-square tests. Logistic and linear regressions, with adjustments where relevant, were applied to determine the demographic and haemodynamic variables which predict obesity among nurses.
Correlation profile analysis was used to examine the correlation between obesity indices (BMI, WC, WHR and WHTR) and major diagnostic components of MS. Using Receiver Operating Characteristics (ROC) curve analysis, the specificity and sensitivity of BMI, WC, WHTR and WHR were calculated to identify the cut-offs that truly diagnosed overweight and obesity among the PHC nurses. The area under the curve (AUC) was used to assess and compare the ability of the BMI, WC, WHTR and WHR to predict the presence of any two components of metabolic syndrome with AUC comparisons through non-parametric methods (Delong, Delong & Clarke-Pearson, 1988). A statistical significance was set at p<0.05. All analysis was conducted using the Statistical Package for Social Sciences (SPSS) version 22.0.

6.3 Major Findings of the Study

The major findings of the study were:

- That the majority (76%) of the professional nurses are obese, with an additional 18% being overweight. Female nurses were found to be more obese than their male counterparts; and obesity was found to be higher among the older participants.

- Of all the demographic and behavioural factors, gender, marital status, age, duration of practice, alcohol use and smoking were found to be associated with obesity among the study participants. Only age and non-alcohol use were the significant predictors of obesity.

- The present study found no significant relationship between physical activity and obesity.
• Nurses who do not consume alcohol and do not smoke were found to have a higher prevalence of obesity.

• This study revealed an alarming prevalence of abdominal obesity among these professional nurses, ranging from 50%-90% using various anthropometric measures.

• In this study, female gender and participants above 30 years were the significant and independent predictors of abdominal obesity among the study participants. Female nurses who were above 30 years had a higher prevalence of abdominal obesity compared to those who were less than 30 years.

• Of the 203 nurses involved in this study, only eight percent had ever smoked or used any tobacco product and only three percent of the nurses currently smoked. Twenty-seven percent of the nurses in this study had ever consumed alcohol and only 18% currently consumed alcohol. Male nurses had a higher prevalence of lifetime alcohol use.

• Concerning physical activity, 33% did not engage in physical activities, and of the remaining 67%, only 29% of them met the WHO recommendation for being active. Overall, the majority (71%) were either not active or insufficiently active.

• The majority of the participating nurses were aware of the benefits of physical activity. Some of the highlighted benefits included weight loss (93.1%), better sleep (95.5%) and alertness (96.5%). However, in spite of being knowledgeable about the various benefits of physical activity, they still did not feel obliged to engage in such activities. The nurses highlighted a lack of time (74.0%) and a lack of commitment (63.3%) as the major barriers.
• The prevalence rate of hypertension among the professional nurses was 52%. Surprisingly, 41% of the hypertensive nurses were unaware of their hypertensive status. Of those who were aware of their hypertension status and who were on treatment, only 38.1% had a controlled blood pressure. Only age and the duration of practice were the significant predictors of hypertension among the study population.

• The present study revealed that there are no guidelines for managing overweight and obese patients.

• The findings of this study demonstrated that obese patients were managed through health education on diet (95.1%), physical activities (94.6%) and constant weight monitoring (15.3%).

• The study also revealed that health education on the importance of weight loss was poorly done (91.9%).

• In this study, the optimal cut-off points for predicting abdominal obesity among nurses for WC, WHTR and WHR were 94.5cm, 0.53 and 0.81, respectively.

• The findings of this study suggest an increase in the cut-off point for WC, a new cut-off point of 94.5cm against the previously used 80 cm, a slight increase in the WHTR, 0.53 against 0.50 and also, a slight reduction in the currently used cut-off point for WHR (0.85), to 0.81.
6.4 Conclusions

Based on the findings of the study, the following conclusions were drawn:

- This study showed an alarmingly high prevalence of overweight and obesity among professional primary healthcare nurses in the Eastern Cape Province in South Africa. This suggests that the primary healthcare nurses in this setting do not practise the health promotion behaviours they preach and might not be good health role models.

- Similarly, the prevalence of abdominal obesity is high among primary healthcare professional nurses in the setting. This portends great risk to the healthcare workforce of the Eastern Cape Province.

- There is a high prevalence of hypertension among professional nurses in the Eastern Cape Province of South Africa. Also, there is a high rate of hypertension unawareness and uncontrolled hypertension among the study participants. Only ageing and duration of practice were independent predictors of hypertension among the study population.

- The study documented low prevalence of smoking, but low physical activity among PHC professional nurses in Eastern Cape, SA. There is thus a need for the implementation of a workplace wellness programme that will foster healthy lifestyle behaviours among nurses.

- The study demonstrated that there are no weight management guidelines for PHC nurses to use in the management of the obese patients in the Eastern Cape Province of South Africa. Also, the nurses are not in-service trained on the management of obese patients.
• The optimal cut-off points for predicting abdominal obesity among nurses were 94.5cm, 0.53 and 0.81, for WC, WHTR and WHR, respectively. These suggested an increase in the universal cut-off point for WC and WHTR, and a slight reduction in the currently used cut-off point for WHR from 0.85 cm to 0.81 cm.

6.5 Limitations of the Study

Several limitations of this study should be noted in interpreting the findings of the study. Firstly, given that the study was confined to only one province, its findings cannot be generalized to the entire nursing population in South Africa. Secondly, the cross-sectional nature of the study does not warrant causal associations to be ascertained, but only to be interpreted as hypothetical causal relations; and the convenience sampling of the clinics even though the districts were randomly selected. Thirdly, the self-reporting of lifestyle behaviours might have introduced recall bias and dishonesty. Finally, the limited size of this sample does not allow for the application of gender adjustment.

6.6 Strengths of the study

Height, weight and waist and hip circumferences were measured, not self-reported, which is a more accurate assessment procedure that adds validity to the data. Also, to the best of the researcher’s knowledge, no study exists on the prevalence and correlates of overweight and obesity among PHC nurses in the Eastern Cape Province; as well as on health promotion (HP) guidelines for weight management for obese patients in the region. The developed guidelines for the management of obese patients in PHC facilities will thus fill the gap on this phenomenon.
The guidelines will facilitate the development of a preventive strategy for health care problems associated with overweight and obesity, such as, hypertension and diabetes. Notwithstanding the relatively small sample of the study, the information provided on the cut-off points in diagnosing overweight and obesity as well as abdominal obesity using WC, WHR and WHTR provide a snapshot of the controversy and contradiction inherent in using other country-specific cut-off points in diagnosing total or abdominal obesity in populations. Also, baseline data has now been established for future comparative studies on total and abdominal obesity among nurses in the South African context.

6.7 Recommendations

Based on the findings and conclusions drawn from this study, the following recommendations were formulated to address the issues raised in the study:

i. The Eastern Cape Department of Health should, as a matter of priority, implement measures to curb the growing menace of overweight and obesity among professional nurses, by instituting a workplace wellness health programme for nurses in the province.

ii. Notwithstanding the fact that the professional nurses ought to know and take measures to maintain healthy weight, as the nature of their job demands, the government should intensify efforts in this direction by health advocacy and periodic workshops targeting professional nurses. Workshops should highlight the importance and need to promote healthy lifestyle behaviours, by regular participation in physical activity, moderate intake of alcohol or abstinence from alcohol and by discouraging eating of processed and fast foods saturated with fats and oils.
iii. The professional nurses should regularly screen their body mass index for early detection and management of obesity.

iv. Further studies involving larger samples and other cadres of nurses in the province or nationally should be conducted to develop context-specific cut-off points in diagnosing obesity in relation to cardiometabolic risks.

v. Given the non-availability of weight management guidelines, there is an urgent need to implement the guidelines (herein developed) for the management of the obese patients in primary health care in the Eastern Cape, and perhaps, in other provinces of South Africa.

vi. Future studies examining overweight and obesity in professional nurses should endeavour to include cardiovascular risk variables such as total cholesterol, triglycerides and fasting blood glucose. This will aid understanding of the relationship of obesity with physiological variables often associated with increased metabolic risk, among South African professional nurses. Given the present sample is a cross-sectional sample; these issues could not be addressed here. Therefore, a longitudinal study is warranted.
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Murray, C. & Ng, M. (2016). Nearly one-third of the world’s population is obese or overweight, new data shows. Institute of Health Metrics and Evaluation. *Available from:*


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Nurse's conception of the encounter with obese patients in primary health care. *BMC Family Practice, 1471-2296-12-7.*


Appendix A: Data Extraction Tool

Dear Participant

I am Sizeka Monakali, a PhD student at the University of Fort Hare. I am conducting a study about Development of Health Promotion Guidelines for Weight Management among Primary Health Care Nurses in Eastern Cape, South Africa. I am requesting you to answer the questionnaire and reflect your true reaction when answering the questions. This questionnaire will be used for academic purpose only.

Questionnaire

- Read the questionnaire thoroughly and seek clarity where you do not understand.
- Answer all questions honestly and to the best of your knowledge.
- Indicate your answer by marking the appropriate block with an *X*

SECTION A: DEMOGRAPHIC DATA

1. Age in (Years)
   - 21-30
   - 31-40
   - 41-50
   - 51-60
   - 61-70

2. Gender
   - Male
   - Female

3. Marital Status
   - Single
   - Married
   - Divorced
   - Separated
   - cohabiting

4. Number of Children
   - None
   - 1-2
   - 3-4
   - More than 4
5. Location

<table>
<thead>
<tr>
<th>Region</th>
<th>District</th>
<th>Sub-district</th>
<th>Clinic</th>
</tr>
</thead>
</table>

6. Level of education

<table>
<thead>
<tr>
<th>Diploma</th>
<th>Degree</th>
<th>Masters</th>
<th>Others (specify)</th>
</tr>
</thead>
</table>

SECTION B: ANTHROPOMETRY MEASUREMENTS AND BLOOD PRESSURE

Anthropometry

<table>
<thead>
<tr>
<th>ID</th>
<th>Site</th>
<th>Trial 1</th>
<th>Trial 2</th>
<th>Trial 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Body mass (kg)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Stature (cm)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Station 2: Girths (cm) | 3   | Neck   |         |         |
|                       | 4   | Waist (minimum) |         |         |
|                       | 5   | Gluteal (hip)   |         |         |

Blood Pressure

<table>
<thead>
<tr>
<th>ID</th>
<th>Site</th>
<th>Trial 1</th>
<th>Trial 2</th>
<th>Trial 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>Systolic blood pressure</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Diastolic blood pressure</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Pulse rate</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

SECTION C: MEASURING RISK FACTORS

2. Current Stage of Physical activity

2.1. Prior Behaviour

What attempts have you made in the past to be physical active?

<table>
<thead>
<tr>
<th>Activity</th>
<th>Yes</th>
<th>no</th>
</tr>
</thead>
<tbody>
<tr>
<td>walking</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Running</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cycling</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
What did you learn from these activities?

<table>
<thead>
<tr>
<th>Lessons</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improved lifestyle</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No improvement</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Made lifestyle worse</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other effects (specify)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3. **Personal Influences**

3.1 What are the personal benefits of becoming more active?

<table>
<thead>
<tr>
<th>Personal benefits</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight loss</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight gain</td>
<td></td>
<td></td>
</tr>
<tr>
<td>More alert</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sleep better</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Others (specify)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
3.2. What problems (barriers) might you have trying to be more active?

<table>
<thead>
<tr>
<th>Barriers</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of time</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lack of commitment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No initiatives</td>
<td></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Others (specify)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3.4. How sure are you (self-efficacy) that you can overcome barriers to being more active?

1  2  3  4  5  6  7  8  9  10  
Uncertain  Very sure

3.5. How do you socialise during your spare time?

<table>
<thead>
<tr>
<th>Social activities</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hanging out with friends</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Braai</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alcohol intake (social drinker)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social smoker</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Others (specify Religious activities)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Others (specify)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
3.6. How often are you taking the following items? (Number of times per day, per week or per month (use only one item))

<table>
<thead>
<tr>
<th>Items</th>
<th>/day</th>
<th>/week</th>
<th>/month</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sweets/ chocolates</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cake / Biscuits</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cool drinks</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coffee creamer</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coffee</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tea</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sugar</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Full Cream Milk</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low fat/ Skim Milk</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eggs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peanut Butter</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soya mince/ Legumes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chicken/ meat/ fish</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bread</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Porridge</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Samp/ Mealie Rice</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fruit</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vegetables</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Salt/ Stock/ soup</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Powder</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
3.7. Are there any obesity management guidelines for managing patients

Yes:  

No:

3.8. How do you manage obese patients?

<table>
<thead>
<tr>
<th>Variables</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health education on diets</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health education on physical activity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constant weighing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Referral to dietician</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health education on importance of weight loss</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3.8. Are you currently using any medication?

<table>
<thead>
<tr>
<th>Condition</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diabetes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hypertension</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight loss medication</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anti retro viral drugs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Respiratory</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Others (specify)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
4. Interpersonal Influences

4.1. Social Norms- Do you have any family member or friend expect who expect you to be physical active? Yes No

If so who........................................................................................................................................

4.2. Social Support- Who will encourage you to be active or be active with you

..............................................................................................................................................................

4.3. Role Models- Is anyone in your family or any of your friends physical active 3-5 days every week? Yes or No

If so who, and what do they do?

..............................................................................................................................................................

5. Situational Influences

Where could you be physical active doing what you enjoy?

..............................................................................................................................................................

5.1 Commitment to a Plan of Action

Are you ready to set goals and develop plan of action to become more active? Yes No

Steps of plan

..............................................................................................................................................................

5.2. Competing Demands of Preferences (Follow up)

What problems did you encounter in trying to be more active?

..............................................................................................................................................................

5.3. How can you avoid these problems in future?

..............................................................................................................................................................
DEVELOPMENT OF HEALTH PROMOTION GUIDELINES FOR WEIGHT
MANAGEMENT AMONG PRIMARY HEALTH CARE NURSES IN THE EASTERN
CAPE PROVINCE, SOUTH AFRICA

Dear Research participant,
You are asked to participate in a research study conducted by Monakali Sizeka PhD degree student at the University of Fort Hare, School of Health Sciences, Department of Nursing Sciences. Research Project: Development of health guidelines for weight management among primary health care nurses in Eastern Cape, South Africa

PURPOSE OF THE STUDY
The purpose of the study is to be to develop health promotion (HP) guidelines for weight management among PHC nurses in Eastern Cape Province.

PROCEDURES
If you agree to participate in this study, you will be asked to do the following;

- You will be provided with a participant information sheet, which is written in English providing information about the research
- You will be required to sign a written informed consent form.
- Your height, weight, waist circumference, hip circumference and blood pressure will be measured.

POTENTIAL RISKS AND DISCOMFORT
Speaking about your weight and weight management you may sometimes feel uncomfortable. If at any time you feel you do not want to answer a particular question, please tell the researcher and you will not be asked to answer.
PAYMENT FOR PARTICIPANTS

You will not receive any payment for participating in this research

PARTICIPATION AND WITHDRAWAL

Participation in this research is strictly voluntary, and you can decide to whether to participate in this study or not. You are also free to stop participating in this research at any time you choose to. Should choose not to participate or discontinue your participation in the research, there will be no consequences

IDENTIFICATION OF INVESTIGATORS

Should you have any questions or concerns, please feel free to contact;

Principal Investigator: Mrs S. Monakali
No. 6 Bell Street Fort Beaufort Hospital, Beaufort
Phone no: 0466451111. Speed dial; 2277
Email: Sizeka.monakali@gmail.com

Supervisor: Prof DT Goon
University of Fort Hare: Faculty of Health Sciences
East London
Phone no: 043 704 7359
Email: dgoon@ufh.ac.za

Signature of Participant …………………………. Date: .........................

Signature of Researcher……………………………….Date.........................

Witnessed: ........................................ Date: ..........................
Appendix C: Ethical Clearance Certificate

ETHICAL CLEARANCE CERTIFICATE
REC-270710-028-RA Level 01

Certificate Reference Number: G000318MON01

Project title: Development of health promotion guidelines for weight management among Primary Health Care Nurse in Eastern Cape Province, South Africa

Nature of Project: PhD

Principal Researcher: Sizelka Monakali
Sub-Investigator:

Supervisor: Prof D.T Goon
Co-supervisor:

On behalf of the University of Fort Hare's Research Ethics Committee (UREC) I hereby give ethical approval in respect of the undertakings contained in the above-mentioned project and research instrument(s). Should any other instruments be used, these require separate authorization. The Researcher may therefore commence with the research as from the date of this certificate, using the reference number indicated above.

Please note that the UREC must be informed immediately of

- Any material change in the conditions or undertakings mentioned in the document
- Any material breaches of ethical undertakings or events that impact upon the ethical conduct of the research
Appendix D: Permission Letter from Department of Health EC Province

Eastern Cape Department of Health

Enquiries: Zonwabele Merile
Tel No: 040 809 0830
Date: 25 November 2015
Fax No: 043 612 1409
e-mail address: zonwabele.merie@echoalth.gov.za

Dear Mrs S Monakeli

RE: Development of Health promotion guidelines for weight management among PHC nurses in the Eastern Cape Province and South Africa. (EC_2015RP10_426)

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

1. During your study, you will follow the submitted protocol with ethical approval and can only deviate from it after having a written approval from the Department of Health in writing.

2. You are advised to ensure, observe and respect the rights and culture of your research participants and maintain confidentiality of their identities and shall remove or not collect any information which can be used to link the participants.

3. The Department of Health expects you to provide a progress on your study every 3 months (from date you received this letter) in writing.

4. At the end of your study, you will be expected to send a full written report with your findings and implementable recommendations to the Epidemiological Research & Surveillance Management. You may be invited to the department to come and present your research findings with your implementable recommendations.

5. Your results on the Eastern Cape will not be presented anywhere unless you have shared them with the Department of Health as indicated above.

Your compliance in this regard will be highly appreciated.

SECRETARIAT: EASTERN CAPE HEALTH RESEARCH COMMITTEE
Appendix E: Permission Letters from The Four Districts (Bcm, Chris Hani, Sarah Baartman And Or Tambo)

Province of the
EASTERN CAPE
HEALTH

BUFFALO CITY METRO HEALTH DISTRICT
OFFICE OF THE SUB-DISTRICT MANAGER
38 Warden Road, Box 61, Grahamstown 6230, Eastern Cape
Tel: 046-1211 1599 - Fax: 046-121 5772 - Website: www.bcmhealth.co.za
Email: h.e.m.b.roberson@health.gov.za

28 Mar 2017
33 Fitzpatrick Drive
Extension 2
Butterworth
4905

Madam

RE: REQUEST FOR APPROVAL TO CONDUCT A RESEARCH STUDY ON: DEVELOPMENT OF HEALTH PROMOTION GUIDELINES FOR WEIGHT AMONG PHC NURSES IN THE EASTERN CAPE PROVINCE AND SOUTH AFRICA [EC. 2015.880-926]

Be advised that permission is hereby granted to conduct research in Buffalo City Sub District as requested. Kindly familiarize yourself with the conditions below before commencing with your study.

1. The learner will conduct research study without compromising client’s confidentiality and the smooth running of the service.

2. The learner will not provide/publish any reports/statements without prior discussion with and permission of the sub district.

3. ID must be submitted to the sub district office before commencing the study.

4. The sub district will not be held liable for any loss, damage or injury suffered by the learner in the process of conducting the study.

I accept the conditions as stated in the abbreviated version of Department of Health Agreement Clause for researchers.

S. Mbowo
Full Name & Surname

[Signature]

28/03/2017
Date

W. Nango
Witness Name & Surname

[Signature]

28/03/2017
Date

United in achieving quality health care for all

Health promoter line 0800 76 2951
24 hour EMS Centre 0800 00 334
Website: www.bcmhealth.co.za

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Monakali, Sizeka

From: dotsen7868@yahoo.com
To: aborgile.aj@ehl.gov.za; Monakali, Sizeka; iohandte.terenie@D psychiatric.
Cc: nikaly.kenzie.DUKISAN.VEST
Subject: RE: REMINDER : REQUEST FOR PERMISSION TO CONDUCT A STUDY
Attachments: P1_011 CACADU.jpg; P1_20 CACADU.jpg; MONAKALI UTH
ETHICALCLEARANCE.pdf; ECDSG APPROVAL LETTER.pdf

Dear Ms Monakali,

Thank you for choosing to include Sarah Baartman Health District in your Personal Professional Development.

We look forward to embarking on this research journey with you and moreover to learn from your results.

Kind regards,

Darlene

On Tuesday, March 1, 2016 8:46 PM, "Monakali, Sizeka" <stmonakali@afh.ac.za> wrote:

Afternoon Ms Devos

Just a friendly permission.

Mrs. Sizeka Monakali
ASL.PH Project
Manager School of
Health Sciences
East London Campus
St. Church Street
University of Fort Hare

+27 (0)43 704 7358
es: monakali@afh.ac.za;
www.afh.ac.za

From: Vosakali, Sizeka
Sent: 18 January 2016 08:51 PM
To: darlenevdos@yahoo.com
Subject: REQUEST FOR PERMISSION TO CONDUCT A STUDY

Dear Ms Devos
Enquiries: Mr. T.O. Siyangaphi
Date: 01 March 2017

To: SUB-DISTRICT MANAGERS – OR TAMBO
CLINIC SUPERVISORS – OR TAMBO
ALL CLINIC MANAGERS – OR TAMBO

From: DISTRICT MANAGER

Subject: PERMISSION TO CONDUCT RESEARCH STUDY: MRS. S. MONAKALI

Dear Sub-District Manager,

This communication serves to inform you that MRS. S. MONAKALI has been approved to conduct research study on "DEVELOPMENT OF HEALTH GUIDELINES FOR WEIGHT MANAGEMENT AMONG PRIMARY HEALTH CARE NURSES IN EASTERN CAPE, SOUTH AFRICA". She will be conducting the study at all OR Tambo Clinics and Gateways.

Mrs. Monakali is a registered student at University of Fort Hare studying towards Ph.D. in Nursing Science. In order for her to complete her studies, she needs to conduct research. The approval was first granted by the Department of Health Head Office after they have evaluated her research topic which was also approved by the Ethics Committee at University of Fort Hare. Upon completion of her studies, she will come back to share the results with you.

Therefore, you are requested to assist her and for more information please contact the District Manager’s Office.

Yours in Health Services,

MRS. M. NTSHANGA
DISTRICT MANAGER

Cc: MRS. MONAKALI

DATE: 03/2017

Scanned by CamScanner
Appendix F: Letter From Data Analyst

WHOM IT MAY CONCERN

I have over 5 years experience in the teaching profession, both at high school and tertiary level. My research experience is well over 6 years and I was a principal investigator on over 3 projects. In my current position, as a post-doctoral research fellow at the Department of Sociology of the University of Fort Hare, I teach both Undergraduate and Postgraduate Research courses, write articles for publication, review manuscripts prior to publication for both local and international journals and evaluate students’ thesis. My training in advanced quantitative technique, demography, statistical reasoning for public health and understanding clinical research: behind the statistics and my over 5 years experience in data analysis allowed me to focus on data analysis, research, academic writing and student development.

I hereby certify that I conducted the data analysis for the principal investigator, Mrs Sizeka, Monakali.

The project is entitled ‘DEVELOPMENT OF HEALTH PROMOTION GUIDELINES FOR WEIGHT MANAGEMENT AMONG PRIMARY HEALTH CARE NURSES IN THE EASTERN CAPE PROVINCE, SOUTH AFRICA.

I trust that the data analysis was thoroughly done and accurately reflects the findings of the study and that the findings are well aligned to the objectives of the study.

Both parties respected the principles of anonymity, confidentiality, accountability and reliability.

Should there be any questions that arise from this exercise, kindly contact me on ajayianthony@gmail.com.

Anthony Ajayi (Research Fellow and private data analyst)

No 4 Lake Street
Vincent
East London
5247
January 6, 18
Appendix G: Letter from the Editor

TO WHOM IT MAY CONCERN

I have 42 years’ experience in the teaching profession, both at high school and tertiary level. In my last position before retiring in December 2016, I was a Teaching and Learning Consultant employed by the Teaching and Learning Centre (TLC) of the University of Fort Hare. As such, I facilitated modules on the Post Graduate Diploma in Higher Education and Training (PGDHET) and also evaluated lecturers’ teaching and their courses. My skills set allowed me to focus on management, language, research and student development. Activities which speak to this included being the editor of the TLC’s bi-annual newsletter for approximately eight years.

I hereby certify that I have proofread and edited a thesis submitted to me by the Doctoral candidate, Sizeka Monakali, Student number: 201317426 of the University of Fort Hare. The thesis topic is:

`DEVELOPMENT OF HEALTH PROMOTION GUIDELINES FOR WEIGHT MANAGEMENT AMONG PRIMARY HEALTH CARE NURSES IN THE EASTERN CAPE PROVINCE, SOUTH AFRICA`

This thesis is to be submitted in fulfilment of the requirements for the Doctor of Philosophy degree in the Nursing Sciences’ Department of the Science and Agriculture Faculty of the institution. The General Prospectus pages 110-113 provided institutional guidelines around requirements regarding layout, page size and spacing. The Harvard referencing guidelines were used for the checking of in-text referencing, with the candidate using a programme/tool for the end-referencing. I trust that the language used accurately reflects the intended meaning of the data tabulated and that the narrative is aligned with the aforementioned. Every effort has been made to avoid confusion or misunderstanding. The principles of anonymity, confidentiality, accountability and reliability were respected by both parties.

Should there be any questions that arise from this exercise, kindly contact me on lscheckle@gmail.com.

Linda Scheckle (Private Editing Service)

Address:
Flat 2 Riverview Heights
6 Riverview Terrace
Beacon Bay
East London
5241
Appendix H: List of Submitted Manuscripts


