FACTORS CONTRIBUTING TO NON-COMMUNICABLE DISEASES AMONGST NURSES IN A RURAL COMMUNITY OF THE NORTH WEST PROVINCE OF SOUTH AFRICA

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DISSERTATION SUBMITTED IN THE FULFILMENT OF THE REQUIRMENTS FOR THE DEGREE OF MASTER OF COMMUNITY NURSING SCIENCE IN THE FACULTY OF AGRICULTURE ,SCIENCE AND TECHNOLOGY, NORTH WEST UNIVERSITY (MAFIKENG CAMPUS)

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December 2015

DECLARATION

I, BETTY ELLEN PHETOE, student number: 16074327 hereby declare that this research titled "Factors contributing to Non-communicable Diseases amongst nurses in a rural community of North-West Province of South Africa" for the degree of the Masters in Nursing Science at North-WestUniversity is my original work. The sources used have been cited and acknowledged in a form of references. The work of this dissertation was done by me and it has not been accepted for any other higher degree or professional qualification at any other educational institution.

Signature.....

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Date.....

This dissertation has been submitted with my approval to be certified according to the requirements for Masters in Nursing: Community Nursing Science rules and regulations.

Signed.....

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Date.....

DEDICATION

I dedicate this work to my late grandmother Mrs DikelediMokgethi, who raised me with love and great support, who believed in me so much. Grandmother, I love you and I miss you deeply, you instilled many principles that I apply in my life, thank you.

To my late husband, Dr. DanileFavourscent Gcinumkhonto. Lisa, I appreciate your love, support and kindness, I will forever be grateful to you. I will always love you.

ACKNOWLEDGEMENTS

I would like to extend my gratitude to Almighty God and the persons and organisations mentionedbelow for their different roles, encouragement and support for this study

My sincere gratitude to Professor UshotanefeUseh, who supervised my study with

patience. I will always appreciate the support you gave me throughout my study, even especially during my difficult times.

I express my sincere gratitude to all the lecturers in the Department of Nursing for teaching and providing guidance during the process of my study, your efforts are highly appreciated.

I thank doctors Paul and Christopher, who assisted with parts of the statistical work of this study.

Special thanks to my parents, Mr Enoch and Mrs MapulaPhetoe, my children, Ntombixolo, Galeboe, Rorisang, Zonke and Nomathansaqa, who gave me love and support. Thank you for your understanding and encouragement. To my uncle Mr Caswell Mokgethi, I appreciate your efforts and the love you gave me throughout. My uncles, aunts and cousins from my maternal and paternal families, and friends, thank you. My in- laws are specially acknowledged too, thank you so much.

I also wish to appreciate the Democratic Nurses Organisation of South Africa (DENOSA) for the financial support for this study.

ABSTRACT

Background: There is an increased contribution on Non-Communicable Diseases (NCDs) to the burden of diseases, which are a growing cause of death and disability. The impact of obesity has become a seminal public health issue, especially diabetes and hypertension.

Purpose: The study aimed at investigating the factors contributing to NCDs amongst nurses in a rural community of the NorthWest Province of South Africa.

Methods: The design for this study was a descriptive, cross-sectional survey. Participants were 150 nurses. The instrument for data collection was a self-administered questionnaire. Permission to conduct this study was sought from DoH and hospital management. The Government Employee Medical Scheme (GEMS) assisted with collecting data on blood pressure, blood glucose, BMI, weight, and other anthropometric measurements. Chi square and the generalized linear model were used to determine the possible relationship between and effects of demographic features, dietary and drinking patterns as well as anthropometric features on obesity.

Results and conclusions: The results of this study showed that marital status, physical activity, increased intake of chicken, fried foods, fruit juice, alcohol, as well as less intake of water had an impact on NCDs, especially obesity among professional and enrolled nurses. The study also found out that waist-to-hip ratio as well as body weight are predictors of obesity among nurses. It is important therefore that the awareness of the risk of NCDs such as obesity be emphasized among nurses of all categories.

Recommendation: The participation of nurses in the wellness programme should be encouraged and possibly made compulsory in order to reduce the risk of NCDs among nurses in the NorthWest Province.

ABBREVIATIONS AND ACCRONYMS

- BMI -Body Mass Index
- BoD -Burden of Diseases
- BP -Blood pressure
- CVS -Cardiovascular Diseases
- DM -Diabetes Mellitus
- DoH -Department of Health
- HBM -Health Belief Model
- HRQoL -Health related quality of life
- NCDs -Non-communicable Diseases
- NHANES -National Health and Nutrition Examination Survey
- NMMD -NgakaModiriMolema District
- NWP -North-West Province
- OB -Optimistic Bias
- RD -Registered Dietician
- SA -South Africa
- SPSS -Statistical Packages for Social Sciences
- SSA -Sub Saharan Africa
- WHO -World Health Organization

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CHAPTER ONE:

ORIENTATION TO THE STUDY

1.1 Introduction

This chapter provides an overview of the study and the following are discussed: background of the study, problem statement, purpose, objectives, hypothesis, and significance of the study, operationalization of concepts and finally arrangements of chapters.

1.2 Background to the study

According to the 2010/11 – 2012/13 strategic document of the Department of Health (DoH), there is an increased contribution on Non-Communicable Diseases (NCDs) to the Burden of Disease (BoD) in South Africa. Emerging evidence from empirical studies estimates that NCDs account for 11-13% of the BoD, especially in the middle and older segment of the population. It is thus imperative that government implements enhanced programmes for prevention and treatment of lifestyle related diseases, as well as co-ordinate intersectoral and interprofessional approaches in mitigating the increase in NCDs. The Department also intends to implement a long term care model to manage diseases of lifestyle. Thequadruple diseaseburden that is reported by Econex (2009) attest to this and stresses those NCDs are classified as group II burden to the general population.

There is evidencethat strongly suggests a combination of health policy at societal level together with health education at individual and family levels would foster smoking cessation, ideal nutrition, and weight control, physical activities such asregular exercises; receiving enough sleep and managing stress levels. It is anticipated that this would go a long way in preventing and reversing non-communicable diseases (Dean et al., 2011).

In both developed and now increasingly in developing countries, diabetes mellitus is one of the most common chronic diseases and continues to increase in number as changing lifestyles characterized by physical inactivity and poor diets leading to increased obesity become more pronounced (Shaw et al., 2009). Obesity is considered

the strongest non-metabolic risk factor for diabetes (Daniel et al., 1999). It is a major cause of cardio-vascular disease and Diabetes Mellitus can also lead to blindness and renal failure, especially amongst the older aging populations as commonly seen in developed countries (Lipschombe & Hux, 2007; Yang, 2007). Research also has established the fact that middle aged populations are increasingly being affected by blindness related to NCDs (Blaum et al., 2010). There is a strain on health facilities as a result of a growing population affected by NCDs, especially diabetes mellitus (Davidson, 2003; 2004). The World Health Organization (WHO) has predicted that the number of patients with diabetes mellitus will double from 143 million in 1997 to 300 million in 2025, largely because of dietary and other lifestyle factors (Ovayolu, 2010).Grant et al (2001) allude to the fact that patients with diabetes mellitus experience psychological problems including social withdrawal, depression and anxiety.

Diabetes mellitus, hypertension and obesity are now globally a major public health problem, with most countries' health authorities emphasizing the need for proper eating habits and physical exercise (Tsai et al., 2004; Adibelli et al., 2009). It is estimated that over 700 million people around the world in 2015 alone will be obese, a major health challenge that will lead to increased chronic diseases such as hypertension, certain types of cancers and heart disease (Tjepkama, 2008). In Canada, at least 25 percent of the population was classified as obese, with obesity rates among the provinces the highest in the world (Tjepkama, 2008). Between 1986 and 2004 obesity rates almost doubled among women aged 25-34 years, yet the majority of births take place in this age group every year. The proportion of people who are obese, weighing 90kg or more, continued to rise from 4.1 percent to 10.7 percent over 10 years (Fell, 2005).

In Sub-Saharan Africa there is a growing epidemic of non-communicable diseases including cardio-vascular, diabetes and obesity which are related to poor lifestyles in the general population. In the past, much focus has been placed on maternal and child health mortality, as well as infectious diseases with less attention paid to the growing need to mitigate non-communicable diseases (Mensah, 2008). In 2004 over half of all deaths were caused by infectious conditions and one quarter by non-communicable diseases. However, by 2030 nearly half of deaths would be caused by non-communicable diseases, most of which are related to poor lifestyles.

In some Sub-Saharan African (SSA) countries such as the Democratic Republic of Congo, Nigeria, Ethiopia and South Africa age standardized deaths from non-

communicable diseases were believed to be higher than in some developed countries (Dalal, 2011). A study conducted in Tanzania also highlighted the rise in deaths related to non-communicable diseases particularly in the economically active population age group of 15-59 years. Changes in the demographic profile of SSA population may be an important factor influencing the future incidence of NCDs in Africa. In the case of South Africa it was reported that 56 percent of white men and 49 percent of black men and three quarters of black women were overweight or obese (Senekal et al.,2003).

Obesogenicity is defined as the sum of the influences that the surroundings, opportunities, or conditions of life have on promoting individuals or populations (Ulijaszek, 2007). Obesityfound in different populations has been linked to culture and tradition. Socio-cultural pressure, verbal commentary and level of maturity may have an influence on how individuals perceive their bodies in terms of level of satisfaction (Padgett & Biro, 2003).

In pre-dominantly paternalistic societies such as Morocco, where the role of a mother is most valued as women; being overweight is associated with increased fertility (Batnitzky, 2011), and therefore accepted as a sign of maturity. Similarly in the Democratic Republic of Congo, this is also the norm amongst primiparous nursing mothers (Pagezy, 1991). In Southern Africa, the *Botsese* tradition among the Batswana encourages purifying mother and child. This practice promotes obesity (Sayagues, 2012). In the case of South Africa culture-related attitudes especially among the black population that supports fatness has possibly contributed to the high prevalence of obesity. The thought of being overweight as "beautiful and attractive" has created a notionthat being overweight is normal (Skaal & Pengpid; page 3: 2014).

Like the general population, non-communicable diseases among health professionals are significantly higher globally. In the United States 29.5 percent of nurses were obese, some of them were not even aware that they were overweight or obese. This has been partly blamed on poor eating habits and lack of physical exercise or weight management behaviours (Zapka et al., 2009). Also a lack of awareness of what constitutes obesity hasalsobeen blamed for the high incidence of obesity (Sally et al., 2008).

In South Africa, several studies have alluded to the fact that this phenomenon among nurses was on the rise with over 40 percent of interviewed nurses suffering from lower

back problems, with another 25 percent overweight in a public hospital in Kwazulu-Natal (Naidoo & Coopoo, 2007). NCDs such as hypertension and type 2diabetes were also a common ailment among nurses in the Western Cape (Phiri et al., 2014). The poor and limited availability of healthy foods at working places, and the high cost of healthy foods provided by the hospitals promotes poor eating habits. This contributes to overweight and obesity (Phiri et al., 2014).

Differences in gender and place of residence have also been found in some studies in South Africa and other African countries to influence obesity patterns. Skaal and Pengpid (2014) reported that female nurses were more obese than male nurses; rural South African women were unconcerned about their weight and did not want to lose weight. Also those 40years and over are more likely to be obese compared to those younger.In the Vhembe and Capricorndistricts of SA, which are predominantly rural and semi-rural respectively, the prevalence of overweight and obesity was highamongst nurses (Goon et al., 2013).

1.3. Problem Statement

There has been a progressive increase in the prevalence of NCDSs and obesity in South Africa and this has also affected health care workers who are perceived tobe more conversant with its prevention. In a study in rural Limpopo, the prevalence was as high as 44.4percent for female nurses, a rate comparable to that in developed countries. This has serious implications for the health sector as it is the nurses who are crucial to the healthcare sector. A sick or unhealthy health care profession would lead to further shortages in the health care sector. Haire, Matjila & Stally (2008) suggest that culture plays a major role in obesity. Some cultures encourage eating foods high in fats and carbohydrates for various reasons. An example of this is in the traditional cultural practice of *Botsetse* by the Batswana people. A woman and her new-born baby are kept in their separate houses for a particular period during which the woman is offered a lot of 'care', 'food' (a goat, or sheep or an ox is slaughtered for *motsetse* to eat meat) and plenty time to rest- resulting in weight gain as a result of physical inactivity (Haire, Matjila & Stally, 2008). This kind of practice may be prevalent in rural settings while in urban settings easy access to fatty foods and lack of time to prepare proper healthy foods may be a contributing factor to the high prevalence of obesity (Skaal & Pengpid, 2011). It should be noted that combined figures obtained for obesity and overweight

BMI in the adult population across all ethnic groups were 57percent for women and 29percent for men (Jackson, Chambless & Yang, 1996). The typical work of the nurse is relatively sedentary resulting in reduced metabolism. In South Africa, limited knowledge and understanding of NCDs and obesity among nurses calls for studies that can provide information about the extent of the obesity problem, especially among nurses in ruralareas. Therefore, this study hopes to document empirical evidence on the incidence of communicable diseases amongst nurses in the NorthWest Province.

1.4. Research aim and objectives

This study aimed at examining the factors contributing to NCDs amongst nurses in rural communities of the North-West Province.

The objectives for this study were to:

1. Investigate the influence of selected socio-demographic characteristics of age, gender, marital status, highest qualification, and years of working experience and physical activities of nurses on NCDs.
2. To determine the relationship between dietary habits as predictors of obesity.
3. Describe the perceptions of body size and images amongst nurses.

Research question

What are the factors contributing to non-communicable diseases amongst nurses in the North west province with regard the relationship between dietary habits as predictors of obesity and the influence of selected socio-demographic characteristics of age, gender, marital status, highest qualification, and years of working experience and physical activities of nurses on NCDs?

1.5. Hypotheses

The following hypotheses were tested in this study:

Hypothesis 1:

There is no significant effect of selected socio-demographic characteristics of age, gender, marital status, highest qualification, and years of working experience and physical activities of nurses on obesity among nurses.

Hypothesis 2:

There is no significant effect of dietary habits of nurses on obesity among nurses.

Hypothesis 3:

There is no significant effect of anthropometric measurements of nurses on obesity among nurses.

1.6. Conceptual framework: Social/Behavioural Theory-Based

The health belief model (HBM) is a psychological model that was developed for the purpose of explaining and predicting health behaviours. This explanation is effected by putting emphasis on the attitudes and beliefs of individuals. The health belief model has four constructs that represent the perceived threat and the net benefits. The constructs are perceived susceptibility, perceived severity, perceived benefits, and perceived barriers. In this study, the perceived susceptibility best explains the gap in terms of the relationship among healthcare workers and their lifestyles. Perceived susceptibility describes one's opinion of chances of getting a condition, and within the context of this study, nurses engage in behaviourdetrimental to their overall health such as smoking, drinking alcohol, eating of high fat diet and limited participation in physical activities. The construct of perceived risk as measured by the HBM assumes that the more susceptible individuals'contract disease the more likely they engage in a desired behaviour (Roger, 2006). This study was designed to examine perceived risk of obesity among nurses. Optimistic bias (OB) demonstrates the misguided belief that one's chances of suffering a harmful event are minor compared to that of one's peers, which represents the attitude, subjective norm and perceived behaviour to influence the intention to change behaviour (Klein & Helweg-Larsen, 2002).

The HBM and other theories have traditionally been applied to adults and the main premise is that the more people feel vulnerable to an illness, the more ready they will be to change health behaviours or seek health care. The magnitude (correlation) of the association between the constructs and the predicted outcome are best moderate and likely to be negligible amongst nurses who perceive them to be indestructible (McIntyre et al., 2002).

1.7. Significance of the study.

According to the Medical Research Council, NCDs accounted for 37% of deaths; with cardiovascular and diabetes accounting for 19 percent of deaths (Steyn et al., 2003). South Africa has one of the highest obesity prevalence rates on the African continent and is believed to rival several developed countries (Skaal & Pengpid, 2011). Health care workers also face increased risk of NCDs along with a high prevalence of obesity, poor eating habits and insufficient physical activity. Unlike the general population, this population segment is expected to be more knowledgeable about the risks of NCDs and obesity. Historically, health facilities have dealt with acute, infectious diseases with very scant work done on whether health facilities including health professionals are able to deal with NCDs in their own environment (Peck et al., 2014). It is thus imperative that this study critically investigates the reasons for rising NCDs and obesity in the health care profession. It is hoped that the results of this study would lead to urgent policy formulations that would encourage better lifestylesamongst others. The strategic plan for the prevention and control of NCDs 2013-2017 has clear set strategies that include training of health care professionals in dealing with NCDs and obesity (Peck et al, 2013). However, studies have shown that most health care professionals are not conversant with these strategies, which suggests a need to inform them of the benefits of these strategies aimed at mitigating NCDs among health care professions. Provincial and national government may also utilise the findings of this study to improve the wellness programme for health care professions.

1.8. Operationalization of concepts

Obesity

Obesity is a medical condition in which excess body fat has accumulated to the extent that may have an adverse effect on health leading to reduced life expectancy and/ or increased health problems (WHO, 2000). Obesity is also defined by body mass index and further evaluated in terms of fat distribution via the waist-hip ratio and total cardiovascular risk factors (WHO, 2004). Being over weight affects an individual's health and daily activities such as to be at risk of developing cardiovascular diseases and

diabetes.

BMI

Body mass index is defined as the subject mass divided by square of their height, expressed in kilograms per square meter and calculated as: BMI = mass (kg) / height (m2) (WHO, 2004). It is important to balance body weight and height by leading a healthy lifestyle that is, by excersice and healthy food.

Hypertension

According to Kaplan, Gidding, Pickering, and Wright (2005), diagnosing hypertension involves examining the presence of blood pressure (BP) that is persistently at or above certain levels on at least two separate occasions. Individuals over the age of 18 with a blood pressure level above 140/90 mm Hg are considered to be hypertensive (Chobanian, 2003). Blood pressure prevented by leading a stree free life, through healthy eating and excersice and also can be controlled by eating healthy, by minimal exercise and taking of medication.

Diabetes Mellitus

The term diabetes mellitus describes a metabolic disorder of multiple aetiology characterised by chronic hyperglycaemia with disturbances of carbohydrate, fat and protein metabolism resulting from defects in insulin action or insulin secretion or both. The effects of diabetes include long term damage, dysfunction and failure of various organs. Diabetes may present with characteristic symptoms such as thirst, polyuria, blurring of vision, and weight loss. In its severe forms, ketoacidosis or non-ketotic hyperosmolar state may develop and lead to stupor, coma and in the absence of treatment, death (Alberti et al, 2004). It is important to keep healthy life style because it will prevent the complications of the condition such as blurred vision, amputation from wound ulcersexcessive weight loss and death.

Overweight

Over weight and obesity are defined as abnormal or excessive fat accumulation that may impair health (Burns & Groove, 2004). Over weight and obesity predisposes an individual to cardiovascular diseases diabetes and other disease. It is important to regularly

exercise and maintain good body weight.

Nurse

A nurse is a person who cares for the others holistically. Nurses are responsible for patients' care and advocacy (R2176 of 1993 as amended). Nurses are divided into three categories according to their level of training namely, auxiliary nurse, enrolled nurse and professional nurse as regulated by the South African Nursing Council. These three nursing categories form part of this study population and sample. Nurses were participants who helped to conduct this study.

Auxiliary nurse

Auxiliary nurse refers to nurses who have undergone a one year education and training programme according to the South African nursing council regulation (R 2176 of 1993 as amended) and are registered with SANC (1993). Auxiliary nurses are educated to provide elementary care and according to their scope of practice (SANC, 2005). Nurses were participants who helped to conduct this study. A nurse is a person who cares for the others holistically and are responsible for patients' care and advocacy

Enrolled nurse

Enrolled nurse refers to nurses who have undergone two years education and training nursing programme, according to SANC (R 2175 of 1993 as amended) and are registered with SANC (SANC, 2005). A nurse is people who cares for the others holistically and are responsible for patients' care and advocacy). Nurses were participants who helped to conduct this study

Professional nurse

Professional nurse refers to nurses who have undergone a four years or more education and nursing training programme, according to the SANC regulations (R 683 of 1989 as amended, R 425 of 1989 as amended), and are registered with the South African Nursing Council. Professional nurses are trained to practice independently, to render comprehensive nursing care, patient advocacy, to be responsible and accountable for such practice according to their scope of practice (SANC, 2005). Nurses were participants who helped to conduct this study. A nurse is a person who cares for the

others holistically and is responsible for patients' care and advocacy.

1.9. Research method

This study uses cross sectional descriptive survey design. The analyses were based on univariate, bivariate and the multivariate. In the univariate, descriptive statistics was used in investigating the demographic features of the participants, as well as the discrepancies among some of the characteristics of the NCDs. Prevalence of obesity, hypertension and diabetes levels was cross tabulated against demographic characteristics. The generalized linear model (GLM) was used in determining the risk and effects of the predisposing factors of NCDs. The level of significant was set at 0.05. The generalized linear model (GLM) is a special class of non-linear models which makes use of linear methods in solving nonlinear problems. In many life situations, assumptions of linearity and normality do not hold. When these happen, the GLM is most suitable.

1.10. Chapter divisions

Chapter 1: Introduciton and overview of study

Chapter 2: Literature review

Chapter 3: Research method

Chapter 4: Results of the study

Chapter 5: Discussion of results

Chapter 6: Conclusions, limitations and recommendations

1.11. Summary

The chapter described the introduction, background, problem statement, objectives and hypotheses, significance of the study, definitions of operational concepts and arrangements of chapters. The next chapter will provide on how literature review was conducted for this study.

CHAPTER TWO:

LITERATURE REVIEW

2.1. Introduction

The purpose of this section was to review existing literature, on non-communicable diseases such as obesity, hypertension and diabetes among nurses. This was done under the following sub-headings obesity, hypertension, and diabetes. Furthermore, the literature on the possible relationship between obesity and hypertension, obesity and diabetes, and hypertension and diabetes and physical activity were also reviewed.

All of the information about the subject under investigation was gathered using, journals electronic databases, dissertations, and internet sources. Thedatabases used include PubMed and EBSCO Host. Literature was searched between 1990 and 2014. To search the required literature sources, key words such as obesity, hypertension, diabetes, nurses, South Africa, physical activity, nutrition, and body size and body perception were entered in the search engines.

2.2. Background

There is a growing area of knowledge that is beginning to demonstrate without question that physical inactivity and increased sedentary nature of our daily living habits are serious threats to our bodies, which cause problems to normal body functioning and job productivity (Reidpath, 2001). The health workers are not left out. The average health personnel (nurses, doctors, physiotherapists, etc.) are fat (Ogunjimi et. al., 2009).

Some of our female health personnel in our health sectors have become 'social cripples' (Bradshaw et. al.,2003), meaning that they are too tired to attend to emergency situation, too tired to assist with the patients' need, too tired to go for doctors' rounds and even to administer the drugs. Gallassie (2004) reported that obesity is now a major disease in Africa. He further stated that in South Africa, one in every three men and more than half of women are obese.

2.2.1. Prevalence of obesity

The increased prevalence of overweight in adults and adolescents, effective weight loss strategies have been and are currently under examination. A study by O' Brien, Holubkov, and Reis, (2004) revealed that obesity was under acknowledged by primary care providers. Only 53% of the patients who met the study definition of obesity were documented as obese in their health care provider's assessment. A similar study by Louthan et al., (2005) found that only 29% of children with a body mass index greater than 95th percentile for gender and age were diagnosed as overweight by the physician. A study conducted among overweight Native-American youth concluded that 15 ercent of children were overweighed (Adams, Quinn & Prince, 2005). Stafford, Farhat, Misra, and Schoenfeld (2000), examined the national patterns of obesity reporting within office based, obesity related practices. The outcome was that physicians only recognized approximately 38 percent of their obese patients. In the United States, the majority of nurses were categorised as overweight, some not actively involved in any form of physical activity (Zapka et al., 2009). In the case of South Africa several studies show that obesity is a growing public health problem, even amongst health care workers were one study suggested that upto 73 percent of health care workers were overweight and obese (Skaal & Pengpid, 2011).

2.2.2. Predictors of obesity

Several studies have used BMI as a predictor of obesity in both clinical practice and epidemiology studies (Romero-Corral et al., 2007; Neovius & Rossner, 2005). Furthermore, BMI should be considered across different age, gender, and race (Romero-Corral et al., 2007). However, literature has also revealed that BMI does not adequately discriminate body fatness and lean body mass more especially in patient suffering cardiovascular disease and children (Romero-Corral et al., 2007; Neovius & Rossner, 2005). In addition Neovius and Rossner (2005) revealed other highly, accurate, expensive and time consuming diagnostic measures of obesity such as computed tomography, densitometry and dual x-ray. Other diagnostic measures for obesity revealed by Neovius and Rossner (2005) are waist circumference (WC), and waist hip ratio (WHR). Research has shown that there is a relationship between quality of life and BMI. It has been reported that quality of life impairment worsens with increasing obesity (White et. al., 2004). Reports show that, obesity affects each and very population across

different cultures whereby related quality of life differ between different populations. This is the same for all health care professionals as those who are obese are not able to carry out their duties effectively as healthcare professionals due to illness (Al-Haddad et. al.,2013)

2.2.3. Factors contributing to obesity

A variety of factors contribute to overweight and obesity, including metabolic or genetic abnormalities.However, the overwhelming majority of cases appear to be primarily linked to poor eating habits and sedentary life-style (American Obesity Association, 2002). Within the health care and lay communities, it is generally accepted that sound dietary management and regular physical activity are integral components of an effective weight loss and management program (Uwaifo & Arioglu, 2004). It is also generally accepted within the healthcare community that weight management is a multifaceted problem. The public frequently turns to nurses for both in depth explanations, regarding why particular weight management interventions work, and assistance with the implementation of such interventions.

In England for example, 24 percent of men and 25 percent of women are obese (body mass index defined as weight in kg by height in m^2). However, the ever increasing evidence suggests that the social relationships may also play a role in determining weight gain (Kouvonen et al., 2011). Prevalence of obesity in the study conducted in Utah women were approximately twice obese than in men 34 percent v 18 percent P<.001 (Arathi & Curhan et al., 2007). An Italian case control found a similar association. Khoi (2007)argue that, the state of obesity was speculated to provide a chronic level of lower- grade inflammation that not only may contribute to the risk of growing epidemic of obesity in the recent years but its association on the negative effects on health. For men 29.9% were overweight and /obese and 9.2% had abdominal obesity, whereas 56.6% of women were overweight and / obese and 42% had abdominal obesity. In a study conducted in Limpopo, overweight and obesity increased with age, peaking at ages 30-39 years for overweight and over 50 years for obesity. (Goon et al., 2013). While females were more likely to be obese and overweight than males (Goon et al., 2013;Skaal &Pengpid, 2011; Zapka et al., 2009)

2.2.4. Obesity and overweight

Overweight and obesity are widely recognized among the most common and devastating health problems according to the U.S. Department of Health and Human Services (2001). According to the most recent National Health and Nutrition Examination Survey (NHANES)-a national, cross-section survey of the non-institutionalized population-nearly 51 million adults (31 percent) are obese. ([BMI]>30). This survey also estimates that 65 p[ercent of individuals aged 20 years and older in the United States are either overweight (BMI 25-30) or obese (BMI 30-40). Finally, an estimated 10million people (4.7percent of the population) are morbidly obese. The incidence of overweight and obesity increased by 300 percent over the past four decades (Dallas et. al., 2003; Hill, Wyatt, Reed, & Peters, 2003). If the current trend continues, projecting NHANES data through 2008 suggests that the incidence of obesity in adults will rise to 39% with an additional 345 of adults being overweight (Hill et al., 2003).

Health problems linked to overweight and obesity are numerous (Lauder et al., 2009). Obesity is one of the single greatest risk factors for hypertension and heart disease, increasing the risk for each by a factor of five (National Heart, Lung, & Blood Institute, 2003). The link between obesity and type 2 diabetes mellitus is also well established (Uwaifo & Arioglu, 2004). Less well-known but equally significant risks of obesity include increased frequency and severity of degenerative joint disease, increased pulmonary disease, sleep apnea, and several cancers (Braunwald et al., 2005; Cale & Kaaks, 2004; Calle, Walker-Thurmond, & Thun, 2003; International Agency for Research on Cancer, 2002). For persons requiring surgery, obesity presents a significant risk in terms of poor or prolonged wound healing and general recovery (Way & Doherty, 2003). Overall, obese persons will experience a 12-fold increase in mortality when compared to persons of normal weight (Braunwald et al., 2011). Of additional concern is the dramatic increase in overweight and obesity in childhood and adolescence. Current estimates show that 165 of U.S. children are overweight (American Obesity Association, 2002).

2.2.5. Diet and overweight

The majority of teenagers in Maryland were not meeting the daily recommendations for dietary intake. According to Wright et. al., (2003), there was a marked reduction in the

consumption of high fibre fruits and vegetables. Dairy products and increased consumption of nutrient-poor foods and sweetened beverages and increased percentage of total calories from snackswere observed. The Dietary Intervention Study in Childhood was a randomized clinical trial that examined the effect of a decreased amount of saturated fat and cholesterol diet in a group of 23 to 45 years old who were diagnosed with elevated low density lipoprotein (Wright et al., 2003).The physical activity time frames were measured at baseline and these measurements were later taken after 1 year and again after 3 years. The researchers predicted that over 3 years, weekly self-reported physical activity would be related to lower systolic blood pressure, low-density lipoprotein, and BMI.

2.2.6. Overweight and Healthand Health Professionals

One of nurses' primary responsibilities is to provide both formal and informal patient Care and Health Education. Developing successful interventions for overweight and obesity, as well as motivating people to use them, is the subject of much investigation (Uwaifo & Arioglu, 2004). Strategies for motivating and implementing behaviour changes remain elusive. Nurses are important resource for patients trying to understand and implement healthy behaviours. Because they interact with the community along all levels of the healthcare continuum, nurses can significantly influence patients trying to lose weight and maintain weight loss. Anecdotal observation of large groups of nurses suggests that obesity may be as prevalent among the profession as in the general population (Sharma, 2009). This is a significant observation because this group of professionals is presumed to have an advanced knowledge of both the health-related risks of obesity and the methods for managing it. If these health-care providers do not respond to obesity intervention, it may be unrealistic to expect the general public to do so (Yang, 2007).

Potentially, nurses could reach millions of South Africans with health education, yet like many who are overweight they are in need of help in reducing the health risks associated with overweight. A lack of awareness about being overweight may partly explain why health care workers who are obese are nonchalant about their weight and not engaged in physical activity (Senekal et al., 2003, Skaal & Pengpid, 2011 & Goon et al., 2013).

In the U.S women nurses were more likely to be obese as they had a higher per cent intake of fat and walked less during their breaks compared to their male counterparts

(Zapka et. al., 2009).It was postulated that those residing in urban areas were more likely to eat food high with fat content than those in rural areas. In rural and township areas of South Africa full cream dairyproducts, cheap fatty meat and snacks such as fried fat cakes were responsible for added daily fat intake (Kruger et al., 2005). In South Africa the levels of obesity varied by race and place of residence. The urban black women are more overweight and obese than the white counterpart. Asian men and women were obese (Kruger et. al., 2005). Among nurses in the rural Vhembe district of Limpopo, 7.7 percent and 6.1percent of female and male nurses was extremely obese (Goon et. al., 2013).

It was revealed that stress was not a factor that contributed to weight gain as nurses who reported greater job stress reported healthier eating habits and better physical activity patterns (Zakat et al., 2009). On the contrary, nurses interviewed in a South African hospital indicated that occupational stress was blamed for poor eating habits (Phiri et al., 2014) which could easily lead to weight gain.

In the Western Cape a lack of time to prepare proper meals due to long working hours contributed to hypertension and diabetes especially among nurses who worked at night (Phiri et al.,2014)

2.2.7. Dietary Factors

Most contributing factors towards overweight and obesity is that people are accessing luxury foods, high in fat and energy (Puoane et al., 2002). A study by Wong et. al., (2004), agreed that there is a definite need for physicians and health care providers to receive nutrition education in order to reduce the major causes of morbidity and mortality. Maillet and Young, (1998), concluded that, nutritional training in medical school is inadequate and that there is a lack of faculty awareness and use of current nutrition recommendations and practice guidelines. A study by Flynn, Sciamanna, and Vigilante (2003) addressed physicians' knowledge of diet and its effect on blood lipids and lipoproteins. It was concluded that if physicians are to provide dietary and cholesterol management instructions, more knowledge about nutrition is needed. Another study by Perrin, Flower, and Merman (2005) presented the idea that physicians' own weight perceptions may influence their method of managing their obese patients. The study showed that 49% of overweight paediatricians did not classify themselves as overweight

which could possibly cause under recognition of overweight patients (Roger, 2006). In addition, Walter (2011) suggests that the people that identified themselves as either overweight or thin reported that counselling on their weight problems was more difficult than those who classified themselves as an average weight.

Most physicians have limited time during patient encounter or do not have specific skills needed to effectively counsel obese patients regarding dietary interventions, it is essential for obese youth to be referred to a qualified health care provider who can meet the specific needs of the patient (Ma, Urizar, Alehegn, & Stafford, 2004). A registered dietician (RD) is educated and trained specifically to assess and treat individuals who are at nutritional risk due to exogenous obesity. Dietetic professionals are key health care providers in helping patients achieve long term weight loss and weight maintenance. Dieticians are knowledgeable about the concept of energy balance and how to advise patients to alter their dietary intake and food composition. Dieticians are also trained in teaching their patients about behavioural changes such as goal setting, taking action, and identifying potential barriers to weight loss (Hill, Thompson, & Wyatt, 2005), yet, referral to registered dieticians has been limited. Other cultural practices whereby they have feasts which encourages overeating changes in dietary consumption, along with decreased in physical activity and other environmental factors contributes to an increase in obesity (Sayagues, 2010). It should be observed that major staple foods in South Africa such as mealie meal or pap and rice are rich in carbohydrates and thus a major factor leading to overweight and obese populations including health care professionals (Goon et. al., 2013).

2.2.8. Culture and Gender relations

Women and girls tend to suffer the effects of cultural stereotypes, attitudes, indirect and direct marginalization in various ways. According to Haire and Matjila (2008), cultures play a major role in weight management. *Botsetse,* for example is an African cultural practice for the Batswana people, where a woman and her new-born baby are kept in their separate house for a particular period ranging from one to three months after she has given birth. According to Setiloane (1976), *motsetse* and her baby are cared for by the mother who is the grandmother to the new baby. She cooks, cares for the baby and washes the clothes for them and keep them 'physically' and 'spiritually' healthy. *Botsetse* is a purifying ritual which is performed after child birth by the Batswana, during this period

a woman is offered a lot of care, food (a goat, or sheep or an ox is slaughtered for *motsetse* to eat meat) and plenty time to rest (Stally, 2008).It is plausible that cultural norms were more receptive towards fatness and as a result some Health care workers would view themselves as being of normal weight or even healthy (Skaal & Pengpid , 2011; Senekal et al, 2001).

2.2.9. Environmental factors

Environmental factors have been reported to be associated with obesity. Obesity is recognized as both genetic and environmental mechanisms (Mollentse, 2006).In addition it has also been found that long exposure to environmental factors such as high fat diet and physical inactivity can predispose an individual to obesity (Mollentse, 2006). Akpa and Mato (2008) included drugs as one of the environmental factors that could predispose an individual to obesity. And further explained that obesity is associated with high income level and other indicators of socio-economic status. In the case of South Africa highly educated staff with better incomes were more likely to be obese than non-medical staff (Skaal & Pengpid, 2011).

2.2.10. Physical Activity

Physical activity is an important component of any programme that seeks to promote the health and well-being of individuals. There are numerous health benefits that are associated with a physical active lifestyle. Egan (2006) emphasises that an active lifestyle can help to maintain weight control, lower their blood pressure, improve their psychological well-being, and lay the foundation for increased activity in adulthood. An active lifestyle would increase life expectancy and decrease the risk of developing cardiovascular disease. Williams et al. (2002) emphasises that lack of adequate physical activity is a major cardiovascular risk factor for people of all ages.

There have also been other studies (Datar & Sturm, 2004) using exercise interventions that examines overweightandexercise patterns with results showing that regular exercise have favourable effects on markers of inflammation, insulin sensitivity, endothelial function, and vascular reactivity. Other researchers (Patrick, Norman & Calfas, 2004) have examined relationships between higher BMI levels and sedentary activity and reported that people, exposed to regular periods of scheduled physical activity, generally observe a reduction in overweight/obesity. Individuals who participate in physical activity

have generally shown a reduction in the existence of cardiovascular risk factors (Datar & Sturm, 2004; Patrick, Norman & Calfs, 2004). The importance of physical activity in health promotion has wildly been recognized as key health behaviour, associated with preventing chronic lifestyle diseases (Bradshaw et al., 2003). Many South African studies have shown a growing trend of non-active leisure activities and its effects on health variables (DoH 2002; WHO 2005(cited in Walter & Du Randt, 2011).

2.2.11. Physical Activity and wellness

Physical activity is an important component of any program that seeks to promote the health and well-being of individuals. There are numerous health benefits that are associated with a physical active lifestyle. According to Williams et al. (2002), an active lifestyle can help adult maintain weight control, lower their blood pressure, improve their psychological well-being, and lay the foundation for increased activity in adulthood. An active lifestyle would increase life expectancy and decrease the risk of developing cardiovascular disease (Williams et al., 2002). The lack of adequate physical activity is regarded as major cardiovascular risk factor for people of all ages. However, there have not been many longitudinal studies conducted to examine data regarding this type of relationship in children and adolescents. Literature contains some cross-sectional, observational, and short-term intervention studies that have investigated physical activity and cardiovascular risk factors. These studies, however, have demonstrated either inconclusive results or have shown small positive results. One intervention study that was conducted in adults reported significant association between blood pressure and cholesterol level and participation in physical activity (Janz, Dawson & Mahoney, 2002; Kelley & Tran, 2003; Williams, Hayman & Daniels, 2002). Among health care professions it was imperative that adequate awareness is created regarding the benefits of such wellness programmes. The department of health does offer an online employee wellness programme. Lack of interest by nurses, staff shortages and fatigue were identified in a study as factors that negatively influenced participation in such wellness programme (Phiri et al., 2014).

2.2.12. Alcohol Consumption and tobacco

Alcohol drinking increases blood pressure (Djousse & Gaziano, 2007). Saremi, Hanson, Tulloch-Reid, Williams, and Knower (2004) examined the associations between alcohol consumption, Type 2 diabetes and hypertension. They conducted a cross-sectional, prospective study. In it, the prevalence and incidence of diabetes and hypertension by categories of alcohol intake were determined. The results showed a positive, statistically significant relationship between blood pressure and alcohol consumption.

In another study that examined the relationship between reported alcohol consumption, cardiovascular disease (CVD) risk factors, a 10 year CHD risk score, and hypertension in women, Nanchahal, Ashton, and Wood, (2000) investigated female employees aged 30 to 64 years. The researchers gathered information on personal and lifestyle factors, including height, weight, blood pressure, lipids and lipoproteins. The relationship between alcohols and a derived coronary risk score and hypertension were also examined. The results showed an increase in the prevalence of hypertension among those participants consuming 15 – 21 units/week.

Heavy alcohol intake increased the risk of hypertension, but there was still uncertainty about the relationship between light-to-moderate alcohol consumption and incident hypertension.

Some studies have provided substantial evidence that heavy alcohol consumption (three or more standard drinks per day) was predictive of hypertension, and a reduction in alcohol consumption was related to a significant dose-dependent lowering of mean systolic and diastolic blood pressure (Miller, Raymond, Anton, Brent, Egan, & Nguyen, 2007).

2.2.13. Factors contributing to diabetes

Diabetes mellitus is one of the most common chronic diseases in nearly all countries and it continues to increase in number and significance as changing lifestyle, lead to reduced physical activity and increased obesity (Shaw et al., 2009).Obesity is considered the strongest non metabolic risk factor for diabetes (Daniel et al., 1999). According to Lipscombe and Hux (2007) and Yang et al. (2010) diabetes is a major cause for cardiovascular disease although Lipscombe and Hux (2007) further stated that despite

that diabetes causes CVA, diabetes is also a major leading cause of blindness and most common cause of end stage of renal failure diseases in developed countries. In addition diabetes is the most psychological demanding chronic conditions (Garratt et al, 2001).Patients diagnosed with diabetes experience psychological problems including social withdrawal, depression and anxiety (Garratt et al., 2001) Diabetes and it has profound effects on the health of our population and well-being of our economy (Davidson, 2003; 2004; Miller et al., 2004; Lipscombe & Hux, 2007). The World Health Organization (WHO) estimates that are 150 million people with diabetes to double by 2025, but as a result demographic and lifestyle changes it is being identified as a major health problem, and a major cause of mortality and morbidity (Rotchford, 2002).Furthermore there are considerable numbers of patient assessed measures of health outcomes that are specific to diagnose diabetes (Garratt et al., 2001).

2.3. Summary

This chapter discussed literature review of this study. The sub- topics which were covered were as follows: prevalence of obesity, predictors of obesity, factors contributing to obesity, obesity and overweight, diet and overweight, overweight and health professionals. The next chapter will provide an overview of research methods used in this study.

CHAPTER THREE:

METHODOLOGY

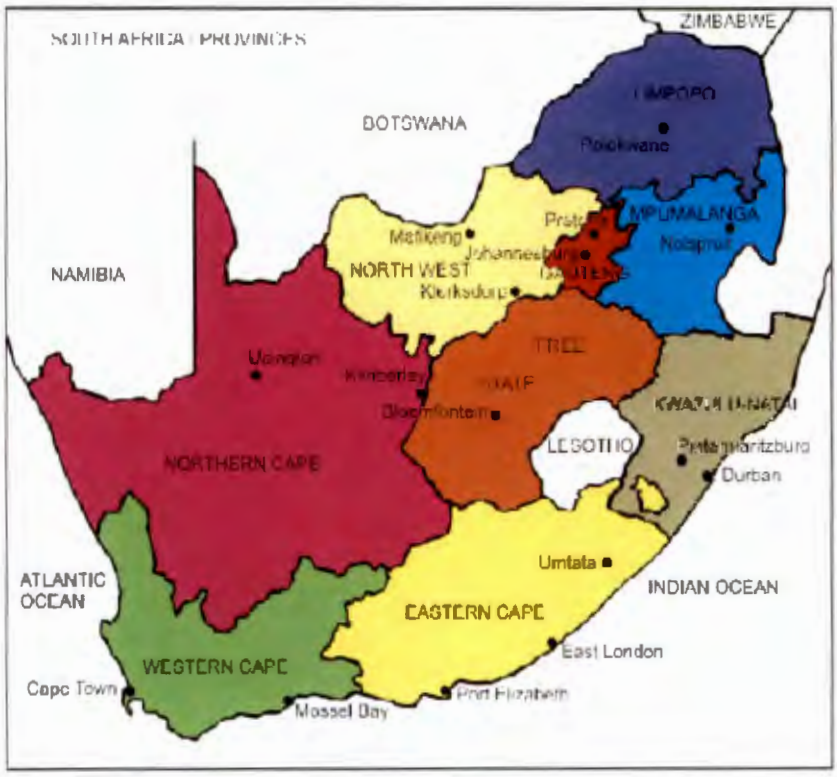
3.1. Introduction

This chapter provides an overview of research methods used in this study. The methods are discussed under the following subsections: study setting, study design, study population, sampling design, sampling size determination, instrumentation for data collection, procedure for data collection, validity and reliability of data collection instrument, ethical consideration, data analysis and summary of the chapter.

3.2. Study setting

Data were collected from two Mafikeng Provincial hospitals in the NorthWest province of South Africa.Theprovincial capital is Mafikeng. North-West province is divided into four districts namely Ngaka Modiri Molema, Bojanala, Dr Kenneth Kaunda, Dr Ruth SegomotsoMompati, and the two hospitals that are situated in the Ngaka Modiri Molema between Lomanyaneng village and Danville township.

The South Africa Map



3.3. Study Design

This is a quantitative study with across sectional descriptive survey design (Creswell 2013). This design was used to compare between nursing categories, types of NCDs and across genders (Burns & Groove, 2009), as well as to investigate the effect and relationship between hypertension, diabetes and obesity among nurses.

3.4. Study population

The population considered in this study consisted of 823 nurses, from the three different categories according to their level of training and scope of practice as regulated by the South African Nursing Council. Respondents were all nurses employed at the Provincial and Psychiatric hospitals.

3.5. Sampling design

The sampling design used in this study is a two-stage sampling. The first stage involved the stratification of nurses according to their level of training and second, thenurursesscope of practice which is regulated by the South African Nursing Council. There are three categories of nurses in the council: professional nurses, enrolled nurses, and enrolled nursing auxiliaries. Each of these categories has their peculiar characteristics, and thus forms a stratum. Members of each stratum are homogenous in terms of their characteristics (Van der Walt, 2005). The second stage involved simple random sampling, which is allocated proportionally among the strata.

3.6. Sample size determination

The procedure for selecting sample size was approached by the method proposed by Cochran (1963, 1977). The procedure assumes that the population may not be known, but the proportion of the population associated with the characteristics of a study must be known. The proportion is obtained from previous studies. The Cochran method is given as:

$$n = \frac{z_{\alpha/2}^2 p(1-p)}{e^2}$$

where n = sample size to be determined

z = area under the normal curve

α = level of significance

p = proportion of population associated with the characteristics of study

e = margin of error, or confidence interval

The hospital population is made up of the following:

Professional Nurses	$N = 289$
Enrolled Nurses	$N = 315$
Enrolled nursing auxiliaries	$N = 219$

Total $N = 823$

The following data were used in computing the sample size with the Cochran method above:

$z = 1.96$

$\alpha = 5\%$

$p = 6.9\%$ (Goon et al, 2013)

$e = 4.06\%$

The Raosoft sample size calculator was used to determine the sample size of participants of this study. The numbers of participants in the study were 263 obtained at a margin of 5%, 95% confidence level and 50% response distribution. The final number of the participants who participated in this study was 150, representing 57% of the predetermined sample size. The reduction of the sample size was due to the exclusion criteria of existing pathologies and inaccurate roster register of participants provided by the provincial hospital establishment.

The study is multidisciplinary and lies in between health and social science research. This makes the level of significance and the margin of error acceptable in this study. Thus the sample size is:

$$n = \frac{(1.96)^2(0.069)(1-0.069)}{(0.0406)^2}$$

$n = 149.71 = 150$ (approx.)

Allocation of the 150 sample size was done in the following proportion:

- Professional nurses $n_1 = \frac{289}{823}$x150 = 52.7 = 53 (approximate)
- Enrolled nurses $n_2 = \frac{315}{823}$x150 = 57.4 = 57 (approximate)
- Enrolled nursing auxiliaries $n_3 = \frac{219}{823}$x150 = 39.9 = 40 (approximate)

Total $n = 150$

3.7. Instrumentation for data collection

The instrument for data collection includes:

A) Data collection sheet (Appendix A) which had information on demographic details of the participants such as sex, age, race, economic status, educational level, income, Description of job (nature and type of job), history of physical activities, smoking history and diet pattern.

B) Specific data relating to non-communicable diseases was collected using the following:

- Aneroid Sphygmomanometer for the measurement of blood pressure: According to Akpa et al,(2009) diagnosing hypertension involves examining the presence of blood pressure that is persistently above certain 140mmHg systolic and 90mmHg diastolic levels on at least two occasions or using antihypertensive medication are considered hypertensive (Opavian, 2009).
- Littman Stethoscope was used for measuring heart rate and assessment of air entry and checking of the lungs.
- Bathroom scale was used for body weight: Adiposity was assessed by calculating body mass index (BMI), based on height and weight, and is reported in percentile: underweight (less than 5^{th}), healthy weight (5th to 85th), overweight (85^{th} to 94^{th}), and obese (95^{th} and above) according to Grandy et al (2011). Health related fitness parameters included level of endurance, level of strength, flexibility and body composition.

- Glucometer and strips for blood sugar: For checking if participants are diabetic, blood glucose machine was used-above 7mmol or if the participants' doctor had informed them that they are diabetic (Ovayola, 2010).
- Height-o-meter for measuring height of participants, and
- Tape rule/ measure for Waist to Hip ratio.

3.8. Procedure for Data collection

Data on socio- demographic information, feeding and culture were collected using a self-constructed questionnaire. With the assistance of management, the sample nurses were

identified and the questionnaire given to them to fill in and requested back after it was completed. Assurances were given to all the participants that this study was only for academic purposes and the results would be used to influence policy. All the identified participants gathered into a conference room where they filled in the research questionnaire and they were advised to complete the questionnaire truthfully. Every Wednesday for ten weeks health talks on NCDs were conducted by hospital and government employee medical (GEM) scheme management staff that were trained to do so. Data collected included risk factors NCDs. Health talk was given by this group on causes and prevention of NCDs prior to data collection. These talks were held at the health centres during lunch hours for approximately thirty minutes and included the importance of eating a balanced and healthy diet, importance of physical activity and quality of life, how alcohol and smoking can affect quality of life and how behaviour modification can be made, as well as the strategies on how to prevent obesity amongst others.A letter was written to the Government employee medical scheme to request them to assist with instruments to measure blood pressure, checking of blood glucose, body mass index,height and body mass. Questionnaires were completed immediately as the participants were tested by data collectors.

3.9. Pilot testing, validity and reliability of data collection instrument

The reliability and validity of BMI as a measure of adiposity was found to be 0.87 and 0.89 respectively. The study used the self-administered questionnaire which was used by various researchers in the past and are, therefore, reliable and valid.

Reliability is defined as the dependability of a measurement instrument that is the extent to which the instruments provide the same results on repeated trials. Validity is defined as a measure of the truth of accuracy and claims an important function throughout the research process (Burns & Groove, 2006). A self-constructed questionnaire was used to collect the data. Validity and reliability test of the instrument .The measuring instrument was tested to determine its validity and reliability.

3.9.1 Pilot testing

Pilot study is a small-scale version of the proposed study research, interview or

observation (Burns & Groove, 2009). Pilot testing was done to determine feasibility of the study in terms of availability of participants, time and financial resources. In addition, it also gave this researcher an opportunity to have an experience with the participants and setting (Burns & Grove, 2009). The pilot study was conducted by administering the questionnaire to five staff of the hospital that were not part of the main study but endowed with similar characteristics with the research participants in order to determine validity and reliability of the questionnaire (Burns & Grove, 2009). Thus, the researcher was able to identify ambiguous items in the questionnaire that needed clarification and to ensure that the questionnaire was measuring the intended purpose (Creswell, 2013). The pilot test also assisted in determining the amount of time needed to fill in the questionnaire which was about 20-30 minutes. Corrections and adjustments were done. Changes were made to the items on feeding and drinking.

3.9.2 Validity

The quality of research is determined by the validity of the collected data and the results. Validity implies the extent to which the questionnaire is going to measure factors contributing to NCDs amongst nursesin this study (Pollit & Beck, 2009). Validity was maintained as correct and complete since quantitative data was collected by using a piloted questionnaire. Additionally, all elements that measured the variables to be tested wereincluded in the questionnaire (Creswell, 2013). Furthermore, a reasonable sample was also obtained which covered the targeted groups.

Construct validity was achieved by examining the differences between the conceptual and operational definitions of variables and determining whether or not the questionnaire actually measured the concepts NCDs (Burns & Grove, 2009). The researcher fostered construct validity by defining and explaining the meaning of the concepts of interest in the study, including NCDs. Furthermore, to ensure face validity, experts in NCDs and an expert in statistics reviewed the questionnaire. Their comments were incorporated in the final questionnaire to ensure face validity. Some comments required rewording of statements and others were deleted. Validity of the questionnaire in the data collection sheet was inserted with the assistance of the statician and the supervisor. Face validity was used to ensure that the questionnaire measured what it is supposed to measure.

3.9.3. Reliability

Reliability refers to the consistency of a research instrument. It is linked to the extent that if the study is repeated using the same methods under the same conditions and circumstances the research yields the same results (Holloway & Wheeler, 2013, LoBiondo-Wood & Haber, 2014). In this study, the questionnaire was pilot-tested to ensure reliability so that if reused at a certain time in similar conditions the results would be more or less the same.

In addition, coefficient reliability test using Cronbach`s alpha was carried out to determine internal consistency of the items in the instrument and if they were reliable in measuring the dependent variables. This ensured that by using the questionnaire reliable responses were obtained. Cronbach alpha coefficient was calculated for each of the subscales on the results of the pilot study. Some of the items were dropped which had a coefficient of less than 0.6 and re-testing was done. Cronbach alpha coefficients on the data set were as follows for items on these subscales: Dietary and smoking habit was 0.61. Anthropometry measurement was 0.85. The coefficient ranged from 0.6 to 0.85. Although in most social science research the required coefficient cut off point is 0.7, a coefficient of 0.6 has been used in literature and is acceptable (Nunnally and Bernstein, 1978). However, some of the subscales have been previously tested and used in other countries including Malaysia, (Chuan & Barnett, 2012) where this coefficient was for local validation. In addition some subscales in the questionnaire had coefficient higher than 0.6.

3.10. Ethical consideration

Ethical clearance for this study was granted by the North-West University Ethics Committee. The researcher then sought for Ethics approval from the North-West province Department of Health. Permission to conduct this study at the chosen facilities was granted by the management of the hospitals. Informed consent was sought from individual participants. Also permission to conduct data was sought from provincial department of health and hospital management before data was collected. Arrangements with the hospitals were made and agreed on the dates for data collection. A formal written request for assistance with all parameters was made to the Regional Management of the Government Employee Medical Scheme (GEMS) in the Mafikeng

Offices of the North-West province and permission was granted. GEMS provided resources which were used to assess participants' blood pressure, blood glucose, BMI, weight, and other anthropometrics measurements. Data was collected over six sessions on different dates from June to August 2013.

Participants were given an autonomous participation written letter requesting them to participate in the study by the researcher, and participants who were interested were given the consent form to sign. Participants' rights were clearly outlined on the consent form. Participants were informed from the beginning about their rights to participate or to refuse to participate and to withdraw from participating at anytime they wish to. The researcher also informed the participants that they will not be harmed if they decide to withdraw from the study.

3.11. Methods of Analysis

The analysis was carried out at three levels, namely, the univariate, bivariate and multivariate levels.

3.11.1. Univariate Analysis

The first used explorative data analysis (EDA) also called the descriptive statistics to look at thesocio-economic and demographic features of the participants under study.

3.11.2. Bivariate analysis

The bivariate analysis involved the test of independence between the predictor variables (socio demographic features, dietary habits, and anthropometric features) and obesity. This is by use of the chi square test.

3.11.3. Multivariate analysis

The usual linear regression model has been found not to be suitable for researches that have to do with binary or multinomial response data. Other models have been suggested in solving these types of scenarios. These include the probity model, and logistic regression (Hailpern &Visintainer, 2003). However, the probity model lacks natural

interpretation of regression parameters, which is major setback. On the other hand, the logistic regression is a direct probability model since it is expressed in terms of Pr{Y = 1|X}. Moreover, it has the ability to provide valid estimates, regardless of study design (Harrell, 2001).

The multivariate analysis involved the use of logistics regression (also called the logit model) and the generalized linear model (GLM) was used in determining the risk and effects of the predisposing factors of obesity. The level of significant was set at 0.05.

3.12.1 Logistic Regression

The logistic regression is expressed as follows:

Let y_i = non communicablenon-communicable diseases (NCDs) among nurses in this study

and x_i = the factors contributing to NCDs among nurses in this study

The variables are expressed in binary form below:

$$y = \begin{cases} 1 & nursehasNCD(s) \\ 0 & \text{nurse does not have NCD(s)} \end{cases} \quad (3.1)$$

$$y = \begin{cases} 1 & \text{exposed to factors} \\ 0 & \text{not exposed to factors} \end{cases} \quad (3.2)$$

Both variables follow the Bernoulli distribution with parametersp_y, and p_x respectively.

The model for the above phenomenon is given in the simple logistic regression model below:

$$logitp(x) = log\frac{p(x)}{1-p(x)} = log\frac{p(x)}{q(x)} = \alpha + \beta x \quad (3.3)$$

where

x = is a single factor, $p(x)$ is the probability of vulnerability to NCDs for a given value of$x$, $q(x)$ is the complement of the probability of vulnerability to NCDs, β is the coefficient of the given value of$x$, and α is the constant coefficient.

The odds ratio for the simple model above is given as

$$OR = e^{\beta} \tag{3.4}$$

Hence, for this study, the logistic model is given as

$$logitp(x_i) = log\frac{p(x_i)}{q(x_i)} = \beta_0 + \sum_{i=1}^{k}\beta_i x_i \tag{3.5}$$

$$= \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \cdots + \beta_k x_k \tag{3.6}$$

Whereβ_0 is the constant coefficient, and β_i is the coefficient of the i^{th} value of the factor x contributing to NCDs among nurses in this study.

For any given x_i, the odds ratio is given as

$$OR = \left(e^{\beta_i}\right)^{\Delta} \tag{3.7}$$

WhereΔ is an increment of$i$

3.12.2 The Generalized Linear Model

The generalized linear model (GLM) is a special class of nonlinear models which makes use of linear methods in solving nonlinear problems. It is recalled that the linear model is expressed as

$$y_i = X\beta + u_i \tag{3.8}$$

where

y_i is predictand (response, dependent) variable

X is the matrix of uncorrelated predictor (independent) variables

β is the coefficient (slope) of the predictor variables

u_i is the error associated with the model ($u_i \sim N(0,1)$

both the X, y_i are uncorrelated and normally distributed

In many life situations, assumptions of linearity and normality do not hold. When these happen, the GLM is most suitable. In the GLM, the characteristics listed above are generalized, such that both the predict and predictor variables may be distributed as normal, binomial, Poisson, gamma, or inverse Gaussian, each having its parameter including a meanμ. As usual β remains the coefficient of the predictor variable$X$. Also, there is a link function f that defines the model as

$$f(\mu) = X\beta \quad (3.9)$$

3.13. Summary

Research analysis was carried out at three levels, namely, the univariate, bivariate and multivariate levels. Many life situations, assumptions of linearity and normality do not hold. When these happen, the GLM is most suitable. In the GLM, the characteristics listed above are generalized, such that both predict and predictor variables may be distributed. This chapter outlined research approaches followed in this chapter. This study followed a quantitative approach with a cross sectional descriptive survey design. The instrument used was divided into six sections namely Section A: Demographic information, Section B: Physical activity and my job, Section C: Dietary and Smoking Habit, Section D: Anthropometry Measurements, Section E: Non-communicable Diseases Parameters and Section F: Perceptions of Self-image and Overweight. The next chapter provides an overview of research analysis and how results are presented.

CHAPTER FOUR:

RESULTS

4.1 Introduction

In this chapter, results of the analyses are presented. The results are presented according to the following subsections: descriptive characteristics of the variables under study, test of independence of the variables under study, predictive relationship between socio-demographic characteristics and obesity; predictive relationship between feeding habits and obesity; and predictive relationship between anthropometric features and obesity. The analyses are categorized under the different categories of nurses; professional nurses, enrolled nurses, and enrolled nurses auxiliary.

4.2. Socio-demographic Characteristics of participants

Table 4.1a: Demographic characteristics of participants

Characteristics	Percent		
	Professional Nurses	Enrolled Nurses	Auxiliary Nurses
Gender			
Male	17	26	20
Female	83	74	80
Marital status			
Single	55	72	70
Married	38	23	23
Divorced	8	6	8
Highest qualification			
Doctoral	0	0	0
Masters	6	0	0
Bachelors	23	0	15
Diploma	43	4	15
Certificate	15	9	10
0thers	9	88	60
Race			
African	100	100	100
White	0	0	0
Asian	0	0	0
Colored	0	0	0
Total	100	100	100

Table 4.1a above presents the demographic characteristics of participants. The majority of the participants, irrespective of section of nurses, were females. Professional female nurses made up the majority of nurses (83%) followed by those female nurses who were in the auxiliary section (80%). The results also show that most of the interviewed participants were single, especially among the enrolled and auxiliary nurses at 72% and 70% respectively with only 38% of professional nurses indicating that they were married. In addition, the majority of Professional Nurses had a diploma as their highest qualification (43%) followed by Bachelors (23%) with 9% having other qualifications. The results further show that most participants enrolled as nurses (88%) and auxiliary nurses (60%) also have other qualifications.

Table 4.1b: General food intake of participants

Characteristics	Percent		
	Professional Nurses	Enrolled Nurses	Auxiliary Nurses
Gardening			
Yes	28	30	25
No	72	70	75
Vegetarian			
Yes	21	28	15
No	79	72	85
Meat Preference Per week			
Beef	2	4	0
Chicken	25	25	28
All of the above	53	53	55
Non response	13	11	18
Frequency of beef intake			
Once a week	60	47	48
Twice	23	35	23
Thrice	9	7	8
Never	8	11	23
Frequency of chicken intake			
Once a week	17	5	3
Twice	25	26	33
Thrice	55	68	63
Never	0	0	3
non response	4	0	0
Frequency of water intake			
Two	15	11	10
Four	28	25	20
Six	21	25	38
Eight	36	40	33
Frequency intake of juice			
Once	34	35	33
Twice	36	32	35
Thrice	17	21	20
Never	9	9	10
Non response	4	4	3

Table 4.1b presents the general food intake and preferences of interviewed participants. Irrespective of type of nurses, the majority of the interviewed participants indicated that they did some form of gardening and were vegetarian; particularly those enrolled as auxiliary nurses (85%). Regarding meat preference, on average 53% of interviewed participants preferred beef, chicken and vegetables with only 4% and 2% of professional nurses and those enrolled as nurses preferring beef. Regarding frequency of beef intake, most participants' particularly professional nurses (60%), had beef once a week followed by those enrolled as auxiliary nurses (48%). Conversely, the majority of participants had chicken three times a week particularly those enrolled as nurses (68%) followed by 63% of auxiliary nurses. Furthermore, the majority of professional and enrolled nurses respectively took eight glasses of water per day compared to the majority of auxiliary enrolled nurses who took six glasses of water per day.

Finally, the majority of professional (36%) and auxiliary nurses (35%) indicated that they had two glasses of juice daily compared 35% of enrolled nurses who indicated that they only had one glass of juice daily.

Table 4.1c: General Food and alcohol intake by participants

Characteristics	Percent		
	Professional Nurses	Enrolled Nurses	Auxiliary Nurses
Vegetables			
Per week			
Once	13	7	20
Twice	34	26	38
Thrice	49	65	40
Never	2	2	0
Non Response	2	0	3
Fried Food			
Per week			
Once	40	46	40
Twice	38	23	23
Thrice	19	19	30
Never	4	12	5
Non-response	0	0	3
Alcohol			
Per week			
Yes	30	54	38
No	68	46	63
Non Response	2	0	0
Alcohol Preference			
Per week			
Beer	19	35	15
Brandy	4	2	0
Spirit	8	11	10
Whisky	2	7	8
All of the above	0	0	5
Non response	68	46	63
Alcohol Frequency			
Per week			
One bottle	17	19	8
Two	8	12	10
Three	4	21	10
More	2	4	8
Non response	70	44	65
Do you Smoke			
Per week			
Yes	4	18	13
No	96	81	83
Non Response	0	2	5
Total	100	100	100

Table 4.1c above presents the general food and alcohol intake of interviewed participants. In general, most of the three groups of participants indicated that they had

vegetables three times a week, especially among enrolled nurses(65%), followed by professional nurses(40%). 2% of professional and enrolled nurses never ate vegetables.

Also, the majority of participants indicated that they had fried food once a week, particularly enrolled nurses (46%), and followed by auxiliary and professional nurses (40%) respectively. This is compared to 12% of enrolled nurses who indicated that they never ate friend food within a week. Regarding alcohol intake 54% of enrolled nurses indicated that they took alcohol beverages, followed by 38% of auxiliary nurses. Only 30% of professional nurses indicated that they took alcohol beverages suggesting that the majority of professional nurses did not take alcohol beverages. Similarly, the majority of enrolled nurses preferred beer (35%) followed by 19% of professional nurses. The above table further shows that the majority of enrolled nurses had three bottles of their favorite alcohol beverage a week(21%) compared to 17% of professional nurses who indicated that they only had one bottle per week.

Table 4.1d: Participants' perceptions of weight

Characteristics	Percent		
	Professional Nurses	Enrolled Nurses	Auxiliary Nurses
African women must be endowed			
Strongly agree	6	0	5
Agree	6	7	8
Undecided	4	9	5
Disagree	49	58	30
Strongly disagree	23	19	35
Non response	13	7	18
Add more weight			
Strongly agree	4	9	3
Agree	6	12	8
Undecided	9	11	8
Disagree	40	30	30
Strongly disagree	28	23	35
Non response	13	16	18
Partner likes me this way			
Strongly agree	13	37	23
Agree	42	39	28
Undecided	8	0	8
Disagree	9	11	10
Strongly disagree	8	7	5
Non response	21	7	28
Being slim means I am unwell			
Strongly agree	23	26	23
Agree	25	19	18
Undecided	6	0	3
Disagree	26	23	20
Strongly disagree	9	25	18
Non response	11	7	20
Risk of obesity			
Yes	58	60	58
No	42	40	43
Non Response	0	0	0
Total	100	100	100

Table 4.1d presents participants' perceptions of their overall weight. Irrespective of the three groups of nurses, the majority of nurses disagreed that an African man must be endowed particularly among auxiliary nurses (38%) followed by enrolled nurses (33%). Only 8% of professional nurses agreed that African men must be endowed. Conversely, 58% of enrolled nurses were undecided regarding whether African women must be endowed followed by 49% of professional nurses. Only 35% of those enrolled as

auxiliary nurses strongly agreed that African women must be endowed. Interestingly 40% of professional nurses, followed by 30% of enrolled and auxiliary nurses disagreed regarding adding more weight. Only 9% of enrolled nurses agreed to the statement.

Furthermore, 42% of professional nurses followed by enrolled nurses (39%) and those auxiliary nurses (28%) agreed that their partners liked them that way. However, 28% and 21% of auxiliary and professional nurses did not respond to whether partners liked them that way. It is plausible that these participants were not in any relationship. Variations regarding the statement that being slim means I am unwell are seen in the table above with 26% of enrolled nurses supporting the affirmative. This is compared to 26% of professional nurses who disagreed. It is plausible that cultural norms that encourage people to be fat may be responsible for the current variations among the three groups of nurses.

Finally, irrespective of the three groups, the majority of participants agreed that they were at risk of obesity with 60% of enrolled nurses, followed by professional and auxiliary nurses at 58%.

4.3 Test of independence of study participants

The bivariate analyses consisted of testing if there was some independence between Body Mass Index (BMI) and the study variables. Analysis here was conducted using chi-square test, and significant tests were conducted at 5% and 10% levels of significance respectively. The results are presented in Tables 4.2a, 4.2b, and 4.2c. It was shown that among the professional nurses, BMI was found at 5% level of significance to be dependent on frequency of drinking water, frequency of drinking fruit juice, and the knee circumference, while at 10% level of significance it is found to be dependent on age, marital status, and years of working experience, physical activity, and waist-to-Hip ration.

Table 4.2a: Test of Independence of the Study Variables

(*Dependent Variable:* ***Body Mass Index*** **– BMI**)

Independent Variables	**Chi Square (χ^2)**		
	Professional Nurses	**Enrolled Nurses**	**Auxiliary Nurses**
Age	35.015**	35.188	27.383
Gender	1.661	3.503**	1.253
Marital status	5.231**	6.465*	7.523*
Highest qualification	0.085	0.103	10.149*
Years of working experience	30.159**	26.185**	8.000
Physical activity	3.178**	5.126*	0.171

* Significant at 5% level ** Significant at 10% level

Among the enrolled nurses, at 5% level of significance BMI was found to be dependent on marital status, physical activity, frequency of drinking fruit juice, and drinking of alcoholic beverages. At 10% level of significance, it was found to be dependent on gender, years of working experience, and frequency of drinking alcoholic beverages.

Table 4.2b: Test of Independence of the Study Variables

(*Dependent Variable:* ***Body Mass Index*** **– BMI**)

Independent Variables	**Chi Square (χ^2)**		
	Professional Nurses	**Enrolled Nurses**	**Auxiliary Nurses**
Being a vegetarian	0.106	1.327	1.851
Frequency of eating beef	1.164	5.688	3.139
Frequency of eating chicken	0.935	1.177	8.044*
Frequency of drinking water	11.476*	1.750	5.467
Frequency of drinking fruit juice	10.758*	7.926*	3.408
Frequency of eating vegetables	1.556	5.734	2.852
Frequency of eating fried food	2.123	1.474	8.461*
Drinking of alcoholic beverages	0.560	8.916*	2.462

* Significant at 5% level ** Significant at 10% level

On the other hand, among the enrolled nurses auxiliary, BMI was found to be dependent at 5% level of significance on marital status, highest qualification, and frequency of eating chicken, frequency of eating fried foods, shoulder measurements, and knee circumference. But at 10% level of significance BMI was dependent on ankle circumference only.

Table 4.2c: Test of Independence of the Study Variables

(*Dependent Variable:* ***Body Mass Index*** **– BMI**)

Independent Variables	**Chi Square (χ^2)**		
	Professional Nurses	**Enrolled Nurses**	**Auxiliary Nurses**
Height (m)	20.918	22.516	25.337
Body weight (kg)	50.254	52.845	40.000
Waist (cm)	36.192	36.780	35.226
Hip (cm)	44.762	52.153	34.544
Waist-to-Hip ratio	50.254**	49.114	37.272
Shoulder measurements (cm)	22.418	16.291	27.117*
Ankle circumference (cm)	21.356	9.493	22.123**
Knee circumference (cm)	32.700*	24.028	27.840*
Knee to ankle	0.132	0.858	0.392

* Significant at 5% level ** Significant at 10% level

4.4 Impact of studied Variables on BMI

The results of the multivariate analyses that showed the impact of the study variables on Body Mass Index (BMI) are discussed in this section. The method of analysis used here was the Generalized Linear Model (GLM), and the results were presented also at 5% and 10% level of significance respectively.

4.4.1 Socio-demographic of participants

Table 4.3a shows the socio-demographic variables that had impact on Berniring the case of the professional nurses, physical activity ($\beta = -0.316$) was found to significantly negatively impact BMI at 5% level of significance. This means that for every decreased involvement in physical activities, the risk of BMI becomes higher at the rate

of 0.316.But at 10% level of significance gender ($\beta = 0.388$) was found to significantly positively impact BMI. For both the enrolled nurses and enrolled nurses auxiliary, there was no socio-demographic variable that was found to be significant at both levels of significance.

Table 4.3a: Socio-Demographic Variables Predicting Obesity

(*Dependent Variable:* ***Body Mass Index*** **– BMI**)

Independent Variables	**Professional Nurses**	**Enrolled Nurses**	**Auxiliary Nurses**
Age	0.006	-0.007	0.256
Gender	0.388**	0.160	0.485
Marital status	0.115	0.043	-0.409
Highest qualification	-0.012	-0.026	0.174
Years of working experience	-0.006	0.015	0.019
Physical activity	-0.316*	0.204	0.243

* Significant at 5% level ** Significant at 10% level

4.4.2 Feeding habit of participants

Table 4.3b is the results of the impact on BMI by variables on feeding habit. It was found among the professional nurses that at 5% level of significance frequency of eating chicken ($\beta = -0.197$) significantly negatively impact BMI, frequency of drinking water ($\beta = 0.145$) significantly positively impact BMI, and also the frequency of drinking fruit juice ($\beta = 0.196$) significantly positively impact BMI.These means that the more a person eat chicken, the risk of BMI is decreased at the rate of 0.197, increase in the intake of water as well as fruit juice increase the chance of BMI risk at the rates of 0.145 and 0.196 respectively. For the nurses in the enrolled category, drinking of alcoholic beverages ($\beta = 0.328$) is the only feeding habit, at 5% level of significance, that significantly positively impact BMI. What this means is that the risk of BMI is increased at the rate of 0.328 with alcoholic drinking. In the enrolled nurses category, no feeding habit was found to be significant at 5% level. But at 10% level of significances, frequency of eating chicken ($\beta = -0.368$) significantly negatively impact BMI, frequency of eating fried foods ($\beta = -0.160$) significantly negatively impact BMI, and drinking of

alcoholic beverages ($\beta = 0.325$) significantly positively impact BMI. These results showed that the risk of BMI is decreased at the rate of 0.368 when the frequency of eating chicken is increased, and also when the rate at which eating of fried foods is increased, the risk of BMI is decreased at the rate of 0.16. But on the other hand, the risk of BMI is increased at the rate of 0.325 with increase in alcoholic drinking.

Table 4.3b: Feeding Habits Variables Predicting Obesity
(*Dependent Variable:* ***Body Mass Index*** **– BMI**)

Independent Variables	**Professional Nurses**	**Enrolled Nurses**	**Auxiliary Nurses**
Being a vegetarian	-0.028	0.002	-0.181
Frequency of eating beef	0.062	0.112	0.014
Frequency of eating chicken	-0.197*	0.093	-0.368**
Frequency of drinking water	0.145*	-0.041	0.102
Frequency of drinking fruit juice	0.196*	-0.087	0.152
Frequency of eating vegetables	-0.051	0.128	0.066
Frequency of eating fried food	-0.136	0.104	-0.160**
Drinking of alcoholic beverages	-0.210	0.328*	0.325**

* Significant at 5% level ** Significant at 10% level

4.4.3 Anthropometry of participants

Table 4.3c displays the impact of anthropometric variables on Body Mass Index (BMI).In the professional nurses category, only body weight ($\beta = 0.022$) at 5% level of significance, was found to significantly positively impact BMI.This means that increase in body weight increases the risk of BMI at the rate of 0.022.Among the enrolled nurses category, body weight ($\beta = 0.015$) and Hip ($\beta = 0.003$) significantly positively impact BMI at 5% level of significance. This means that increase in body weight increases the risk of BMI at the rate of 0.015, and increase in hip measure increases the risk of BMI at the rate of 0.003.But at 10% level of significance, height ($\beta = 0.002$) significantly positively impact BMI.The results showed that increase in height is likely to increase the risk of BMI at the rate of 0.002.In the case of enrolled nurses auxiliary, at 5% level of significance only body weight ($\beta = 0.018$) significantly positively impact BMI. In other words, the risk of BMI is increased at the rate of 0.018 by the increase of body weight.

Table 4.3c: Anthropometric Variables Predicting Obesity

(*Dependent Variable:* ***Body Mass Index*** – **BMI**)

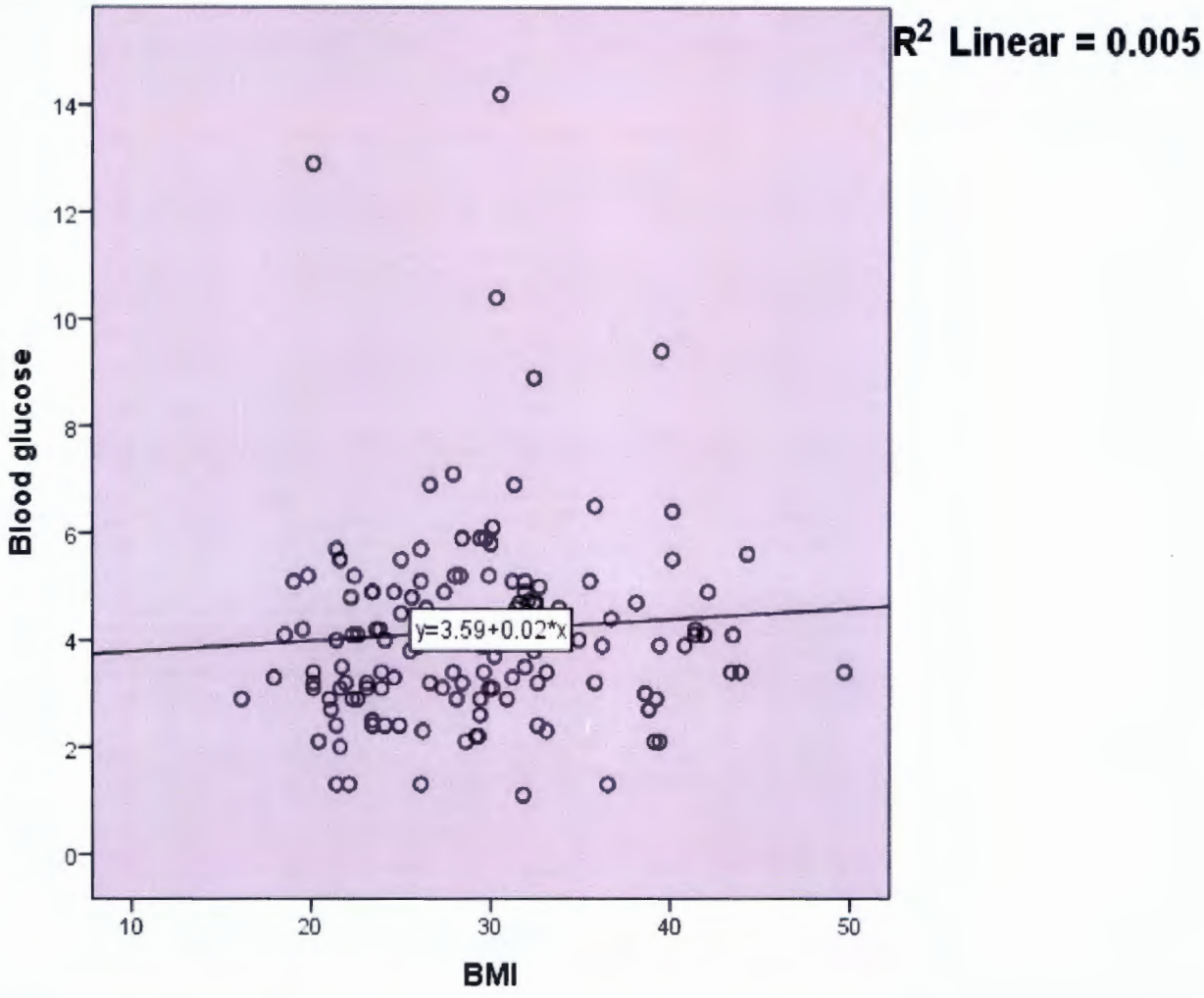
Independent Variables	**Professional Nurses**	**Enrolled Nurses**	**Auxiliary Nurses**
Height (m)	0.001	0.002**	0.000
Body weight (kg)	0.022*	0.015*	0.018*
Waist (cm)	0.000	-0.002	-0.006
Hip (cm)	-0.003	0.003*	0.001
Waist-to-Hip ratio	0.004	0.029	-0.014
Shoulder measurements(cm)	0.003	0.002	0.024
Ankle circumference (cm)	0.004	-0.010	0.003
Knee circumference (cm)	0.006	-0.013	-0.003
Knee to ankle	-0.027	-0.340	0.193

* Significant at 5% level ** Significant at 10% level

4.4. Diabetes mellitus

4.4.1. a. Relationship between Blood-Glucose and BMI.

Figure 4.4.1.a: Relationship between Blood-Glucose and BMI.



A positive linear relationship (0.005) between BMI and the Blood Glucose measure is presented in Figure 4. 4.4.1. a

4.4.1. b. The relationship between Blood-Glucose and Body Weight

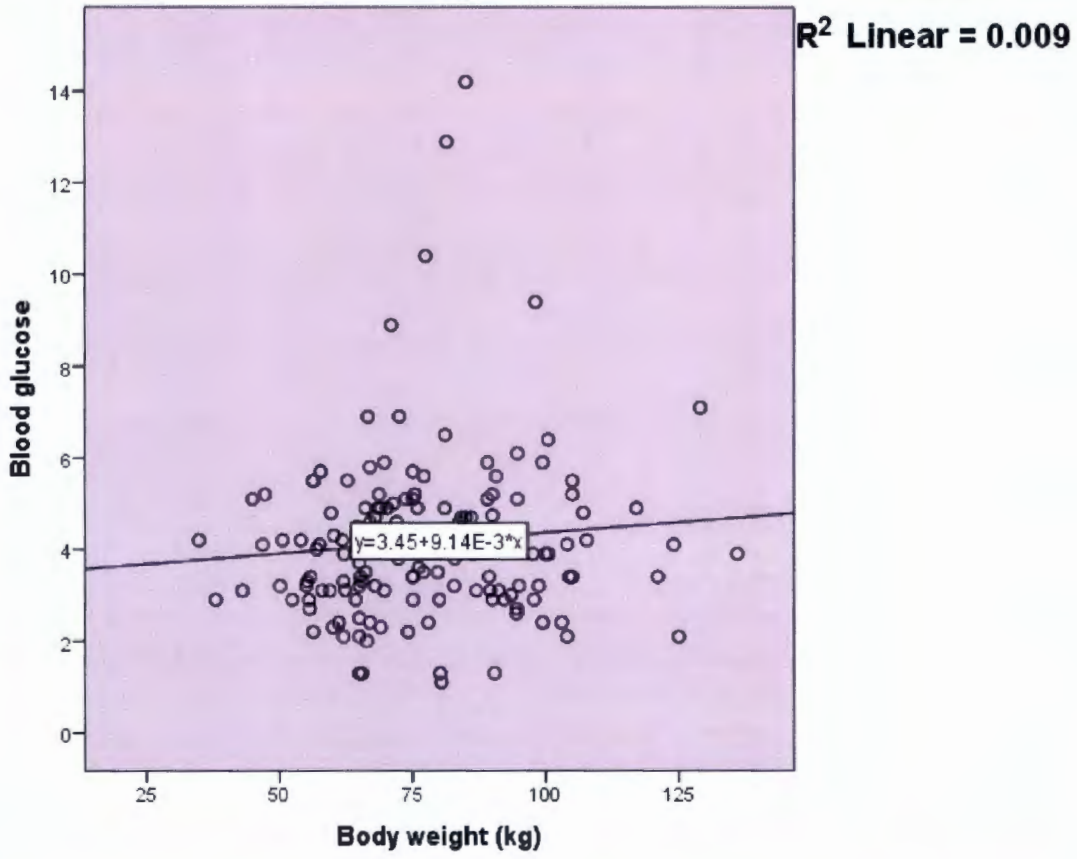


Figure 4.4.1.b: the relationship between Blood-Glucose and Body Weight

The relationship between Blood Glucose and body weight is presented in Figure 4.4.1.b. About 0.9% of the change in the Blood-glucose level is explained by the change in the Body weight.

4.4.1. c. Relationship between the Blood Glucose and Age.

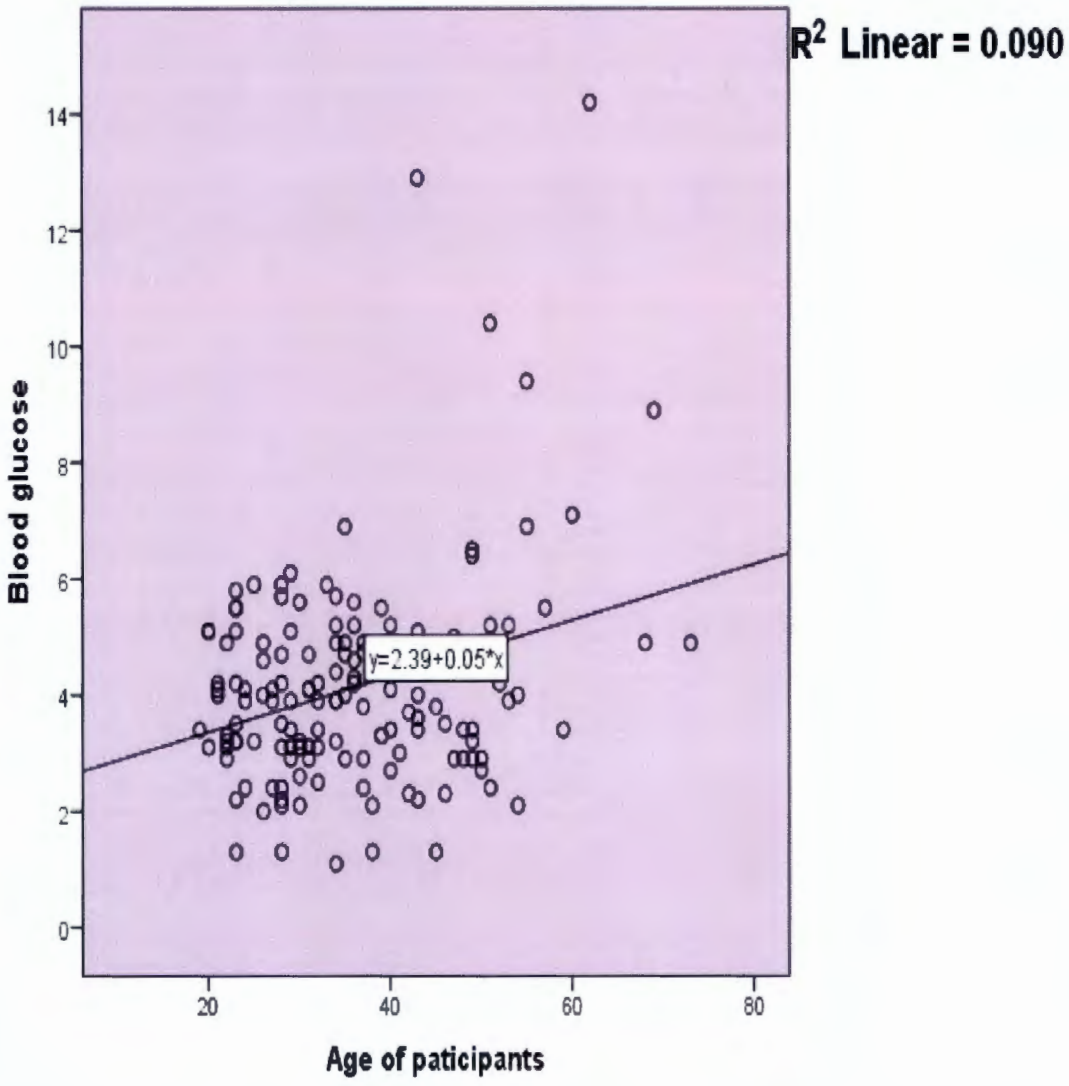


Figure 4.4.1.c: Relationship between Blood-Glucose and Age.

Figure 4.4.1.c, above illustrates a positive linear relationship between blood glucose and BMI in participants. There is a positive linear relationship between the Age and the Blood Glucose measure (9%).

4.5. Summary

This chapter has shown that socio-economic variables of nurses did not have any impact on BMI. But feeding habits and drinking of alcoholic beverages had an impact on enrolled and auxiliary nurses' BMI. In addition body weight of both professional and enrolled nurses was also significantly associated with BMI. The next chapter provides an overview on the discussion of the results of the study.

CHAPTER FIVE:

DISCUSSIONS OF RESULTS

5.1. Introduction

This work aimed at describing factors contributing to NCDs amongst nurses in the North-West province. The final number of participants in this study was 150, representing 57 percent of the estimated sample size. This study outlined research approaches followed. This study followed a quantitative approach with a cross sectional descriptive survey design. The instrument used was divided into six sections namely Section A: Demographic information, Section B: Physical activity and my job, Section C: Dietary and Smoking Habit, Section D: Anthropometry Measurements, Section E: Non-communicable Diseases Parameters and Section F: Perceptions of Self-image and Overweight. Investigate the influence of selected socio-demographic characteristics of age, gender, marital status, highest qualification, and years of working experience and physical activities of nurses on NCDs.

The objectives were to determine the relationship between dietary habits as predictors of obesity, to describe the perceptions of body size and images amongst nurses and the association between socio-demographic charecteristics of ndcs amongst nurses in the North West province. Research analysis was carried out at three levels, namely, the univariate, bivariate and multivariate levels. Many life situations, assumptions of linearity and normality do not hold. When these happen, the GLM is most suitable. In the GLM, the characteristics listed above are generalized, such that both predict and predictor variables may be distributed

5.1.1. Association between socio-demographic characteristics and NCDs

The bivariate results show that irrespective of the category of nurses, marital status was statistically significant in relation to body mass index of the respondent, especially among professional nurses. The reason for this could be further explored as this was not within the scope of this study. Physical activity was also statistically significant in relation to Body Mass Index, especially among professional nurses and to a lesser extent enrolled nurses. In addition, the results show that years of experience were significantly associated with BMI among professional and enrolled nurses. Nurses who

had spent more working years in practice were found to be more obese. This might be as a result of the relative sedentary nature of the profession. Sedentary lifestyle and lack of adequate physical activity increases hypertension and other related illnesses including blood pressure (Gang & Hu et al., 2004 & Mork et al., 2010). It is expected that enrolling in a wellness programme could be a remedy. That is why wellness programmes must be taken seriously especially by those who are susceptible to NCDs. Furthermore, it is plausible that those who work longer are more prone to increased body mass index as a result of long sitting hours and relative inactivity especially among those who work night shifts (Griep et al., 2014).

5.1.2. Association between eating habits and alcohol intake and Obesity

The bivariate results show that the frequency of drinking juice was statistically associated with body mass index among professional and enrolled nurses, suggesting that those who drank more fruit juice were susceptible to increased BMI. It is plausible that such fruit juices are just sweetened beverages containing sugar which is a key ingredient to increased obesity (Karabudak & Kizitan, 2010). As a result, the frequency of intake of such fruit juice in a day or a week may lead to increased risk of obesity, especially if there is a lack of physical activity among nurses. Similarly, frequency of drinking water was statistically associated with body mass index among professional nurses. This may be due to the fact that most professional nurses drank less water. Drinking water had the positive effects of reduced hunger and increased satiety (Sarganas et. al., 2013). In addition, enrolled nurses' drinking of alcoholic beverages was statistically associated with increased body mass index. Table 4.1c shows that enrolled nurses drank more alcoholic beverages than their counterparts, which may partly explain the significant association. Depending on the alcohol that was consumed and the frequency of consumption, enrolled nurses may be at risk of obesity and other related consequences of too much alcohol intake. For instance, those who drank spirits were more at risk of increased obesity (Lukasiewicz et al., 2004). In general the results have shown a significant association between dietary habits of nurses and obesity among nurses.

5.1.3. Association between anthropometric variables and obesity

The results have shown that waist to hip ratio was statistically associated with body mass index among professional nurses. This clearly suggests that professional nurses might have been prone to obesity resulting from their lack of physical inactivity. This

may also lead to increased knee circumference as the results also suggest an association with body mass index. In general the results show no significant association between anthropometric variables and NCDS such as obesity. Therefore the results of this study reject those of a study that has revealed that the anthropometic variables are shown to have significant association on obesity (Beck et al, 2011& Candido et al, 2012).

5.1.4. Impact of socio-economic variables on obesity

This variable suggests that professional nurses did not do any form of physical activity and were thus prone to BMI. Research has shown that female nurses, more than male nurses, were prone to increased BMI. Given that most of the participants were female nurses from the demographic characteristics, it is thus plausible that female nurses were more prone to BMI. Also, the attitudes of nurses who are not enrolled in the wellness or physical activity programme of the hospital management might also contribute to increase BMI. The multi-variate results show that gender, and to a lesser extent physical activity, had an impact on the BMI (NOO, 2010 & Wang, 2004) of professional nurses.

5.1.5. Impact of feeding habit variables on obesity

The multivariate results show that among professional nurses, frequency of eating chicken, drinking water and drinking fruit juice had an impact on body mass index. This corroborates results from previous researchers on the effect of feeding habits on obesity (Al-Rethaiaa et al, 2010; Triches & Giugliani, 2005 & Swinburn et al, 2004). It is plausible that professional nurses may not be taking enough water compared to the fruit juices. The results further show that eating chicken impacted negatively on the body mass index among auxiliary and professional nurses. Table 4.1b shows that the majority of auxiliary nurses eat chicken at least thrice a week. However, alcohol beverages impacted positively on body mass index of enrolled and auxiliary nurses. Most enrolled nurses drank three bottles of alcoholic beverages reported in Table 4.1c which may partly explain its impact on their body mass index.

5.1.6. Impact of Anthropometric variables on obesity.

The results show that body weight positively impacts on body mass index of professional, enrolled and auxiliary nurses, suggesting that the increase in obesity is

directly associated with increased body weight. Increased intake of alcohol and increased intake of fried food among auxiliary nurses may partly contribute to increased obesity. Also a lack of physical exercise may lead to increased body mass index among professional nurses. This is consonant with the findings of Beck et al. (2011) and Candido et al (2012).

5.1.7. Relationship between Blood-Glucose Age, body weight and BMI.

The findings of the current study revealed that there is a very weak positive relationship between Age and Blood Glucose level with a very poor predictive power (R-square=0.090). According to Veghari et.al (2010), the Fasting Blood Sugar (FBS) is a determinant of Diabetes Mellitus (DM) such that the FBS of at least 126 mg/dl is classified as type 2 DM. Moreover, they found a significant positive correlation between Age and FBS (p=0.01). This suggests that the findings of Veghari et.al (2010)'s study are divergent from those of the current study. Hans et.al (2007)'s findings agreed with those of the current study.

To explain the divergence of these results, another variable is added to the model. The current study showed that with body weight included in the model, a significant relationship between Age, body weight and Blood glucose is revealed (p-value=0.003). The results of the study by Fain et.al (2008) revealed no significant correlation between age and fasting glucose from a larger study of 58 type 2 morbidly obese women. It can thus be remarked that the inclusion of males in the sample may have led to the relationships that was established between age, body weight and Blood glucose. Dicker (2013) remarked that BMI greater than 30 indicates obesity. In other words, BMI cannot be ruled out from the discussion on relationships between body weight and blood glucose levels because the 2 independent variables are related.

As such the relationship between BMI and blood glucose levels is also discussed in this subsection. A weak positive linear relationship was found between BMI and blood glucose (R-square=0.005. However, with age included in the model, a significant linear model was found between age, BMI and the dependent variable blood glucose. Since BMI is a predictor of obesity and it is dependent on body weight, it will then be more appropriate to use BMI with age as predictors of blood glucose. That is, with the aid of body weight, BMI in conjunction with age is a good determinant of the relationship between obesity and blood glucose. A positive linear relationship of (0.005) between

BMI and the Blood Glucose was measured respectively. Relationship between blood glucose and age illustrated a positive linear relationship between blood glucose and BMI in participants. There is a positive linear relationship between the Age and the Blood Glucose measured at (9%).

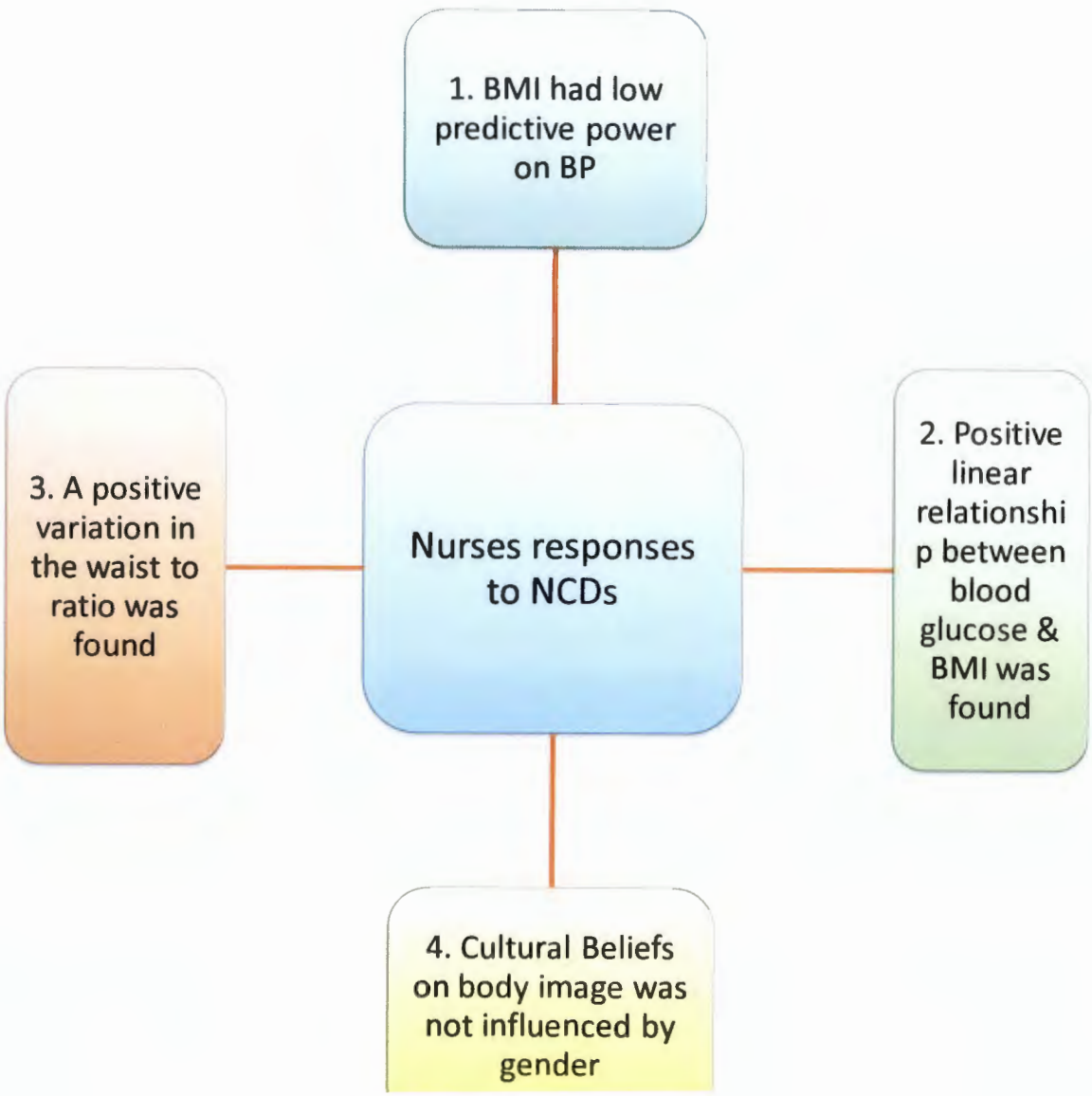
5.1.8. Health Belief Model and NCDs amongst Nurses

It is worth positioning the relationship between the chosen framework for this study which is Health Belief Model and responses of nurses in this study to NCDs. The participants demonstrated a positive attitude to NCDs. All the participants were enrolled in a mandatory wellness programme organised by the hospital authority. The attitudes of nurses who are not enrolled in the wellness or physical activity programme of the hospital management might generate a different result. It is therefore recommended that further study be conducted to evaluate NCDs amongst the cohort of nurses who are not enrolled in a structured physical activity programme. It is improbable to generalise the findings in this study to all nurses in SA. It is unrealistic to predict nurses' behaviour to NCDs using this study.

Participants in this study were able to demonstrate perceived susceptibility, perceived severity, perceived benefits, and perceived barriers as expected from their responses. Participants' awareness of their perceived susceptibility to NCDs was also inferred from the outcome of this study. Nurses in the Provincial Hospital studied here were expected to participate in Health Education in the Community with the aim of reducing NCDs.

Health Education practice usually includes advice against behaviour inimical to health which includes smoking, drinking alcohol, eating a high fat diet and participating less in physical activities (Mahoney & Garrard, 2001). This study examined the generalized perceived risk among nurses. It might be erroneously believed that as nurses, they might be perceived as invincible and excessively optimistic that they are not at risk of NCDs. Optimistic bias (OB) demonstrates the misguided belief that one's chances of suffering a harmful event are minor compared to others to necessitate the willingness and intention to change behaviour (Klein &Helweg-Larsen, 2002). Perceived threat of NCDs as reported by Health Belief Model might be the established risks of BMI and waist to hip ratio than culture and belief as presented in the above figure.

Figure 1: Figure 1: Perceived threat to NCDs by Participants in this study



5.2. Summary

In conclusion the results have shown that socio-economic variables, dietary habits of nurses in general had an impact on NCDs especially obesity among professional and enrolled nurses.The results of this study showed that marital status, physical activity, increased intake of chicken, fried foods, fruit juice, alcohol, as well as less intake of water had an impact on NCDs, especially obesity among professional and enrolled nurses. The study also found out that waist-to-hip ratio as well as body weight is predictors of obesity among nurses. It is important therefore that the awareness of the risk of NCDs such as obesity be emphasized among nurses of all categories. The next chapter proviveds an overview on conclusion, the limitation and recommendations of the study.

CHAPTER SIX:

CONCLUSION, LIMITATIONS AND RECOMMENDATIONS

6.1. The previous chapter covered discussion of results. This chapter encompass the conclusion, limitations and recommendations of the study. Conclusion, limitations and recommendations are discussed below:

6.2. Conclusion

The objectives were to determine the relationship between dietary habits as predictors of obesity, to describe the perceptions of body size and images amongst nurses and the association between socio-demographic charecteristics of ndcs amongst nurses in the North West province. Research analysis was carried out at three levels, namely, the univariate, bivariate and multivariate levels. Many life situations, assumptions of linearity and normality do not hold. When these happen, the GLM is most suitable. In the GLM, the characteristics listed above are generalized, such that both predict and predictor variables may be distributed.

This study has shown that there are significant associations between selected socio-demographic characteristics, eating habits and alcohol intake of nurses. In addition, the results also demonstrated that socio-demographic, eating habits and anthropometric variables have an impact on the BMI of professional, enrolled and auxiliary nurses.

Furthermore, it is plausible that those who work longer are more prone to increased body mass index as a result of long sitting hours and relative inactivity especially among those who work night shifts (Griep et. al., 2014). However, alcohol beverages impacted positively on body mass index of enrolled and auxiliary nurses. Most enrolled nurses drank three bottles of alcoholic beverages reported in Table 4.1c which may partly explain its impact on their body mass index.

A positive linear relationship of (0.005) between BMI and the Blood Glucose was measured respectively.

The relationship between Blood Glucose and body weight was measured and about 0.9% of the change in the Blood-glucose level is explained by the change in the Body

weight. Relationship between blood glucose and age illustrated a positive linear relationship between blood glucose and BMI in participants. There is a positive linear relationship between the Age and the Blood Glucose measured at (9%).

In summary the results have shown that socio-economic variables, dietary habits of nurses in general had an impact on NCDs especially obesity among professional and enrolled nurses.The results of this study showed that marital status, physical activity, increased intake of chicken, fried foods, fruit juice, alcohol, as well as less intake of water had an impact on NCDs, especially obesity among professional and enrolled nurses. The study also found out that waist-to-hip ratio as well as body weight is predictors of obesity among nurses. It is important therefore that the awareness of the risk of NCDs such as obesity be emphasized among nurses of all categories. The bivariate results show that irrespective of the category of nurses, marital status was statistically significant in relation to body mass index of the participants, especially among professional nurses.

6.3. Limitations of this study.

A key limitation of this study was the sample size of the participants which would be considered small. This limits its generalisation to a larger population. This was mainly because the study was delimited to the nurses in the rural area of the North-West Province as a pilot project for a larger study.

A possible limitation of the study could be the chosen research design. A qualitative approach might have provided an in-depth insight into additional factors contributing to NCDs amongst nurses. It would have been interesting to explore behavioural and cultural beliefs and NCDs.

6.4. Recommendations

This study was aimed at describing the factors that contribute NCDs among nurses in the North-West Province. This is important given that South Africa is one of several sub-Saharan African countries faced with a rising population affected with non-communicable diseases such as obesity, hypertension and diabetes mellitus.

It is hoped that the outcome of this study shall assist with the development of a comprehensive and integrated strategy to prevent and control chronic non-communicable diseases among nurses. This should include a multi-sectorial approach at all levels, including at policy and implementation levels.

Actions to prevent chronic diseases should include:

- Encouraging physical activities, especially among professional nurses as this is important in dealing with issues of increased weight. If necessary, wellness programmes must be made compulsory for all level staff.
- Changing of eating habits is necessary to prevent nursing staff from eating and drinking foods and beverages that encourage weight gain and other non-communicable diseases. All general health institutions must provide proper healthy foods to their staff as most are not able to cook as a result of workloads.
- Related to the above, improved working conditions must be promoted especially amongst those who work night shifts. Staffing at night to be improved based on nurse patient ratio. Night staff during their lunch to have a chance to do physical excercises same as during the day to prevent weight gain due to stored energy.
- Wellness programmes must encompass a holistic approach which not only looks at encouraging staff to do physical activity but also encourages staff to eat healthy foods and drink only those beverages that promote good health.

- It is also recommended that further study be conducted using mixed methods of qualitative and quantitative approaches.

- It is therefore recommended that further study be conducted to evaluate NCDs amongst the cohort of nurses who are not enrolled in a structured physical activity.
- It will be improbable to generalise the findings in this study to all nurses.
- It will also be unrealistic to predict nurses' behaviour to NCDs using this study.
- It is suggested that further study need to be conducted with broader age range of participants and well defined exclusion criteria which will be aimed at only including participants who are not involved in structured physical activities.
- It is suggested that further study be conducted to investigate these factors and their possible connection.

- A further study is recommended to investigate this problem.
- It is recommended that this study to be replicated with larger sample size and possibly different research design and no health talk pre- data collection in a structured physical activity programme Further studies need to be conducted with a larger and diverse sample to confirm or reject these findings.
- It will be interesting to test these findings in a lager racial and gender diverse group.
- In addition to specific recommendations above, it is hoped that the outcome of this study shall assist with the development of a comprehensive and integrated strategy to prevent and control chronic non-communicable diseases among nurses. This should include a multi-sectorial approach at all levels, including at policy and implementation levels.
- Actions to prevent chronic diseases should include encouraging physical activities and structured wellness programmes at workplaces and advocacy interventions to change the perceptions of policy makers and the public about the risk factors and their control.

Summary

This study has shown that there are significant associations between selected socio-demographic characteristics, eating habits and alcohol intake of nurses. In addition, the results also demonstrated that socio-demographic, eating habits and anthropometric variables have an impact on the BMI of professional, enrolled and auxiliary nurses.

Wellness programmes must encompass a holistic approach which not only looks at encouraging staff to do physical activity but also encourages staff to eat healthy foods and drink only those beverages that promote good health.

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8. Appendices
Appendix A: Approval of Ethics Letter of the North-West University

NORTH-WEST UNIVERSITY
YUNIBESITI YA BOKONE-BOPHIRIMA
NOORDWES UNIVERSITEIT

Private Bag X6001, Potchefstroom
South Africa 2520

Tel: (018) 299-4900
Faks: (018) 299-4910
Web: http://www.nwu.ac.za

Ethics Committee
Tel +27 18 299 4850
Fax +27 18 293 5329
Email Ethics@nwu.ac.za

ETHICS APPROVAL OF PROJECT

This is to certify that the next project was approved by the NWU Ethics Committee:

Project title : Non-communicable diseases and Physical activities and quality of life across different populations in the North-West Province.
Project leader: Prof. U Useh
Ethics number: **NWU-00014-12-A9**

Expiry date: 2017/03/07

The Ethics Committee would like to remain at your service as scientist and researcher, and wishes you well with your project. Please do not hesitate to contact the Ethics Committee for any further enquiries or requests for assistance

The formal Ethics approval certificate will be sent to you as soon as possible.

Yours sincerely

Me.Marietjie Halgryn
NWU Ethics Secretariate

Appendix B: Approval of Ethics Letter of the Department of Health

health
Department of
Health
North West Province
REPUBLIC OF SOUTH AFRICA

Lichtenburg road corner
Danville Mafikeng
Private Bag X2031
Mafikeng 2735

Tel (018) 383 2005 x 1095
ebotse@nwpg.gov.za
www.nwpg.gov.za/health

MAFIKENG PROVINCIAL HOSPITAL

To: Ms Betty Ellen Phetoe

From: Acting CEO

Date; 16 May 2012

Topic: Requested to conduct Research on Non- Communicable Diseases Amongst nurses in a rural community of the North West Province of South Africa.

Your request with regard to the above topic was received and acknowledged, you are informed that an approval has been granted.

You are advised to make further arrangements with the office of Mrs. Moromane (Deputy Director Nursing).

Hope that you will accumulate the necessary information for your Research.

Regards

16/05/2012

Acting CEO; Mr R.L Lebotse

Appendix C: Motivation for Change of Research Topic

NORTH WEST UNIVERSITY
YUNIBESITI YA BOKONE BOPHIRIMA
NOORDWES UNIVERSITEIT
MAFIKENG CAMPUS

Private Bag X2046, Mmabatho
South Africa 2735

Tel +2718 389-2111
Fax +2718 392-5775
Web http://www.nwu.ac.za

TO: Policy Planning, Research Monitoring and Evaluation

FROM: Prof Useh and Ms B E Phetoe

DATE: 07 April 2014

SUBJECT: MOTIVATION FOR CHANGE OF RESEARCH TOPIC

This is to confirm that the Principal investigator Ms B E Phetoe and her supervisor Prof Useh agreed on changing of research title to read as follows -

Non communicable diseases amongst nurses in a rural area of North West Province of South Africa, instead of the initial one – Non communicable disease amongst nurses in the peri-urban area of North West Province of South Africa

Regards

PROF U. USEH
SUPERVISOR

MS B.E. PHETOE
STUDENT

Appendix D: Approval of Ethics of amended Research Topic

health
Department of
Health
North West Province
REPUBLIC OF SOUTH AFRICA

3801 First Street
New Office Park
MAH KENG 2735

Enq Keitumetse Shogwe
kshogwe@nwpg.gov.za
www.nwhealth.gov.za

POLICY, PLANNING, RESEARCH, MONITORING AND EVALUATION

To : **Ms B.E Phetoe**

From : **Policy, Planning, Research, Monitoring & Evaluation**

Subject : **Approval of Amended Research Topic- Non communicable diseases amongst nurses in a Rural Area of North West Province of South Africa.**

Purpose

To inform the researcher that permission of changing the research topic from **Prevalence of obesity, hypertension, diabetes mellitus amongst nurses in North West Province of South Africa** to **Non communicable diseases amongst nurses in a Rural Area of North West Province of South Africa** has been granted by the North West Department of Health. The researcher is expected to arrange in advance with the chosen districts or facilities, and issue this letter as prove that permission has been granted by the provincial office.

Upon completion, the department expects to receive a final research report from the researcher.

Kindest regards

Acting Director: PPRM&E
Mr. B Redlinghys

Date

DEPARTMENT OF HEALTH
PRIVATE BAG X2069
2014 -04- 17
SUPERINTENDENT GENERAL

1

Healthy Living for All

Appendix E: Letter of Approval to Conduct the Research Project in the Barolong BooraTshidi Area

Barolong Boora Tshidi Traditional Council

Private Bag X001
Ratshidi
2739
Mahikeng

Fax.: (018) 384 1662
Stand No :S25°52'35"E25°36'58"
Email:jkmontshioa@telkomsa.net
Website:www.barolongbooratshidi co.za

Namane Tsa Tholo

The Secretary
Denosa

Attention : Ms B.E. Pheto E. (Project Facilitator)

Dear Madam.

RE : REQUISITION TO CONDUCT THE RE-SEARCH PROJECT IN THE BAROLONG BOORA TSHIDI AREA.

Your letter dated 02nd May 2012 refers :

The Barolong Boora Tshidi Traditional Council hereby grants your organisation (Denosa) permission to conduct the research project in our village as requested.

Regards

Public Relation Officer

.....

SOLOMON RASENTI MOLEMA.

Appendix F: Approval letter from the Hospital Management to Conduct Research amongst Nurses

health
Department of
Health
North West Province
REPUBLIC OF SOUTH AFRICA

Lichtenburg Road corner
Danville Mafikeng
Private Bag X2031
Mafikeng, 2735

Tel (018) 383 2005 x 1065
Fax (018) 383 2005
www.nwpg.gov.za/health

MAFIKENG PROVINCIAL HOSPITAL

To: Ms Betty Ellen Phetoe

From: Acting CEO

Date; 16 May 2012

Topic; Requested to conduct Research on Non- Communicable Diseases Amongst nurses in a rural community of the North West Province of South Africa.

Your request with regard to the above topic was received and acknowledged, you are informed that an approval has been granted

You are advised to make further arrangements with the office of Mrs. Moromane (Deputy Director Nursing).

Hope that you will accumulate the necessary information for your Research.

Regards

16/05/2012

Acting CEO; Mr R.L Lebotse

Appendix G: Questionnaire

Section A: Demographic Information:

1.1 Age (years) _____

1.2 Sex: Male_____ Female_____

1.3 Marital status:

Single _____

Married _____

Divorced _____

1.4 Race (please tick one)

1 .African _____

2. White _____

3. Asian _____

4. Colored _____

1.5. Highest Qualification (please tick one)

1.5.1 Doctoral degree _____

1.5.2 Master's degree _____

1.5.3. Bachelor of Nursing Science _____

1.5.4. Diploma in Nursing Sciences _____

1.5.5. Certificate as a professional nurse_____

1.5.6 Others (Please specify) _____

1.6. Years of working experience _____

1.7. Income (monthly) ZAR_____

1.8 Job and work descriptions

1.8.1 Job description/ Role: (e.g. Professional Nurse)

_____

1.8.2. Work Specification (e.g. Unit Manager, Ward Manager)

_____

1.8.3. Work station: e.g. Wellness clinic, outpatient, obstetrics and gynecology ward)

_____

1.8.4. Nature of work (e.g. deliveries, sedentary, involves lifting and transfers, purely supervision, cleaning etc.)

_____

_____

_____

1.9. Residence

1.9.1. Where do you live? (Specify location/ or unit)

_____

1.9.2. Estimated distance to place of work

_____

1.9.2. Mode of transport to and from work daily (mode of transport e.g. Cycle, donkey, Taxi, walk, own car etc.)

_____

_____

_____

1.10. Home assistance

1.10.1. Do you have a house help? Yes _____ No _____

1.10.2. The role of your helper

_____

_____

_____

_____

_____

1.11. History of any chronic disease? Yes_____ No _____

1.11.1 If yes please specify _____

Section B: Physical Activity and my Job

2.1 Do you participate in physical activities?

Yes _____No _____

2.2 If yes, please describe type, duration, frequency, intensity

_____

_____

_____

_____

2.3 If No Please provide reason(s)

_____

_____

_____

_____

_____

_____

_____

2.4. Do you do gardening?

Yes _____ No _____

2.5. If yes please give reason(s)

_____

_____

_____

_____

2.6. If no please give reason (s)

_____

_____

_____

_____

_____

3. Section C: Dietary and smoking Habit

3.1 Are you are vegetarian? Yes _____ No _____

3.2. Please tick one or more preferences?

1. Beef _____
2. Chicken _____
3. Vegetables _____
4. All of the above_____

3.3. How often do you eat beef?

1. Once a week
2. Twice a week
3. Thrice and more
4. Never

3.4 How often do you eat chicken?

1. Once a week
2. Twice a week
3. Thrice and more
4. Never

3.5 How many glasses of water do you drink daily?

1. 2 glasses
2. 4 glasses
3. 6 glasses
4. 8 glasses and more

3.6 How often do you drink fruit juice (such as apple, orange or grape)?

1. Once a week
2. Twice a week
3. Thrice and more
4. Never

3.7 In the past seven days how often have you eaten vegetables?

1. Once a week
2. Twice a week
3. Three and more
4. Never

3.8 How often do you eat fried food?

1. Once a week
2. Twice a week
3. Three and more
4. Never

3.9. Do you drink alcohol beverages?

Yes _____ No _____

3.10. If yes what are your preferences?

1. Beer _____
2. Brandy _____
3. Spirit _____
4. Whisky _____
5. All of the above_____

3.11. How often do you drink weekly?

1. One bottle
2. Two bottles
3. Three bottles
4. If more- specify

3.12. Do you smoke?

Yes _____No _____

3.13. If yes, how old were you when you started to smoke? _____

3.14. How many cigarettes do you smoke per day? _____

4. Section D: Anthropometry measurements

Height/ m _____

Body weight/ kg _____

BMI _____

Skin fold measurements _____

Waist/cm _____

Hip/cm _____

Waist -to- Hip ratio _____

Ankle circumference/cm L_____ R_____

Knee circumference/cm L_____R_____

Shoulder measurements/ cm _____

Section E: Non-communicable diseases parameters

Blood pressure_____

Blood glucose _____

Section F: Perception of Self-Image and overweight (Please tick as appropriate response)

Items	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
An African man should be endowed with weight (big belly)					
An African woman should be endowed with weight (fat and rounded)					
I would want to add a bit more					
My partner likes me this way					
If I am slim I might be mistaken for being unwell by everyone					

Thank you

Appendix H: Data Sheet and Consent Form

Data Collection Sheet

Dear Participant,

You are invited to voluntarily participate in this study titled: **Factors contributing to Non-Communicable Diseases amongs tNurses in a selected rural and peri-urban community of North West Province of South Africa.** This study is in partialfulfilment of therequirement of M.Sc. degree in NursingSciences at theNorth-West University, Mafikeng Campus. All responses wil lbe treated with the highest level of confidentiality. You may withdraw from participating at anystage of this study without being prejudiced.

You will be required to sign a separate consent form prior toparticipation in this study.

Thank you