

**KNOWLEDGE, ATTITUDES, AND PRACTICES OF NURSES REGARDING
OBESITY IN PRIVATE HEALTHCARE INSTITUTIONS IN OSHANA REGION,
NAMIBIA**

By

PERSEVERANCE MOYO



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DECLARATION

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ABSTRACT

Background:

The prevalence of obesity has been steeply rising both in developed and developing countries, regardless of the attention which is being channelled towards it. Since this increase in obesity rate is leading to an increase in morbidity rate, new innovative treatments and care delivery strategies are needed. Nurses across the globe need to be equipped with strategies on how to address this growing health problem. The aim of study was to determine the levels of knowledge, attitudes, and practices of nurses regarding obesity in private healthcare institutions in the Oshana region, Namibia.

Objectives:

The objectives were to measure the levels of knowledge, attitude, and practices of nurses; to determine if there was an association between nurses' knowledge, attitude, and practice scores; if there was an association between knowledge levels and their socio-demographic characteristics; and to determine strategies nurses' thought might improve their knowledge, attitudes, and practices, regarding obesity at private healthcare institutions in Oshana region, Namibia.

Methods:

A quantitative cross-sectional design was used for the study. A proportional stratified random sampling method was used to select 250 participants for the study. The data were collected using a self-administered questionnaire. SPSS version 27 was used to analyse the data. Pearson's correlation test, Chi-square tests and logistic regression were used to determine associations between knowledge level and other variables.

Results:

The participants' response rate was 100%. More than a third of the participants had good knowledge ($n=97$; 39%), more than two-fifths had a good attitude ($n=112$; 44.8%) and more than a third had good practices ($n=96$; 38.4%). There was a statistically significant strong positive correlation between knowledge and attitude scores, knowledge and practice scores and attitude and practice scores ($r=0.812$, $r=0.812$ and $r=0.834$, respectively). Chi-square tests showed statistically significant associations between knowledge level and age, occupation, and educational level ($p<0.01$). Age groups 20-25 years and 26-30 years were less likely to have good knowledge compared to the age group 46-45 years (crude odds ratio (OR) = 0.31, 95% CI [0.12

– 0.79] and OR = 0.37, 95% CI [0.14 – 0.92], respectively). Enrolled nurses were less likely to have good knowledge compared to nurse managers (OR = 0.15, 95% CI [0.06 – 0.41]). Participants with diplomas were less likely to have good knowledge compared to those with masters and doctorate degrees (OR = 0.11, 95% CI [0.03 – 0.43]). More than 70% of the participants strongly agreed knowing their BMI, that their experience in treating obese patients and their current knowledge of obesity might improve their knowledge, attitudes, and practices regarding obesity. Furthermore, more than 70% of the participants strongly agreed training on obesity and rewarding nurses who treat obese patients appropriately might improve their knowledge, attitudes and practices regarding obesity.

Conclusion:

The levels of knowledge, attitudes, and practices regarding obesity among nurses were low. It was, therefore, recommended that the institutions should introduce obesity training and obesity mentorship programmes for their nurses, as well as offering rewards to nurses who appropriately manage obese patients.

Keywords:

Knowledge, attitude, practices, nurses, obesity

OPSOMMING

Agtergrond:

Die voorkoms van vetsug het skerp toegeneem in beide ontwikkelde en ontwikkelende lande, ongeag die aandag wat daarheen gekanaliseer word. Aangesien hierdie toename in vetsugsyfer lei tot 'n toename in die morbiditeitskoers, is nuwe innoverende behandelings en sorglewering strategiese nodig. Verpleegsters regoor die wêreld moet toegerus word met strategiese om hierdie groeiende gesondheidsprobleem aan te spreek. Hierdie studie het dus ten doel gehad om die vlakke van kennis, houdings en praktyke van verpleegsters rakende vetsug in private gesondheidsorginstellings in die Oshana-streek, Namibië, te bepaal.

Doelwitte:

Die doelwitte was om die vlakke van kennis, houding en praktyke van verpleegsters te meet; om te bepaal of daar 'n verband was tussen verpleegsters se kennis, houding en praktyk tellings; om te bepaal of daar 'n verband was tussen kennisvlakke en hul sosio-demografiese kenmerke; en om strategiese te bepaal wat verpleegsters se denke hul kennis, houdings en praktyke ten opsigte van vetsug by private gesondheidsorginstellings in Oshana-streek, Namibië, kan verbeter.

Metodes:

Die studie het 'n kwantitatiewe deursnee-ontwerp gebruik. 'n Proporsionele gestratifiseerde ewekansige steekproefmetode is gebruik om 250 deelnemers vir die studie te selekteer. Die data is ingesamel met behulp van 'n self-gedadministreerde vraelys. SPSS weergawe 27 is gebruik om die data te ontleed. Pearson se korrelasietoets, Chi-kwadraattoetse en logistiese regressie is gebruik om assosiasies tussen kennisvlak en ander veranderlikes te bepaal.

Resultate:

Die deelnemers se responskoers was 100%. Meer as 'n derde van die deelnemers het goeie kennis gehad ($n=97$; 39%), meer as twee vyfdes het 'n goeie houding gehad ($n=112$; 44.8%), en meer as 'n derde het goeie praktyke gehad ($n=96$; 38,4%). Daar was 'n beduidende sterk positiewe korrelasie tussen kennis- en houdingtellings, kennis- en praktyktellings, en houding- en praktyktellings ($r=0.812$, $r=0.812$ en $r=0.834$, onderskeidelik). Chi-kwadraattoetse het verbande tussen kennisvlak en ouderdom, beroep en opvoedkundige vlak getoon ($p<0.01$). Ouderdomsgroepe 20-25

jaar en 26-30 jaar was minder geneig om goeie kennis te hê in vergelyking met die ouderdomsgroep 46-45 jaar (ru-kansverhouding (OR) = 0.31, 95% CI [0.12 - 0.79] en OR = 0.37, 95% CI [0.14 – 0.92] onderskeidelik). Ingeskrewe verpleegkundiges was minder geneig om goeie kennis te hê in vergelyking met verpleegbestuurders (OR = 0.15, 95% CI [0.06 – 0.41]). Deelnemers met diplomas was minder geneig om goeie kennis te hê in vergelyking met diegene met meesters- en doktorsgrade (OR = 0.11, 95% CI [0.03 – 0.43]). Meer as 70% van die deelnemers het sterk saamgestem dat hulle kennis van hul BMI, hul ervaring in die behandeling van vetsugtige pasiënte en hul huidige kennis van vetsug hul kennis, houdings en praktyke rakende vetsug kan verbeter. Verder het meer as 70% van die deelnemers sterk saamgestem dat opleiding oor vetsug en die beloning van verpleegkundiges wat vetsugtige pasiënte toepaslik behandel hul kennis, houdings en praktyke rakende vetsug kan verbeter.

Slotson:

Die vlakke van kennis, houdings en praktyke rakende vetsug onder verpleegkundiges was laag. Dit is aanbeveel dat die instellings vetsugopleiding en vetsugmentorskapprogramme vir hul verpleegsters moet instel, asook om belonings aan verpleegkundiges te bied wat vetsugtige pasiënte toepaslik bestuur.

Sleutelwoorde:

Kennis, houding, praktyke, verpleegsters, vetsug

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ABBREVIATIONS

BMI – Body Mass Index

HREC – Health Research Ethics Committee

MCO – Medical Centre Oshakati

WHO – World Health Organization

CHAPTER ONE

FOUNDATION OF THE STUDY

1.1 Introduction

Obesity is a severe condition and a growing burden of disease, as well as a highly neglected public health crisis across the world (Agha & Agha, 2017:1). The prevalence of obesity has been steeply rising both in developed and developing countries, regardless of the attention which is being channelled towards it (World Health Organization (WHO), 2015:1). Hruby and Hu (2015:673) reported more than 85% of adults in the United States of America are expected to be obese by the year 2030. Furthermore, obesity among the male adult population in China increased four-fold between 1993 and 2009. Agha and Agha (2017:1) reported that European countries such as France, Spain, Sweden and Switzerland observed an increase in obesity by about 30% in the previous decade.

Amugsi (2018:1-3) revealed a significant increase in obesity in African countries over the past 15 years. Egypt had a 13% increase in obesity, whereas Ghana had a 65% increase. Furthermore, obesity prevalence doubled in Kenya, Benin, Niger, Rwanda, Ivory Coast and Uganda, while Zambia, Burkina Faso, Mali, Malawi and Tanzania experienced a three-fold increase.

Since the prevalence of obesity has been increasing and leading to an increased morbidity rate, new innovative treatments and care delivery strategies are needed. Globally, nurses need to be equipped with strategies to address this growing health problem. Nurses tend to focus on measuring vital observations such as temperature, pulse, blood pressure, oxygen saturation, weight, but rarely focus on measuring the Body Mass Index (BMI) (Hruby & Hu, 2015:673).

To develop new strategies to address obesity, the nurses' knowledge, attitudes and practices need to be determined. Therefore, this research study focused on determining the nurses' knowledge, attitudes and practices regarding obesity in private healthcare institutions in the Oshana region, Namibia.

1.2 Significance of the problem

According to a study conducted in Brazil by Teixeira, Pias-Ribeiro and Pinho da Costa Maia (2012:256), there is a bridge between the knowledge gained at nurses'

respective schools about obesity and the practices regarding obesity. Furthermore, medical training largely occurs under biomedical influence which might contribute to the difficulty nurses face as they deal with a behavioural disease, whose main mode of treatment lies mainly in behavioural change.

The role of the nurses is important in working effectively with obese patients to promote healthy lifestyle behaviours to improve their physical and mental wellbeing. If obesity is not managed appropriately, it might lead to significant clinical and economical problems to the obese patients. However, if nurses demonstrate good attitudes and practices regarding obesity, obese patients may have confidence in seeking assistance at healthcare institutions. The changes in attitudes and practices of nurses might assist in addressing the United Nations sustainable development goal 3 to ensure healthy lives and promote well-being for all people at all ages specifically in Namibia (United Nations Development Programme, 2022:3).

1.3 Rationale

Obesity is a complex disease and is largely preventable. If the current trends of the increase in obesity persist, 20% of the world's adult population is expected to be obese by 2030 (Hruby & Hu, 2015:673). In addition, obesity increases the risk of non-communicable diseases such as depression, type 2 diabetes, cardiovascular diseases and some cancers which might increase the global morbidity and mortality rates (Hruby & Hu, 2015:673). To decrease the prevalence of obesity, nurses should have adequate knowledge, good attitudes and practices regarding obesity (Hruby & Hu, 2015:673).

During in-service obesity training sessions, the researcher observed that some of her colleagues did not have sufficient knowledge regarding obesity. The researcher also observed that the majority of her colleagues did not measure the BMI of visibly obese patients. After a thorough literature search, the researcher observed that studies on knowledge, attitudes and practices of nurses regarding obesity were conducted in Windhoek and the southern parts of Namibia.

Limited literature was available on the topic in the northern part of Namibia. The aim of the study was to determine the knowledge, attitudes and practices of nurses regarding obesity in the northern part of Namibia. The findings from this study might assist hospital managers and policy-makers to develop and implement policies, as

well as strategies to improve the care of obese patients, who, according to Galiwango (2021:1), sometimes felt being discriminated against.

1.4 Problem statement

High levels of obesity knowledge, good practice and good attitudes towards obese patients among nurses are important at healthcare institutions and the healthcare system in Namibia. This may ensure obese patients receive the health care needed without discrimination and/or stigmatisation. Different factors affect obesity knowledge, practices and attitudes among nurses. These factors include the nurses' weight, their beliefs about obesity and how the communities in which they stay perceive people who are obese (Somannavar & Appajigol, 2014:401).

Galiwango (2021:1) indicated that nurses at Medical Centre Oshakati (MCO) rarely determined their patients' BMI. Without knowing the levels of knowledge, attitudes and practices of nurses about obesity, obese patients might have remained dissatisfied with the services they received at the healthcare institutions. Clients' dissatisfaction with services due to nurses' lack of obesity knowledge and poor attitudes and practices might have resulted in the loss of clients for the healthcare institutions, suboptimal care of the obese patients, as well as patients mistrusting the healthcare institutions.

The researcher did not find any research study that was conducted in the northern parts of Namibia to determine the knowledge, attitudes and practices of nurses regarding obesity. Research was therefore needed to determine the levels of knowledge, attitudes and practices of nurses regarding obesity in private healthcare institutions in the Oshana region of Namibia. Furthermore, if the nurses' levels of knowledge, attitudes and practices were determined and appropriately addressed, it might positively influence obesity policy and strategy formulation in the Oshana region of Namibia.

1.5 Research question

What are the levels of knowledge, attitudes, and practices of nurses regarding obesity in private healthcare institutions in the Oshana region, Namibia?

1.6 Aim of the study

The study aimed to determine the levels of knowledge, attitudes, and practices of nurses regarding obesity in private healthcare institutions in the Oshana region, Namibia.

1.7 Research objectives

Research objectives are the outcomes a researcher aims to achieve by conducting research (Polit & Beck, 2017:69).

The objectives of this study were to determine the:

- Level of knowledge of nurses regarding obesity at private healthcare institutions in the Oshana region, Namibia
- Attitudes of nurses regarding obesity at private healthcare institutions in the Oshana region, Namibia
- Practices of nurses regarding obesity at private healthcare institutions in the Oshana region, Namibia
- Association between nurses' knowledge scores and attitude scores, knowledge scores and practice scores and attitude scores and practice scores regarding obesity at private healthcare institutions in the Oshana region, Namibia
- Association between knowledge levels regarding obesity among nurses and their socio-demographic characteristics at private healthcare institutions in the Oshana region, Namibia
- Strategies which may improve the nurses' knowledge, attitudes, and practices regarding obesity at private healthcare institutions in the Oshana region, Namibia.

1.8 Conceptual framework

Theoretical and conceptual frameworks make research findings more meaningful and acceptable to the theoretical constructs in a research field. A conceptual framework is a visual representation of the main theoretical concepts of a study. The conceptual framework is usually presented in the form of a graphic or schematic diagram depicting the key concepts and their relationships. It presents an integrated way of looking at a problem being studied. Furthermore, it describes the relationship between the main concepts of a study (Adom, Hussein & Agyem, 2018:439). Social Cognitive Theory was used to guide this research study.

The Social Cognitive Theory was proposed by Albert Bandura in 1986 and focused on the understanding of individuals' health behaviours. In addition, the Social Cognitive Theory assumes people and their environments interact continuously. Furthermore, it also has a major effect on interventions for behavioural change which addresses both

the psychosocial factors that determine health behaviour and strategies to promote behavioural change.

Human behaviour, on the other hand, is a three-way, dynamic, reciprocal theory in which personal belief factors, environmental influences and behaviour continuously interact. The principle of human behaviour emphasises that people learn not only through their own experiences, but also through observing others and observing the results of their actions (Rejeski & Fanning, 2019:1008-1009).

According to Glanz, Rimer and Viswanath (2008:171), concepts of the Social Cognitive Theory include:

- Reciprocal determinism: This refers to behavioural changes resulting from interaction between a person and the environment, and this change is bidirectional.
- Behavioural capacity: This refers to the need for a person to have knowledge and skills to influence behaviour.
- Expectations: This refers to beliefs about the likely results of action.
- Self-efficacy: This refers to confidence in the ability to act and persist in the action.
- Observational learning: This refers to beliefs based on observing others like self and/or seeing physical results.
- Reinforcement: This refers to responses to a person's behaviour that increase or decrease the chances of recurrence of the behaviour.

In this study, Social Cognitive Theory was applied as follows:

Nurses' knowledge, attitudes and practices regarding obesity are influenced by several factors. The factors mentioned by Pearce, Rychetkin, Wutzke and Wilson (2019:3-5) influencing knowledge, attitudes and practices of nurses regarding obesity include organisational factors, patient factors and nurses' personal factors. To change the harmful attitudes and practices of nurses regarding obesity, they should be educated on the negative impact of their attitudes and practices regarding obesity. If the nurses are not informed about the negative impact of their attitudes and practices, they may not make any effort to change (Dietz, Baur, Puhl, Taveras, Vaay & Kapelman, 2015:2521-2522).

Furthermore, unless nurses believe they can improve their knowledge, attitudes and practices regarding obesity, they may lack the desire to change their attitudes and practices regarding obesity. Nurses' attitudes and practices regarding obesity are also affected by the outcomes they expect from their actions. Any financial or psychological gains nurses expect from their attitudes and practices regarding obesity are likely to reinforce their attitudes and practices, while expected losses are likely to inhibit their attitudes and practices regarding obesity (Seitovirta, Vehvilainen-Julkunen, Mitronen, De Gieter & Kvist, 2017:1049).

Figure 1 shows a graphical presentation of the different factors that influence obesity knowledge, attitudes and practices of nurses and how knowledge, attitudes and practices are interrelated.

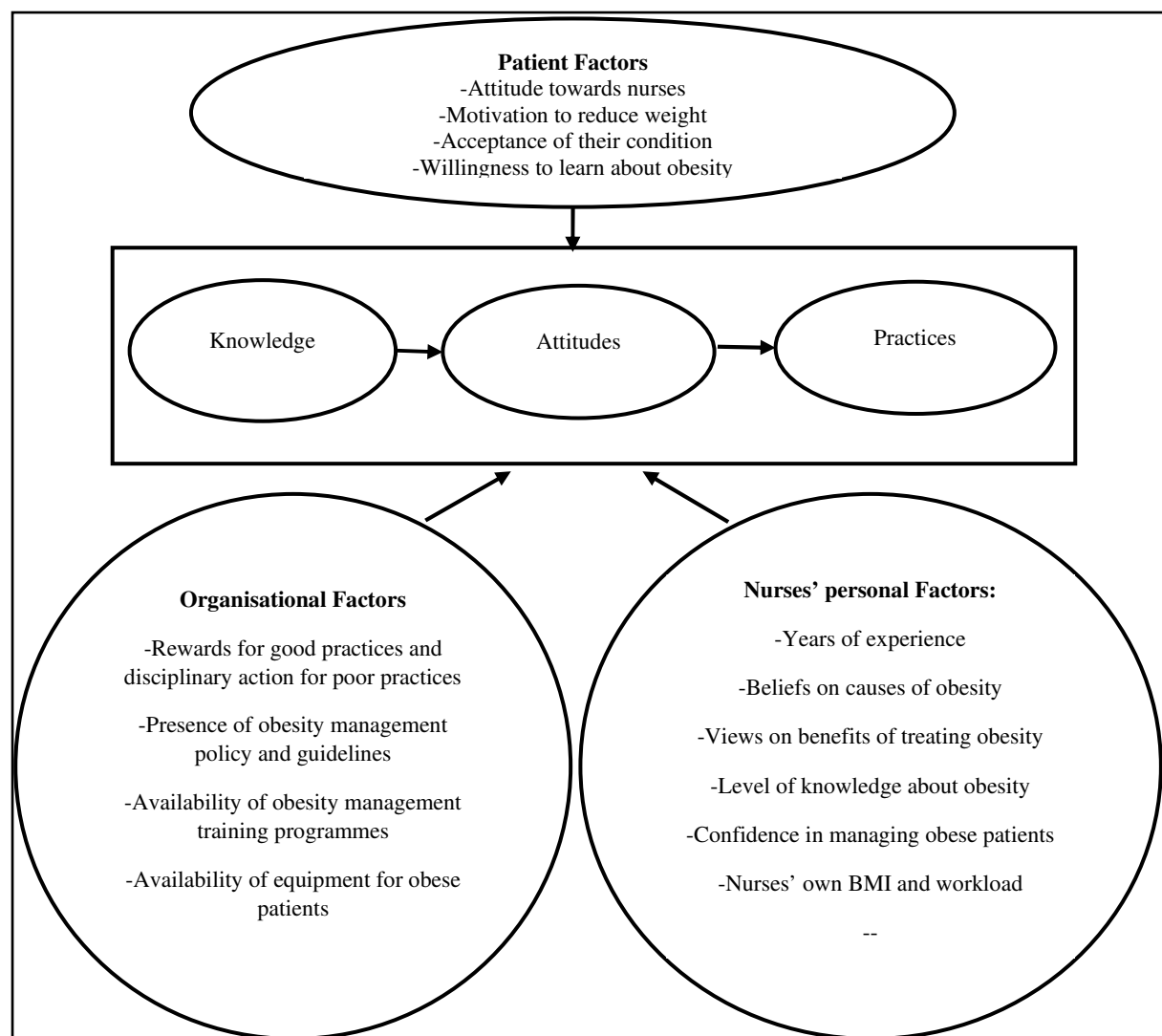


Figure 1: Conceptual Framework for knowledge, attitudes, and practices of nurses on obesity

An interplay of organisational factors, patient factors and nurses' personal factors influences the knowledge of nurses regarding obesity, which in turn affects their attitudes. Attitudes affect the practices of nurses regarding obesity. Knowing the knowledge levels of nurses regarding obesity may therefore help determine their attitudes and practices regarding obesity (Wynn, Islam, Thomas & Myint, 2018:22).

The conceptual framework was applied to determine how knowledge, attitudes and practices of nurses regarding obesity are related in terms of patient factors, organisational factors and nurses' personal factors briefly discussed in the following paragraphs.

1.8.1 Patient factors

Patient factors in the conceptual framework were derived from the literature review on obesity. Patient factors influencing the knowledge, attitudes and practices of nurses regarding obesity are the patient's motivation to reduce weight, their attitudes toward nurses, their acceptance of their condition and their willingness to learn more about obesity (Bucher Della Torre, Courvoisier, Saldarriaga, Martin & Farpour-Lambert, 2018:122). The patient factors are further explained in section 2.10.

1.8.2 Organisational factors

There are several organisational factors influencing the knowledge, attitudes and practices of nurses regarding obesity included in the conceptual framework. Some organisational factors influencing knowledge, attitudes and practices of nurses regarding obesity, include the availability of guidelines for the treatment of obese patients, availability of hospital equipment for obese patients and rewards for nurses who manage obese patients appropriately (Pearce *et al.*, 2019:14). The organisational factors are further explained in section 2.11.

1.8.3 Nurses' personal factors

The nurses' personal factors included in the conceptual framework were used to explain how they affected the nurses' knowledge, attitudes and practices regarding obesity. Some nurses' personal factors include their own BMI, workload, years of experience, beliefs regarding causes of obesity, views on benefits of treating obesity and confidence in treating obese patients (WHO, 2015:177). Nurses' personal factors are further explained in section 2.9.

1.9 Research methodology

A quantitative research method was used in this study. A detailed discussion of the methodology is presented in Chapter Three.

1.9.1 Research design

A quantitative research design applying a cross-sectional survey was used. The quantitative research design was chosen as it was expected to produce reliable and objective findings which could be replicated (Antwi & Hamza, 2015:220).

1.9.2 Study settings

The study was conducted at four private healthcare institutions in the Oshana region, Namibia. The study settings are discussed in detail in Chapter Three, Section 3.2.

1.9.3 Population and sampling

The study population included all nurses working at the four chosen healthcare institutions. A proportional stratified random sampling method was used to select 250 participants.

1.9.4 Research instrument

The researcher used a self-administered questionnaire that was adapted from the one used by Somannavar and Appajigol (2014:400-403) in their study on knowledge, attitudes and practices of public sector primary healthcare physicians in India. Permission was granted to the researcher to utilise the instrument. The questionnaire was available only in English. The Likert scale questionnaire consisted of seven sections.

1.9.5 Pilot study

A pilot study was conducted at another healthcare institution in the Oshana region that did not form part of the main study. Twenty-three nurses participated in the pilot study.

1.9.6 Reliability of the questionnaire

A test-retest method for stability and Cronbach's alpha for internal consistency were used to determine the reliability of the questionnaire.

1.9.7 Validity of the questionnaire

Content and face validity of the questionnaire used were ensured by consulting experts in the field of obesity, the research supervisor and potential participants for the study.

1.9.8 Data collection

The researcher and three research assistants met with all the participants at the healthcare institutions in groups in their respective wards concurrently. Data collection took place at times determined by the various unit managers of the healthcare institutions. The nurses who agreed to take part in the study were requested to sign an informed consent form.

1.9.9 Data analysis

The data were analysed using IBM Statistical Package for Social Sciences (SPSS) version 27. According to Polit and Beck (2017:356), descriptive statistics include percentages and frequencies. These descriptive statistics were used in the analysis of the data and the data were presented in the form of tables, charts, and graphs.

Pearson's correlation coefficient was calculated to determine associations between numerical variables, while Chi-square tests and logistic regression were used to determine associations between the knowledge level and socio-demographic characteristics of participants. The responses to the open-ended question were analysed using the thematic analysis method (Polit & Beck, 2017:539).

1.10 Ethical considerations

The researcher obtained ethical approval from Stellenbosch University's Health Research Ethics Committee (HREC), as well as institutional permissions from the directors of the private healthcare institutions where the study was conducted. The HREC ethical clearance reference number is S21/06/103. See Appendix 5 for Stellenbosch University's HREC ethical clearance letter and Appendices 7 – 10 for the institutional study setting approvals.

The participants in a research study can be used as a source of data. It is the responsibility of the researcher to ensure no harm is caused to the participants during the research study. Researchers should always uphold the autonomy of the participants, maximise benefits and reduce the harm that may arise from the study (Yip, Han & Sng, 2016:686). The researcher applied the ethical principles of respect for persons, justice, beneficence, and non-maleficence in this study in the following discussion.

1.10.1 Respect for persons

According to Ehrlich and Joubert (2014:37), research participants should agree to take part in a study freely, without intimidation, undue inducement, or deception. All the participants in the study were autonomous persons who could responsibly make their own decisions since they were professional nurses. The researcher explained to all potential participants that participation was voluntary and those who chose not to take part in the study could withdraw freely.

1.10.2 Justice

Polit and Beck (2017:141) mentioned that justice in research involves selecting participants based on the requirements of the study and not on a particular group's vulnerability. Although the researcher is an employee at MCO, one of the healthcare institutions where the study was conducted, she was not in a position of authority that would influence the participants' responses. The researcher also used a research assistant to collect data from the participants at MCO. Furthermore, all the potential participants at the selected healthcare institutions were given an equal opportunity to participate in the study through the random selection of the sample.

1.10.3 Beneficence and non-maleficence

The principle of beneficence refers to the promotion of the good of the study participants by the researchers. Human research should produce benefits for participants or other people in society (Polit & Beck, 2017:139). In this study, participants were expected to know their knowledge, attitudes, and practice levels regarding obesity. This information might help them realise their gaps in knowledge, attitudes, and practices regarding obesity. Participants were expected to work on the gaps which would improve their services and make them better nurses. Obese patients might also benefit from improved care at healthcare institutions.

The principle of non-maleficence stipulates that the researcher must avoid, prevent, or reduce unnecessary harm in studies that involve human beings (Polit & Beck, 2017:139). The researcher ensured the questionnaire did not contain sensitive questions. The researcher followed the coronavirus disease of 2019 (COVID-19) prevention protocols explained in Chapter Three, Section 3.8.5, to reduce the risk of transmission to the data collectors and the participants.

1.10.4 Informed consent

Informed consent is important in research as it safeguards the interests of participants. It ensures participants are provided enough information about a study before agreeing to participate (Ehrlich & Joubert, 2014:37).

The researcher and the research assistants explained the study details to all the study participants. Furthermore, the researcher and the research assistants provided all the potential participants with the study information letter. Those who decided to participate in the study were required to sign an informed consent form. See Appendix 1 for the information letter and the informed consent form used by the researcher in this study.

1.10.5 Confidentiality and privacy

Confidentiality in research ensures data provided by participants will be kept in strict confidence, while privacy ensures that participants have control over what they disclose to researchers (Polit & Beck, 2017:147).

The researcher protected the privacy and confidentiality of all participants by ensuring the questionnaires were anonymous. After completing the data analysis process, the data were kept on a password-protected computer by the researcher. The completed hardcopy questionnaires are kept in locked steel cabinets that only the researcher has access to. The collected data are kept for five years, after which they would be permanently deleted from the computer and the hardcopy questionnaires would be shredded.

1.11 Operational definitions

Body mass index: BMI is the weight of a participant divided by his/her height squared (kg/m^2). According to WHO (2015:176), the weight should be measured in kilograms while the height is measured in metres. BMI will be obtained by dividing the weight by the square of the height. In this study, BMI refers to the weight of a participant divided by his/her height squared.

Nurses' personal factors: These are individual nurse characteristics, behaviours, knowledge and attitudes that influence how they treat and relate to obese patients (Goad, Gleeson & Jackson, 2018:444). The same definition is applied in the study.

Obesity: WHO (2015:176) defines obesity as having BMI of 30 kg/m² or more. The same definition is applied in the study.

Organisational factors: They are operational attributes, processes, or conditions within an organisation like working hours, workload, remuneration and availability of policies that govern the work of nurses (Valaitis, Meagher-Stewart, Martin-Misener, Wong, MacDonald & O'Mara, 2018:2). The same definition is applied in the study.

Patient factors: According to Molina-Mula and Gallo-Estrada (2020:853), patient factors are characteristics, behaviours and attitudes of individual patients which they portray to nurses when seeking healthcare services. The same definition is applied in the study.

1.12 Duration of the study

The activities carried out to complete the study included proposal submission, data collection, data analysis and writing up the chapters for the thesis. Table 1 shows the activities carried out to complete the study, as well as the duration of each activity.

Table 1: Study activities and their durations

Activity	Duration of Activity	Month/Dates
Proposal submission to HREC	-	07/05/2021
Chapter One	1 year and 2 weeks	15/05/2021 – 30/05/2022
Chapter Two	11 months	01/06/2021– 30/05/2022
Pilot test	2 days	28/09/2021 & 06/10/2021
Training of research assistants	2 days	07– 08/10/2021
Chapter Three	7 months and 3 weeks	07/10/2021– 30/05/2022
Data Collection	2 weeks	18 – 30/10/2021
Chapter Four	7 months	01/11/2021 – 30/05/2022
Chapter Five	5 months	01/01/2022 – 30/05/2022

The research proposal was submitted to Stellenbosch University's HREC on 7 May 2021. The ethics clearance was granted on 14 September 2021. Once institutional permissions were granted, a pilot test was conducted on 28 September and 6 October

2021. The pilot test was conducted twice to determine the reliability of the questionnaire using a test-retest method.

1.13 Format of the research

Chapter One: Foundation of the study

Chapter One contains the significance of the problem, the problem statement, aim and objectives of the study, the conceptual framework of the study and a summary of the methodology and ethical principles used in the study.

Chapter Two: Literature review

Chapter Two contains a review of the relevant literature drawn from previous studies that addressed the topic of factors influencing knowledge, attitudes, and practices of nurses regarding obesity.

Chapter Three: Methodology

Chapter Three contains discussions on the research methodology such as study design, sampling strategy, data collection tool, the data collection process, and data analysis of the study.

Chapter Four: Results

Chapter Four contains the results of the study.

Chapter Five: Discussion, conclusions, and recommendations

The results of the study are compared with the results of previous studies and conclusions and recommendations are presented in this chapter.

1.14 Significance of the study

Obesity is associated with increased morbidity and mortality because of its association with non-communicable diseases. To reduce the impact of obesity, obese patients should feel free to present their medical problems at healthcare institutions. This requires the nurses to have good attitudes and good practices toward the obese patients (Lobstein, 2015:78).

Limited literature about the knowledge, attitudes and practices of nurses are available in the northern part of Namibia. This study is therefore significant as it attempted to address the literature gap. The information gathered is expected to contribute towards the formulation of policies and strategies to improve knowledge, attitudes, and

practices of nurses regarding obesity. Improvement in the knowledge, attitudes, and practices of nurses regarding obesity is expected to enhance patient satisfaction with services at private healthcare institutions. In addition, patient satisfaction is expected to encourage obese patients to seek services at healthcare institutions, thereby reducing disease burden and improving their health statuses.

1.15 Conclusion

The prevalence of obesity has been steeply rising both in developed and developing countries. The researcher observed some of her colleagues working in a private healthcare institution in Namibia discriminating against obese patients. Furthermore, after a thorough literature search, she discovered that limited information could be found on the nurses' levels of knowledge, attitudes, and practices regarding obesity in the Oshana region in Namibia. Chapter One contains a brief overview of knowledge, attitudes, and practices of nurses regarding obesity. Furthermore, in Chapter One the ethical principles applicable to this study were discussed. Chapter Two will discuss the literature review of the study.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

Chapter One contains a description of the foundation of the study. The conceptual framework was applied to the study and the research design were briefly discussed.

This chapter contains the literature review of the study. The purpose of the literature review is to form the theoretical framework for the research and to specify where the study fits into the wider arguments. It validates the importance of one's research project against the backdrop of previous research conducted on the same topic (Jesson, Matheson & Lacey, 2012:26). A literature review is defined as a valuation of the body of research that addresses the research questions in the study, and it proposes hesitant solutions to the research under study. Furthermore, the literature review identifies the current knowledge about the research study topic, which helps in identifying questions about the study topic not answered by previous research studies (Polit & Beck, 2017:87).

The literature review of this study aimed to explain what is known about knowledge, attitudes, and practices regarding obesity among nurses, as well as to conceptualise variables used in the study. Chapter Two contains discussions on the literature search strategy, the definition of obesity, the prevalence of obesity, the clinical and economic problems related to obesity.

Furthermore, a review of studies conducted to determine the knowledge, attitudes, and practices of nurses regarding obesity and factors related to them, as well as strategies to reduce obesity are also discussed. The factors related to knowledge, attitudes and practices are divided into nurses' personal factors, patient factors and organisational factors.

2.2 Literature search strategy

Articles used in the literature review were searched from Google Scholar and PubMed. The articles chosen were published between 2011 and 2022 and were written in English. The researcher firstly searched using single keywords such as obesity, nurses, knowledge, attitudes, practices, and Namibia. This process was followed by combining the keywords using Boolean operators, for example, knowledge, nurses,

and obesity were combined using 'AND'. Using Boolean operators helped in expanding and delimiting the search. The operator 'AND' was used to retrieve articles that contained both terms, while the operator 'OR' was used to retrieve articles that contained either item. Truncation symbols were put at the end of a root word and wildcard symbols in the middle of a search term to allow for different spellings. The use of truncation symbols and wildcards expanded the search as it allowed for different forms of the root word to be included in the search. After identifying the relevant articles through reading their abstracts, references cited in the articles were used to find earlier studies on the topic. Recent articles compared to the ones identified in the initial search were retrieved using citation indexes.

2.3 Definition of obesity

Obesity, also referred to as corpulence or fatness, is the excessive accumulation of body fat usually caused by the consumption of more calories than the body can use (Rogers, Young & Lotha, 2021:1). WHO defines obesity as an abnormal or excessive fat accumulation that may impair health (WHO, 2015:176). Obesity is a chronic disease that results from an energy imbalance between calories consumed and calories expended (WHO, 2015:176).

Obesity is mostly measured using BMI, which is weight divided by height squared (kg/m^2). A person is classified as overweight if their BMI is between 25-29.9, obese if their BMI is between 30-39.9, while a BMI of 40 or more is classified as severely obese (WHO, 2015:176-177).

The amount of excess fat and its distribution in the body have implications for human health. BMI is considered to be a surrogate of the percentage of fat in the body, hence it is used to define obesity. However, it should be noted BMI is affected by several factors such as age, ethnicity and some chronic diseases, for example, cardiac and renal failure (Nuttall, 2015:122).

The use of BMI as a measurement tool of obesity has been debated as some scholars argued BMI is a score that does not objectively measure the amount of fat in the body. However, because of the association between BMI and morbidity and mortality, there is consensus among healthcare professionals despite its limitations, BMI is the simplest method for assessing obesity (Muller & Geisler, 2017:1256).

2.4 Prevalence of obesity

The worldwide prevalence of obesity has nearly tripled between 1975 and 2016. In 2016, 13% of the adult population was obese, while the prevalence rate of the 5-18 years age group rose from 4% in 1975 to 18% in 2016 (WHO, 2021:2-3). The prevalence rate of obesity increased globally between 1980 and 2013 to 27.5% for adults. These increases were observed in both developed and developing countries. However, the prevalence is generally higher in developed countries for all ages, mostly due to a lack of physical exercise and intake of unhealthy foods (Apovian, 2016:126-127).

In children, the rate of obesity increased from less than 5% to 47.1% between 1980 and 2013 (Apovian, 2016:126). Recent figures suggest more than 300 million children and adolescents between the ages of 5-19 years were obese during 2016 (Di Cesare, Soric, Biovet, Miranda, Bhutta, Stevens, Laxmaiah, Kengine & Bentham, 2019:63-64). Globally, the prevalence of obesity rose from 4.8% in 1990 to 5.9% in 2018 for under five years old children. The increase in obesity prevalence figures led to the endorsement of a “no increase in childhood obesity by 2025” by the WHO (Di Cesare *et al.*, 2019:63-64).

The prevalence of obesity rose significantly in many European countries between 1975 and 2016. In addition, the prevalence of obesity in Europe varied by country and sex. The sharp increase in prevalence was greater in adult males than in adult females. It ranged from 22.7% in Portugal to 29.3% in the United Kingdom among adult males and from 19.5% in Switzerland to 31.3% in the United Kingdom among adult females (Janssen, Bardoutsos & Vidra, 2020:517). However, there has been a recent slowing down of the increase in obesity in some European countries such as Finland, Greece and Spain, especially among adult females. The slowing down has been attributed to the introduction of taxes on unhealthy foods and beverages, which improved healthy eating habits. This slowing down has not been reported in other European countries like the United Kingdom and Switzerland (Janssen *et al.*, 2020:517).

In various African countries such as Uganda, Nigeria, Seychelles, Madagascar, South Africa and Zambia, the prevalence of obesity differs from country to country. In rural Nigeria, the prevalence of obesity in adults is 30% compared to 25.1% in Seychelles.

In South Africa, the prevalence of obesity is about 30%. Furthermore, the prevalence differs from district to district in South Africa, from 24.4% in the Mkhonto district to 45.7% in the Malaza district (Kengue, Echouffo-Tcheugui, Songwi & Mbanya, 2013:980-981). However, countries such as Madagascar has a 2.2% obesity rate whereas rural Uganda has 5%, which is much lower than in other African countries (Kengue *et al.*, 2013:980-981).

A study conducted in rural Karonga and urban Lilongwe in Malawi revealed an overall prevalence of 15.7%. Furthermore, the findings depicted differences according to sex, as well as rural versus urban residence. The prevalence among women was 7.1% in the rural area and 15.5% in the urban area, whereas in men the prevalence was 1.2% in the rural area and 2.8% in the urban area (Chilunga, Musicha, Tafatatha, Geis, Nyirenda, Grampin & Price, 2019:1856).

Limited literature was found on the national prevalence of obesity in Namibia. However, in one study conducted at a private clinic in Windhoek, 30% of the study population was obese (Ntumba, Kazembe & Zaire, 2013:1-2). Obesity remains under-recognised, underdiagnosed and undertreated in healthcare institutions as few studies are executed in primary healthcare institutions (Aleem, Lasky, Brooks & Batsis, 2015:408).

2.5 Risk factors for developing obesity

A risk factor is a variable associated with an increased chance of developing a disease (Ehrlich & Joubert, 2014:17). Some identified risk factors for obesity described by Swinburn, Caterson, Seidell and James (2012:93) include:

- **Sedentary lifestyle:** Sedentary lifestyle refers to a lifestyle that lacks physical activities. This type of lifestyle is common in urban dwellers. It is more common because of the use of machines to do physical jobs that used to be done by people. Furthermore, affordable second-hand cars are reducing distances travelled on foot by people.
- **Energy-dense food is affordable and easily accessible to many people.** In high-density suburbs in some countries, fruit and vegetable stalls are at selected places, whereas the energy-dense food vendors are easily accessible.
- **Massive marketing of energy-dense food.** Companies market energy-dense food intensely on various platforms, whereas healthy foods are not necessarily

marketed that intensely in some countries. Therefore, many individuals are more inclined to buy energy-dense foods instead of healthy food.

- The African belief is, “gaining weight is a measure of success”. In some African societies, when one gains weight, it means he/she is successful. This belief increases the pressure on people to gain weight for them to be perceived as successful.
- The increasing “obesogenicity” of the external environment is likely to be a major driving force for the increasing obesity epidemic.

Globally, there has been an increase in the intake of energy-dense food high in fat and sugar. Massive marketing of energy-dense food globally is associated with the promotion of food high in fat, salt, and sugar. Different platforms used for marketing include television, radio, the internet, and mobile devices. This massive marketing of unhealthy foods is now propagating societal norms, where energy-dense and low-nutrient foods are acceptable and desirable. The use of massive food marketing affects people’s food attitudes, preferences, and consumption because of a logical, cumulative sequence of cognitive and behavioural responses. Even brief exposure to food advertising has been associated with an increased intake of food. Therefore, massive marketing of energy-dense food is resulting in more intake of unhealthy foods, leading to obesity (Norman, Kelly, McMahon, Boyland, Bauer, Chapman, King, Hughes & Bauman, 2018:2).

Furthermore, there is a notable decrease in physical activity, due to factors such as urbanisation, sedentary work and motorised modes of transport (WHO, 2015:184). In addition, sedentary lifestyles which include television watching and irregular physical activity are associated with obesity. This is because individuals with sedentary lifestyles use less energy than they consume, leading to weight gain. Furthermore, globally, the increased intake of energy-dense food such as sugar-sweetened beverages, food with highly refined grains, ultra-processed food and alcohol are associated with obesity (Hruby & Hu, 2015:678).

“Obesogenicity” of the environment is also a risk factor for obesity. Obesogenic environments which are influenced by surroundings, opportunities and conditions of life, promote obesity in individuals and populations (Budd, Mariott, Graff & Falkenstein, 2011:127). Obesogenic areas such as residential areas with poor sidewalk quality, no

access to parks, proximity to bars, liquor stores, fast food, and convenience stores, are associated with a high prevalence of obesity because they reduce opportunities for physical activity. As a result of the close proximity to fast food stores, there is an increased chance that people will consume energy-dense food (Schwartz, Seeley, Zeltser, Drewnowski, Ravussin, Redman & Liebel, 2017:283). In Africa, body image perception among Africans is an important factor associated with obesity. Body image perception is driven by culture, socio-economic status, and urbanisation among African societies. Black South Africans have a higher tolerance for bigger body sizes compared to white South Africans. Black South Africans prefer bigger body sizes because their societies associate obesity with affluence, health, happiness, and attractiveness. Similar beliefs among black Africans about big body sizes have been reported in other African countries such as Nigeria, Ghana, and Zimbabwe (Draper, Davidowitz & Goedecke, 2015:549).

In the city of Windhoek in Namibia, busy lifestyles and sedentary lifestyles were identified as contributing factors to obesity. The people in the city are usually busy at work throughout the day with little time to do physical activities. Moreover, most of the people in the city make use of vehicles to move around, which further reduces the time spent on physical activities (Ntumba, *et al.*, 2013:5).

2.6 Clinical impact of obesity

The outcome of obesity might harm the public health system because it can cause a wide spectrum of co-morbidities (Lobstein, 2015:78). Co-morbidities might include type 2 diabetes mellitus, cardiovascular diseases, liver diseases, cancers, and mental health problems. Obesity is also linked to numerous undesired health outcomes, such as premature death and considerable disability, as well as limited treatment success in certain conditions such as diabetes mellitus and hypertension (Kyrou, Randeva, Tsigos, Kaltsas & Weickert, 2017:195).

The WHO (2015:179) compiled a list of non-communicable diseases associated with obesity which is presented below and illustrated in Figure 2.

- Endocrine disorders, for example, diabetes mellitus
- Cardiovascular diseases, mainly heart diseases, hypertension, and cerebrovascular accidents, were reported to be the leading cause of death in 2012

- Musculoskeletal disorders, specifically osteoarthritis
- Cancers such as endometrial, breast, ovarian, prostate, gallbladder, kidney, and colon cancer and
- Non-alcoholic fatty liver disease, which may lead to liver cirrhosis.

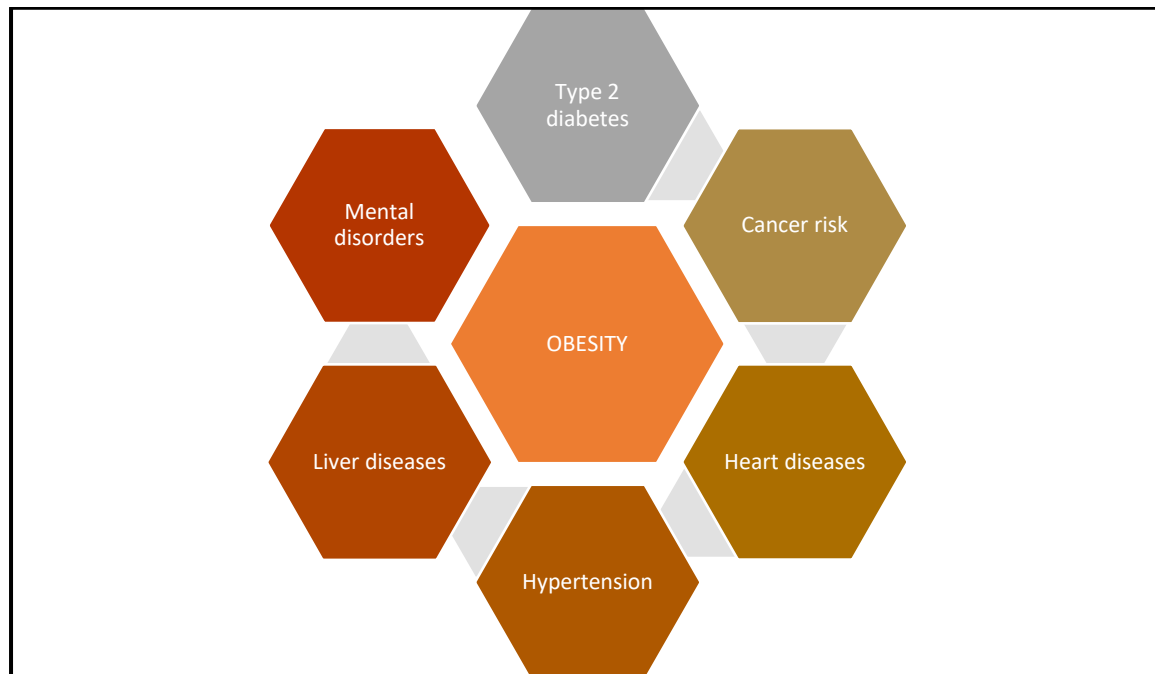


Figure 2: Co-morbidities associated with obesity

Several hypotheses have been postulated to explain the association between obesity and cancer. The prominent hypothesis focuses on lower insulin sensitivity. Excess body weight and adiposity are directly related to insulin resistance. Elevated insulin levels in the body lead to faster growth and increased aggressiveness of some cancers such as colorectal, pancreatic, liver, and endometrial cancer. In addition, the high cytokine production and activation of pro-inflammatory signalling pathways associated with obesity have also been linked to the initiation and promotion of cancer cells. Furthermore, increased oxidative stress among obese patients due to reduced anti-oxidative activities may lead to deoxyribonucleic acid (DNA) damage. The damage caused in the DNA might result in increased cancer risk among obese patients (De Pergola & Silvestris, 2013:3-5).

The risk of cardiovascular diseases is associated with the duration of obesity. If an individual is obese for at least two decades, he/she is at risk of developing coronary artery disease. It is estimated that for every 10kg rise in body weight, there is a 12% risk of having coronary heart disease. According to the data retrieved from the

Framingham Heart Study, for every 10kg rise in body weight, the systolic blood pressure rises by 3mmHg, while the diastolic blood pressure rises by 2.3mmHg. Furthermore, the Framingham Heart studies also revealed the rise of BMI by 1kg/m² increases the risk of heart failure by 5% in men and 7.6% in women. The studies concluded that 32-49% of global heart failure patients are obese (Csige, Ujvarosy, Szabo, Lorincz, Paraph, Harangi & Somodi, 2018:189-190). In addition, various studies emphasised the relationship between sudden cardiac arrest and obesity (Apovian, 2016:33; Kyrou *et al.*, 2017:199; Lobstein, 2015:78). Furthermore, obesity is considered an independent risk factor in the development of ventricular tachyarrhythmia (Centers for Disease Control and Prevention, 2016:47).

Obesity is associated with an increased risk of non-alcoholic fatty liver disease. Non-alcoholic fatty liver disease is the most common cause of chronic liver disease. The disease occurs when the rate of hepatic fatty acid uptake from plasma and fatty acid synthesis is higher than the rate of fatty acid oxidation and export. Obesity leads to an increase in fatty acid in the plasma, which increases intrahepatic triglyceride content. The increase in intrahepatic triglyceride content results in liver inflammation and fibrosis. Non-alcoholic fatty liver disease is associated with increased morbidity and mortality in the population (Sarwar, Pierce & Koppe, 2018:533-534).

Chronic diseases such as hypertension and type 2 diabetes mellitus shown in Figure 2 have a strong correlation with BMI and closely follow the prevalence patterns of excessive body weight in most populations (Lobstein, 2015:77). Furthermore, an increase in BMI above 30kg/m² may result in the development of more than one obesity-related co-morbidity, which increases the risk of premature death (Kyrou *et al.*, 2017:199).

The mental impact of obesity stigma on individuals is enormous. The effects of obesity stigma are illustrated in Figure 3.

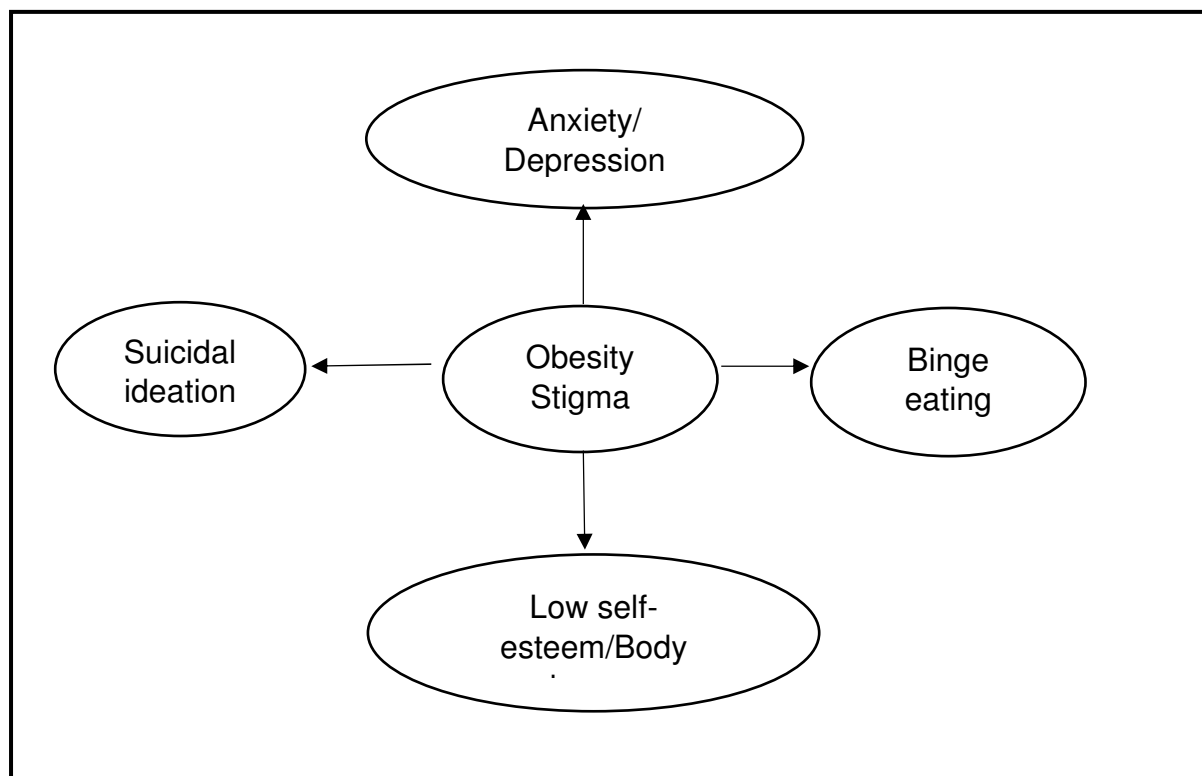


Figure 3: Mental impact of obesity stigma

Obesity stigma may lead to individuals developing depression, anxiety, low self-esteem, body image concerns, binge eating, avoiding physical activities, self-harm and suicide. Despite all these harmful consequences, nurses still view obesity as a patient's responsibility. In addition, obese people are perceived negatively by others, which may result in several harmful psychological responses (Flint, 2015:14).

Obese individuals who are stigmatised against are more likely to have a low self-esteem compared to those who are not stigmatised against. Low self-esteem usually emanates from weight-related teasing and criticism by relatives and peers. Stigmatisation can also lead to bullying and social marginalisation of people who are obese. Social marginalisation is the social exclusion of peers who are viewed as undesirable or different. Social exclusion of obese individuals may lead to depression and suicide ideation (Harringer & Thompson, 2012:248).

Binge eating is common among obese patients. Binge eating involves uncontrollably eating an unusually large amount of food in a short time. It also involves eating food quicker than normal, eating until one is uncomfortably full and eating large amounts of

food even when not hungry. Obese patients sometimes use binge eating as a distracting coping mechanism to reduce negative feelings about their bodies (McCuen-Wurst, Ruggieri & Allison, 2018:97).

Obesity in childhood is associated with a higher chance of obesity, premature death, and disability in adulthood. Obese children may also develop hypertension, insulin resistance, difficulties in breathing and psychological effects such as anxiety, depression, and low self-esteem (Hruby & Hu, 2015:673).

2.7 Economic burden of obesity

The cost of illness studies can be based on patient-level cost data or aggregate cost data from the routine statistics. Cost of illness studies are used to identify different components of costs of any disease or their related complications in different sectors of the society. These are costs that would have been saved if the disease had not existed, especially preventable diseases. Different perspectives are used to conduct the cost of illness studies so as to determine different types of costs. These perspectives can help measure the costs to the health systems, individuals, society and third-party payers (Tremmel, Geratham, Nilsson & Saha, 2017:437).

Obesity constitutes a huge economic burden for countries globally, as well as on individuals and families. Five percent of the global deaths figure was attributed to obesity in 2014. In 2014, it was estimated 2.8% of the global gross domestic product (GDP), which is US\$2 trillion, was used to treat obesity and obesity-related complications (Tremmel *et al.*, 2017:437).

Obesity cost of illness studies have revealed that obesity negatively impacts economic growth as a result of lost workdays, lower productivity at work and permanent disability (Hecker, Freijer, Hiligsmann & Evers, 2022:2). The cost of obesity can be determined using different elements, such as direct costs and indirect costs as illustrated in Figure 4.

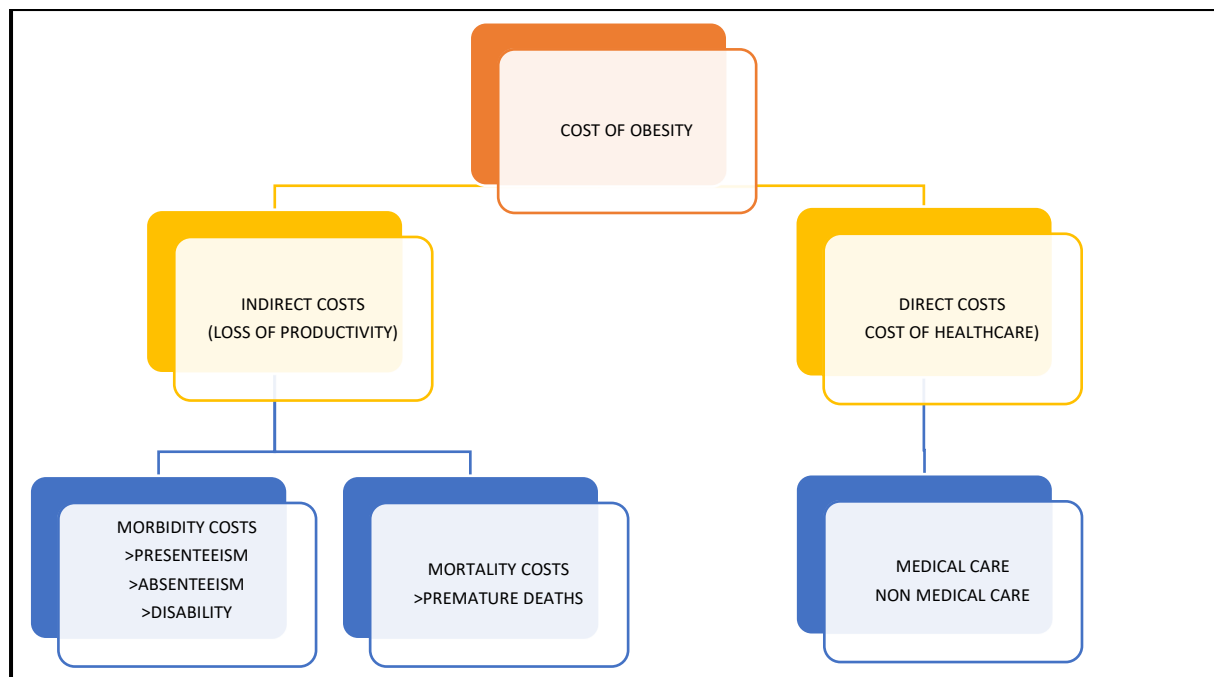


Figure 4: Cost of obesity (Adapted from Tremmel *et al.*, 2017:437)

Obese individuals bear extra costs because of their obesity. The costs range from excess healthcare expenditure, furniture replacement, new clothing requirements and excess food intake. The excess healthcare expenditures arise from medical care needs associated with the management of obesity and its co-morbidities. Obese patients may require medication or surgery to reduce their weight, and this leads to extra medical costs. Furthermore, obesity may lead to other medical conditions like hypertension, diabetes mellitus and liver disease, which will add extra costs to their care. Non-medical costs may arise from special equipment such as chairs, doors, and transport devices like lifts, they may require at home and the workplaces. Obesity can also lead to a reduction in employment prospects which leads to more people being added as social grant beneficiaries (Hecker *et al.*, 2022:2).

The indirect costs because of obesity and obesity-related illnesses emanate from absence from work, disability support, loss of productivity and early pension payments. Loss of productivity emanates from presenteeism, absenteeism, disability, and premature death. Presenteeism results from obese patients requiring more time to complete tasks and their inability to perform some physical job demands. As a result of co-morbidities associated with obesity, people with obesity are more likely to be absent from work, due to illnesses compared to non-obese individuals. As a result, the indirect costs amounted to US\$42.8 billion in 2010 in the United States of America

alone. These indirect costs leave a dent in the economies of countries and the world at large (Dee, Kearns, O'Neill, Sharp, Staines, O'Dwyer, Fitzgerald & Perry, 2014:2).

During 2013, the global direct costs, which are the annual per capita expenditures accrued by obese individuals, were 30% higher than those of individuals with normal weight. In the United States of America, the per capita expenditures of obese individuals versus normal-weight people were 23%, 45% and 87% greater for persons with class 1, 2 and 3 obesities, respectively. In Africa, the economic burden of obesity ranged from 1.9% to 4.7% of total annual healthcare costs and 2.8% of total annual hospital costs (WHO, 2015:181).

2.8 Nurses' factors influencing their knowledge, attitudes, and practices regarding obesity

2.8.1 Knowledge regarding obesity

Nurses' knowledge levels regarding obesity may influence the management of obesity and how nurses perceive obese patients (Gormley & Melby, 2020:107). Globally, nurses generally have a low level of knowledge about obesity (Gormley & Melby, 2020:107). In the United Kingdom, nurses have an average knowledge of obesity. Most of the nurses believe obesity is a condition that is completely in the control of the individual, thus leading them to blame the obese individuals. Furthermore, some nurses believe obesity is not a disease but a lifestyle consequence. In addition, the nurses indicated that obesity was taught as a predisposing factor to some diseases (Wynn *et al.*, 2018:22-23).

Although nurses in the United States of America have knowledge about obesity, as well as the burden of chronic illnesses associated with it, they seldom discuss its burden and its negative impact on the future of the country's health (Barnett, 2014:8). Furthermore, nurses in South Africa have inadequate knowledge about obesity. They, therefore, indicated they required training in calculating the BMI of patients (Van Tonder, Kelly & Van Rooyen, 2021:38).

Nurses are aware that BMI is a tool used to diagnose obesity and exercise helps to reduce obesity. However, they indicated a need for combining strategies to address obesity (Petrin, Kahan, Turner, Gallagher & Dietz, 2017:352; Ardzi, Shariff, Omar, Ramli & Isa, 2014:40; Teixeira *et al.*, 2013:256). Furthermore, nurses indicated obesity is a risk factor for many non-communicable diseases including cancer and that it can

be reduced by eating less and healthier. In addition, most nurses agree that eating fruits and food with less sugar help in reducing obesity (Teixeira *et al.*, 2013:256; Bucher Della *et al.*, 2018:125; Somannavar & Appajigol, 2014:401). Nurses indicated they lack knowledge about obesity, as obesity training did not form part of their training programmes (Wynn *et al.*, 2018:22-23). The more knowledge the nurses have regarding obesity, the more likely they will understand that obesity is not entirely the fault of the patients. This may lead to better attitudes and practices regarding obesity among nurses (Gormley & Melby, 2020:107).

2.8.2 Attitudes regarding obesity

Nurses' attitudes regarding obesity may influence their desire to seek more information about obesity. Nurses who have positive attitudes about obesity are more likely to search for more information regarding the disease. This will improve their knowledge about obesity, which may improve their obesity management practices and attitudes towards obese patients (Wynn *et al.*, 2018:24).

Globally, many nurses view obesity as a personal choice that results from a lack of self-control. Hence, nurses view obesity as the patient's sole responsibility to manage obesity. Some nurses also believe being in the same shift with obese colleagues is stressful and physically exhausting since obese colleagues are slower in carrying out their duties. The belief that obese people are slower in carrying out tasks results in the nurses being biased against obese patients. Furthermore, having pro-thin and anti-fat attitudes among nurses result in stereotyping obese patients as being lazy, unintelligent, and worthless. Some nurses associate obesity with laziness because obese patients tend to move and do activities slower (Pervez & Ramonaledi, 2017:43).

The pro-thin and anti-fat attitudes by nurses are in contrast with their beliefs about other behaviours related to health conditions, such as cardiovascular diseases and diabetes mellitus. Some nurses believe the challenge in treating these conditions emanate from the disease characteristics and complexity of their management and not as a complication of obesity (Pervez & Ramonaledi, 2017:43).

Some nurses in the United Kingdom believe it is up to an individual to reduce weight and as nurses, they do not have much to do regarding this. In addition, some of the nurses also believe obesity is a choice (Gormley & Melby, 2020:105; Wynn *et al.*, 2018:24). In contrast, most nurses in the United States of America considered obesity

as a disease and not because of the individuals' own doing. Hence, the nurses offered to counsel obese patients (Teixeira *et al.*, 2013:256).

Obesity stigma attitudes among nurses are common. This is reflected by the reports of stigma filed by the patients against healthcare institutions. Some obese patients are hesitant to be examined and screened due to the expected stigma. The perception that nurses show an elevated level of stigmatisation attitudes toward obese patients may be as a result of the higher degree of contact they have with obese patients, compared to their colleagues (Budd *et al.*, 2011:127).

Some nurses exhibit low confidence in their ability to treat obesity, opting to engage other colleagues, such as dietitians and nutritionists as better qualified professionals to counsel obese patients. The stigma associated with obesity places a significant barrier against the efforts of nurses to manage obesity effectively. This bias also affects future nurses. The nursing students completing clinical rotations and practicums are easily influenced and may become perpetrators of obesity bias and stigmatisation if not trained properly (Dietz *et al.*, 2015:2521-2522).

In the United Kingdom, the national guidelines stipulate nurses should screen and offer assistance to all overweight and obese patients to lose weight. However, such conversations are uncommon in practice. The researchers further revealed nurses' attitudes are likely to affect how they consider obesity in their patients. The nurses indicated they were not sure if medical interventions would succeed in managing obesity, since it is more of a behavioural condition than a medical condition. The nurses believed the success of the interventions was more in the hands of the patients than in the hands of the nurses. Furthermore, overweight and obese nurses highlighted it would be seen as hypocritical by patients for them to discuss obesity, since they were also obese (Pervez & Ramonaledi, 2017:43-44).

The attitudes of nurses regarding obesity improve as their knowledge levels regarding obesity increase (Wynn *et al.*, 2018:24). Most nurses in the United Kingdom view obese patients as less self-disciplined, less compliant and more annoying than non-obese patients (Flint, 2015:14). In addition, some nurses reported seeing obese patients as a waste of time. Despite the awareness of associated health risks and acknowledging obesity as a pandemic, the nurses failed to intervene to the extent they should have. In addition, some nurses view discussing weight management with their

patients in counselling sessions as an inconvenience (Budd *et al.*, 2011:127).

The reports of nurses' stigmatisation attitudes are of concern given the increase in obesity-related medical conditions and complications. Since the role of healthcare is preventative and curative, the reports that nurses stigmatise obese patients and in some cases, are not performing their duties of providing health education and treatment, are both concerning and unacceptable (Flint, 2015:14). In a literature review done by Goad *et al.* (2018:445), most of the studies revealed nurses who had a higher BMI had more positive attitudes towards patients who were obese compared to those who had lower BMI.

Most nurses view obesity as a medical condition. They understand communities view them as role models and therefore should maintain a normal weight. However, most nurses do not agree that they experience professional gratification when treating obese patients (Petrin *et al.*, 2017:352; Teixeira *et al.*, 2013:259). Most nurses generally have negative attitudes towards obesity (Bucher Della Torre *et al.*, 2018:126; Sikorski, Luppa, Glaesmer, Braehler, Konig & Riedel-Heller, 2013:516).

2.8.3 Practices regarding obesity

Nurses' practices regarding obesity are influenced by several factors. These factors include their level of knowledge about obesity, their attitudes towards obese patients and the attitudes of the obese patients towards them. In addition, the nurses' practices may also be influenced by their working hours and other organisational factors. Poor practices are likely to turn away obese patients who may require health services. This may result in an increasing prevalence of obesity in communities (Nolan, Deehan, Wylie & Jones, 2012:356).

Most nurses give weight control advice to their obese patients, use BMI as a measuring tool to assess the severity of obesity and offer advice to their obese patients on increasing physical activity to reduce and maintain weight. In addition, some nurses also advise on diet intake to their obese patients. Most of the nurses have average knowledge about obesity. However, some nurses' practices remain a concern (Teixeira *et al.*, 2013:259; Petrin *et al.*, 2017:352-353; Kausar, Mukhtar & Shaheen, 2021:351; Somannavar & Appajigol, 2014:402; Zhu, Norman & While, 2013:6).

Although the majority of patients seen by primary care nurses require advice on weight loss and are interested in losing weight, few nurses provide diet advice. Some nurses feel advising on a diet to their new obese patients may be offensive to the obese patients. They believe it is better to build rapport with the patients first before discussing obesity with them. However, some nurses are only comfortable discussing a dietary intake with obese patients provided the patients have co-morbidities (Walsh, Grech & Hill, 2019:4).

Globally, most nurses do not weigh adult patients (Van Tonder *et al.*, 2021:38). However, in South Africa, most nurses indicated they weigh their patients upon admission. In addition, the nurses indicated they recorded their patients' dietary intake and had nutrition management conversations with their patients during ward rounds (Van Tonder *et al.*, 2021:38). Furthermore, nurses discuss the dangers of obesity with their obese patients, for example, the risk of heart diseases, increased blood pressure, complications of diabetes such as blindness and reduced activities of daily living. However, few nurses discuss abnormal lipids as a danger associated with obesity (Petrin *et al.*, 2017:356).

2.8.4 Association between knowledge of nurses regarding obesity and their socio-demographic characteristics

The association between knowledge levels of nurses and their different socio-demographic characteristics differ from one socio-demographic characteristic to another. Studies conducted in China and Iraq which included samples of 5311 and 100 nurses, respectively, revealed an association between the level of education of the nurses and their knowledge levels regarding obesity. Nurses with higher educational levels in nursing had higher levels of knowledge regarding obesity. These studies did not show associations between levels of knowledge regarding obesity and the gender of nurses (Fan, Hong, Cheung, Tang, Zhang, Hu, Jiang, Chen, Yu, Gao, Wang, Chen & Yang, 2020:620; Tiryag & Atiyah, 2021:4670). Furthermore, no associations were found between nurses' levels of knowledge regarding obesity and their marital status, age, BMI and years of experience (Tiryag & Atiyah, 2021:4670-4671).

2.9 Nurses' personal factors influencing knowledge, attitudes, and practices regarding obesity

Nurses' personal factors include their own BMI, workload, years of experience, beliefs regarding causes of obesity, views on benefits of treating obesity and confidence in treating obese patients (WHO, 2015:177).

The personal characteristics of nurses have an influence on their knowledge, attitudes and practices regarding obesity. On a global scale, the WHO (2015:177) reported 23% of healthcare professionals, including nurses were obese. As a result, the nurses' own BMI might strongly influence how they would manage and counsel obese patients. Nurses with a normal BMI are more confident and more likely to give health education about obesity to their obese patients compared to those with a higher BMI (WHO, 2015:177).

The workload nurses have, has an impact on how they deliver healthcare to obese patients. In most healthcare institutions, especially in developing countries, nurses have heavy workloads which leave them exhausted. Caring for obese patients further increases this workload as it requires more time to assist them with activities of daily living like bathing and walking. This results in the nurses providing poor quality care to obese patients, in order to complete their tasks on time (Huang, Cheng, Duffield & Denney-Wilson, 2021:1815).

The nurses' years of experience also influence the way they treat obese patients. Years of experience among nurses in the United States of America have a positive effect on how they treat obese patients. More experienced nurses, with 10 years or more, show more compassion towards obese patients and have more confidence in bringing up the subject of obesity compared to their inexperienced counterparts. Most nurses argued it is both patients' and nurses' responsibility to discuss obesity. However, a few nurses believe it is solely the nurses' responsibility (Petrin *et al.*, 2017:352-353).

Nurses' beliefs about obesity influence their attitudes towards obese patients. Nurses who believe obesity is a condition completely in the control of individuals are more likely to have negative attitudes towards obese patients. This is because they believe obese patients gain weight intentionally and cannot control themselves. This belief

usually translates to poor practices regarding obesity among nurses (Wynn *et al.*, 2018:22).

Nurses acquire knowledge on obesity from several sources. They usually acquire knowledge on obesity from their initial training at nursing schools, continuing education activities and colleagues they work with. Nurses who have more knowledge regarding obesity usually have better attitudes towards obese patients compared to those with less knowledge. Furthermore, nurses with more knowledge regarding obesity tend to have better practices regarding obesity, compared to those with less knowledge (Bucher Della Torre *et al.*, 2018:128).

2.10 Patient factors influencing knowledge, attitudes, and practices of nurses regarding obesity

Some of the patient factors influencing the knowledge, attitudes and practices of nurses regarding obesity are the patient's motivation to reduce weight, their attitudes toward nurses, their acceptance of their condition and their willingness to learn more about obesity. Nurses are more likely to have a good attitude towards patients who are motivated to lose weight. On the other hand, patients who are motivated to lose weight may motivate nurses to enhance their knowledge of the disease (Bucher Della Torre *et al.*, 2018:122).

Patients' attitudes towards nurses are influenced by several factors. These factors might include their beliefs about their disease and their expectations from the nurses. Patients who believe their disease can be cured are more likely to have a good attitude towards the nurses compared to patients who do not believe they will be cured. Furthermore, patients who expect the nurses to be friendly to them are also more likely to reciprocate a good attitude. In addition, obese patients who regard nurses as a reliable source of information for managing their weight are comfortable discussing their weight with nurses and are more likely to have positive attitudes towards the nurses. However, obese patients who feel no matter what they do or how hard they try, they are unable to lose weight, are less likely to be motivated to lose weight. This usually results in obese patients exhibiting bad attitudes towards nurses, which in return leads to nurses being demotivated (Dicker, Alfadda, Coutinho, Cuevas, Halford, Hughes, Iwabu, Kang, Reynose, Rhee, Rigas, Salvador, Sbraccia, Vazquez-Velazquez & Caterson, 2021:14-15).

Willingness to learn about obesity and entering into weight-related care among obese patients depend on the extent of obesity. Severely obese patients are more willing to learn about obesity and enter weight-related care compared to those who are obese. In addition, obese patients who have co-morbidities are also more willing to learn about obesity compared to those without co-morbidities. This willingness to learn about obesity tends to influence the attitudes of nurses towards obese patients, thereby influencing their practices (Tol, Swinkels, De Bakker, Veenhof & Seidell, 2014:2-3).

A trusting relationship between a nurse and his/her obese patient is important, since it influences the success of obesity management. Obese patients who trust their nurses are more likely to adhere to the advice they receive from the nurses. However, for these patients to trust their nurses, the trust should be mutual. Stigma experienced by obese patients in the hands of nurses tends to decrease this trust. Furthermore, patients who feel judged about their weight by nurses also tend to trust them less. This lack of trust towards the nurses is associated with negative attitudes and poor practices regarding obesity among nurses. This may lead to less motivation among the nurses to seek more knowledge concerning the disease (Gudzune, Bennett, Cooper & Bleich, 2014:129).

2.11 Organisational factors influencing knowledge, attitudes, and practices of nurses regarding obesity

Organisational factors influencing knowledge, attitudes and practices of nurses regarding obesity, include the availability of guidelines for the treatment of obese patients, availability of hospital equipment for obese patients, rewards for nurses who manage obese patients appropriately, disciplinary actions for nurses who discriminate against obese patients and obesity training programmes for nurses (Pearce *et al.*, 2019:14).

Rewards are an important incentive and if used correctly can motivate nurses to perform their work well. Rewarding nurses will make them feel valued and appreciated. Rewards should not only be financial but should also include non-financial and psychological rewards. Financial rewards may include salaries, annual bonuses and vacation allowances, whereas non-financial rewards may include presents, work-life balance, free meals and attending fully paid training sessions. Psychological rewards

include recognition and compliments from the organisation and colleagues (Seitovirta *et al.*, 2017:1049).

Disciplinary actions can be used to prevent bad behaviour in the workplace. The use of disciplinary actions in healthcare organisations is gaining popularity because of its potential to influence the behaviour of individual nurses. This is because individuals tend to be more sensitive to losses than gains. Disciplinary actions such as forfeiting overtime working hours and demoting the culprits may help improve attitudes and practices of nurses regarding obesity (Kim, Max, White, Chapman & Muench, 2020:623-624). Furthermore, the availability of obesity guidelines may motivate nurses to learn more about obesity. This may result in nurses acquiring more knowledge about obesity, which will improve their attitudes and practices regarding obesity. Obesity management guidelines ensure nurses have the knowledge to manage obese patients. Furthermore, obesity management guidelines ensure standardisation on the quality of care, as well as management of obese patients (Pearce *et al.*, 2019:14).

Healthcare settings are perceived to be the main source of weight stigma. A study conducted in Germany reported optimising care for obese patients posed a huge challenge for the nurses. The nurses argued equipment such as diagnostic facilities, plus-size patient gowns, stretchers and scales were not sufficient at most healthcare centres or were not available at all. Attempts to lose weight by patients were often unsuccessful, which brought the impression that obese patients are difficult to treat. Hence, the lack of appropriate utilities for care coupled with perceived and feared complications in the treatment and care of obese patients might promote the negative views of nurses on obese patients (Sikorski *et al.*, 2013:513).

Provision of training in obesity, availability of hospital equipment for obese patients and availability of obesity management policy at a healthcare institution may influence nurses' knowledge, attitudes and practices regarding obesity. Training enhances nurses' knowledge levels about obesity. Availability of hospital equipment to cater for obese patients may also stimulate nurses to seek more information on obesity, which will enhance the nurses' knowledge levels (Sikorski *et al.*, 2013:513).

2.12 Strategies to reduce obesity

Strategies aimed at reducing obesity vary from individually targeted to population-targeted methods. For the strategies to be cost-effective, they should be used in

combination and should be available for the whole population. The increase in obesity due to an increase in urbanisation is a challenge to health systems with limited resources (Stephenses, Cobiac & Veerman, 2014:167-168). As a result of the complexity of the obesity pandemic, obesity reduction strategies and policies across multiple levels are needed to have a measurable effect (Malik, Willet & Hu, 2013:13). The strategies are divided into three, namely knowledge, attitudes and practices and they are discussed in the following paragraphs.

2.12.1 Improving nurses' knowledge regarding obesity

Nurses play a key role in obesity management. However, they exhibit a lack of knowledge and skills in obesity management. Therefore, nurses should be trained on guidelines and attitudes to improve nursing practices and the essential skills needed to treat patients with obesity. In addition, equipment required to treat and diagnose obesity should be easily available at healthcare institutions (Bucher Della Torre *et al.*, 2018:128).

Educational policies may increase or decrease obesity health differences, depending on whether they reinforce or counteract gene-related differences. While guidelines may help improve nurses' knowledge about obesity, they are not mandatory and therefore may not be adhered to. However, policies are mandatory and therefore are more likely to be followed compared to guidelines. For nurses to play a role in the reduction of obesity, they must acquire adequate knowledge regarding obesity. There must be educational strategies that emphasise the complex aetiology of obesity (Bray, Fruhbeck, Ryan & Wilding, 2016:1947).

Strategies to improve knowledge among nurses include providing them with information about obesity indicating contributing factors beyond personal control. These factors might include biological and genetic contributors. There is a strong genetic component underlying interindividual differences in body weight. Studies done on some twins and families have estimated the heritability of obesity to be between 40% and 70%. Genetic causes of obesity are broadly classified into monogenic and polygenic causes. Monogenic causes result from a single gene mutation, while polygenic causes result from several polymorphisms that each have a small effect. (Dietz *et al.*, 2015:2521).

Most nurses are poorly prepared to treat obesity. Nurses should not only be trained on the treatment of obesity, but training should also focus on the ability to employ behavioural strategies and the ability to work in collaboration with multi-disciplinary teams to collectively address the obesity pandemic. Therefore, to address the global obesity pandemic all nurses, regardless of specialty, must be aware of current recommendations issued by their respective health departments concerning obesity. These recommendations include physical activity, healthy eating, treatment goals and approaches for both children and adults to address obesity (Stephenes *et al.*, 2014:167-168).

2.12.2 Improving nurses' attitudes regarding obesity

Reducing weight stigma among nurses is essential to improve the quality of care, promote equal treatment and ultimately reduce the prevalence of obesity. A study conducted in Switzerland indicated obese patients were less likely to obtain preventative health services and examinations such as mammograms, pelvic examinations, and cancer screening. The reason for it is that nurses perceived these procedures to be difficult to perform on obese patients (Bucher Della Torre *et al.*, 2018:122).

Furthermore, it was recommended healthcare institutions develop policies to enforce nurses to treat all patients equally. There is a need for an open-door policy for patients with the public relations departments in healthcare institutions. This will allow patients to have direct access to the public relations departments to present their complaints, should they be treated unfairly or feel stigmatised by nurses. In addition, healthcare institutions must have stricter disciplinary actions on personnel who would have been found guilty of negative attitudes towards obese patients (Bray *et al.*, 2016:1947; Dietz *et al.*, 2015:2521). However, some researchers recommend rewards instead of disciplinary actions. They emphasise healthcare institutions must develop systems allowing patients to rate the nurses and rewarding good professional behaviour with rewards, such as nurse of the week/month and ultimately nurse of the year (Senanayake, 2021:236).

2.12.3 Improving practices of nurses regarding obesity

In the United States of America, nurses have been called to address obesity by screening for obesity during ambulatory visits and providing weight reduction, nutrition and physical activity counselling to their obese patients. Evidence revealed nurses'

advice can encourage weight loss among patients. However, weight-related counselling during ambulatory visits occurs at modest rates and is infrequently aligned with recommended methods shown to support behavioural change (Smith, Seehoker, Gullet, Jackson, Antagnoli, Knejci & Flocke, 2015:388).

Studies examining barriers to weight counselling in primary care practice revealed nurses felt inadequately trained and reported a lack of time and poor self-efficacy to counsel on weight management. Reports in the United States of America show only half of the graduating nurses rate themselves as fully prepared to counsel patients about diet and exercise. The studies further revealed specific areas of need such as knowledge deficit, poor attitudes and low confidence (Smith *et al.*, 2015:388-389).

2.12.4 Strategies that can be used at the population level

Obesity results from either excessive food intake or insufficient physical activity. The first law of thermodynamics states body weight cannot change if, over a specified time, energy intake is equal to energy spent. Therefore, efforts to develop effective strategies to reduce obesity rates may benefit from understanding how energy balance is achieved, hence the need to reverse the obesogenic environments (Hill, Wynatt & Peter, 2013:126). The public, therefore, needs to be taught the advantages of taking less energy-dense food and being physically active (Barnett, 2018:8).

According to Hill *et al.* (2013:130-132) and Sneidell and Halberstadt (2015:9-12), some of the strategies that can be used to reduce obesity include:

- Food restrictions: It was established one-third of childhood obesity progresses into adult obesity. Therefore, children must be restricted on the type of foods they consume to avoid obesity in adulthood. This can be achieved through teaching the parents and caregivers healthy eating habits for children. Children must also be encouraged to increase their physical activity.
- Increasing physical activity in the population is one of the strategies to ensure individuals regulate the energy balance zone and maximise the intrinsic biological mechanisms for managing energy balance.
- Transport infrastructure used to promote physical activity such as cycling to work, creating footpaths for walking and cycle paths alongside the main road for cycling.

- Encouraging individuals to adopt healthy behaviour through campaigns at hospitals, churches, schools, and workplaces.
- Encouraging wellness centres at workplaces and/or having employees enrolled at local gymnasiums.
- Formulating policies at hospitals to measure BMI on all ambulatory patients and having an obesity-friendly health education corner.
- Ensure a paradigm shift of community health nurses to not only focus on undernutrition but to address overnutrition as well.

In the current obesogenic environment, maintaining a healthy body weight for most people requires cognitive skills to assist with energy expenditure and overcome the habit of overeating versus under-exercising. These skills must be emphasised in children. There should be emphasis on environments which promote physical activity and healthy lifestyles (Swinburn *et al.*, 2012:33-34).

2.13 Conclusion

The prevalence of obesity differs from one setting to another and is higher in developed countries compared to developing countries. Although experts agree obesity can best be measured by BMI, some researchers argue it does not objectively measure the amount of fat in the body. The risk of developing obesity is affected by several factors that include environmental, biological, and genetic factors. Obesity can lead to several medical conditions which might lead to an increase in healthcare costs of countries.

Knowledge, attitude, and practice scores regarding obesity are generally low among nurses due to various factors. Strategies are therefore required to improve the nurses' knowledge, attitudes, and practices, to assist in the reduction of obesity among populations. The next chapter, Chapter Three, contains a presentation of the research methodology used in the study.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

Chapter Two contains a review of the literature on obesity. The purpose of Chapter Three is to give an in-depth description of the research methodology.

This chapter contains an outline on the quantitative cross-sectional survey research design, study setting, population sampling, inclusion and exclusion criteria used in the study. Furthermore, the chapter contains discussions on the research instrument, pilot test, data collection, validity and reliability of the questionnaire and data analysis.

3.2 Study settings

A study setting is a physical, social, and cultural environment in which a study is conducted (Majid, 2018:3). The study was conducted in private healthcare institutions in the Oshana region of Namibia. Figure 5 shows the map of Namibia with all the regions in the country, including the Oshana region.



Figure 5: Map of Namibia

The study was conducted at four private healthcare institutions in the Oshana region, Namibia, namely Ongwediva 24-hours Health Centre, Ondangwa Private Hospital, Medical Centre Oshakati and Beta Medical Centre. These four healthcare institutions employ most nurses in the private sector in the Oshana region.

The catchment area for the four private healthcare institutions was the whole Oshana region, as well as the southern part of Angola. In total, the four private healthcare institutions attend to at least three-thousand outpatients and two-hundred inpatients per month. Figure 6 shows the map of the Oshana region with the institutions where the study took place, indicated with red crosses.

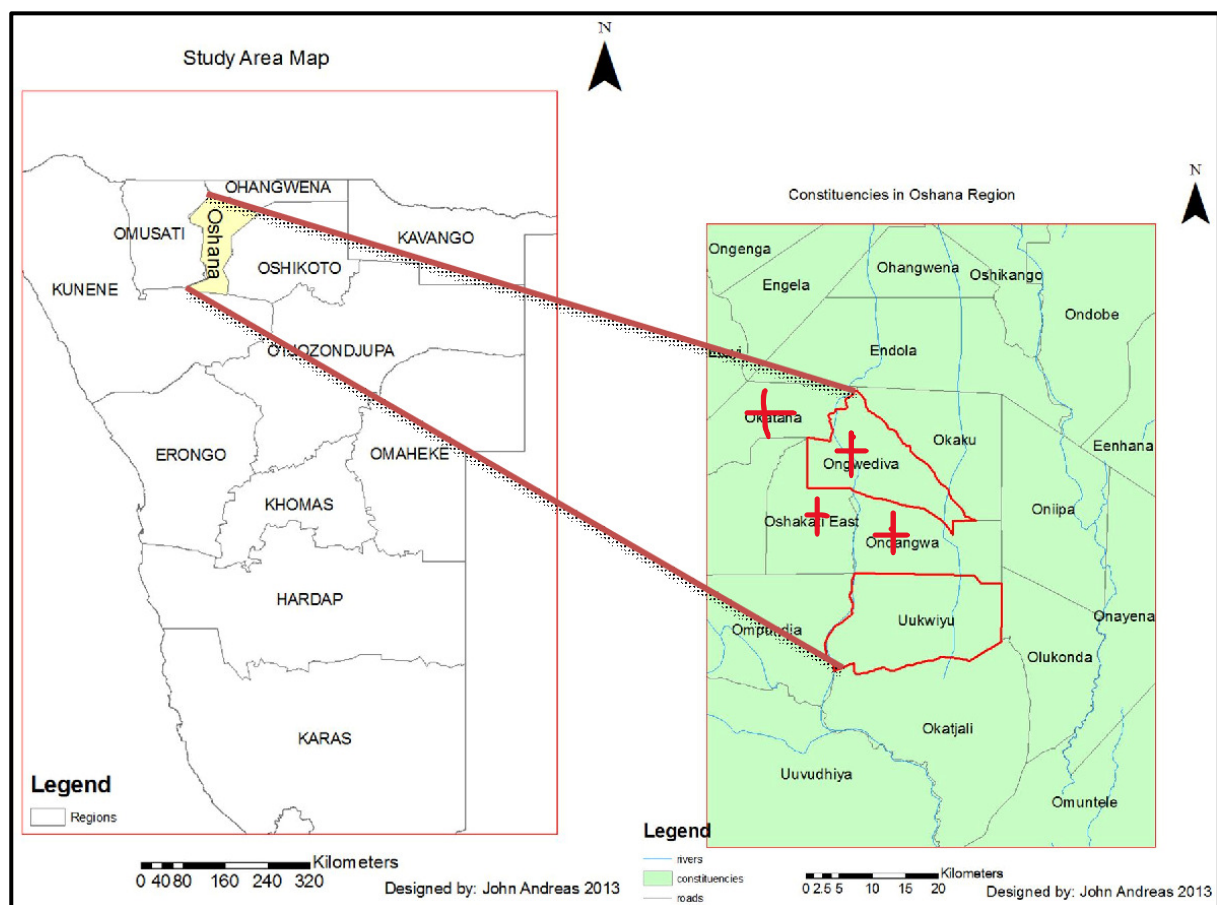


Figure 6: Study settings

3.3 Research design

The research design can be viewed as the overall plan which connects conceptual research problems to pertinent and achievable empirical research (Creswell, 2014:11-12). The research design determines the types of analyses which are to be done to achieve the desired results. For any research to be carried out successfully, a suitable research design is required. A study is set for success by following a proper research design which has the following characteristics: neutrality, reliability, validity and generalisation (Creswell, 2014:11-12).

Furthermore, a research design is a plan adopted by the researcher before the commencement of data collection to achieve the research objectives. The purpose of the research design is to translate a research problem into data for analysis so that it provides relevant answers to the research questions. Research design is concerned with the intentions, plans, aims and purposes within the practical constraints of time, location, researcher's availability and money to fund the research (Asenahabi, 2019:79).

Research designs bind the research together through a structured plan, thereby showing all the major parts of the research work in unison to address the research questions (Creswell, 2014:12).

The quantitative research design is a technique used to produce discrete or quantifiable values. The data collected for a quantitative research design results from empirical observations and measurements. A quantitative design is used where the variables to be measured are numerical (Asenahabi, 2019:79). In addition, quantitative research designs enables a researcher to describe the type of research conducted such as the survey, review, correlation, or experiments (Creswell, 2014:12).

A cross-sectional survey is a type of observational study design where a researcher collects data on the outcome and the exposures in study participants at a single time point. A cross-sectional survey can be both descriptive and analytical. The purpose of a descriptive cross-sectional survey is to provide a picture of the situation, while an analytical cross-sectional survey helps in determining how the study variables are related to one another (Polit & Beck, 2017:168-170).

A quantitative, cross-sectional research design was used in this study as it ensured reliable and objective findings which could be replicated. The other advantage of the

quantitative design was that the results of the study might be generalisable to other healthcare institutions in the region. A cross-sectional survey was more financially viable as no follow-up sessions with participants were required. Moreover, a cross-sectional survey was less time-consuming (Antwi & Hamza, 2015:221).

3.4 Population and sampling

3.4.1 Population

A population can be defined as all people who can participate in a research study. It can also be defined as a group of individuals the researcher intends to conduct research on and draw conclusions (Rahi, 2017:3). The study population of this study included all registered nurses and enrolled nurses working at the four chosen healthcare institutions. The nurses were selected for the study as they work closely with obese patients. The four healthcare institutions employ 400 nurses in total.

3.4.2 Sampling

Sampling is the process of selecting a segment of the population for a study. By taking a representative sample, a researcher reduces costs, time to conduct the research and also the defined manpower needed, compared to researching the whole population (Acharya, Prakash, Saxena & Nigam, 2013:330).

Acharya *et al.* (2013:330) mentioned selecting a sample depends on several factors such as:

- Sampling methodology- which should be systematic, as well as defined to draw valid inferences from the sample.
- Sample size and
- Response rate.

A proportional stratified random sampling method was used to select participants for this study. According to Christensen, Burke Johnson and Turner (2015:168), proportional stratified random sampling is conducted in two steps. Firstly, the target population is divided into homogeneous subgroups. The second step involves randomly selecting participants from each subgroup. The number of participants selected from each subgroup depends on the size of the subgroup. In this study the homogeneous subgroups were all nurses at each healthcare institution where the study was conducted.

This proportional stratified random sampling method was used because the target population contained nurses who could be grouped according to where they work. The first step of the sampling involved listing all the nurses according to their place of work. The second step involved selecting the participants using simple random sampling. The names of all nurses who met the inclusion criteria at each healthcare institution were entered into a Microsoft Excel spreadsheet separately and a random number was generated for each name. The random numbers were arranged from smallest to biggest and the first 250 nurses were chosen to participate in the study.

3.4.3 Sample size

A sample is the subset of the population, selected to represent the larger population (Newman, 2018:3). The sample size was determined using Yamane's formula and was approved by Stellenbosch University's statistician. According to Adam (2020:91), the formula states $n = N / (1 + e^2N)$ where n is the sample size, N is the population size and e is the margin of error. The margin of error used for the study was 5% because the researcher wanted a confidence level of 95%. This formula was used because the population size was known. For this study, the population size, $N=400$, resulted in the sample size, $n=250$. Table 2 shows the distribution of nurses at the four healthcare institutions where the study was conducted and the contribution of each institution to the sample size.

Table 2: Distribution of nurses at the study settings and their contribution to the study sample

Name of healthcare institution	Number of nurses at the institution	Contribution of nurses at the institution to the total number of nurses at all the study settings (%)	Number of nurses that were selected into the study sample (n)
Ondangwa Private Hospital	150	37.5	94
Medical Centre Oshakati	101	25.25	63
Beta Medical Centre	80	20.0	50
Ongwediva 24-hours Health Centre	69	17.25	43
Total	400	100	250

3.4.4 Inclusion criteria

The inclusion criterion for the study was:

- Nurses permanently employed by the four healthcare institutions.

3.4.5 Exclusion criteria

The exclusion criteria for the study were:

- Nurses who were on annual leave or absent on the days of data collection.
- Nurses working on a contract basis.

3.5 Data collection instrument

A self-administered questionnaire was chosen as the data collection instrument. The self-administered questionnaire was the cheapest instrument to administer and it allowed the researcher to collect the data faster. Furthermore, the self-administered questionnaire allowed participants to remain anonymous, which ensured they gave truthful answers (Christensen *et al.*, 2015:72).

The self-administered questionnaire utilised in this study was used by Somannavar and Appajigol in another study. The authors used the questionnaire to study the knowledge, attitudes and practices of the public sector primary healthcare physicians in India (Somannavar & Appajigol, 2014:400-403). The researcher obtained permission from the authors to utilise and adapt the questionnaire in this study. The adaptation involved regrouping questions into different sections. An open-ended question regarding the nurses' experiences regarding obesity was added to the questionnaire. See Appendix 2 for the permission email from the authors.

English is the main mode of communication used in the nursing schools and healthcare institutions in Namibia, hence the questionnaire was available in English. The questionnaire consists of 40 statements, of which 35 statements have responses in the form of a Likert scale, 5 statements have selected responses which are not in any scale. The Likert scale statements could be answered with responses such as strongly agree, agree, do not know or not sure, disagree and strongly disagree.

The questionnaire is divided into seven sections, namely, sections A, B, C, D, E, F and G. The formatting of the sections is as follows:

Section A: Demographic data

Section A consists of 5 statements, which includes statements 1-5. These statements focus on the socio-demographic profile of participants. The statements were used to

determine the personal characteristics of the participants and focus on their age, sex, level of education, occupation and whether they know their BMI.

Section B: Knowledge of nurses regarding obesity

Section B consists of 10 statements, which includes statements 6-15 in a Likert-scale format. These statements were used to determine the knowledge of nurses regarding obesity.

Section C: Attitudes of nurses regarding obesity

Section C consists of 5 statements, which includes statements 16-20. These statements were used to determine the attitudes of nurses regarding obesity.

Section D: Practices of nurses regarding obesity

Section D consists of 5 statements, which includes statements 21-25 in a Likert-scale format. These statements were used to determine the practices of nurses regarding obesity.

Section E: Nurses' personal factors influencing their knowledge, attitudes and practices regarding obesity

Section E consists of 5 statements, which includes statements 26-30 in a Likert-scale format. These statements were used to determine the nurses' personal factors which may influence their knowledge, attitudes and practices regarding obesity.

Section F: Organisational factors influencing knowledge, attitudes and practices of nurses regarding obesity

Section F consists of 5 statements, which includes statements 31-35 in a Likert-scale format. These statements were used to determine the organisational factors which may influence the knowledge, attitudes and practices of nurses regarding obesity.

Section G: Patient factors influencing knowledge, attitudes and practices of nurses regarding obesity

Section G consists of 6 statements, which includes statements 36-41, with statements 36-40 in a Likert-scale format. Statements 36-40 were used to determine the patient factors which may influence the knowledge, attitudes and practices of nurses regarding obesity. See Appendix 3 for the questionnaire.

3.6 Pilot study

A pilot study is a small-sized study used to plan and modify the main study. It is designed to test the feasibility of and support modifications of the protocol, methods

and procedures to be used in the main study (Polit & Beck, 2017:624). The pilot study for this study was conducted to assess the clarity of the questions and to evaluate if the time allocated to complete the questionnaire was sufficient. Furthermore, the pilot study was used to determine the reliability and validity of the questionnaire as explained in this chapter, sections 3.7.1 and 3.7.2.

A statistician from Stellenbosch University was consulted on the number of participants required for the pilot study. Twenty-three participants were chosen to participate in the pilot study because, according to Cocks and Torgerson (2013:200), a pilot study should have a minimum of 9% of the sample size of the main study.

The researcher conducted a pilot study at Kudada and Henock (KD and H) Medical Services in the Oshana region. This healthcare institution did not form part of the main study. The researcher contacted the director of KD and H Medical Services' office telephonically to book for an appointment with the director. The researcher met the director of the hospital on 27 September 2021, to request institutional permission to conduct the pilot study. The researcher explained the research study, the purpose of the pilot test, as well as the data collection process of the pilot study to the director. The director requested the study proposal, the study questionnaire and Stellenbosch University's ethics clearance letter for the study. The researcher provided the director with the printed copies of the documents requested.

The director accompanied the researcher to the nursing manager. The researcher explained the research study, the purpose of the pilot study, as well as the data collection process of the pilot study to the nursing manager. After the director and the nursing manager verified the documents, written consent was given to the researcher to conduct the pilot study at the institution. See Appendix 6 for the institutional permission for the pilot study.

The nursing manager arranged a meeting with the unit managers in her office to introduce the researcher to the unit managers. The researcher then explained the research study, the purpose of the pilot study, as well as the data collection process of the pilot study to the unit managers. The researcher discussed a convenient date and time with the unit managers to conduct the pilot study. The unit managers indicated the date as 28 September 2021.

A time schedule for the pilot study data collection on 28 September 2021 was agreed on. Furthermore, the director, the nursing manager and the unit managers agreed the researcher would do a repeat of the data collection on the same participants on 6 October 2021, to determine the stability of the questionnaire. Table 3 shows the data collection schedule for the pilot study

Table 3: Data collection schedule for the pilot study

Date	Data Collection Group	Number of participants	Times for data collection
28 September 2021	Theatre nurses	3	07H30 – 08H30
	Casualty nurses	4	08H45 – 09H45
	Maternity Ward nurses	3	10H00 – 11H00
	Paediatrics Ward nurses	4	11H15 – 12H15
	Female Ward nurses	4	14H00 – 15H00
	Male Ward nurses	5	15H15 – 16H15
6 October 2021	Theatre nurses	3	07H30 – 08H30
	Casualty nurses	4	08H45 – 09H45
	Maternity Ward nurses	3	10H00 – 11H00
	Paediatrics Ward nurses	4	11H15 – 12H15
	Female Ward nurses	4	14H00 – 15H00
	Male Ward nurses	5	15H15 – 16H15

The participants were chosen using a convenience sampling method. The researcher visited each ward as indicated in Table 3 and was introduced to the nurses by their respective unit managers. The researcher met the nurses in the tearooms of their respective wards. The researcher explained the purpose of the research study and the pilot study to the nurses and requested those who were willing to participate to sign the informed consent. After completion of the informed consent, the participants were given the questionnaire to complete. The researcher remained in the tearooms, while the nurses were completing the questionnaires to clarify uncertainties. The researcher collected the completed questionnaires at the end of the meetings and requested the participants to comment on the clarity of the questionnaire. Thereafter, the researcher thanked the participants and left.

The feedback from the pilot study was as follows:

- The pilot study indicated the thirty minutes allocated for questionnaire completion were sufficient.
- The participants revealed all the questions in the questionnaire were clear, except one question (question 41), the open-ended question.
- The participants verbally explained the open-ended question did not specify explanations they were expected to share.

After discussion with the supervisor, the researcher modified the question for the main study. Before the modification, the question read, 'Do yo have any explanation you would like to share?' and after the modification it read, 'Do you have any explanation you would like to share about obesity?'

3.7 Reliability and validity

3.7.1 Reliability of the questionnaire

Reliability is defined as the degree to which the results obtained by an instrument can be replicated (Zohrabi, 2013:259). Three aspects of reliability are equivalence, stability, and internal consistency. Stability is measured to ensure the same results are obtained when a research instrument is used consecutively two or more times (Bolarinwa, 2015:198). A test-retest method is used to measure stability. A test-retest correlation coefficient of 0.80 or higher shows that a questionnaire is reliable. Internal consistency determines if all subparts of an instrument measure the same characteristic and Cronbach's alpha is used to measure this aspect of reliability (Polit & Beck, 2017:303-304).

A test-retest method was used to determine the stability of the questionnaire used in this study. This involved administering the questionnaire to the same participants on two different occasions and comparing the responses. The questionnaire was administered to the participants of the pilot test on two occasions which were one week apart. The findings were entered into SPSS and the correlation coefficient was calculated. The correlation coefficient was 0.85 and therefore the questionnaire was considered to have stability.

A Cronbach's alpha of 0.9 or more shows excellent consistency, between 0.8-0.9 good consistency and between 0.7-0.8 acceptable internal consistency per scale of a

questionnaire. For constructs with less than 10 items, a Cronbach's alpha greater than 0.5 is acceptable (Polit & Beck, 2017:308).

To determine the internal consistency of the questionnaire, SPSS was used to analyse the data gathered during the pilot test. A Cronbach's alpha for each construct was calculated. The Cronbach's alpha for knowledge score items was 0.82, for attitude score items was 0.87 and for practice score items was 0.80. In addition, the Cronbach's alpha for nurses' factors' items was 0.73, for organisational factors' items was 0.77 and for patients' factors' items was 0.83. Because each of the constructs had a Cronbach's alpha value above 0.7, the questionnaire was considered to be internally consistent.

Furthermore, the researcher ensured the findings of the study reflected accurate data of the participants by capturing the data correctly. The researcher requested the statistician from Stellenbosch University to recheck the data analysis.

3.7.2 Validity of the questionnaire

Validity is the extent to which an instrument measures what it is meant to measure. Types of validity include content, face, criterion and construct validity. Face validity refers to whether an instrument looks like it is measuring what it is supposed to measure. A questionnaire has face validity if its content simply looks relevant to the person completing it. Face validity is subjective (Polit & Beck, 2017:309-310).

In this study, the face validity of the questionnaire was measured during the pilot study. Participants were requested to evaluate the readability, consistency of style and formatting and clarity of the questions and language used. The participants confirmed the face validity of the questionnaire.

Content validity refers to the extent to which an instrument's items adequately capture what is supposed to be measured, that is, the construct. Content validity can be measured using a judgemental or a quantitative approach. A judgemental approach involves consulting literature on the subject and seeking inputs from experts. A quantitative approach involves requesting experts to score the questionnaire and come up with an average score (Polit & Beck, 2017:310).

Content validity of the questionnaire was ensured by using a judgemental approach. This involved conducting a literature review on obesity, as well as consulting experts

and the research supervisor. The literature review ensured the researcher identified the important items to be considered in obesity research. Thereafter, the researcher consulted the statistician at Stellenbosch University and the experts in the field who included two physicians at MCO, one dietician at Ondangwa Private Hospital and one dietician at Beta Medical Centre in April 2021. The consultations took place before the study proposal was submitted to Stellenbosch University's HREC. The consulted experts, the research supervisor and the statistician confirmed the content validity of the questionnaire.

3.8 Data collection

Data collection is a process of collecting information from all relevant sources to find answers to the research problem, test the hypothesis and evaluate the outcomes (Creswell, 2014:189). It can be divided into two categories which are secondary and primary data collection. The primary data collection process, which was followed in this study, is time-consuming and expensive compared to secondary data collection (Miles, Huberman & Saldana, 2014:35).

After receiving the ethics clearance from Stellenbosch University's HREC to conduct the research, the researcher applied for institutional approval at the four healthcare institutions. The researcher attached the application letter, the study proposal and the HREC clearance letter to the emails sent to the healthcare institutions. See Appendix 7 for institutional study settings approval letters.

Following being granted institutional approvals, the researcher contacted the nurse managers' secretaries telephonically for appointments. The researcher met the nurse managers of the four institutions separately according to the appointments, who introduced the researcher to the unit managers of the wards. Table 4 shows the dates and times of the meetings with the nurse managers and the unit managers.

Table 4: Schedule of researcher's meetings with the nursing managers and unit managers

Date	Time	Institution
29 September 2021	11H00 – 12H00	Medical Centre Oshakati
30 September 2021	09H00 – 10H00	Beta Medical Centre
01 October 2021	12H00 – 13H00	Ongwediva 24-hours Health Centre
04 October 2021	10H00 – 11H00	Ondangwa Private Hospital

The researcher explained the research study, the purpose of the study and the data collection process and the roles of the research assistants with the nursing managers. The researcher and the nursing managers agreed on dates and times when data would be collected in the different wards.

3.8.1 Utilisation of research assistants

Research assistants are people employed by research institutes or researchers to help with academic or private research. They provide support to researchers through collecting, analysing, and interpreting data (Christensen *et al.*, 2015:112). The researcher recruited professional nurses who had worked with her in previous research projects to be the research assistants. The researcher briefly explained the purpose of the research study and the expectation from the potential research assistants to the professional nurses. Three professional nurses agreed to act as research assistants in the study and signed an agreement. The three professional nurses who agreed to assist as research assistants were requested to be on vacation leave or off duty during the two weeks of data collection. The research assistants were paid R2 000.00 each for the two weeks.

3.8.2 Functions of research assistants

The researcher used three research assistants to assist with the data collection process. This enabled the data collection process to be conducted concurrently at all the study settings to reduce the time required to complete the data collection.

The functions of the research assistants were:

- Ensuring COVID-19 protocols were adhered to by the participants
- Explaining the purpose of the research study to potential participants
- Explaining the participants' rights during the study
- Answering questions about the study posed by the potential participants

- Requesting those who agreed to participate in the study to sign the informed consent forms
- Providing the participants with the questionnaires to complete
- Collecting the signed informed consent forms and the completed questionnaires from the participants and
- Distributing R30 healthy snacks to participants

3.8.3 Training of research assistants

Training of research assistants took place in the boardroom of Medical Centre Oshakati. The researcher ensured COVID-19 protocols were adhered to during the training. The research assistants were trained by the researcher on ethical standards in research, the research study topic, and the process of data collection. The training was conducted in the form of lectures which were presented over two days. Table 5 shows the training schedule.

Table 5: Research assistants training schedule

Date	Time	Topic
7 October 2021	10H00 – 10H30	Welcoming Remarks and Introductions
	10H30 – 11H30	Introduction to principles and practices of research
	11h30 – 12h00	Tea Break
	12H00 – 13H00	Research Ethics and the informed consent process
	13H00 – 14H00	Lunch
	14H00 – 15H00	Questions and Discussions
8 October 2021	10H00 – 10H30	Summary of research study topic
	10H30 – 11H30	Description of research study questionnaire
	11h30 – 12h00	Tea Break
	12H00 – 13H00	Data collection process
	13H00 – 14H00	Lunch
	14H00 – 15H00	Questions and Discussions

3.8.4 Data collection schedule

A data collection schedule for each institution was prepared by the researcher. The researcher was responsible for collecting data at Ondangwa Private Hospital, research assistant 1 at Medical Centre Oshakati, research assistant 2 at Beta Medical Centre and research assistant 3 at Ongwediva 24-hours Health Centre. The researcher and the research assistants met all the nurses at the different healthcare institutions in groups in their wards.

Different times for data collection were allocated for both day and night shift nurses over two weeks. Table 6 shows the data collection schedule used by the researcher and the research assistants.

Table 6: Data collection schedule for the four healthcare institutions

Date	Data Collection Group	Ondangwa Private Hospital	Medical Centre Oshakati	Beta Medical Centre	Ongwediva 24 Hours Health Centre	Times for day shift nurses	Times for night shift nurses
18 October 2021	General Ward nurses	√	√	√	√	14H00 – 15H00	20H00 – 21H00
	Intensive care unit nurses	√	√	X	X	15H30 – 16H30	21H30 – 22H00
19 October 2021	Maternity Ward nurses	√	√	√	X	14H00 – 15H00	20H00 – 21H00
	Paediatrics Ward nurses	√	√	√	√	15H30 – 16H30	21H30 – 22H00
20 October 2021	Casualty nurses	√	√	√	√	14H00 – 15H00	20H00 – 21H00
	General Ward nurses	√	√	√	√	15H30 – 16H30	21H30 – 22H00
21 October 2021	Theatre nurses	√	√	√	√	14H00 – 15H00	20H00 – 21H00
	Maternity Ward nurses	√	√	√	X	15H30 – 16H30	21H30 – 22H00

22 October 2021	Paediatrics Ward nurses	√	√	√	√	14H00 – 15H00	20H00 – 21H00
	Casualty nurses	√	√	√	√	15H30 – 16H30	21H30 – 22H00
23 October 2021	Intensive care unit nurses	√	√	X	X	14H00 – 15H00	20H00 – 21H00
	Theatre nurses	√	√	√	√	15H30 – 16H30	21H30 – 22H00
24 October 2021	General Ward nurses	√	√	√	√	14H00 – 15H00	20H00 – 21H00
	Paediatrics Ward nurses	√	√	√	√	15H30 – 16H30	21H30 – 22H00
25 October 2021	General Ward nurses	√	√	√	√	14H00 – 15H00	20H00 – 21H00
	Intensive care unit nurses	√	√	X	X	15H30 – 16H30	21H30 – 22H00
26 October 2021	Maternity Ward nurses	√	√	√	X	14H00 – 15H00	20H00 – 21H00
	Paediatrics Ward nurses	√	√	√	√	15H30 – 16H30	21H30 – 22H00
27 October 2021	Casualty nurses	√	√	√	√	14H00 – 15H00	20H00 – 21H00
	General Ward nurses	√	√	√	√	15H30 – 16H30	21H30 – 22H00

28 October 2021	Theatre nurses	√	√	√	√	14H00 – 15H00	20H00 – 21H00
	Maternity Ward nurses	√	√	√	X	15H30 – 16H30	21H30 – 22H00
29 October 2021	Paediatrics Ward nurses	√	√	√	√	14H00 – 15H00	20H00 – 21H00
	Casualty nurses	√	√	√	√	15H30 – 16H30	21H30 – 22H00
30 October 2021	Intensive care unit nurses	√	√	X	X	14H00 – 15H00	20H00 – 21H00
	Theatre nurses	√	√	√	√	15H30 – 16H30	21H30 – 22H00

KEY: √ - Data collection session, X – No data collection session

The data collection was conducted on more than one occasion in the wards of the various study settings to ensure all the nurses working in the different shifts were given an equal opportunity to participate in the study. The general wards of the study setting accommodate both medical and surgical patients (male and female), hence their staff compliment are bigger than the other wards. The researcher, therefore, allocated more data collection sessions for the general wards of the healthcare institutions.

3.8.5 Data collection process

The data collection process was conducted according to the data collection schedule discussed in this chapter, section 3.8.4 by the researcher and research assistants. The data collection process started with the researcher or research assistants explaining the purpose of the study to the randomly selected potential participants, followed by a question-and-answer period of 5 minutes. All the randomly selected potential participants were given hard copies of the information letter. The randomly selected potential participants willing to take part in the study were requested to sign

the consent form. After signing the informed consent forms, the participants submitted them to the researcher or the research assistants.

The researcher or the research assistants requested the participants who had signed the informed consent forms to complete the questionnaires. The participants were required to indicate their chosen responses using a cross (x). The participants were allocated 30 minutes to complete the questionnaire. The participants submitted the completed questionnaires at the end of the meeting to the researcher or the research assistants. Each participant received an R30 healthy snack as a token of appreciation for their participation. The healthy snack consisted of a dried fruit snack bar and a 300ml fruit juice drink.

The researcher and the research assistants adhered to the COVID-19 protocols for the respective healthcare institutions. They ensured all participants were wearing masks, sanitised the hands of all participants attending the meetings, restricted the maximum number of people in the meeting room to five and ensured social distancing of 1.5 metres between the participants. The researcher was responsible for supplying the sanitizers for the venues. See Appendix 4 for MCO COVID-19 protocol.

3.9 Data analysis

Research data analysis is a process in which researchers use data to tell a story and to interpret the data to derive insights (Miles *et al.*, 2014:5). Data analysis assists to reduce chunks of raw data into much smaller fragments that make sense. It involves three essential things which are organising data, reducing data and top-bottom/bottom-up fashion. Furthermore, data analysis is a time-consuming process, ambiguous and messy, while at the same time fascinating (Marshall & Rossman, 2016:35).

In quantitative research studies, data analysis involves the use of both descriptive and inferential statistics (Christensen *et al.*, 2015:394). Descriptive statistics allow researchers to summarise and describe data. Descriptive statistics commonly used are frequencies and percentages, frequency distributions, measures of central tendency, measures of variability, correlation coefficients and several risk indexes. Measures of central tendency are mode, median and mean, while measures of variability are range, standard deviation and variance. Correlation coefficients are used to describe the direction and magnitude of a relationship between two variables.

Risk indexes such as relative risk and odds ratio describe outcomes in relation to exposures and they provide useful information for clinical decision-making (Polit & Beck, 2017:356-370).

Inferential statistics allow researchers to make extrapolations about a population using data from a representative sample of the population. Inferential statistics make use of confidence intervals and statistical tests. Statistical tests used depend on the level of measurement of the dependent variable and the number of groups the independent variable has. Commonly used statistical tests are independent group t-test, Chi-square tests and analysis of variance (ANOVA) test. Independent t-tests are used to test if there is a difference in the means of a continuous variable between two groups, while a one-way ANOVA test is used where there are three or more groups of the independent variable. The Chi-square test is used to test if there is a difference in proportions of a nominal dependent variable in two or more groups of the independent variable. To examine the strength of a relationship between two continuous variables, Pearson's correlation coefficient is computed (Christensen *et al.*, 2015:443-446).

The researcher was responsible for coding the responses before entering them into SPSS version 27, which was used for analysing the data. The researcher has previously received training on SPSS. The researcher entered the data into two datasets, which she compared to identify any differences. To ensure the data were clean, the researcher ran frequencies on each variable to ensure there were no missing responses. Where missing responses were identified, the researcher checked the cases with the missing responses and went back to the hard copies of the questionnaires to retrieve the responses. Running frequencies also ensured wild codes were identified and corrected. The researcher requested a colleague with training on SPSS to also analyse the two datasets for differences. The data and data analysis results were reviewed by a statistician from Stellenbosch University. The statistician confirmed the findings were accurate.

Nominal data in the questionnaire included sex and occupation, while ordinal data included age groups, level of highest educational attainment and BMI ranges. Nominal and ordinal data were analysed using descriptive statistics like percentages and frequencies. The frequency of each response was expressed as a percentage to give a clear picture of how common each response was. One-sample non-parametric Chi-

square tests were used to determine if the frequencies of the different responses to each statement indicated by the participants were statistically significant. The data were presented in tables, pie charts and bar graphs.

Obesity knowledge among nurses was measured numerically by adding the total scores of each participant in section B of the questionnaire, while attitudes and practices were also measured numerically by adding the total scores of the participants in section C and section D of the questionnaire. The total scores were classified into three groups and the groups were poor, average, and good. For knowledge level, participants who had total scores of between 40 and 50 were regarded as having good knowledge, those with 30 to 39 as average knowledge and those with less than 30 as having poor knowledge. For attitude levels and practice levels, participants who had total scores of 20 to 25 were regarded as having good attitudes and practices, those with 15 to 19 as having average attitudes and practices and those with less than 15 as having poor attitudes and practices.

According to Polit and Beck (2017:385-388), the means of two groups can be compared using an independent t-test, while the means of three or more groups can be compared using a one-way analysis of variance (ANOVA) test. To determine if the means of knowledge scores, attitude scores and practice scores differed according to sex or knowledge of personal BMI, independent t-tests were performed. Furthermore, to determine if the means of knowledge scores, attitude scores and practice scores differed according to educational level or occupation, one-way ANOVA tests were performed.

Pearson's correlation coefficients were calculated to determine if there was a correlation between knowledge and attitude, knowledge and practice and attitude and practice. Chi-square tests were performed to determine if there were associations between the levels of knowledge, attitude and practices and the socio-demographic characteristics of the participants. Crude odds analyses were also performed to determine the extent of these associations. To perform the crude odds analyses, knowledge levels were reclassified to have two groups of the outcome. This meant knowledge levels were divided into good knowledge and poor knowledge. The poor knowledge group included both those who had average scores and poor scores. The reference groups chosen for the analysis were determined from information in the

literature review. A 95% level of confidence was used for the hypothesis tests. Questions in section E, section F and section G of the questionnaire were analysed individually to determine how important each factor was in influencing knowledge, attitudes, and practices of nurses regarding obesity.

3.10 Conclusion

The research was conducted using a quantitative, cross-sectional survey design. The study was conducted in the Oshana region in Namibia. Participants for the study included nurses working at four selected private healthcare institutions in the region. Two hundred and fifty participants were selected from the four institutions using a proportional stratified random sampling method. Data were collected using a self-administered questionnaire. The reliability of the questionnaire was determined using a test-retest method and Cronbach's alpha, while validity was ensured by consulting experts in the field of obesity management and the research supervisor. The data was analysed using SPSS. In the next chapter, Chapter Four, contains a presentation of the results of the study.

CHAPTER FOUR

RESULTS

4.1 Introduction

In Chapter Three, the researcher presented the research design and methodology. In this chapter, Chapter Four, the researcher presents the results of the study. As discussed in Chapter Three, the data was collected by using a self-administered questionnaire to determine the levels of knowledge, attitudes, and practices of nurses regarding obesity and the associations between the levels of knowledge and the socio-demographic characteristics of participants. The questionnaires were administered to all participants who were selected for the study from the four private healthcare institutions in the Oshana region in Namibia (n=250; 100%). The response rate from the participants was 100%.

Collected data were entered into SPSS version 27 which was used for the analysis. Two datasets were created and compared to ensure the accuracy of the data captured. Before analysing the data, missing values were checked by running frequencies for all the variables. Where missing items were identified, the researcher checked the values from the original copies of the questionnaires the participants completed. Statistical tests used in data analysis include independent group t-tests, Chi-square tests, one-way ANOVA tests and Pearson's correlation coefficients.

The results of the study are presented according to the flow of the questions in the questionnaire.

4.2 Socio-demographic characteristics of participants

Participants (n=250) were asked questions regarding their age groups, sex, occupation, educational level and whether they knew their BMI. The results are presented as follows:

4.2.1 Distribution of age groups among participants

The findings are shown in Figure 7.

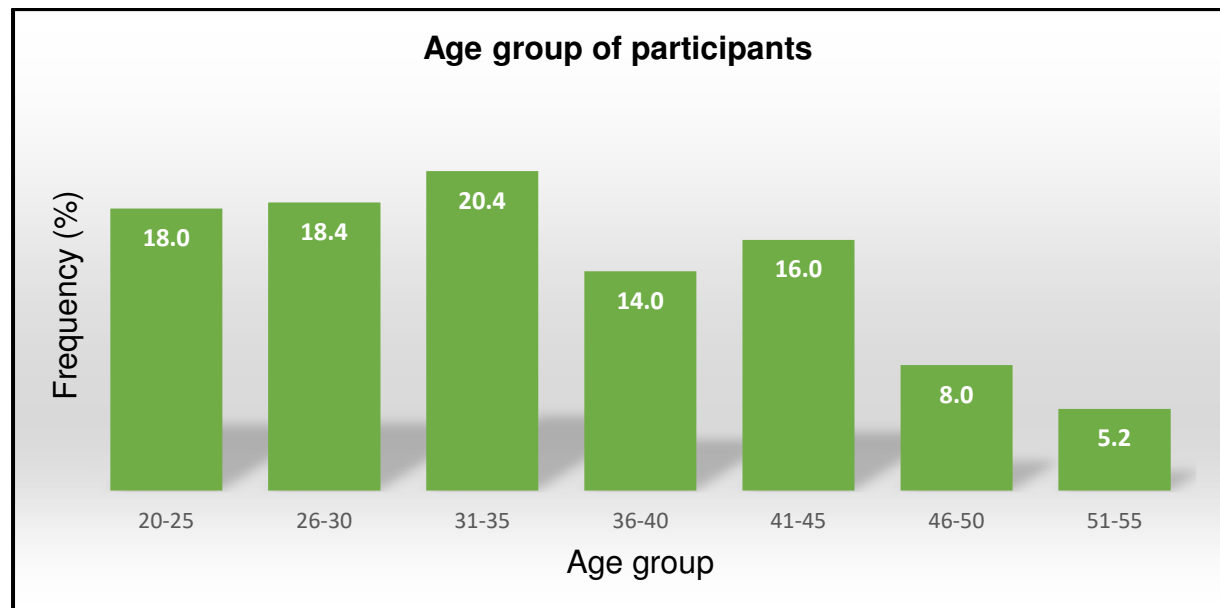


Figure 7: Age groups of participants

About one-fifth of the participants ($n=51$; 20.4%), were in the 31-35 years age group, followed by the 26-30 years age group ($n=46$; 18.4%) and the 20-25 years age group ($n=45$; 18%). The 51-55 years age group had the lowest number of participants ($n=13$; 5.2%).

4.2.2 Sex of participants

The findings are shown in Figure 8.

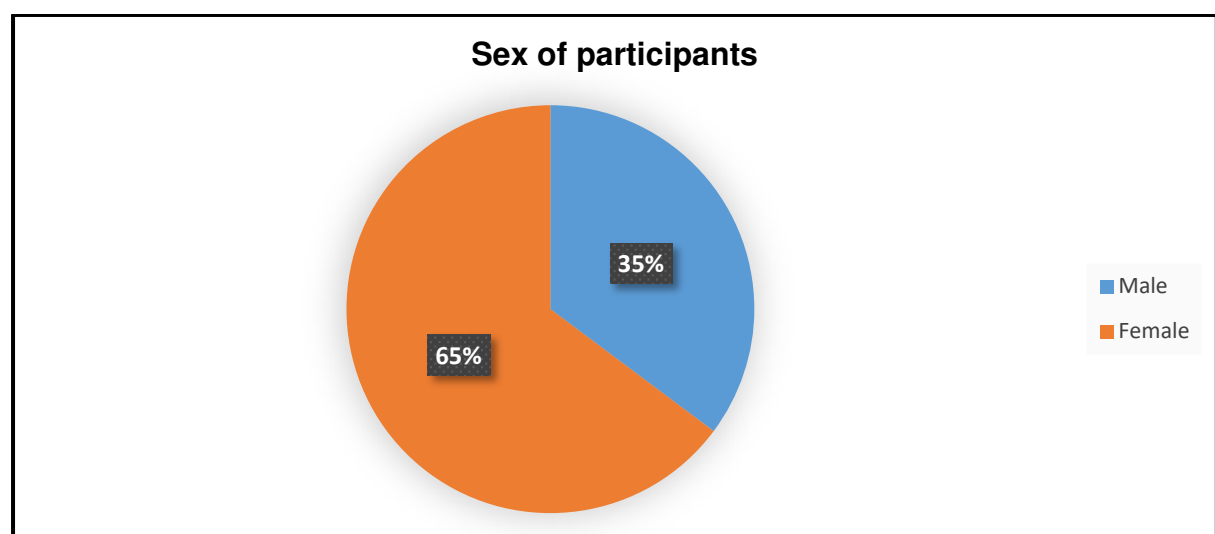


Figure 8: Sex of participants

There were more female participants (n=162; 65%) than male participants (n=88; 35%).

4.2.3 Knowledge of personal BMI by participants

The findings are shown in Figure 9.

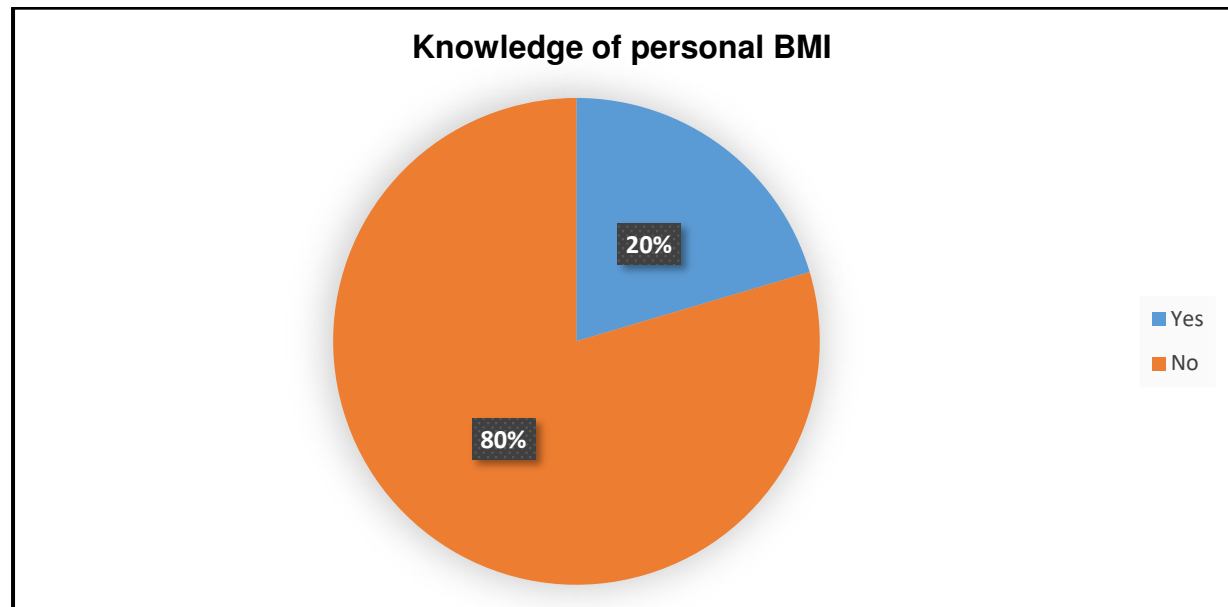


Figure 9: Knowledge of personal BMI by participants

Most of the participants (n=199; 80%), did not know their BMI, while fewer (n=51; 20%), knew their BMI.

4.2.4 Educational level of participants

The findings are shown in Figure 10.

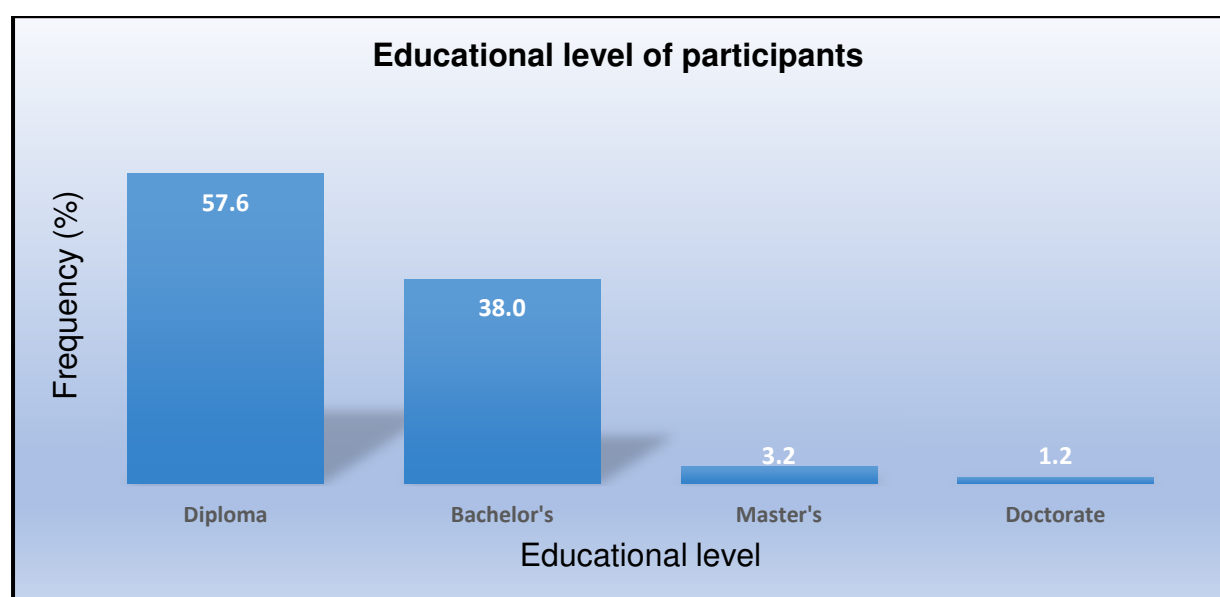


Figure 10: Educational level of participants

More than half of the participants ($n=144$; 57.6%) had diplomas as their highest educational attainment, followed by those who had bachelor's degrees ($n=95$; 38%). Few participants ($n=3$; 1.2%) had doctorate degrees.

4.2.5 Occupation of participants

The findings are shown in Figure 11.

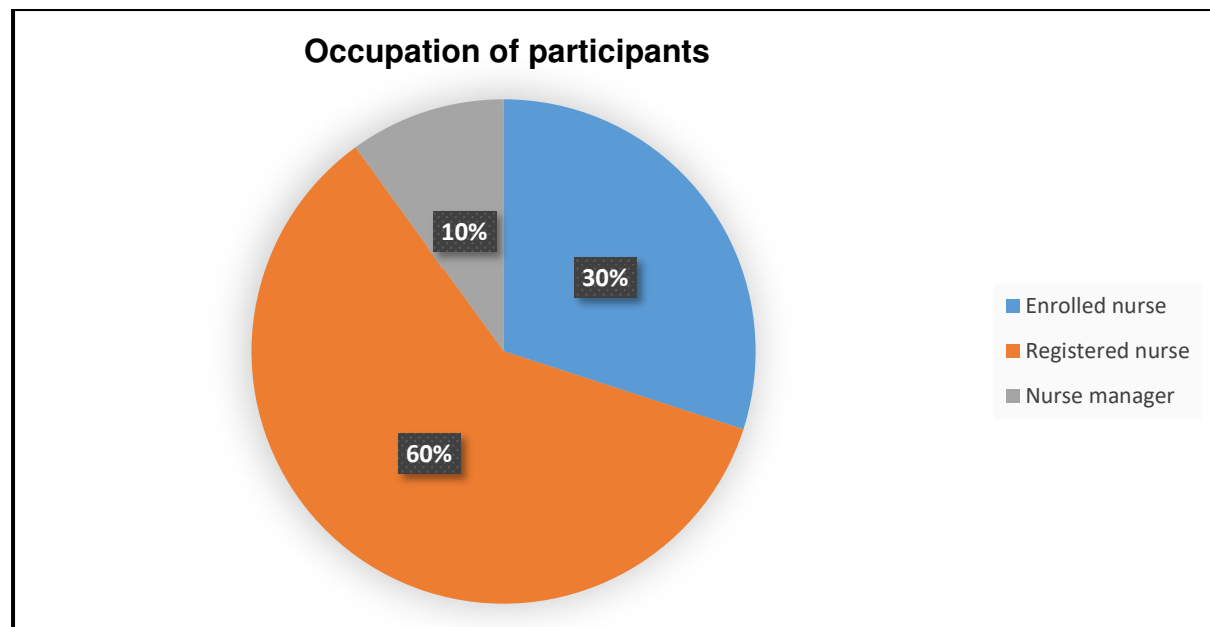


Figure 11: Occupation of participants

The majority of the participants were registered nurses ($n=150$; 60%), followed by enrolled nurses ($n=75$; 30%), while the lowest number was nurse managers ($n=25$; 10%).

4.3 Knowledge of nurses regarding obesity

4.3.1 Frequency distribution of responses to knowledge statements

To address objective 1, participants were requested to respond to ten statements (numbered 6-15 in the research instrument), that were used to determine their levels of knowledge regarding obesity. They were supposed to select one of the five provided responses. The responses were 'strongly disagree', 'disagree', 'do not know', 'agree' and 'strongly agree'. Table 7 shows the frequencies of participants' responses to knowledge statements and the results of the one-sample Chi-square tests.

Table 7: Frequency distribution of responses to knowledge statements

Statement	Response	TOTAL		One-sample Chi-square test summary		
		<i>n</i>	%	Test statistic	Degrees of freedom (df)	<i>p</i> -value
6. Obesity is diagnosed using Body Mass Index (BMI)				137.44	4	<i>p</i> <0.01
	Strongly disagree	24	9.6			
	Disagree	24	9.6			
	Do not know	18	7.2			
	Agree	70	28			
	Strongly agree	114	45.6			
7. An individual with BMI above 30 is considered obese				73.48	4	<i>p</i> <0.01
	Strongly disagree	22	8.8			
	Disagree	36	14.4			
	Do not know	28	11.2			
	Agree	73	29.2			
	Strongly agree	91	36.4			
8. Obesity can be reduced by eating less during meals				69.52	4	<i>p</i> <0.01
	Strongly disagree	25	10.0			
	Disagree	31	12.4			
	Do not know	31	12.4			
	Agree	73	29.2			
	Strongly agree	90	36.0			
9. Eating more fruits and vegetables can help reduce obesity				65.32	4	<i>p</i> <0.01

	Strongly disagree	24	9.6			
	Disagree	33	13.2			
	Do not know	31	12.4			
	Agree	78	31.2			
	Strongly agree	84	33.6			
10. Obesity can increase the cost of healthcare				71.32	4	<i>p < 0.01</i>
	Strongly disagree	31	12.4			
	Disagree	38	15.2			
	Do not know	24	9.6			
	Agree	59	23.6			
	Strongly agree	98	39.2			
11. Doing more exercises daily reduces obesity				95.28	4	<i>p < 0.01</i>
	Strongly disagree	23	9.2			
	Disagree	26	10.4			
	Do not know	31	12.4			
	Agree	67	26.8			
	Strongly agree	103	41.2			
12. Obesity is associated with certain non-communicable diseases				94.68	4	<i>p < 0.01</i>
	Strongly disagree	23	9.2			
	Disagree	30	12.0			
	Do not know	24	9.6			
	Agree	75	30.0			
	Strongly agree	98	39.2			
13. Obesity is a risk factor for certain cancers				113.28	4	<i>p < 0.01</i>

	Strongly disagree	16	6.4			
	Disagree	41	16.4			
	Do not know	17	6.8			
	Agree	73	29.2			
	Strongly agree	103	41.2			
14. Management of obesity involves combining different strategies like drugs, surgery, psychotherapy, and behavioural therapy				126.80	4	<i>p < 0.01</i>
	Strongly disagree	15	6.0			
	Disagree	19	7.6			
	Do not know	33	13.2			
	Agree	77	30.8			
	Strongly agree	106	42.4			
15. Obesity stigma may lead to mental health problems among obese patients				144.68	4	<i>p < 0.01</i>
	Strongly disagree	21	8.4			
	Disagree	30	12.0			
	Do not know	22	8.8			
	Agree	55	22.0			
	Strongly agree	122	48.8			

The findings in Table 7 are described as follows:

- Statement 6:** 'Obesity is diagnosed using Body Mass Index (BMI)':
 Statement 6 was answered correctly by almost half of the participants (n=114; 45.6%) who strongly agreed. The minority of the participants (n=18; 7.2%) indicated they did not know. There were statistically significant differences in the frequencies of the responses indicated by the participants, χ^2 (df=4, n=250) =137.44, $p < 0.01$.

- **Statement 7:** 'An individual with BMI above 30 is considered obese':
Statement 7 was answered correctly by about a third of the participants (n=91; 36.4%) who strongly agreed. The minority of the participants (n=22; 8.8%) strongly disagreed. There were statistically significant differences in the frequencies of the responses indicated by the participants, χ^2 (df=4, n=250) =73.48, $p<0.01$.
- **Statement 8:** 'Obesity can be reduced by eating less during meals':
Statement 8 was answered correctly by about a third of the participants (n=90; 36%) who strongly agreed. The minority of the participants (n=25; 10%) strongly disagreed. There were statistically significant differences in the frequencies of the responses indicated by the participants, χ^2 (df=4, n=250) =69.52, $p<0.01$.
- **Statement 9:** 'Eating more fruits and vegetables can help reduce obesity':
Statement 9 was answered correctly by less than a third of the participants (n=78; 31.2%) who strongly agreed. The minority of the participants (n=24; 9.6%) strongly disagreed. There were statistically significant differences in the frequencies of the responses indicated by the participants, χ^2 (df=4, n=250) =65.32, $p<0.01$.
- **Statement 10:** 'Obesity can increase the cost of healthcare':
Statement 10 was answered correctly by about a fifth of the participants (n=59; 23.6%) who strongly agreed. The minority of the participants (n=24; 9.6%) indicated they did not know. There were statistically significant differences in the frequencies of the responses indicated by the participants, χ^2 (df=4, n=250) =71.32, $p<0.01$.
- **Statement 11:** 'Doing more exercises daily reduces obesity':
Statement 11 was answered correctly by about two-fifths of the participants (n=103; 41.2%) who strongly agreed. The minority of the participants (n=23; 9.2%) strongly disagreed. There were statistically significant differences in the frequencies of the responses indicated by the participants, χ^2 (df=4, n=250) =95.28, $p<0.01$.
- **Statement 12:** 'Obesity is associated with certain non-communicable diseases':

Statement 12 was answered correctly by about two-fifths of the participants (n=98; 39.2%) who strongly agreed. The minority of the participants (n=23; 9.2%) strongly disagreed. There were statistically significant differences in the frequencies of the responses indicated by the participants, χ^2 (df=4, n=250) =94.68, $p<0.01$.

- **Statement 13:** ‘Obesity is a risk factor for certain cancers’:

Statement 13 was answered correctly by about two-fifths of the participants (n=103; 41.2%) who strongly agreed. The minority of the participants (n=16; 6.4%) strongly disagreed. There were statistically significant differences in the frequencies of the responses indicated by the participants, χ^2 (df=4, n=250) =113.28, $p<0.01$.

- **Statement 14:** ‘Management of obesity involves combining different strategies like drugs, surgery, psychotherapy and behavioural therapy’:

Statement 14 was answered correctly by about two-fifths of the participants (n=106; 42.4%) who strongly agreed. The minority of the participants (n=15; 6%) strongly disagreed. There were statistically significant differences in the frequencies of the responses indicated by the participants, χ^2 (df=4, n=250) =126.80, $p<0.01$.

- **Statement 15:** ‘Obesity stigma may lead to mental health problems among obese patients’:

Statement 15 was answered correctly by almost half of the participants (n=122; 48.8%) who strongly agreed. The minority of the participants (n=21; 8.4%) strongly disagreed. There were statistically significant differences in the frequencies of the responses indicated by the participants, χ^2 (df=4, n=250) =144.68, $p<0.01$.

4.3.2 Frequency distribution of total knowledge scores of participants

The total knowledge scores were determined by adding the scores of the responses to the ten statements about knowledge regarding obesity for each participant as explained in section 3.9. The findings are shown in Figure 12.

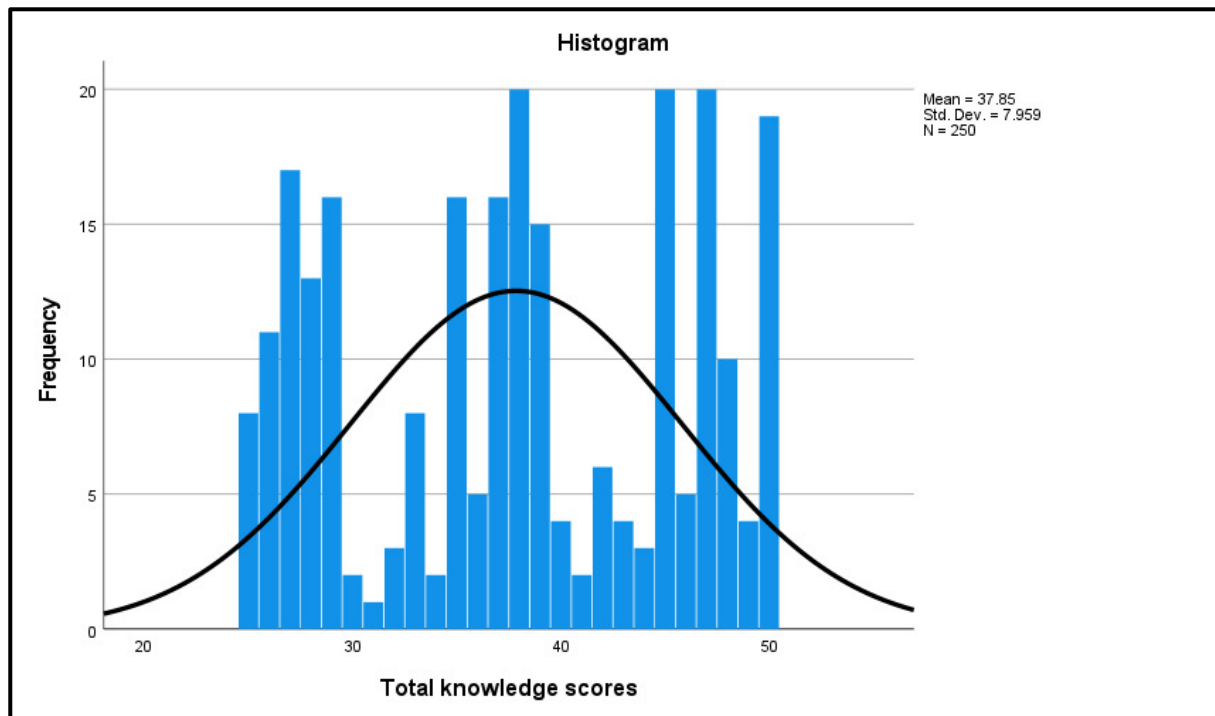


Figure 12: Frequency distribution of total knowledge scores of participants

The distribution of total knowledge scores of participants was negatively skewed. The mean of the total knowledge scores was 37.85 ($SD=7.96$). The maximum score attained by the participants was 50, while the minimum score was 25.

4.3.3 Means of total knowledge scores according to sex and personal knowledge of BMI

To determine whether there were differences in the means of the total knowledge scores when participants were grouped according to sex and their knowledge of their BMI, independent t-tests were performed. The results are shown in Table 8.

Table 8: t-test results of means according to sex and personal knowledge of BMI

Characteristic	Mean	Standard deviation	t-statistic (Equal variance assumed)	Degrees of freedom	p-value
Sex			2.077	248	$p=0.039$
Male	39.26	8.57			
Female	37.09	7.82			
Do you know your BMI			1.255	248	$p=0.211$
Yes	39.10	7.11			
No	37.53	8.15			

The mean of the total knowledge scores for males ($M=39.26$, $SD=8.57$) was significantly higher than for females ($M=37.09$, $SD=7.82$), ($t [df248] = 2.077$, $p=0.039$).

However, the mean of the total knowledge scores for those who knew their BMI ($M=39.10$, $SD=7.11$), was not significantly different from that of participants who did not know their BMI ($M=37.53$, $SD=8.15$), (t [df248] =1.255, $p=0.211$).

4.3.4 Means of total knowledge scores according to educational level and occupation

To determine whether there were differences in the means of the total knowledge scores when participants were grouped according to their educational levels and their occupations, one-way Analysis of Variance (ANOVA) tests were performed. The results are shown in Table 9.

Table 9: ANOVA test results of means of total knowledge scores according to educational level and occupation

Characteristic	Mean	Standard deviation	Sum of squares	Degrees of freedom (df)	Mean square	F-statistic	p-value
Educational level						16.64	$p<0.01$
Between groups			2660.28	3	886.76		
Within groups			13113.24	246	53.31		
Diploma	35.15	7.34					
Bachelor's degree	41.12	7.74					
Master's degree	43.88	5.25					
Doctorate degree	48.00	2.00					
Occupation						34.56	$p<0.01$
Between groups			3448.66	2	1724.33		
Within groups			12324.86	247	49.90		
Nurse Manager	43.72	5.18					
Registered Nurse	39.55	7.11					
Enrolled Nurse	32.49	7.49					

The means of the total knowledge scores statistically significantly differed by educational level (F [3, 246] =16.64, $p<0.01$). The results also show the means of the total knowledge scores of the participants were statistically significantly different for the different occupations (F [2, 247] =34.56, $p<0.01$).

4.3.5 Frequency distribution of knowledge levels of participants

The total knowledge scores of participants were classified into poor, average and good. Those who had a total score between 40 and 50 were classified as good, between 30 and 39 as average and below 30 as poor. The results are shown in Figure 13.

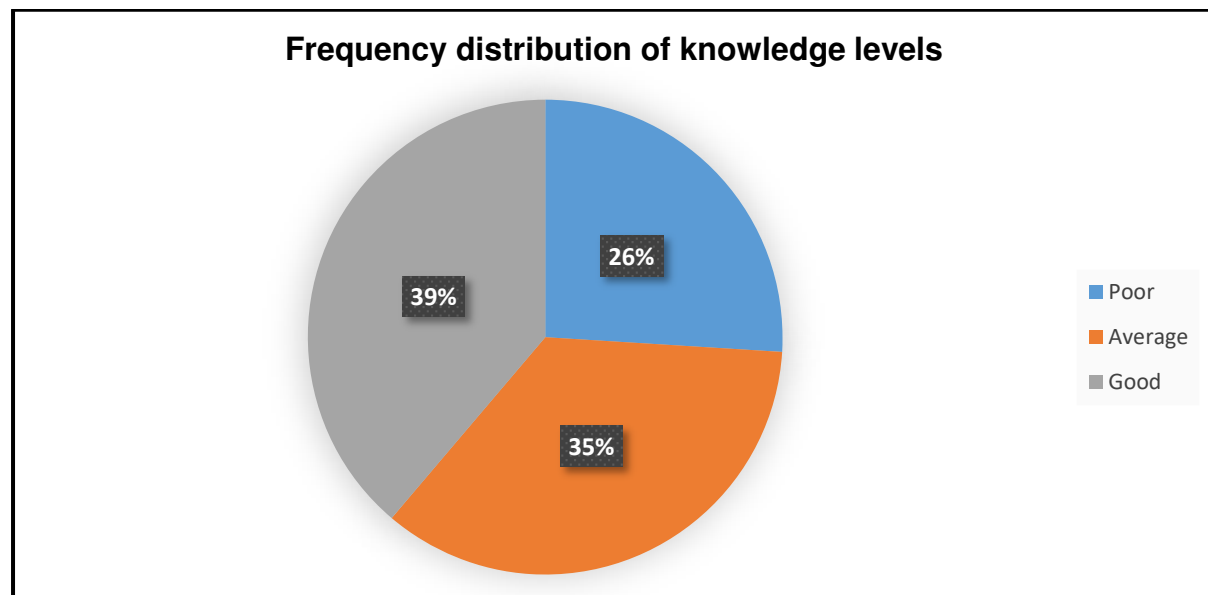


Figure 13: Frequency distribution of knowledge levels of participants

About two-fifths of the participants ($n=97$; 39%) had good knowledge, followed by those with average knowledge ($n=88$; 35%), while few ($n=65$; 26%) had poor knowledge regarding obesity.

4.4 Attitudes of nurses regarding obesity

4.4.1 Frequency distribution of responses to attitude statements

To address objective 2, participants were requested to respond to five statements (numbered 16-20 in the research instrument), that were used to determine their levels of attitude regarding obesity. They were supposed to select one of the five provided responses. The responses were 'strongly disagree', 'disagree', 'do not know', 'agree' and 'strongly agree'. In Table 10, the frequencies of participants' responses to attitude statements and the results of the one-sample Chi-square tests are presented.

Table 10: Frequency distribution of responses to attitude statements

Statement	Response	TOTAL		One-sample Chi-square test summary		
		<i>n</i>	%	Test statistic	Degrees of freedom (df)	<i>p</i> -value
16. Obesity is a medical condition				101.48	4	<i>p</i> <0.01
	Strongly disagree	28	11.2			
	Disagree	36	14.4			
	Do not know	17	6.8			
	Agree	63	25.2			
	Strongly agree	106	42.4			
17. Nurses should set an example and strive to maintain normal weight				97.80	4	<i>p</i> <0.01
	Strongly disagree	19	7.6			
	Disagree	38	15.2			
	Do not know	22	8.8			
	Agree	70	28.0			
	Strongly agree	101	40.4			
18. Treating obese patients is professionally gratifying				82.76	4	<i>p</i> <0.01
	Strongly disagree	23	9.2			
	Disagree	30	12.0			
	Do not know	30	12.0			
	Agree	70	28.0			
	Strongly agree	97	38.8			
19. Not all obese patients develop obesity through carelessness				108.64	4	<i>p</i> <0.01
	Strongly disagree	21	8.4			
	Disagree	35	14.0			
	Do not know	17	6.8			
	Agree	76	30.4			

	Strongly agree	101	40.4			
20. Obese patients are not lazier than normal weight people				116.32	4	$p<0.01$
	Strongly disagree	22	8.8			
	Disagree	34	13.6			
	Do not know	16	6.4			
	Agree	72	28.8			
	Strongly agree	106	42.4			

The findings in Table 10 are described as follows:

- Statement 16:** ‘Obesity is a medical condition’:
 About two-fifths of the participants (n=106; 42.4%), strongly agreed with the statement. The minority of the participants (n=17; 6.8%) indicated they did not know. There were statistically significant differences in the frequencies of the responses indicated by the participants, χ^2 (df=4, n=250) =101.48, $p<0.01$.
- Statement 17:** ‘Nurses should set an example and strive to maintain normal weight’:
 About two-fifths of the participants (n=101; 40.4%) strongly agreed with the statement. The minority of the participants (n=19; 7.6%) strongly disagreed. There were statistically significant differences in the frequencies of the responses indicated by the participants, χ^2 (df=4, n=250) =97.80, $p<0.01$.
- Statement 18:** ‘Treating obese patients is professionally gratifying’:
 Almost two-fifths of the participants (n=97; 38.8%) strongly agreed with the statement. The minority of the participants (n=30; 12%) disagreed. There were statistically significant differences in the frequencies of the responses indicated by the participants, χ^2 (df=4, n=250) =82.76, $p<0.01$.
- Statement 19:** ‘Not all obese patients develop obesity through carelessness’:
 About two-fifths of the participants (n=101; 40.4%) strongly agreed with the statement. The minority of the participants (n=17; 6.8%) indicated they did not know. There were statistically significant differences in the frequencies of the responses indicated by the participants, χ^2 (df=4, n=250) =108.64, $p<0.01$.

- **Statement 20:** 'Obese patients are not lazier than normal-weight people':
About two-fifths of the participants (n=106; 42.4%) strongly agreed with the statement. The minority of the participants (n=16; 6.4%) indicated they did not know. There were statistically significant differences in the frequencies of the responses indicated by the participants, χ^2 (df=4, n=250) =116.32, $p<0.01$.

4.4.2 Frequency distribution of total attitude scores of participants

The total attitude scores were determined by adding the scores of the responses to the five statements about attitudes regarding obesity for each participant as explained in Chapter three, section 3.9. The results are shown in Figure 14.

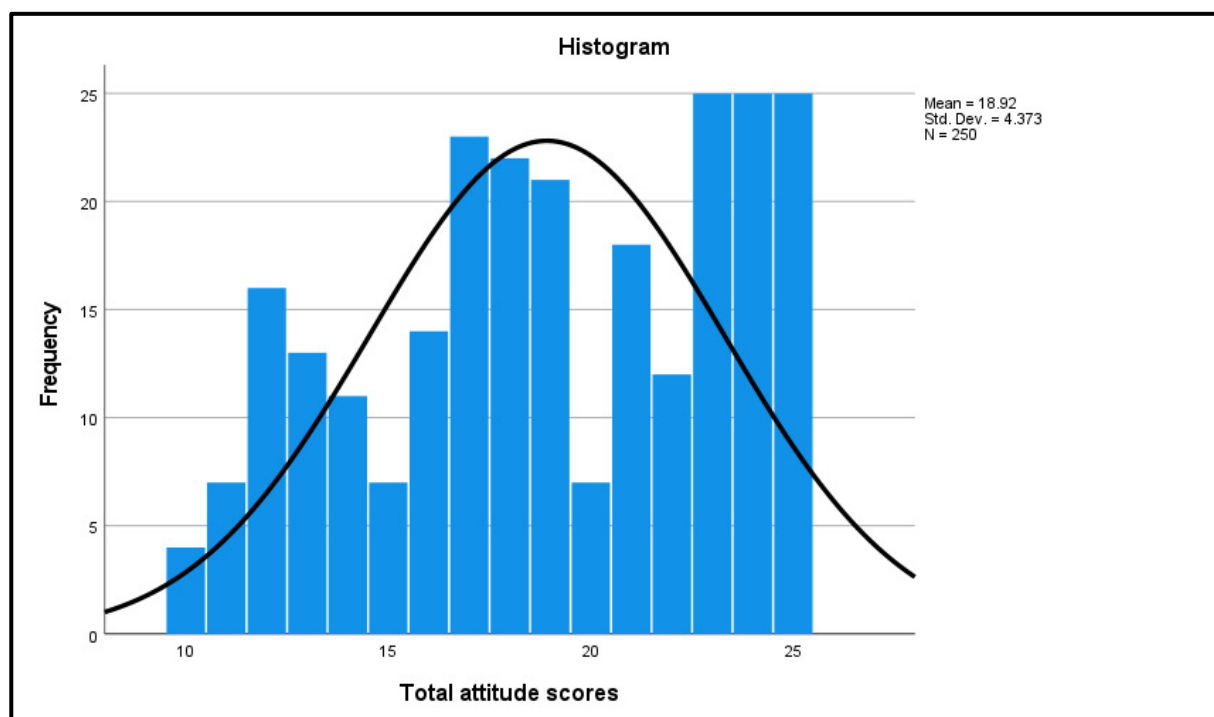


Figure 14: Frequency distribution of total attitude scores of participants

The distribution of total attitude scores of participants was negatively skewed. The mean of the total attitude scores was 18.92 ($SD=4.37$). The maximum score attained by the participants was 25, while the minimum score was 10.

4.4.3 Means of total attitude scores according to gender and personal knowledge of BMI

To determine whether there were differences in the means of the total attitude scores when participants were grouped according to sex and their knowledge of their BMI, independent t-tests were performed. The results are shown in Table 11.

Table 11: t-test results of the mean of total attitude scores according to sex and personal knowledge of BMI

Characteristic	Mean	Standard deviation	t-statistic (Equal variance assumed)	Degrees of freedom	p-value
Sex			0.465	248	$p=0.642$
Male	19.09	4.56			
Female	18.82	4.28			
Do you know your BMI			0.655	248	$p=0.513$
Yes	19.27	4.40			
No	18.82	4.37			

The mean of the total attitude scores for males ($M=19.09$, $SD=4.56$) was not statistically significantly different from that of females ($M=18.82$, $SD=4.28$), (t [df248] =0.465, $p=0.642$). Also, the mean of the total attitude scores for those who knew their BMI ($M=19.27$, $SD=4.40$), was not statistically significantly different from that of participants who did not know their BMI ($M=18.82$, $SD=4.37$), (t [df248] =1.255, $p=0.513$).

4.4.4 Means of total attitude scores according to educational level and occupation

To determine whether there were differences in the means of the total attitude scores when participants were grouped according to their educational levels and their occupations, one-way ANOVA tests were performed. The results are shown in Table 12.

Table 12: ANOVA test results of means of total attitude scores according to educational level and occupation

Characteristic	Mean	Standard deviation	Sum of squares	Degrees of freedom (df)	Mean square	F-statistic	p-value
Educational level						9.879	$p<0.01$
Between groups			511.93	3	170.64		
Within groups			4249.31	246	17.27		
Diploma	17.85	3.91					
Bachelor's degree	20.00	4.62					
Master's degree	23.50	2.33					
Doctorate degree	23.67	2.31					
Occupation						9.241	$p<0.01$
Between groups			331.48	2	165.74		
Within groups			4429.96	247	17.93		
Nurse Manager	22.00	3.06					
Registered Nurse	18.96	4.20					
Enrolled Nurse	17.80	4.61					

The means of the total attitude scores differed statistically significantly by educational level ($F [3, 246] = 9.879, p < 0.01$). The results also show the means of the total attitude scores were statistically significantly different for the different occupations ($F [2, 247] = 9.241, p < 0.01$).

4.4.5 Frequency distribution of attitude levels of participants

The total attitude scores of participants were classified into poor, average and good. Those who had a total score between 20 and 25 were classified as good, between 15 and 19 as average and below 15 as poor. The results are shown in Figure 15.

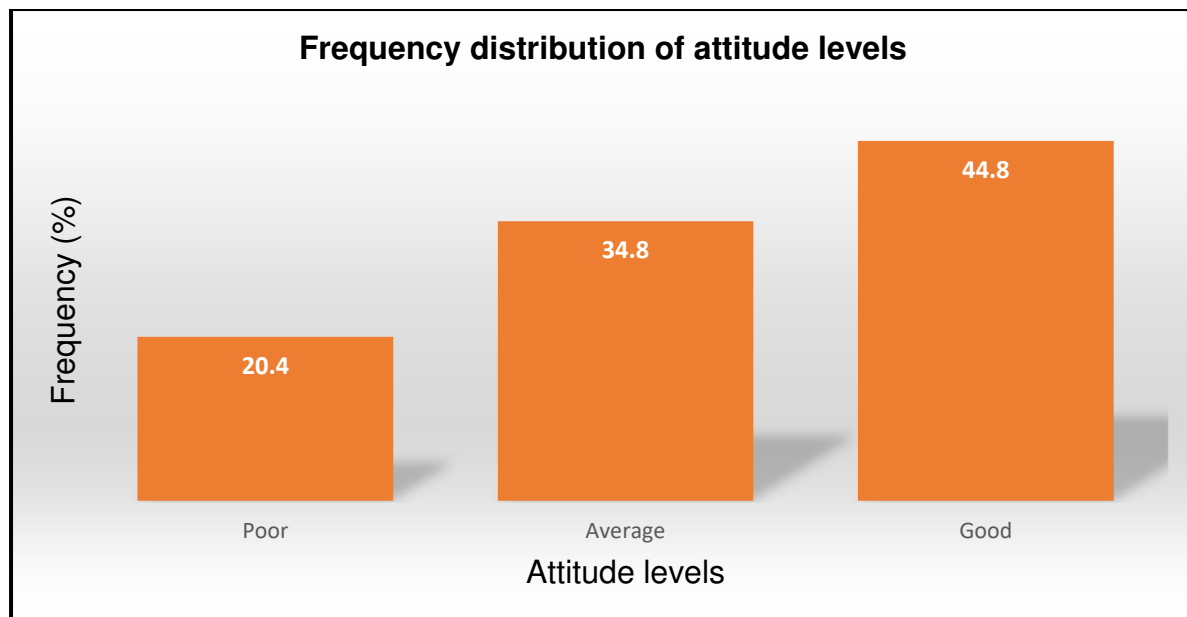


Figure 15: Frequency distribution of attitude levels of participants

About two-fifths of the participants ($n=112$; 44.8%) had a good attitude, followed by participants with an average attitude ($n=87$; 34.8%), while few ($n=65$; 20.4%) had a poor attitude regarding obesity.

4.5 Practices of nurses regarding obesity

4.5.1 Frequency distribution of responses to practice statements

To address objective 3, participants were requested to respond to five statements (numbered 21-25 in the research instrument) that were used to determine their levels of practice regarding obesity. They were supposed to select one of the five provided responses. The responses were 'strongly disagree', 'disagree', 'do not know', 'agree' and 'strongly agree'. Table 13 shows the frequencies of participants' responses to practice statements and the results of the one-sample Chi-square tests.

Table 13: Frequency distribution of responses to practice statements

Statement	Response	TOTAL		One-sample Chi-square test summary		
		<i>n</i>	%	Test statistic	Degrees of freedom (df)	<i>p</i> -value
21. I treat obesity like any other condition				76.68	4	<i>p</i> <0.01
	Strongly disagree	25	10.0			

	Disagree	43	17.2			
	Do not know	20	8.0			
	Agree	68	27.2			
	Strongly agree	94	37.6			
22. I calculate BMI for all my patients				63.48	4	<i>p<0.01</i>
	Strongly disagree	30	12.0			
	Disagree	45	18.0			
	Do not know	21	8.4			
	Agree	62	24.8			
	Strongly agree	92	36.8			
23. I always encourage obese patients to lose weight				54.28	4	<i>p<0.01</i>
	Strongly disagree	28	11.2			
	Disagree	41	16.4			
	Do not know	27	10.8			
	Agree	68	27.2			
	Strongly agree	86	34.4			
24. I always advise on diets to all my obese patients				110.20	4	<i>p<0.01</i>
	Strongly disagree	17	6.8			
	Disagree	33	13.2			
	Do not know	20	8.0			
	Agree	86	34.4			
	Strongly agree	94	37.6			
25. I always take time to discuss the dangers of obesity to all my obese patients				94.40	4	<i>p<0.01</i>
	Strongly disagree	19	7.6			
	Disagree	33	13.2			
	Do not know	27	10.8			
	Agree	71	28.4			
	Strongly agree	100	40.0			

The findings in Table 13 are described as follows:

- **Statement 21:** 'I treat obesity like any other condition':
Slightly above a third of the participants (n=94; 37.6%), strongly agreed with the statement. The minority of the participants (n=20; 8%) indicated they did not know. There were statistically significant differences in the frequencies of the responses indicated by the participants, χ^2 (df=4, n=250) =76.68, $p<0.01$.
- **Statement 22:** 'I calculate BMI for all my patients':
Slightly above a third of the participants (n=92; 36.8%) strongly agreed with the statement. The minority of the participants (n=21; 8.4%) indicated they did not know. There were statistically significant differences in the frequencies of the responses indicated by the participants, χ^2 (df=4, n=250) =63.48, $p<0.01$.
- **Statement 23:** 'I always encourage obese patients to lose weight':
About a third of the participants (n=86; 34.4%) strongly agreed with the statement. The minority of the participants (n=27; 10.8%) indicated they did not know. There were statistically significant differences in the frequencies of the responses indicated by the participants, χ^2 (df=4, n=250) =54.28, $p<0.01$.
- **Statement 24:** 'I always advise on diet to all my obese patients':
Slightly above a third of the participants (n=94; 37.6%) strongly agreed with the statement. The minority of the participants (n=17; 6.8%) strongly disagreed. There were statistically significant differences in the frequencies of the responses indicated by the participants, χ^2 (df=4, n=250) =110.20, $p<0.01$.
- **Statement 25:** 'I always take time to discuss the dangers of obesity to all my obese patients':
Two-fifths of the participants (n=100; 40%) strongly agreed with the statement while few (n=19; 7.6%) strongly disagreed. There were statistically significant differences in the frequencies of the responses indicated by the participants, χ^2 (df=4, n=250) =94.40, $p<0.01$.

4.5.2 Frequency distribution of total practice scores of participants

The total practice scores were determined by adding the scores of the responses to the five statements about practices regarding obesity for each participant as explained in section 3.9. The findings are shown in Figure 16.

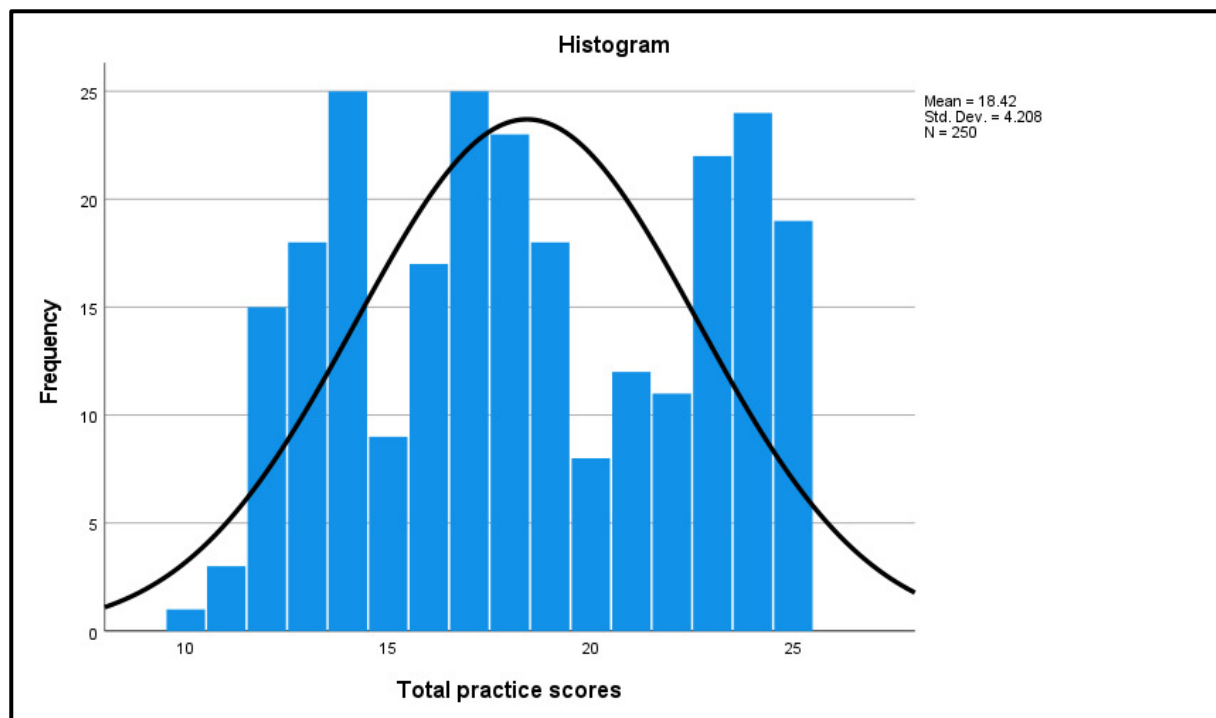


Figure 16: Frequency distribution of total practice scores of participants

The distribution of total practice scores of participants was negatively skewed. The mean of the total practice scores was 18.42 ($SD=4.21$). The maximum score attained by the participants was 25 while the minimum score was 10.

4.5.3 Means of total practice scores according to gender and personal knowledge of BMI

To determine whether there were differences in the means of the total practice scores when participants were grouped according to sex and their knowledge of their BMI, independent t-tests were performed. The results are shown in Table 14.

Table 14: t-test results of the means of total practice scores according to gender and personal knowledge of BMI

Characteristic	Mean	Standard deviation	t-statistic (Equal variance assumed)	Degrees of freedom (df)	p-value
Sex			0.934	248	$p=0.351$
Male	18.76	4.05			
Female	18.24	4.29			
Do you know your BMI			1.059	248	$p=0.291$
Yes	18.98	4.13			
No	18.28	4.23			

The mean of the total practice scores for males ($M=18.76$, $SD=4.05$) was not statistically significantly different from that of females ($M=18.24$, $SD=4.29$), (t [df248]

=0.934, $p=0.351$). Also, the mean of the total practice scores for those who knew their BMI ($M=18.98$, $SD=4.13$), was not statistically significantly different from that of participants who did not know their BMI ($M=18.28$, $SD=4.23$), (t [df248] =1.059, $p=0.291$).

4.5.4 Means of total practice scores according to educational level and occupation

To determine whether there were differences in the means of the total practice scores when participants were grouped according to their educational levels and their occupations, one-way ANOVA tests were performed. The results are shown in Table 15.

Table 15: ANOVA test results of means of total practice scores according to educational level and occupation

Characteristic	Mean	Standard deviation	Sum of squares	Degrees of freedom (df)	Mean square	F-statistic	p-value
Educational level						16.656	$p<0.01$
Between groups			744.39	3	248.13		
Within groups			3664.67	246	14.90		
Diploma	17.03	3.70					
Bachelor's degree	20.03	4.15					
Master's degree	22.38	3.58					
Doctorate degree	24.00	1.73					
Occupation						20.019	$p<0.01$
Between groups			615.00	2	307.50		
Within groups			3794.06	247	15.36		
Nurse Manager	21.88	3.07					
Registered Nurse	18.83	3.91					
Enrolled Nurse	16.45	4.18					

The means of the total practice scores statistically significantly differed by educational level (F [3, 246] =16.66, $p<0.01$). The results also show means of the total practice scores were statistically significantly different for the different occupations (F [2, 247] =20.02, $p<0.01$).

4.5.5 Frequency distribution of practice levels of participants

The total practice scores of participants were classified into poor, average and good. Those who had a total score between 20 and 25 were classified as good, between 15 and 19 as average and below 15 as poor. The results are shown in Figure 17.

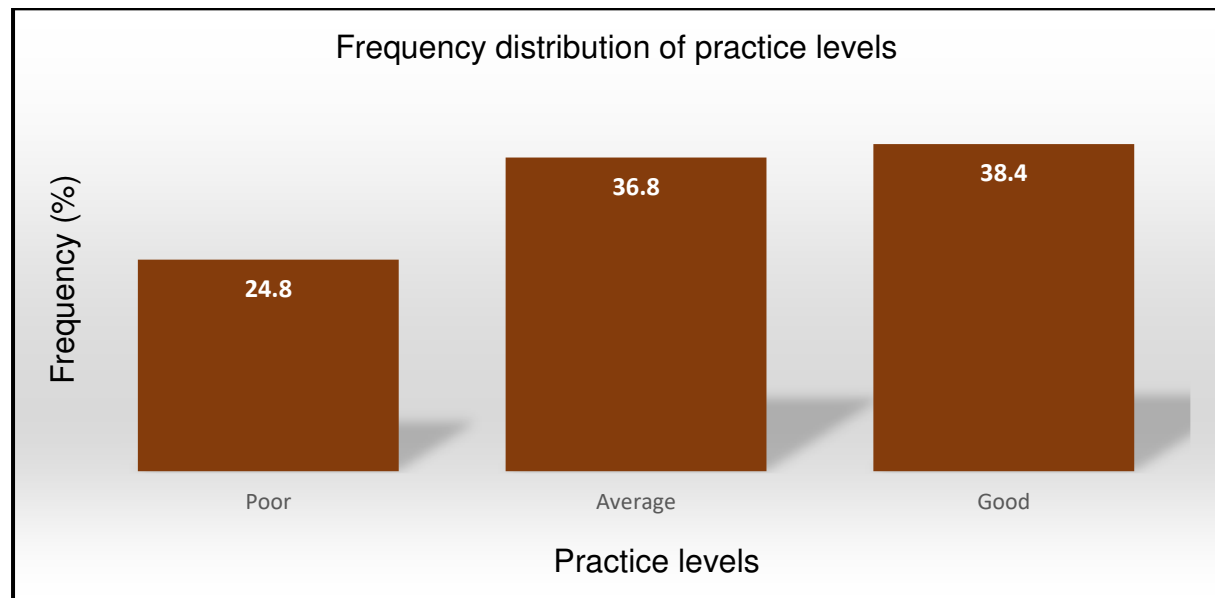


Figure 17: Frequency distribution of practice levels of participants

Almost two-fifths of the participants ($n=96$; 38.4%) had good practices, followed by participants with average practices ($n=92$; 36.8%), while few ($n=62$; 24.8%) had poor practices regarding obesity.

4.6 Correlation between knowledge, attitudes, and practices of participants

To determine if there were any associations between knowledge and attitudes, knowledge and practices and attitudes and practices, Pearson's correlation coefficients for the total scores were determined. The results are shown in Table 16.

Table 16: Correlation between knowledge, attitudes, and practice scores of participants

Correlations				
		Total knowledge scores	Total attitude scores	Total practice scores
Total knowledge scores	Pearson Correlation	1	.812**	.812**
	Sig. (2-tailed)		.000	.000
	N	250	250	250
Total attitude scores	Pearson Correlation	.812**	1	.834**
	Sig. (2-tailed)	.000		.000
	N	250	250	250
Total practice scores	Pearson Correlation	.812**	.834**	1
	Sig. (2-tailed)	.000	.000	
	N	250	250	250
**. Correlation is significant at the 0.01 level (2-tailed).				

The total knowledge scores and total attitude scores had a statistically significant strong positive correlation ($r=0.812$, $p < 0.01$), total knowledge scores and total practice scores had a statistically significant strong positive correlation ($r=0.812$, $p < 0.01$) and total attitude scores and total practice scores also had a statistically significant strong positive correlation ($r=0.834$, $p < 0.01$).

4.7 Association between knowledge levels and socio-demographic characteristics

To address objective 5, socio-demographic characteristics were examined to assess their relationship with knowledge levels of participants regarding obesity. Knowledge levels were recategorised into two groups, which were good and not good. Crude analyses were carried out and Chi-square tests p -values were calculated using IBM SPSS version 27. The results are shown in Table 17.

Table 17: Crude odds ratios and Chi-square tests of association between knowledge levels and socio-demographic characteristics

Characteristics	Crude Odds ratios	95% CI*	Chi-square test summary		
			Test statistic	Degrees of freedom (df)	p-value
Age			12.36	5	p=0.03
20-25 years	0.31	0.12 – 0.79			
26 – 30 years	0.37	0.14 – 0.92			
31– 35 years	0.50	0.20 – 1.21			
36-40 years	0.44	0.16 – 1.16			
41-45 years	1.02	0.40 – 2.57			
46-55 years	Reference	Reference			
Sex			2.53	1	p=0.11
Male	1.54	0.90 – 2.61			
Female	Reference	Reference			
Occupation			17.62	2	p<0.01
Enrolled Nurse	0.15	0.06 – 0.41			
Registered Nurse	0.43	0.18 – 1.04			
Nurse Manager	Reference	Reference			
Education			39.98	2	p<0.01
Diploma	0.11	0.03 – 0.43			
Bachelor's degree	0.56	0.14 – 2.26			
Master's & Doctorate degrees	Reference	Reference			
Knowledge of personal BMI			0.51	1	p=0.48
Yes	1.25	0.67 – 2.34			
No	Reference	Reference			

*CI is the 95% confidence intervals

The findings in Table 17 are described as follows:

- Chi-square tests results:**

The Chi-square tests performed, revealed there was a statistically significant association between age groups and the knowledge level of participants regarding obesity, χ^2 (df=5, n=250) =12.36, *p*=0.03; between occupation and knowledge level regarding obesity, χ^2 (df=2, n=250) =17.62, *p*<0.01; and between education and knowledge level regarding obesity, χ^2 (df=2, n=250) =39.98, *p*<0.01. However, there was no statistically significant association between sex and knowledge level regarding obesity, χ^2 (df=1, n=250) =2.53, *p*=0.11; and between knowledge of personal BMI and knowledge level regarding obesity, χ^2 (df=1, n=250) =0.51, *p*=0.48.

- **Age group crude odds ratios (OR) and 95% Confidence Intervals (CI):**

Using age group 46-55 years as the reference group, the odds of having good knowledge regarding obesity were statistically significantly less for age groups 20-25 years and 26-30 years (crude odds ratio (OR) = 0.31, 95% CI [0.12 – 0.79] and OR = 0.37, 95% CI [0.14 – 0.92], respectively). This means age group 20-25 years was 69% less likely to have good knowledge regarding obesity compared to the age group 46-55 years and the age group 26-30 years was 63% less likely to have good knowledge regarding obesity compared to age group 46-55 years. Age groups 31-35 years, 36-40 years and 41-45 years had knowledge levels that were not statistically significantly different from age group 46-55 (OR = 0.50, 95% CI [0.20 – 1.21], OR = 0.44, 95% CI [0.16 – 1.16] and OR = 1.02, 95% CI [0.40 – 2.57], respectively).

- **Sex OR and 95% CI:**

There was no statistically significant difference in the knowledge level regarding obesity between males and females (OR = 1.54, 95% CI [0.90 – 2.61]).

- **Occupation OR and 95% CI:**

Enrolled nurses were statistically significantly less likely to have a good knowledge level regarding obesity compared to nurse managers (OR = 0.15, 95% CI [0.06 – 0.41]). This means enrolled nurses were 85% less likely to have a good knowledge level regarding obesity compared to nurse managers. There was no statistically significant difference in the knowledge level regarding obesity between registered nurses and nurse managers (OR = 0.43, 95% CI [0.18 – 1.04]).

- **Education OR and 95% CI:**

Using participants with masters and doctorate degrees as the reference group, participants with diplomas were statistically significantly less likely to have a good knowledge level (OR = 0.11, 95% CI [0.03 – 0.43]). There was no statistically significant difference in the knowledge level regarding obesity between the participants who had bachelor's degrees and those who had masters and doctorate degrees as their highest educational attainment (OR = 0.56, 95% CI [0.14 – 2.26]).

- **Knowledge of personal BMI OR and 95% CI:**

There was no statistically significant difference in the knowledge level regarding obesity between the participants who knew their personal BMI and those who did not know their personal BMI (OR = 1.25, 95% CI [0.67 – 2.34]).

4.8 Nurses' personal factors influencing their knowledge, attitudes, and practices regarding obesity

To determine nurses' personal factors influencing their knowledge, attitudes and practices regarding obesity, participants were requested to respond to five statements (numbered 26-30 in the research instrument). The participants were supposed to select one of the five provided responses. The responses were 'strongly disagree', 'disagree', 'do not know', 'agree' and 'strongly agree'. The findings are shown in Table 18.

Table 18: Participants responses to statements on nurses' personal factors influencing their knowledge, attitudes, and practices regarding obesity

Statement	Response	TOTAL		One sample Chi-square test summary		
		<i>n</i>	%	Test statistic	Degrees of freedom (df)	<i>p</i> -value
26. My BMI may influence my knowledge, attitudes, and practices regarding obesity				401.28	4	<i>p</i> <0.01
	Strongly disagree	20	8.0			
	Disagree	24	9.6			
	Not sure	6	2.4			
	Agree	24	9.6			
	Strongly agree	176	70.4			
27. My experience in treating obese patients may influence my knowledge, attitudes, and practices regarding obesity				548.84	4	<i>p</i> <0.01
	Strongly disagree	7	2.8			
	Disagree	14	5.6			
	Not sure	18	7.2			
	Agree	13	5.2			
	Strongly agree	198	79.2			

28. My views toward the causes of obesity may influence my knowledge, attitudes, and practices regarding obesity				275.32	4	$p<0.01$
	Strongly disagree	24	9.6			
	Disagree	12	4.8			
	Not sure	12	4.8			
	Agree	51	20.4			
	Strongly agree	151	60.4			
29. My workload may influence my knowledge, attitudes, and practices regarding obesity				187.32	4	$p<0.01$
	Strongly disagree	25	10.0			
	Disagree	38	15.2			
	Not sure	25	10.0			
	Agree	26	10.4			
	Strongly agree	136	54.4			
30. My current knowledge about obesity may influence my knowledge, attitudes, and practices regarding obesity				401.20	4	$p<0.01$
	Strongly disagree	19	7.6			
	Disagree	6	2.4			
	Not sure	13	5.2			
	Agree	37	14.8			
	Strongly agree	175	70.0			

The findings in Table 18 are described as follows:

- Statement 26:** ‘My BMI may influence my knowledge, attitudes and practices regarding obesity’:
 The majority of the participants (n=176; 70.4%), strongly agreed with the statement. The minority of the participants (n=6; 2.4%) said they were not sure. There were statistically significant differences in the frequencies of the responses indicated by the participants, χ^2 (df=4, n=250) =401.28, $p<0.01$.
- Statement 27:** ‘My experience in treating obese patients may influence my knowledge, attitudes and practices regarding obesity’:

The majority of the participants (n=198; 79.2%) strongly agreed with the statement. The minority of the participants (n=7; 2.8%) strongly disagreed. There were statistically significant differences in the frequencies of the responses indicated by the participants, χ^2 (df=4, n=250) =548.84, $p<0.01$.

- **Statement 28:** 'My views towards the causes of obesity may influence my knowledge, attitudes and practices regarding obesity':

The majority of the participants (n=151; 60.4%) strongly agreed with the statement. The minority of the participants (n=12; 4.8%) disagreed or were not sure. There were statistically significant differences in the frequencies of the responses indicated by the participants, χ^2 (df=4, n=250) =275.32, $p<0.01$.

- **Statement 29:** 'My workload may influence my knowledge, attitudes and practices regarding obesity':

Slightly above a third of the participants (n=136; 37.6%) strongly agreed with the statement. The minority of the participants (n=25; 10%) strongly disagreed or were not sure. There were statistically significant differences in the frequencies of the responses indicated by the participants, χ^2 (df=4, n=250) =187.32, $p<0.01$.

- **Statement 30:** 'My current knowledge about obesity may influence my knowledge, attitudes and practices regarding obesity':

The majority of the participants (n=175; 70%) strongly agreed with the statement. The minority of the participants (n=6; 2.4%) disagreed. There were statistically significant differences in the frequencies of the responses indicated by the participants, χ^2 (df=4, n=250) =401.20, $p<0.01$.

4.9 Organisational factors influencing knowledge, attitudes, and practices of nurses regarding obesity

To determine organisational factors influencing nurses' knowledge, attitudes and practices regarding obesity, participants were requested to respond to five statements (numbered 31-35 in the research instrument). They were supposed to select one of the five provided responses. The responses were 'strongly disagree', 'disagree', 'do not know', 'agree' and 'strongly agree'. The findings are shown in Table 19.

Table 19: Participants responses to statements on organisational factors influencing knowledge, attitudes, and practices of nurses regarding obesity

Statement	Response	TOTAL		One sample Chi-square test summary		
		<i>n</i>	%	Test statistic	Degrees of freedom (df)	<i>p</i> -value
31. The provision of training on obesity at the hospital may influence my knowledge, attitudes, and practices regarding obesity				461.08	4	<i>p</i> <0.01
	Strongly disagree	30	12.0			
	Disagree	13	5.2			
	Not sure	8	3.2			
	Agree	14	5.6			
	Strongly agree	185	74.0			
32. Availability of hospital equipment for obese patients may influence my knowledge, attitudes, and practices regarding obesity				252.52	4	<i>p</i> <0.01
	Strongly disagree	25	10.0			
	Disagree	22	8.8			
	Not sure	19	7.6			
	Agree	34	13.6			
	Strongly agree	150	60.0			
33. Disciplining nurses who ill-treat obese patients at the hospital may influence my knowledge, attitudes, and practices regarding obesity				150.40	4	<i>p</i> <0.01
	Strongly disagree	51	20.4			
	Disagree	12	4.8			
	Not sure	39	15.6			
	Agree	25	10.0			
	Strongly agree	123	49.2			
34. Rewarding nurses who manage obese patients appropriately may influence my knowledge, attitudes, and practices regarding obesity				548.64	4	<i>p</i> <0.01

	Strongly disagree	18	7.2			
	Disagree	8	3.2			
	Not sure	14	5.6			
	Agree	12	4.8			
	Strongly agree	198	79.2			
35. Availability of obesity management policy at the workplace may influence my knowledge, attitudes, and practices regarding obesity				183.44	4	<i>p</i><0.01
	Strongly disagree	39	15.6			
	Disagree	25	10.0			
	Not sure	25	10.0			
	Agree	26	10.4			
	Strongly agree	135	54.0			

The findings in Table 19 are described as follows:

- Statement 31:** 'The provision of training on obesity at the hospital may influence my knowledge, attitudes and practices regarding obesity':
 The majority of the participants (n=184; 74%), strongly agreed with the statement. The minority of the participants (n=8; 3.2%) indicated they were not sure. There were statistically significant differences in the frequencies of the responses indicated by the participants, χ^2 (df=4, n=250) =461.08, p <0.01.
- Statement 32:** 'Availability of hospital equipment for obese patients may influence my knowledge, attitudes and practices regarding obesity':
 The majority of the participants (n=150; 60%) strongly agreed with the statement. The minority of the participants (n=19; 7.6%) indicated they were not sure. There were statistically significant differences in the frequencies of the responses indicated by the participants, χ^2 (df=4, n=250) =252.52, p <0.01.
- Statement 33:** 'Disciplining nurses who ill-treat obese patients at the hospital may influence my knowledge, attitudes and practices regarding obesity':
 Almost half of the participants (n=123; 49.2%) strongly agreed with the statement. The minority of the participants (n=12; 4.8%) disagreed. There were

statistically significant differences in the frequencies of the responses indicated by the participants, χ^2 (df=4, n=250) =150.40, $p<0.01$.

- **Statement 34:** ‘Rewarding nurses who manage obese patients appropriately may influence my knowledge, attitudes and practices regarding obesity’:

The majority of the participants (n=198; 79.2%) strongly agreed with the statement. The minority of the participants (n=8; 3.2%) disagreed. There were statistically significant differences in the frequencies of the responses indicated by the participants, χ^2 (df=4, n=250) =548.64, $p<0.01$.

- **Statement 35:** ‘Availability of obesity management policy at the workplace may influence my knowledge, attitudes and practices regarding obesity’:

The majority of the participants (n=135; 54%) strongly agreed with the statement. The minority of the participants (n=25; 10%) disagreed or were not sure. There were statistically significant differences in the frequencies of the responses indicated by the participants, χ^2 (df=4, n=250) =183.44, $p<0.01$.

4.10 Patient factors influencing knowledge, attitudes, and practices of nurses regarding obesity

To determine patient factors influencing nurses’ knowledge, attitudes and practices regarding obesity, participants were requested to respond to five statements (numbered 36-40 in the research instrument). The participants were supposed to select one of the five provided responses. The responses were ‘strongly disagree’, ‘disagree’, ‘do not know’, ‘agree’ and ‘strongly agree’. The findings are shown in Table 20.

Table 20: Participants’ responses to patient factors influencing knowledge, attitudes and practices of nurses regarding obesity

Statement	Response	TOTAL		One sample Chi-square test summary		
		<i>n</i>	%	Test statistic	Degrees of freedom (df)	<i>p</i> -value
36. Attitudes of obese patients towards me may influence my knowledge, attitudes, and practices regarding obesity				161.36	4	<i>p</i> <0.01
	Strongly disagree	63	25.2			
	Disagree	13	5.2			

	Not sure	26	10.4			
	Agree	25	10.0			
	Strongly agree	123	49.2			
37. Obese patients who are motivated to lose weight may influence my knowledge, attitudes, and practices regarding obesity				262.68	4	<i>p<0.01</i>
	Strongly disagree	39	15.6			
	Disagree	14	5.6			
	Not sure	11	4.4			
	Agree	36	14.4			
	Strongly agree	150	60.0			
38. Patients who have accepted that they are obese may influence my knowledge, attitudes, and practices regarding obesity				327.64	4	<i>p<0.01</i>
	Strongly disagree	18	7.2			
	Disagree	12	4.8			
	Not sure	18	7.2			
	Agree	39	15.6			
	Strongly agree	163	65.2			
39. Willingness to learn about obesity by patients may influence my knowledge, attitudes, and practices regarding obesity				315.16	4	<i>p<0.01</i>
	Strongly disagree	25	10.0			
	Disagree	13	5.2			
	Not sure	10	4.0			
	Agree	42	16.8			
	Strongly agree	160	64.0			
40. Patients who show trust in me as a nurse may influence my knowledge, attitudes, and practices regarding obesity				483.40	4	<i>p<0.01</i>
	Strongly disagree	24	9.6			
	Disagree	5	2.0			

	Not sure	7	2.8			
	Agree	26	10.4			
	Strongly agree	188	75.2			

The findings in Table 20 are described as follows:

- Statement 36:** 'Attitudes of obese patients towards me may influence my knowledge, attitudes and practices regarding obesity':

Almost half of the participants (n=123; 49.2%), strongly agreed with the statement. The minority of the participants (n=13; 5.2%) disagreed. There were statistically significant differences in the frequencies of the responses indicated by the participants, χ^2 (df=4, n=250) =161.36, $p<0.01$.
- Statement 37:** 'Obese patients who are motivated to lose weight may influence my knowledge, attitudes and practices regarding obesity':

The majority of the participants (n=150; 60%) strongly agreed with the statement. The minority of the participants (n=11; 4.4%) were not sure. There were statistically significant differences in the frequencies of the responses indicated by the participants, χ^2 (df=4, n=250) =262.68, $p<0.01$.
- Statement 38:** 'Patients who have accepted that they are obese may influence my knowledge, attitudes and practices regarding obesity':

The majority of the participants (n=163; 65.2%) strongly agreed with the statement. The minority of the participants (n=12; 4.8%) disagreed. There were statistically significant differences in the frequencies of the responses indicated by the participants, χ^2 (df=4, n=250) =327.64, $p<0.01$.
- Statement 39:** 'Willingness to learn about obesity by patients may influence my knowledge, attitudes and practices regarding obesity':

The majority of the participants (n=160; 64%) strongly agreed with the statement. The minority of the participants (n=10; 4%) were not sure. There were statistically significant differences in the frequencies of the responses indicated by the participants, χ^2 (df=4, n=250) =315.16, $p<0.01$.
- Statement 40:** 'Patients who show trust in me as a nurse may influence my knowledge, attitudes and practices regarding obesity':

The majority of the participants (n=188; 75.2%) strongly agreed with the statement. The minority of the participants (n=6; 2%) disagreed. There were statistically significant differences in the frequencies of the responses indicated by the participants, χ^2 (df=4, n=250) =483.40, $p<0.01$.

4.11 Conclusion

Chapter Four contains a description of the findings of the study. Most of the participants were females, had diplomas and were registered nurses. The majority of the participants had good total knowledge scores. Males had significantly higher total knowledge scores compared to females. Most of the participants had good total attitude scores and good total practice scores. The educational level and occupation of the participants had significant effects on the means of the total knowledge scores, attitude scores and practice scores of participants. There was a strong positive correlation between total knowledge scores and total attitude scores, between total knowledge scores and total practice scores and between total attitude scores and total practice scores. There were statistically significant associations between knowledge scores and age, occupation, and educational level of the participants. Few of the participants responded to the open-ended question and three themes emerged from the responses. The discussion of the results, conclusions and recommendations are presented in the next chapter, Chapter Five.

CHAPTER FIVE

DISCUSSIONS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

The results of the study were presented in Chapter Four. The discussion of the results is presented in this chapter, Chapter Five. The discussion is based on the findings of the study and the literature review discussed in Chapter Two. Furthermore, the limitations, conclusions, recommendations of the research study, as well as the dissemination of the study are discussed in this chapter.

5.2 Discussion

The purpose of the study was to determine the levels of knowledge, attitudes, and practices regarding obesity among nurses at private healthcare institutions in the Oshana region, Namibia. The discussion of the results which follows, is presented according to the research objectives presented in Chapter One.

5.2.1 Objective 1

Objective 1 of the study was to determine the knowledge of nurses regarding obesity at private healthcare institutions in the Oshana region, Namibia. The results show the participants have average knowledge regarding obesity ($M=37.85$, $SD=7.96$). The mean knowledge score in this study is higher than the one of a study conducted by Wynn *et al.* (2018:22), where participants had a mean knowledge score of 71%. This may be attributed to the fact that most nurses working in private healthcare institutions in the Oshana region in Namibia have a lot of work experience. The many years of experience may have contributed to the higher mean score for knowledge.

In this study, the mean score for knowledge differs by age, sex, educational level, and occupation. However, the mean score for knowledge is not affected by the participants' knowledge of their BMI. These results concur with the findings of studies by Fan *et al.* (2020:621) and Tiryag and Atiyah (2021:4671), which revealed that educational level influenced the nurses' knowledge regarding obesity. However, the results of this study differ from the results of the study by Tiryag and Atiyah (2021:4671), concerning an association between sex and knowledge scores of participants; which was not the case in the study by Tiryag and Atiyah (2021:4671). The differences between the mean score for knowledge according to the educational level of participants may be linked to the fact that nurses who have attained higher educational levels are more

likely to have learned more about obesity. The higher educational levels make them more knowledgeable about obesity. The results show male nurses have higher knowledge scores compared to female nurses. The difference between males and females is not surprising because a higher percentage of males in this study have a bachelor's, master's or doctorate degree compared to females.

Almost half of the participants responded correctly to the statements, 'Obesity stigma may lead to mental health problems among obese patients' and 'Obesity is diagnosed using BMI'. Only about 36% responded correctly to the statements, 'Eating more fruits and vegetables can help reduce obesity' and 'Obesity can be reduced by eating less during meals'. The proportion of participants who know obesity is diagnosed using BMI in this study is lower than the one reported in a study by Ardzi *et al.* (2014:40), which was 100%. Furthermore, the proportion of participants in this study who responded correctly to the statement, 'Eating more fruits and vegetables can help reduce obesity', is lower than the one reported in a study by Bucher Della Torre *et al.* (2018:125), which was 81%. The result may be explained by the fact nurses in this study have less knowledge regarding obesity, since they attend to fewer patients with obesity, compared to those in the study conducted in Switzerland by Bucher Della Torre *et al.* (2018:125).

More than a third of the participants in this study have good knowledge regarding obesity ($n=97$; 39%), which indicates more nurses in this study have good knowledge compared to results of studies conducted by Gormley and Melby (2020:105) and Tiryag and Atiyah (2021:4671), where 24.7% and 33% had good knowledge, respectively. This higher percentage of nurses who have good knowledge in this study may be because the nurses work at private healthcare institutions. In private healthcare institutions, nurses might manage more obese patients compared to the public healthcare institutions. The managing of more obese patients may have stimulated the nurses to seek more information about obesity, which may have improved their knowledge regarding obesity (Dietz *et al.*, 2015:2522).

5.2.2 Objective 2

Objective 2 of this study was to determine the attitudes of nurses regarding obesity at private healthcare institutions in the Oshana region, Namibia. The results of this study depict the participants' attitude levels are average regarding obesity ($M=18.9$,

$SD=4.4$). The mean score for attitude in this study is higher than the one reported from a study by Bucher Della Torre *et al.* (2018:126), which was 49.8%. The higher total attitude scores in this study compared to those from a study by Bucher Della Torre *et al.* (2018:126) are at variance with literature review findings, because participants in the study by Bucher Della Torre *et al.* (2018:126) had higher total knowledge scores. Participants with higher levels of knowledge are expected to have better attitudes towards obese patients.

In this study, the mean score for attitude does not differ by sex or knowledge of personal BMI but differs by educational level and occupation. These results concur with the findings of the study by Sikorski *et al.* (2013:516), which revealed attitudes about obesity among the participants were influenced by their educational level and occupation. These results might be explained by the fact that higher educational levels improve the knowledge regarding obesity, which in turn improve attitudes about obesity. In addition, the findings of this study for objective 2 are supported by the conceptual framework, which explains a direct relationship between knowledge and attitudes regarding obesity.

About 43% of the participants gave correct responses to the statements, 'Obesity is a medical condition' and 'Obese patients are not lazier than normal-weight people', while 38.8% gave a correct response to the statement, 'Treating obese patients is professionally gratifying'. The proportion of participants who strongly agreed with the statement that 'Obese patients are not lazier than normal-weight people' in this study, is slightly higher than reported by Somannavar and Appajigol (2014:401), which was 30%. Whilst about 43% of nurses in this study reported treating obese patients is professionally gratifying, only 26% of those in a study by Teixeira *et al.* (2013:259) strongly agreed with the statement. The results in this study may be because the participants have higher knowledge regarding obesity and therefore they are more willing to assist obese patients.

Slightly more than two-fifths of the participants in this study have good attitudes regarding obesity ($n=112$; 44.8%). This finding is at variance with the findings of a study by Sikorski *et al.* (2013:515), which revealed 99% of the participants had poor attitudes regarding obesity.

5.2.3 Objective 3

Objective 3 of the study was to determine practices of nurses regarding obesity at private healthcare institutions in the Oshana region, Namibia. The results show the participants had average practices regarding obesity ($M=18.4$; $SD=4.2$). The mean score for practice in this study is higher than the one reported by Zhu *et al.* (2013:6), where participants had a mean practice score of 13.88. This may be explained by the higher level of obesity knowledge regarding obesity among participants in this study.

The mean score for practice in this study does not differ by sex or knowledge of personal BMI but differs by educational level and occupation. About 38% of participants in this study strongly agreed with the statement, 'I treat obesity like any other condition'. This result is slightly higher than the one reported by Kausar *et al.* (2021:352), which was 33.4%. About 40% of the participants in this study strongly agreed with the statement, 'I always take time to discuss the dangers of obesity to all my obese patients'. This result is lower than the percentage reported in a study by Petrin *et al.* (2017:355), which revealed 67% of the participants strongly agreed with the statement. These results reflect the low practice level regarding obesity of participants in this study.

This study reveals slightly less than two-fifths of the participants ($n=96$; 38.4%) have good practices regarding obesity. This result is lower than the results of a study conducted by Van Tonder *et al.* (2021:40), which revealed 49.4% of participants had good practices. The result of this study shows good practices regarding obesity are low among the participants, which coincides with their lower knowledge levels regarding obesity.

5.2.4 Objective 4

Objective 4 of the study was to determine an association between nurses' knowledge scores and attitude scores, knowledge scores and practice scores and attitude scores and practice scores regarding obesity, at private healthcare institutions in the Oshana region, Namibia. The results of the study depict a significant correlation between knowledge scores and attitude scores, knowledge scores and practice scores and attitude scores and practice scores. These results are similar to findings of a study done by Wynn *et al.* (2018:24), which also revealed the attitudes of nurses regarding obesity improved as their knowledge levels regarding obesity increased. The findings

in this study also support the conceptual framework, which postulated that as knowledge levels improve, attitudes of nurses regarding obesity also improve, leading to improved practices (Pearce *et al.*, 2019:14).

5.2.5 Objective 5

Objective 5 of the study was to determine an association between knowledge levels, regarding obesity among nurses and their socio-demographic characteristics at private healthcare institutions in the Oshana region, Namibia. The results of this study reveal an association between knowledge levels and age, occupation, and educational level of the participants. However, there is no association between knowledge levels and sex or knowledge of personal BMI. The results of this study are similar to those of studies by Fan *et al.* (2020:620) and Tiryag and Atiyah (2021:4671), which also revealed an association between knowledge level and educational level.

The results of this study also concur with the results of the study by Tiryag and Atiyah (2021:4671), which reported no association of knowledge level with sex and knowledge of personal BMI. However, the results of this study differs from the results of a study conducted by Tiryag and Atiyah (2021:4671) as an association was found between knowledge level and age. The study results by Tiryag and Atiyah (2021:4671) did not find this association. The results of this study are plausible as the age of participants is associated with their educational level. Since the educational level is known to improve knowledge level regarding obesity, it would also mean age improved obesity knowledge level as older people in this study have higher educational levels.

5.2.6 Objective 6

Objective 6 of this study was to determine strategies nurses think may improve their knowledge, attitudes, and practices, regarding obesity at private healthcare institutions in the Oshana region, Namibia. The results of this study reveal more than 70% of the participants strongly agreed knowing their BMI, their experience in treating obese patients and their current knowledge of obesity may improve their knowledge, attitudes, and practices regarding obesity. The results of this study concur with findings of a study conducted by Stephenes *et al.* (2014:177) which revealed nurses were poorly prepared to treat obesity and therefore require knowledge and experience for them to improve their attitudes and practices regarding obesity. The results also agree with the results of a literature review by Goad *et al.* (2018:445), which reported nurses

with higher BMI were more likely to have positive attitudes towards obese patients compared to those who had lower BMI.

The results of the study reveal more than 70% of the participants strongly agreed training on obesity and rewarding nurses who treat obese patients appropriately may improve their knowledge, attitudes and practices regarding obesity. The results of this study concur with those of a study by Petrin *et al.* (2017:355) which reported 64% of the participants strongly agreed training was necessary for improving the nurses' knowledge, attitudes and practices regarding obesity. The results of this study are meaningful because for nurses to improve their knowledge, they need to undergo training on the disease. A study by Seitovirta *et al.* (2017:1049) also recommended rewards instead of disciplinary actions. These results show nurses are more likely to respond to positive reinforcements instead of penalties.

The results of this study reveal the most important patient factor which may influence nurses' knowledge, attitudes and practices, is the trust the obese patients have in the nurses, while the least important factor is the attitudes of obese patients towards the nurses. These results are at variance with the results of a study by Bucher Della Torre *et al.* (2018:127) which revealed the attitudes of obese patients towards nurses influenced their knowledge, attitudes and practices regarding obesity. The results of this study are credible, because nurses are trained not to use their personal feelings towards patients when attending to them.

5.3 Limitations of the study

Limitations of a study refer to the weaknesses found in a study that are likely to influence the results of the study. Presenting limitations of a study is ethical, as it allows users of the results to understand biases that may affect the results of the study. Limitations also help other researchers to identify gaps which can be researched (Ross & Zaidi, 2019:261).

The limitations of the study are indicated as follows:

- The study was conducted in private healthcare institutions and did not include public healthcare institutions. This makes it impossible to generalise the results for all nurses in the Oshana region.

- The study was conducted in one region of the country, making it difficult to have a clear picture of the knowledge, attitudes and practices of nurses in the country.
- In the study, the researcher was not able to factor out external strategies like training and media programmes that might have influenced the knowledge of participants in the study.

5.4 Conclusions

The proportion of participants in this study who have good knowledge and good attitudes is higher than reported in some previous studies. However, the proportion of those who have good practices in this study are lower than in some previous studies. The study depicts a significant strong positive correlation between knowledge scores and attitude scores, knowledge scores and practice scores and attitude scores and practice scores. This confirms findings from other previous studies. Furthermore, this study reveals associations between knowledge levels and age, knowledge levels and occupation and knowledge levels and educational level. These associations were reported in some studies, while in other studies they were not found. The strategies most nurses strongly agreed with to improve their knowledge, attitudes and practices regarding obesity were their knowledge of personal BMI, experience in treating obese patients, current knowledge of obesity, training on obesity, being rewarded for treating obese patients appropriately, as well as being trusted by obese patients.

5.5 Recommendations

5.5.1 Training on obesity

The proportion of nurses with good knowledge of obesity is low. To improve knowledge regarding obesity among nurses, training opportunities should be provided to all nurses. This can be offered in the form of:

- Providing regular in-service training on obesity at the healthcare institutions.
- Sponsoring nurses to enrol in internationally recognised obesity courses or attend academic conferences on obesity.
- Advocating for regular update of training courses and curricula on obesity for nurses.

5.5.2 Offering rewards to nurses

Most of the participants in this study strongly agreed offering rewards to nurses who manage obese patients appropriately, would improve their knowledge, attitudes and practices regarding obesity. The private healthcare institutions should therefore provide some incentives to those who are considered by patients to have good attitudes and practices. This can be done monthly and patients may vote for their preferred nurses anonymously. This will encourage the nurses to seek more knowledge regarding obesity and to improve their attitudes and practices regarding obesity.

5.5.3 Mentoring of newly qualified nurses

Since this study reveals older nurses were more knowledgeable regarding obesity, private healthcare institutions should start mentorship programmes for newly qualified nurses. Mentoring of the newly qualified nurses may be less expensive, since the nurses gain experience while they are performing their duties. Mentoring of newly qualified nurses may reduce costs of recruitment, since the mentored nurses may become competent enough to provide obesity services which may have required specially trained nurses. Such mentoring may also boost confidence in the newly qualified nurses on the management of obese patients.

5.5.4 Correct blending of nurses

Nurses of different educational levels and different ages have different levels of knowledge, attitudes, and practices regarding obesity. Hence, nurses can be grouped together to ensure different ages and educational levels in the groups. Correct blending of nurses will assist with sharing of information among them, leading to an improvement in knowledge, attitudes, and practices among those with poor levels.

5.5.5 Further research

This study was conducted at four private healthcare institutions only. Future research which includes both private and public healthcare institutions is recommended. Future research may give a more accurate account of the levels of knowledge, attitudes, and practices regarding obesity among nurses in the region. There may also be a need to conduct follow-up research at the same sites after implementation of the recommendations to determine whether there has been an improvement in the knowledge, attitudes, and practices of the nurses regarding obesity.

5.6 Dissemination of study findings

Disseminating study findings to society should be promoted as it may improve changes in practices. It is also an ethical obligation of researchers to disseminate study findings (Edwards, 2015:465). The findings of the study should be disseminated to the academic community and society in the form of a journal article or presentations at academic conferences on obesity. The results of the study are to be made available to the participants and the healthcare institutions which participated in the study.

5.7 Conclusion

The research study reveals the knowledge, attitude, and practice levels regarding obesity among nurses are low. There are strong positive correlations between knowledge scores and attitude scores, knowledge scores and practice scores and attitude scores and practice scores. Knowledge levels are significantly associated with age, occupation, and educational level. Furthermore, most nurses in the study strongly agreed they might improve their knowledge, attitudes, and practices if they knew their personal BMI, had experience in treating obese patients, received training on obesity, were rewarded for treating obese patients appropriately and were trusted by the obese patients.

Based on the findings of this study, it is recommended private healthcare institutions should offer training on obesity to nurses, offer rewards to nurses who manage obese patients appropriately and introduce mentorship programmes to newly qualified nurses on obesity. It is also recommended nurses of different ages and educational levels should be combined in different workplaces so there is sharing of knowledge on obesity. Future research which includes both the public and private healthcare institutions may be needed to ensure findings that are more representative of the knowledge, attitudes, and practices regarding obesity among nurses in the region.

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APPENDICES

Appendix 1: Information letter and informed consent



UNIVERSITEIT • STELLENBOSCH • UNIVERSITY
jou kennisvenoot • your knowledge partner

STELLENBOSCH UNIVERSITY

CONSENT TO PARTICIPATE IN RESEARCH

KNOWLEDGE, ATTITUDES and PRACTICES OF NURSES REGARDING OBESITY IN PRIVATE HEALTH CARE INSTITUTIONS IN OSHANA REGION, NAMIBIA.

You are kindly requested to participate in a research study conducted by Perseverance Moyo, a Master of Nursing Science student from the Faculty of Medicine and Health Sciences at Stellenbosch University. The data from this study will be anonymised and the results will be presented in a report titled: Knowledge, attitudes and practices of nurses regarding obesity in private health care institutions in Oshana region, Namibia. You were selected as a possible participant in this study.

PURPOSE OF THE STUDY

The purpose of the study will be to assess the knowledge, attitudes and practices of nurses regarding obesity in private health care institutions in Oshana region, Namibia.

PROCEDURES

If you volunteer to participate in this study, we will ask you to complete a questionnaire with 41 questions divided into 7 sections. Section A will contain questions on your personal profile, section B will have questions to determine your level of knowledge about obesity, section C your attitude towards obesity, section D your practices regarding obesity and sections E, F and G factors that may influence your knowledge, attitudes and practices regarding obesity. The questionnaire will take about 15 minutes to complete.

POTENTIAL RISKS AND DISCOMFORTS

No harm is anticipated from this study as you will be requested to complete the questionnaire on your own and your identity will be kept anonymous.

POTENTIAL BENEFITS TO SUBJECTS AND/OR TO SOCIETY

It is anticipated that the research will assist the health care institutions' management to come up with strategies to improve your level of knowledge about obesity which will help you take care of obese patients without stigmatising and discriminating them.

PAYMENT FOR PARTICIPATION

There will be no payment for participation. Participants will receive a R30 healthy snack as a token of appreciation for their participation.

CONFIDENTIALITY

The researcher will protect your privacy and confidentiality. This will be done by making sure that the questionnaires do not contain the names of the respondents but just numbers. Collected data will be kept in a password-protected computer and the completed questionnaires will be locked up in cabinets which will only be accessible to the researcher.

The information might also be inspected by the University of Stellenbosch, Health Research Ethics Committee. They will only use the records in carrying out their obligations relating to this study.

PARTICIPATION AND WITHDRAWAL

Participating in the study is voluntary and if you refuse to participate you will not be penalised. Even after signing the informed consent, you can still withdraw from the project at any time if you no longer want to continue participating.

I may withdraw you from this research if circumstances arise which warrant me doing so.

IDENTIFICATION OF INVESTIGATORS

If you have any questions or concerns about the research, please feel free to contact me on [REDACTED] or e-mail me on [REDACTED] or my supervisor on [REDACTED] or University of Stellenbosch Health Research Ethics Committee on +27219389657 or [REDACTED]

SIGNATURE OF RESEARCH SUBJECT

The information above was described to me....., by Perseverance Moyo in English. The sections I could not understand were explained to me satisfactorily.

I....., was given the opportunity to ask questions and these questions were answered to my satisfaction. I am aware that the results of the study will anonymously be processed into a study report and that at any stage I can withdraw my consent and participation in the study.

I hereby consent voluntarily to participate in this study. I have been given a copy of this form.

Signature of Participant

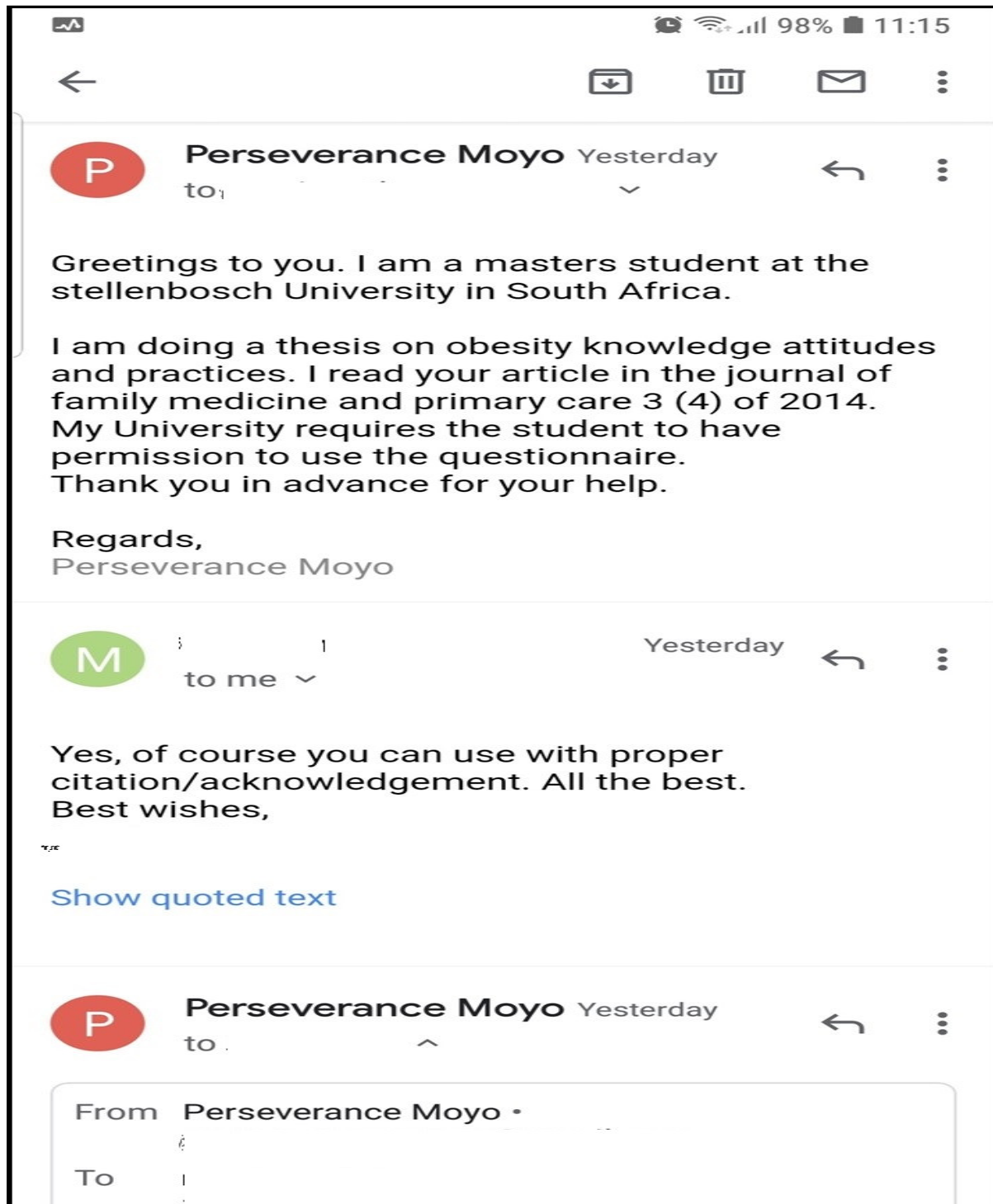
Date

SIGNATURE OF INVESTIGATOR

I declare that I explained the information given in this document to _____ He/she was given enough time to ask me any questions. This conversation was conducted in _____ and a/no translator was used in this conversation. The conversation was translated into _____ by _____.

Signature of Investigator

Date

Appendix 2: Permission to use questionnaire

Appendix 3: Questionnaire

Screening questions

1. Do you work full-time at this health care institution?	
No	
Yes	
2. Have you had formal training in a health-related field?	
No	
Yes	
3. Are you involved in the day to day caring of obese patients?	
No	
Yes	

If your answer is yes to all the above questions, then please complete the rest of the questionnaire.

Section A: Demographic profile of participants

Please put a cross (x) in the blank box in front of the statement you have chosen as your answer.

1. How old are you?

☐	☐	☐	☐
20 – 25	26 – 30	31 – 35	36 – 40
☐	☐	☐	
41 – 45	46 – 50	51 – 55	

2. What is your sex?

☐	☐
Male	Female

3. Do you know your BMI?

☐	☐
Yes	No

4. What is the highest educational level you attained?

☐
Diploma

☐
Bachelor's degree

☐
Master's degree

☐
Doctorate

5. What is your occupation?

☐
Nurse Unit Manager

☐
Registered Nurse

☐
Enrolled Nurse

Section B: Knowledge of nurses regarding obesity

Please choose one response on each statement and show it by a cross (x). Please make sure that you do not consult anyone or any other sources when answering these questions.

	Statement	Strongly disagree	Disagree	Do not know	Agree	Strongly agree
	Score	1	2	3	4	5
6.	Obesity is diagnosed using Body Mass Index (BMI)					
7.	An individual with BMI above 30 is considered obese					
8.	Obesity can be reduced by eating less during meals.					
9.	Eating more fruits and vegetables can help reduce obesity					
10.	Obesity can increase the cost of health care					
11.	Doing more exercises daily reduces obesity					
12.	Obesity is associated with certain non-communicable diseases					
13.	Obesity is a risk factor for certain cancers					

14.	Management of obesity involves combining different strategies like drugs, surgery, psychotherapy and behavioural therapy					
15.	Obesity stigma may lead to mental health problems among obese patients					

Section C: Attitudes of nurses regarding obesity

Please choose one response for each source and show your preferred response by a cross (x) in the provided boxes.

	Statement	Strongly disagree	Disagree	Do not know	Agree	Strongly agree
	Score	1	2	3	4	5
16.	Obesity is a medical condition					
17.	Nurses should set an example and strive to maintain normal weight					
18.	Treating obese patients is professionally gratifying					
19.	Not all obese patients develop obesity through carelessness					
20.	Obese patients are not lazier than normal weight people					

Section D: Practices of nurses regarding obesity

Please choose one response for each source and show your preferred response by a cross (x) in the provided boxes.

	Statement	Strongly disagree	Disagree	Not sure	Agree	Strongly agree
	Score	1	2	3	4	5
21.	I treat obesity like any other condition					
22.	I calculate BMI for all my patients					
23.	I always encourage obese patients to lose weight					

24.	I always advise on diets to all my obese patients					
25.	I always take time to discuss the dangers of obesity to all my obese patients					

Section E: Nurses' personal factors influencing their knowledge, attitudes and practices regarding obesity

	Statement	Strongly disagree	Disagree	Not sure	Agree	Strongly agree
	Score	1	2	3	4	5
26.	My BMI may influence my knowledge, attitudes and practices regarding obesity					
27.	My experience in treating obese patients may influence my knowledge, attitudes and practices regarding obesity					
28.	My views toward the causes of obesity may influence my knowledge, attitudes and practices regarding obesity					
29.	My workload may influence my knowledge, attitudes and practices regarding obesity					
30.	My current knowledge about obesity may influence my knowledge, attitudes and practices regarding obesity					

Section F: Organisational factors influencing knowledge, attitudes and practices of nurses regarding obesity

Please choose one response on each statement and show your preferred response by a cross (x) in the boxes provided.

	Statement	Strongly disagree	Disagree	Not sure	Agree	Strongly agree
	Score	1	2	3	4	5
31.	The provision of training on obesity at the hospital may influence my knowledge, attitudes and practices regarding obesity					
32.	Availability of hospital equipment for obese patients may influence my knowledge, attitudes and practices regarding obesity					

33.	Disciplining nurses who ill-treat obese patients at the hospital may influence my knowledge, attitudes and practices regarding obesity					
34.	Rewarding nurses who manage obese patients appropriately may influence my knowledge, attitudes and practices regarding obesity					
35.	Availability of obesity management policy at the workplace may influence my knowledge, attitudes and practices regarding obesity					

Section G: Patient factors influencing knowledge, attitudes and practices of HCPs regarding obesity

	Statement	Strongly disagree	Disagree	Not sure	Agree	Strongly agree
	Score	1	2	3	4	5
36.	Attitudes of obese patients towards me may influence my knowledge, attitudes and practices regarding obesity					
37.	Obese patients who are motivated to lose weight may influence my knowledge, attitudes and practices regarding obesity					
38.	Patients who have accepted that they are obese may influence my knowledge, attitudes and practices regarding obesity					
39.	Willingness to learn about obesity by patients may influence my knowledge, attitudes and practices regarding obesity					
40.	Patients who show trust in me as a nurse may influence my knowledge, attitudes and practices regarding obesity					

41. Do you have any explanation you would like to share about obesity?

Appendix 4: Medical Centre Oshakati, COVID-19 Protocol

G & M MEDICAL CENTRE			
DR. / M. B CH. B (	University)	DR. / M. B CH. B (	University)
Practice No: _____			

MEDICAL CENTRE OSHAKATI PROTOCOLS TO PREVENT COVID-19

To safeguard visiting patients and staff of the hospital, we have come up with the following measures to prevent the spread of COVID-19.

1. Casualty restricted for emergency and high risk clinical scenarios.

The hospital has suspended routine follow-up visits and normal outpatient services in casualty until further notice. Only emergency services will be offered.

2. Temperature Check

Body temperature is being checked using a thermal scanner for both patients and staff entering the hospital. If one is febrile (Temperature greater than 38 degrees Celsius), he/she will be referred to _____ Clinic for further evaluation.

3. Hand Sanitization

To ensure clean hygiene of patients and staff, a hand washing area was built at the hospital entrance. All patients and staff are required to wash their hands before entering the hospital.

4. Wearing of masks

Wearing of masks is mandatory for both patients and staff in the hospital premises. Anyone without a mask will not be allowed to enter the hospital.

5. Reception and preliminary Screening

Preliminary health screening and patient registration has been moved to the hospital main entrance. All patients are being given a COVID-19 enquiry form. If any patients are at high risk of having COVID-19, they are referred to _____ Clinic for further evaluation.

6. Surgery and Admission

Only emergency clinical scenarios in which a delay in care will lead to serious health consequences will be admitted for in-hospital care and surgery. Admitted patients will

G & M MEDICAL CENTRE

DR. J M. B CH. B (M.B.Ch.B.) University)	DR. L M. B CH. B (M.B.Ch.B.) University)	Practice No: _____
--	--	--------------------

be housed in single rooms and will be given strict admission guidelines to stay in the rooms. All patients going for surgery will be tested for COVID-19.

7. Hospital visits for admitted patients

Hospital visits for admitted patients have been temporarily suspended until further notice.

8. Patient Reviews

Short-term reviews and close follow-ups are discouraged. Only emergency reviews will be done at the hospital. The rest of the patients are being encouraged to contact their doctors telephonically for follow-up.

9. Provision of personal protective equipment (PPE)

All staff attending to patients at the emergency department will be provided with PPE by the hospital. All staff who will be attending to patients who are at high risk of suffering from COVID-19 will also be provided with PPE until the patients' COVID-19 results are known.

10. Social distancing

Chairs in all waiting areas of the hospital are placed at least one metre apart. All rooms at the hospital should not be more than half full at any given time.

11. Other preventive precautions

Windows in all rooms at the hospital should be kept open during the day. All doors should also be kept open to reduce touching. Staff have been employed to disinfect all surfaces that are prone to touch every hour during working hours.

PLEASE NOTE: Kindly adhere to these measures. Any change to this protocol will be communicated to you.

Prepared by Dr (

Managing Director

Medical Centre (24 May 2020)

Appendix 5: HREC ethical clearance



Approval Notice

New Application

14/09/2021

Project ID :22592

HREC Reference No: S21/06/103

Project Title: KNOWLEDGE, ATTITUDES, AND PRACTICES OF NURSES REGARDING OBESITY IN PRIVATE HEALTH CARE INSTITUTIONS IN OSHANA REGION, NAMIBIA.

Dear Ms P Moyo

The **Response** received on 26/08/2021 was reviewed and **approved** by members of **Health Research Ethics Committee** via **expedited** review procedures on 14/09/2021.

Please note the following information about your approved research protocol:

Protocol Approval Date: 14 September 2021

Protocol Expiry Date: 13 September 2022

Please remember to use your Project ID 22592 and Ethics Reference Number S21/06/103 on any documents or correspondence with the HREC concerning your research protocol.

Please note that the HREC has the prerogative and authority to ask further questions, seek additional information, require further modifications, or monitor the conduct of your research and the consent process.

After Ethical Review

Translation of the informed consent document(s) to the language(s) applicable to your study participants should now be submitted to the HREC.

Please note you can submit your progress report through the online ethics application process, available at: Links Application Form Direct Link and the application should be submitted to the HREC before the year has expired. Please see [Forms and Instructions](#) on our HREC website (www.sun.ac.za/healthresearchethics) for guidance on how to submit a progress report.

The HREC will then consider the continuation of the project for a further year (if necessary). Annually a number of projects may be selected randomly for an external audit.

Please note that for studies involving the use of questionnaires, the final copy should be uploaded on Infonetica.

Provincial and City of Cape Town Approval

Please note that for research at a primary or secondary healthcare facility, permission must still be obtained from the relevant authorities (Western Cape Department of Health and/or City Health) to conduct the research as stated in the protocol. Please consult the Western Cape Government website for access to the online Health Research Approval Process, see: <https://www.westerncape.gov.za/general-publication/health-research-approval-process>. Research that will be conducted at any tertiary academic institution requires approval from the relevant hospital manager. Ethics approval is required BEFORE approval can be obtained from these health authorities.

We wish you the best as you conduct your research.

For standard HREC forms and instructions, please visit: [Forms and Instructions](#) on our HREC website <https://applyethics.sun.ac.za/ProjectView/Index/22592>

If you have any questions or need further assistance, please contact the HREC office at 021 938 9677.

Yours sincerely,

Coordinator

HREC1

National Health Research Ethics Council (NHREC) Registration Number:

REC-130408-012 (HREC1)•REC-230208-010 (HREC2)

Federal Wide Assurance Number: 00001372

Office of Human Research Protections (OHRP) Institutional Review Board (IRB) Number:
IRB0005240 (HREC1)•IRB0005239 (HREC2)

The Health Research Ethics Committee (HREC) complies with the SA National Health Act No. 61 of 2003 as it pertains to health research. The HREC abides by the ethical norms and principles for research, established by the [World Medical Association \(2013\)](#), [Declaration of Helsinki: Ethical Principles for Medical Research Involving Human Subjects](#); the South African Department of Health (2006), [Guidelines for Good Practice in the Conduct of Clinical Trials with Human Participants in South Africa \(2nd edition\)](#); as well as the Department of Health (2015), [Ethics in Health Research: Principles, Processes and Structures \(2nd edition\)](#).

The Health Research Ethics Committee reviews research involving human subjects conducted or supported by the Department of Health and Human Services, or other federal departments or agencies that apply the Federal Policy for the Protection of Human Subjects to such research (United States Code of Federal Regulations Title 45 Part 46); and/or clinical investigations regulated by the Food and Drug Administration (FDA) of the Department of Health and Human Services.

Appendix 6: Institutional pilot study site approval letter

KD AND H MEDICAL SERVICES
PRACTICE NO. 170
BUILDING, MAIN ROAD, ONDANGWA, NAMIBIA
P O BOX 170 OSHAKATI
PHONE +264 61 200 1701 EMAIL: kdhmedical@yahoo.co.uk

Mrs Perseverence Moyo

P O Box 170

Oshakati

Dear Mrs Moyo

REF: RESPONSE TO REQUEST FOR CONDUCTING PILOT TEST AT KD & H MEDICAL CENTRE

This letter serves to inform you that after the research committee met to deliberate on your request to conduct a pilot test for the study titled 'KNOWLEDGE, ATTITUDES AND PRACTICES OF NURSES REGARDING OBESITY IN PRIVATE HEALTHCARE INSTITUTIONS IN OSHANA REGION, NAMIBIA,' we came up with the conclusion that you can carry out the pilot test at our institution.

We will appreciate it if you consult our unit managers on the appropriate times to collect the data you require.

We wish you the best in your research.

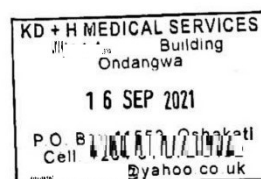
Yours faithfully

Dr E

For: research Committee

KD & H MEDICAL CENTRE

16 September 2021



Appendix 7: Institutional research site approval: Medical Centre Oshakati

Approval letter

G & M MEDICAL CENTRE

DR. ¹
M. B CH. B (University)

DR. ²
M. B CH. B (Makerere University)

Practice No: |

Mrs Perseverance Moyo
P.O. Box
Oshakati

23 September 2021

Dear Mrs P. Moyo

REF: AUTHORISATION TO CARRY OUT STUDY AT MEDICAL CENTRE OSHAKATI

This letter serves to confirm that your letter requesting to conduct a study with the title **'KNOWLEDGE, ATTITUDES, AND PRACTICES OF NURSES REGARDING OBESITY IN PRIVATE HEALTH CARE INSTITUTIONS IN OSHANA REGION, NAMIBIA.'** was received on 18 September 2021. During our weekly Wednesday meetings, we discussed your request and agreed to grant you the approval to conduct the study at our institution.

You should consult our different unit managers so that you do your research at convenient times in order to prevent interruptions of patients' care.

Yours faithfully

MEDICAL CENTRE OSHAKATI

DR- _____

Chair: Research Committee

Medical Centre Oshakati

Appendix 8: Institutional research site approval: Beta Medical Centre Approval letter

MEDICAL CENTRE
COMPLEX OSHAKATI
Pr NO
Tel.
FAX

24 September 2021
Mrs Perseverance Moyo
P.O. Box
Oshakati

Dear Mrs Moyo

REF: PERMISSION TO CONDUCT STUDY AT BETA MEDICAL CENTRE

Thank you for your request to conduct a study at our institution. I write to inform you that your request to conduct a study entitled '**KNOWLEDGE, ATTITUDES, AND PRACTICES OF NURSES REGARDING OBESITY IN PRIVATE HEALTH CARE INSTITUTIONS IN OSHANA REGION, NAMIBIA.**', has been approved.

Please consult our nursing manager so that your data collection does not disrupt services. A report of the findings at the end of the study should also be made available to us.

Yours faithfully

Dr

THE DIRECTOR
Beta Medical Centre
P.O. Box
OSHAKATI
24 SEP 2021

Appendix 9: Institutional research site approval: Ongwediva 24-hour Health Centre Approval letter



ONGWEDIVA 24-HOUR HEALTH CENTRE

Practice Number: 000 000 000

Tel: 000 000 000

Fax: 000 000 000

Email:

@yahoo.com

P O Box 000

Ongwediva

Mrs Perseverance Moyo

P.O. Box 000

Oshakati

23 September 2021

Dear Perseverance

REF: REQUEST FOR PERMISSION TO CONDUCT STUDY AT ONGWEDIVA 24-HOUR HEALTH CENTRE

We acknowledge receipt of your letter requesting to conduct a study with the title **'KNOWLEDGE, ATTITUDES, AND PRACTICES OF NURSES REGARDING OBESITY IN PRIVATE HEALTH CARE INSTITUTIONS IN OSHANA REGION, NAMIBIA.'** Your request was discussed by the institution's management and the research was found to have merit. The management has agreed to grant you permission to conduct the study at this institution.

We wish you the best in your studies.

Yours faithfully

Df;

e

Director

Ongwediva 24-hour Health Centre

THE DIRECTOR

ONGWEDIVA 24-HOUR HEALTH
CENTRE

BOX 000, ONGWEDIVA

23 SEP 2021

Appendix 10: Institutional research site approval: Ondangwa Private Hospital

Approval letter

ERF [redacted] Freedom Square
P.O Box [redacted] Ondangwa
Tel: +[redacted]
Fax: +[redacted]
E-Mail: [redacted]@com.na
Web: www.[redacted].com.na



23 September 2021

Mrs Perseverance Moyo

P.O. Box [redacted]

Oshakati

Dear Mrs Moyo

REF: PERMISSION TO CONDUCT STUDY AT ONDANGWA PRIVATE HOSPITAL

We write to inform you that your request to conduct a study entitled '**KNOWLEDGE, ATTITUDES, AND PRACTICES OF NURSES REGARDING OBESITY IN PRIVATE HEALTH CARE INSTITUTIONS IN OSHANA REGION, NAMIBIA.**', at our hospital has been approved.

You should ensure that you provide us with regular updates on the progress of the study. If you intend on publishing the findings of the study, then we will expect you to apply for the approval separately.

Yours faithfully


.....
Dr. [redacted] Managing Director
MBChB, MScDM, MDM, PGDip (Knowledge mgt)

ERF 1602 Freedom Square, Ondangwa
P.O Box [redacted] Ondangwa
Tel: +264 [redacted]
Fax: +264 [redacted]
E-Mail: [redacted]@com.na / [redacted]@hotmail.com
Web: www.[redacted].com.na
Cell: +264 [redacted]



Appendix 11: Certificate - English Editor



Lona's Language Services

English/Afrikaans
Afrikaans/English

3 Beroma Crescent Beroma Bellville

Cell 0782648484

Email illona@toptutoring.co.za

* Translations * Editing * Proofreading
* Transcription of Historical Docs
* Transcription of Qualitative Research
* Preparation of Website Articles

TO WHOM IT MAY CONCERN

This letter serves to confirm that the undersigned

ILLONA ALTHAEA MEYER

has edited and proofread the thesis of **Perseverance Moyo**

for language correctness.

TITLE: Knowledge, attitudes, and practices of nurses regarding obesity in private healthcare institutions in Oshana region, Namibia

Signed

Ms IA Meyer

24 June 2022

Appendix 12: Certificate -Technical Editor

"Unless you're willing to have a go, fail miserably, and have another go, success won't happen." Phillip Adams

ADD VALUE

"Most successful men have not achieved their distinction by having some new talent or opportunity presented to them. They have developed the opportunity that was in their hand." Bruce Barton

SUCCESS YOUR WAY

"Show me a man who cannot think to do little things and I'll show you a man who cannot be trusted to do big things." Lawrence

VISION

"In many people are looking for security instead of opportunity. They see in more a life than death." James J. Pugh

Work hard.

"Experience shows that success is due less to ability than to zeal. The winner is he who gives himself to his work, body and soul." Sir Thomas Fowell Buxton

life... your way yourway.net

"IN THE MIDDLE OF DIFFICULTY LIES OPPORTUNITY." ALBERT EINSTEIN

**4 Nerina Avenue,
Brantwood,
Kuilsvier.
7580
+27 71 768 4141
rukshana@sun.ac.za**

Since most of us spend our lives doing ordinary tasks, the most important thing is to carry them out extraordinarily well." Henry David Thoreau

RUKSHANA ADAMS
COPYWRITING AND EDITING SERVICES

CERTIFICATE OF TECHNICAL FORMATTING AND EDITING

This is to certify that the thesis titled

"KNOWLEDGE, ATTITUDES AND PRACTICES OF NURSES REGARDING OBESITY IN PRIVATE HEALTHCARE INSTITUTIONS IN OSHANA REGION, NAMIBIA"

written by
PERSEVERANCE MOYO

Reviewed for Technical Formatting and Editing by **RUKSHANA ADAMS**

Date: 30 June 2022
Signature: R. Adams

"THE TROUBLE WITH OPPORTUNITY IS THAT IT ALWAYS COMES DISGUISED AS HARD WORK." ANONYMOUS