KNOWLEDGE, ATTITUDE AND PRACTICES [KAP] OF HEALTHCARE WORKERS IN THE FREE STATE, SOUTH AFRICA REGARDING TYPE 2 DIABETES MELLITUS

by

Charmaine Elizabeth Hassan

Submitted in accordance with the requirements for the degree
Master of Social Sciences in Nursing
School of Nursing
Faculty of Health Sciences
University of the Free State

Supervisor: Dr M Reid

June 2016

This research is partially funded by the National Research Foundation and Department of Health Northern Cape Province

DECLARATION

I, Charmaine Elizabeth Hassan, identity number 670911 0091 089 and student number 2012153546, do hereby declare that this research project submitted to the University of the Free State for the degree MAGISTER SCIENTIAE: KNOWLEDGE, ATTITUDE AND PRACTICES [KAP] OF HEALTHCARE WORKERS IN THE FREE STATE, SOUTH AFRICA REGARDING TYPE 2 DIABETES MELLITUS, is my own independent work, and has not been submitted before to any institution by myself or any other person in fulfilment of the requirements for the attainment of any qualification. I further cede copyright of this research in favour of the University of the Free State.

---------- ----------

Signature of student Date

ACKNOWLEDGEMENTS

This study would not have been possible without the assistance of the following persons:

My supervisor, Dr M Reid, for giving me the opportunity to take part in a larger study;

Dr J Raubenheimer from the Department of Biostatistics, University of the Free State, for the valuable input regarding the statistical analysis of the data;

The respondents for taking part in the study;

The National Research Foundation (NRF) for financial assistance;

The Department of Health Northern Cape Province;

My family especially my mother Irene and sons namely Mikaeal, Ebrahim and Muhammad Yusuf for their love and moral support; and

My Heavenly Father, for his love and grace and for giving me the ability and opportunity to undertake this study.

TABLE OF CONTENT

LIST OF ABBREVIATIONS

CHC	Community Health Centre
CHCW	Community Healthcare worker
DM	Diabetes Mellitus
DSME	Diabetic self-management education
DHIS	District Health Information System
EDL	Essential drug list
HCW	Healthcare Worker
HPM	Health Promotion Model
IDF	International Diabetes Federation
KAP	Knowledge, Attitude and Practice
PHC	Primary Health Clinic
PN	Professional Nurse
NHS	National Health System
WHO	World Health Organisation

GLOSSARY

Attitude: Weiten (2013:G1) defines *attitude* as a feeling or orientation towards a person or a thing. In this study, *attitude* will refer to the attitude of the healthcare worker towards the adult type 2 diabetes patient. This is measured through a series of questions forming part of a structured questionnaire.

Healthcare Worker: A *healthcare worker* refers to the person employed by a health institution in order to provide care to patients visiting the institution (Coulson *et al.,* 2010:

70-72). *Healthcare workers* in this study refer to nurse managers and professional nurses registered with the South African Nursing Council and employed by the Free State Department of Health in Primary Health Clinics and Community Health Centres in the Free State. Healthcare workers also refer to community health care workers who may be employed by the Free State Department of Health or a Non-Governmental Organisation and also provide health care in Primary Health Clinics and Community Health Centres in the Free State.

Knowledge: Webster (2015:1) refers to *knowledge* as the understanding or awareness gained through acquisition of information and experience. In this study, *knowledge* refers to diabetes-related information that is known by the healthcare workers and measured through a series of questions forming part of a structured questionnaire.

Practice: Webster (2015:1) defines *practice* as steps and procedures followed in order to provide quality care. In this study, *practices* refers to practices reflected through a series of questions related to diabetes related healthcare activities and procedures at Primary Health Clinics and Community Health Centres in the Free State.

Type 2 Diabetes Mellitus patient: A type 2 diabetes mellitus patient is a patient whose blood glucose is raised above 8 mm/ℓ due to the insufficient production of insulin by the pancreas in the body (South African Department of Health, 2014:10). In this study, *type 2 diabetes mellitus patient* refers to a patient whose blood glucose is raised above 8 mm/ℓ.

LIST OF TABLES

LIST OF FIGURES

ABSTRACT

The quality of care and the implementation strategies used by health care workers (HCWs) in diabetes care is imperative. The implementation strategies used are determined by the knowledge, attitude and practice of the HCWs, which have an impact on quality of service delivery for adult diabetes patients.

The design involved a descriptive, cross-sectional quantitative design with a structured questionnaire as data collection technique. The population consisted of three prominent groups of HCWs (Nurse Managers, Professional Nurses and Community Health Care Workers) providing care to T2DM patients in the public health sector in the Free State. Convenient selection of the three categories of HCWs per Community Health Care centre from the five districts in the Free State and Primary Health Care clinics, from Mangaung district only, took place.

Community Health Care Workers' knowledge was tested on a set of 22 items with Nurse Managers and Professional Nurses being tested on an additional 14 items for a maximum of 36. Nurse Managers and Professional Nurses showed moderately high knowledge scores, with the lower quartile of 22 still being well above the 50% mark of 18 (out of 36). The median was 23, which does indicate however, that there is still much room for improvement. Community Health Care Workers knowledge scores ranged from 7 to 20, a higher median of 14, and an interquartile range of 11 to 16.

Attitudes scoring was constructed in such a way that a score of zero would indicate an equal mix of positive and negative attitude items, and the higher the score above zero (up to +18), the more positive the attitude, and the lower the score below zero (down to -18), the more negative the attitude. The same attitude scale was used for all HCWs. The Nurse Managers and Professional Nurses displayed the most positive attitudes, with a minimum of only -4, and a maximum of 16. More importantly, the median was 12.5, and the lower quartile score was still a moderately positive 9.5. The attitude scores of the Community Health Care Workers CHWs was more positive, with a median of 7 and an interquartile range from 1 to 10 (although the lowest attitude score was still -11).

Practice scores were calculated with different item sets for each of the three groups, related to their differing roles and responsibilities. Nurse Managers and Professional Nurses could obtain scores from 0 to 16, with higher scores indicating better practices, and Community Health Care Workers a score for 0 to 28. . Nurse Managers and Professional Nurses showed good practice scores, with a low of 6 and a high of 15 (out of 16), and a median of 12. For the Community Health Care Workers, the practice scores were moderately high, with a minimum of 5, but a maximum of 28 (out of 28). The median here was 16, and the interquartile range from 10 to 21.

Recommendations were packaged according to knowledge, attitude and practice namely:

Training was recommended to improve the knowledge of HCWs

The Provincial Department of Health should create platforms to explore value clarifications with all HCWs, and

Nurse Managers responsible for chronic diseases should build into the monitoring and evaluation instruments a section providing the opportunity for HCW to identify elements that influence their practice.

ABSTRAK

Die gehalte van die sorg en die implementering strategieë wat deur gesondheidswerkers (GHWs) in die sorg van diabetes gebruik word, is noodsaaklik. Die implementeringstrategieë wat gebruik word, word bepaal deur die kennis, houding en praktyk van die GHWs, wat weer 'n impak het op die kwaliteit van die diens wat aan volwassene diabetes pasiënte gelewer word.

’n Dwarssnit kwantitatiewe, beskrywende ontwerp is vir die navorsing gebruik, en ’n gestruktureerde vraelys is as data-insamelingstegniek aangewend. Die populasie het uit drie prominente groepe GHWs bestaan (Verpleegbestuurders, Professionele Verpleegkundiges en Gemeenskapsgesondheidswerkers) wat almal betrokke is by die sorgverlening aan pasiënte wat met T2DM in die publieke gesondheidsorgsektor van die Vrystaat versorg word. ’n Gerieflikheidsteekproef is op die drie kategorieë GHWs uitgevoer in die Gemeenskapsgesondheidsentrums van die vyf distrikte van die Vrystaat en die Primêre gesondheidsorgklinieke in die Mangaung-distrik.

Gemeenskapsgesondheidswerkers se kennis is getoets op grond van 22 items, terwyl Verpleeg Bestuurders en Professionele Verpleegkundiges se kennis ook op ’n addisionele 14 items getoets is, om ’n maksimum telling van 36 te bereik. Verpleegbestuurders en Professionele Verpleegkundiges het ’n redelike hoë kennis telling gehad, met die laer kwartiel van 22 wat steeds hoër as die 50% punt uit 18 (van moontlike 36) was. Die mediaan was 23, wat ’n aanduiding is dat daar steeds ruimte vir verbetering is. Gemeenskapsgesondheidswerkers se kennis telling was tussen 7 en 20, ’n hoër mediaan van 14 en ’n interkwartiel-reikwydte tussen 11 en 16.

Houding se toetsing is op so ’n wyse gestruktureer dat ’n telling van nul aangedui het dat positiewe en negatiewe houdingsitems gelyk met mekaar opgeweeg het. Hoe hoër die telling bo nul (tot +18), hoe meer positief is die houding en hoe laer die telling onder nul (tot -18), hoe meer negatief is die houding. Dieselfde skaal is vir alle GHWs gebruik. Die Verpleegbestuurders en Professionele Verpleegkundiges het die mees positiewe houding geopenbaar, met ’n minimum van slegs -4 en ’n maksimum van 16. Die mediaan was 12.5 en die laer kwartiel telling was gematigd positief op 9.5. Die houding tellings van die Gemeenskapsgesondheidswerkers was meer

positief met ’n mediaan van 7 en ’n interkwartiel-reikwydte tussen 1 en 10 (hoewel die laagste houdingstelling -11 was).

Praktyk tellings se hoeveelheid items het vir elk van die drie groepe GHWs verskil, aangesien die items die spesifieke groep se verantwoordelikhede weerspieël het. Verpleeg Bestuurders en Professionele Verpleegkundiges kon tellings van 0 tot 16 verkry, met hoor tellings wat op beter praktyk dui. Gemeenskaps-gesondheidswerkers se telling kon varieer tussen 0 en 28. Verpleegbestuurders en Professionele Verpleegkundiges het goeie praktyk tellings getoon, met ’n lae telling van 6 en ’n hoë telling van 15 (uit 16), met ’n mediaan van 12. Gemeenskapsgesondheidswerkers se praktyk telling was redelik hoog, met ’n minimum van 5 en maksimum van 28 (uit 28). Die mediaan was 16 en die interkwartiel-reikwydte tussen 10 en 21.

Aanbevelings is soos volg uiteengesit volgens kennis, houding en praktyk: Opleiding is aanbeveel om die kennis van GHWs te verbeter; die Provinsiale Departement van Gesondheid moet platforms skep om waarde verklaring met alle GHWs te ondersoek; en Verpleegbestuurders, wat verantwoordelik is vir chroniese siektes, moet in die monitering- en evalueringsinstrumente ’n afdeling invoeg waar GHWs die geleentheid gebied word om elemente te identifiseer wat hul praktyke kan beïnvloed.

CHAPTER1
INTRODUCTION

This chapter will provide an overview of the study as depicted in Figure 1.1.

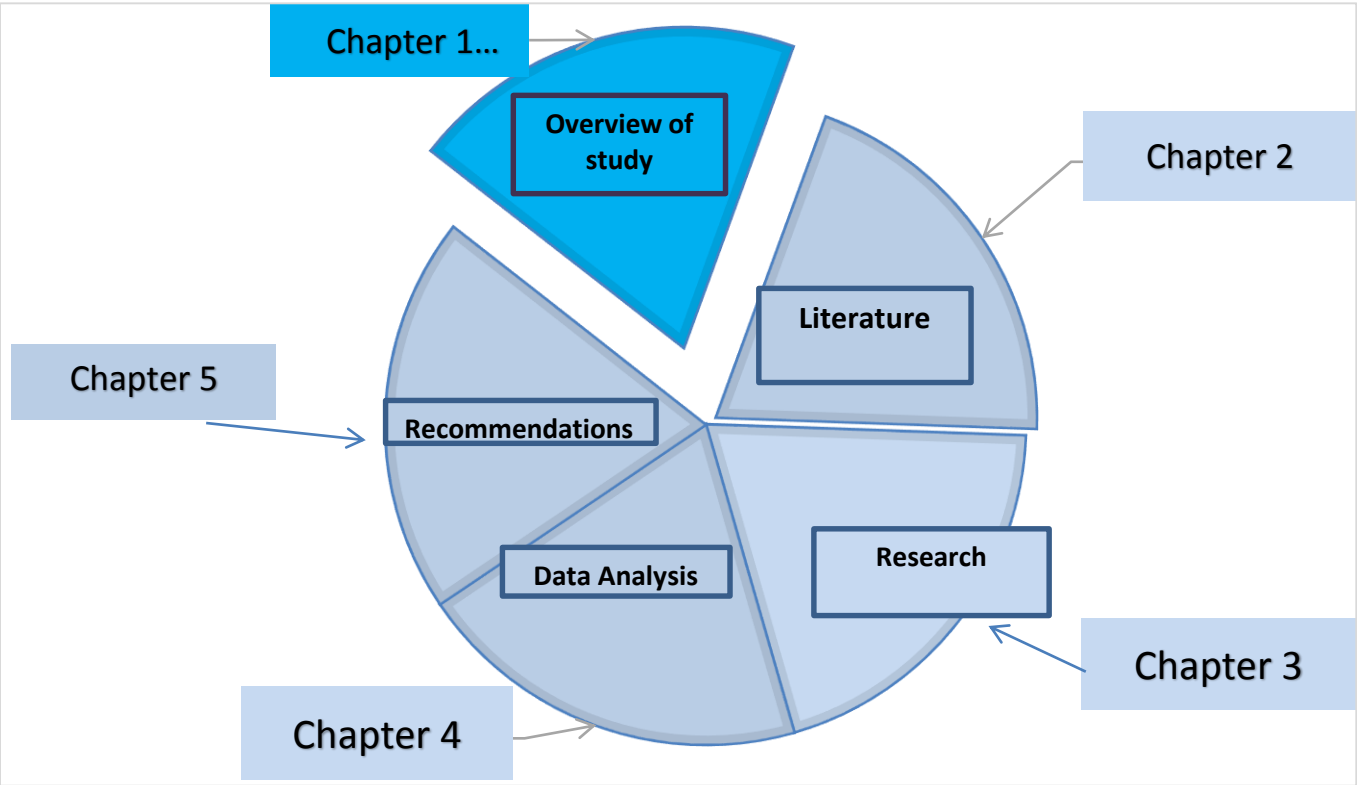

Figure 1.1: *Overview of study as adapted from De Vos et al. (2010:70)*

1.1 INTRODUCTION

Diabetes Mellitus (DM) has become one of the major causes of death and ill health amongst many individuals. According to the International Diabetes Federation (IDF) 382 million people had been diagnosed with DM by the end of 2013 and 592 million are still to be diagnosed by the end of 2035 (International Diabetes Federation, 2013:7). One hundred and seventy five million of these adults are undiagnosed (International Diabetes Federation, 2013: 30). Internationally, one person dies from DM every six seconds. Stated otherwise, globally 5,1 million deaths per annum are due to DM (International Diabetes Federation, 2013:7).

Africa, as part of the developing world, is expected to see an increase in diabetes of up to 28 million people by 2030. It is specifically the prevalence of type 2 diabetes,

which is on the increase especially in low-income and middle-income countries (International Diabetes Federation, 2013:15).

South Africa, a middle-income country at the southernmost tip of Africa, is not excluded from the surge in diabetes prevalence. Approximately 1,5 to 2 million people live with diabetes in South Africa, implying that this condition is of public health concern (International Diabetes Federation, 2012:1). The number of self-reported DM cases amongst men and women during a 2007 and 2009 survey in the Free State, one of the eight provinces in South Africa, was 1,8% and 4%, respectively (Van Zyl *et al.*, 2012:3). The prevalence of DM, as highlighted, has far-reaching effects on the individual, community and the economic status of South Africa. In real terms, the country is dealing with a "silent killer" (Kheir *et al.*, 2011:185).

The individual diagnosed with DM is affected on a physical and psychological level by the disease. Eye problems and multi-vessel coronary artery disease are examples of some of the physical effects of the disease, whereas psychological effects such as anxiety and depression are examples of psychological effects individuals with DM may experience (Kheir *et al*., 2011:185). These patients need to be treated promptly in order to prevent complications (Smalls *et al.*, 2012:385-389).

Patients suffering from DM in South Africa can receive treatment at the Primary Health Clinics (PHC) and Community Health Centres (CHC). This shows that the burden of treatment is on the public sector. Services provided by this primary level of health care are presented by various categories of healthcare workers (HCWs), of which professional nurses (PN) and community health care workers (CHCW) form the backbone. A brief explanation of the professional nurse as a cadre of HCW will be provided.

The management of services provided to DM patients by the PN is supervised by the nurse manager at the PHC and CHC. The services provided by the PN are rendered according to Regulation R2598, which is specified in the *South African Nursing Act 33 of 2005*, addressing the scope of practice of the professional nurse (Republic of South Africa, 2005:25). The CHCW forms part of the HCW performing activities under the direct and indirect supervision of the PN. The activities of the CHCW's are

not legally regulated under the South African Nursing Council (Booysen, Erasmus & Van Zyl, 2009:15).

Since DM is one of the chronic diseases placing a burden on the health system in South Africa, the South African National Department of Health recognises diabetes as a major health concern (Bradshaw *et al.*, 2007:700; South Africa Department of Health, 2011c:4). Dr Aaron Motsoaledi, the National Minister of Health, has announced the implementation of a National Health Insurance plan. The plan aims to ensure that all South African citizens receive appropriate, efficient and quality healthcare services, regardless of their socio-economic status (South Africa, Department of Health, 2011c:3).

Patients are screened for DM at primary healthcare level, diagnosed and provided with appropriate treatment according to an essential drug list (EDL), as well as educated and counselled (Reddy, 2012:5). Patients with complications are referred to the secondary healthcare level if further management by a health practitioner is necessary. The National Minister of Health also announced that district specialist teams would be appointed in each province in order to improve health services. The purpose of the district specialist health teams, is to strengthen the services at the PHC and CHC as well as to oversee the implementation of the National Health Insurance and reengineering of the PHC services (South Africa, Department of Health, 2011c:8-10). The aim of the district teams is to bridge the gap between PHC and CHC services, the community and non-governmental organisations. The objective of this initiative is to strengthen the management of conditions. DM is one example of such a chronic condition. This initiative will assist in better self-management of the chronic condition by the patient.

1.2. PROBLEM STATEMENT

The quality of care and the implementation strategies used by HCWs in diabetes care is imperative (Adams & Carter, 2010:96). The implementation strategies used are determined by the knowledge, attitude and practice of the HCW. It is well known that knowledge, attitude and practice have a “domino effect” on one another in that knowledge influences attitude and practice. This in turn will have an impact on quality of service delivery for adult diabetes patients. This was evident in research

performed at the PHC and CHCs within black communities of Cape Town, which describes that the knowledge, attitude and practices of the HCWs influence the care provided (Goodman *et al.*, 1997:305-309). Evidence in research has shown that education is useful in obtaining better results in understanding diabetes, resulting in changing the knowledge, attitude and practice of the HCW (Gagliardino, Gonzalez & Corporale, 2007:304-307).

Since the majority of diabetes patients are cared for at the PHC and CHCs of the public health sector by HCWs, it is important to be aware of the knowledge, attitude(s) and practices of this group of HCWs pertaining to Type 2 Diabetes Mellitus adult patients. Since the researcher is not aware of any studies describing the knowledge, attitudes and practices of healthcare workers working with adult patients with T2DM, this study will address this void in research. Data obtained from this study further inform a larger study project, which aims to develop a health dialogue model for patients with T2DM in the Free State Province of South Africa.

1.3 AIM OF THE STUDY

This study aims to assess diabetes related knowledge, attitude(s) and practices [KAP] of HCWs working with adult patients with T2DM in the Free State, South Africa. The HCWs are employed at the PHC and CHCs in the Free State Province.

1.4 RESEARCH DESIGN

A research design refers to the plan that the researcher uses in order to investigate the aims and objectives in the study. The research design gives guidance to the study regarding the planning and implementation of the study (Botma *et al.*, 2010:39; Polit & Beck, 2012:58). The researcher made use of a descriptive, cross-sectional quantitative design.

The main aim of the descriptive design is to observe, count and classify the knowledge, attitude and practices related to diabetes of healthcare workers working with T2DM adult patients in the CHC centres and PHC clinics in the Free State.

A cross-sectional design was used as the researcher collected data from a representative sample at the PHCs and CHCs on a specified day, as outlined in the

data collection plan. Each of the three groups of HCWs completed a questionnaire. Apart from cross-sectional studies collecting data at a specific point in time, it also focuses on various groups simultaneously.

A quantitative design was used as human behaviour was measured. The level of knowledge, attitude and practices of HCWs was measured using a structured questionnaire.

The researcher chose a paradigm that was aligned to the design.

1.4.1 Research paradigm

The research paradigm can be defined as a design of collecting and interpreting data. These legitimised assumptions are based on the researcher's worldview, which influences the decisions that will be taken in the designing and interpretation of data. According to Botma *et al.* (2012:40), the researchers' assumed paradigm is fundamental and should be mentioned early in a research study. The research paradigm will influence what should be studied, what questions should be asked and what rules the researcher will use in interpreting the data (Botma *et al*., 2010:40).

A variety of paradigms exists in social science research and positivism is one such a paradigm. Positivism is a research paradigm that places emphasis on observing facts in a systematic way (Botma *et al.*, 2010:42). This study is quantitative by nature and requires a high degree of objectivity; hence, the utilisation of positivism as the research paradigm. The application of positivism as a research paradigm is expressed through ontology, epistemology and the methodologic assumptions the researcher will hold during the study.

1.4.2 Ontology

Ontology is based on the how the researcher views what constitutes the nature and characteristics of reality (Botma *et al.,* 2010:42). In this study, the researcher believes that reality is very objective and that unchangeable natural cause and effect laws govern this true reality. Therefore, the description of knowledge, attitude and practices of HCWs working with T2DM patients are seen to be measurable, with specific interrelationships between these three concepts. Ajzen (1991:102-103)

states there are specific determinants which motivate an individual to perform specific behaviour namely, knowledge influences attitude and practice. A description of epistemology will follow.

1.4.3 Epistemology

Epistemology is a branch of philosophy that addresses the nature of knowledge, focusing mainly on the structure of knowledge and how one can know and explain something (Botma *et al.,* 2010:42). In this study, the researcher assumes that knowledge can be described in a systematic way. Ajzen (1991:102-103) states that there are determinants which motivate individuals to perform certain behaviours, namely knowledge, influences attitude and practice. An accurate description of knowledge can be generated from the instrument that is administered through the research subjects in determining their knowledge, attitudes and practices. The questionnaire used to interview HCWs in this study allows a systematic description of the key variables (knowledge, attitude, practice). A brief description of the methodological assumptions follows.

Methodological assumptions refer to the rules and procedures that the researcher must follow to conduct the investigation. Governed by the positivist approach followed, the researcher will control the investigation through structured questionaire when performing the planned survey. Therefore, it is logical that this study will follow a quantitative descriptive route.

1.5 RESEARCH TECHNIQUE

The research technique refers to the measurement strategies used to collect data. The researcher made use of a structured questionnaire that was completed by the interviewee. A questionnaire completed by an interviewer is used for this study as it enables statistical analysis of the data obtained and makes it possible to obtain quantifiable data. Two aspects, namely *population* and *sampling*, are important in order to obtain data for the research. A description of *population* follows.

1.6 POPULATION

HCWs providing chronic care to T2DM adult patients at the CHCs and PHCs in the Free State public health sector were included as the population for this study. The Free State Department of Health could not provide exact numbers of PNs and CHCWs providing care to T2DM patients. After consultation with the Free State Department of Health, the researcher therefore calculated an average of two professional nurses per either CHC or PHC and five CHCWs per CHC and PHC. The population consisted of:

HCWs working in the 10 CHCs in the five districts of the Free State (Nurse managers = 5, Professional Nurses = 20, and CHCWs = 50; Total N=75)

HCWs working in 42 PHCs in the Mangaung District (Professional Nurses = 84, CHCWs = 210, and 1 assistant provincial manager; Total N=295)

1.7 SAMPLING

Sampling according to the various populations was conducted in the following manner:

All five districts and all CHC Centres (n=10) were included in the study. However, the Mangaung Metro District was purposefully selected to perform a random selection of 25% of PHC Clinics (n=11); and

All nurse managers of chronic diseases in five districts of the Free State and the Provincial Nurse Manager responsible for chronic diseases in the Free State Province (n =6) were included.

The type of selection performed indicated two professional nurses and five CHCW per site. The sample from CHCs and PHCs for the study included PN (n=42), CHCWs (n=105) and Nurse Managers (n=6).

1.8 DATA COLLECTION

Permission to conduct this study was obtained from the Health Sciences Research Ethics Committee (See Figure 3.3 and Addendum A1). Written permission to do the

research was obtained from the Department of Health in the Free State, since this specific study formed part of a larger study aimed at developing a health dialogue model for patients with diabetes in the Free State. The permission from the Department of Health reflects the permission granted towards the overarching study (See Figure 3.3 and Addendum D2).

A pilot study was then conducted at the Gabriel Dichabe Clinic in the Mangaung District. After completion of the pilot study, an appointment was made with the provincial nurse manager and the programme coordinators for chronic diseases, to interview them regarding the data collection plan that will be followed. These role-players were involved, as practical arrangements were made with them, but they also had to be interviewed themselves. This data collection plan is shown by means of a flow chart in Figure 3.3. The data collection plan will be discussed in Chapter 3. Trustworthiness as an important aspect of data collection will follow.

1.9 TRUSTWORTHINESS OF RESEARCH PROGRAMME

The trustworthiness framework was applied based on four epistemological standards, namely credibility, dependability, confirmability and transferability. This framework and its application will be discussed in Chapter 2.

1.10 VALIDITY

Content and face validity used in this study will be explained in detail in Chapter 3.

1.11 RELIABILITY

The measures the researcher utilised in order to ensure reliability of the study will also be highlighted in Chapter 3.

1.12 ETHICAL ISSUES

Three primary ethical principles on which standards of ethical conduct in research should be based, as expressed in the Belmont Report guided the study. The three primary principles include the principles of beneficence, respect for human dignity and justice. The application of these principles is discussed in depth in Chapter 3.

1.13 DATA ANALYSIS

Information obtained by the structured questionnaire was analysed by a biostatistician at the Department of Biostatistics at the UFS. Descriptive statistics, namely frequencies and percentages for categorical data and means and standard deviation or medians and percentiles for continuous data, was calculated. The analysis was generated using SAS® software.

1.14 CONCLUSION

This chapter provided an overview to the study. A discussion of the problem statement and the purpose of the study were detailed. The research design that was used and the research technique, data collection and analysis utilised were highlighted. Aspects regarding the trustworthiness that were applied and the ethical principles the study adhered to was highlighted. The following chapter will discuss the literature review of this study.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

The previous chapter provided an overview of what the study was about, while this chapter will provide a literature review as depicted in Figure 2.1. An in-depth description of the healthcare system used in South Africa, the disease profile of diabetes mellitus, knowledge, attitude and practices of HCWs working with T2DM adult patients in the Free State and the theory of planned behaviour will be unpacked.

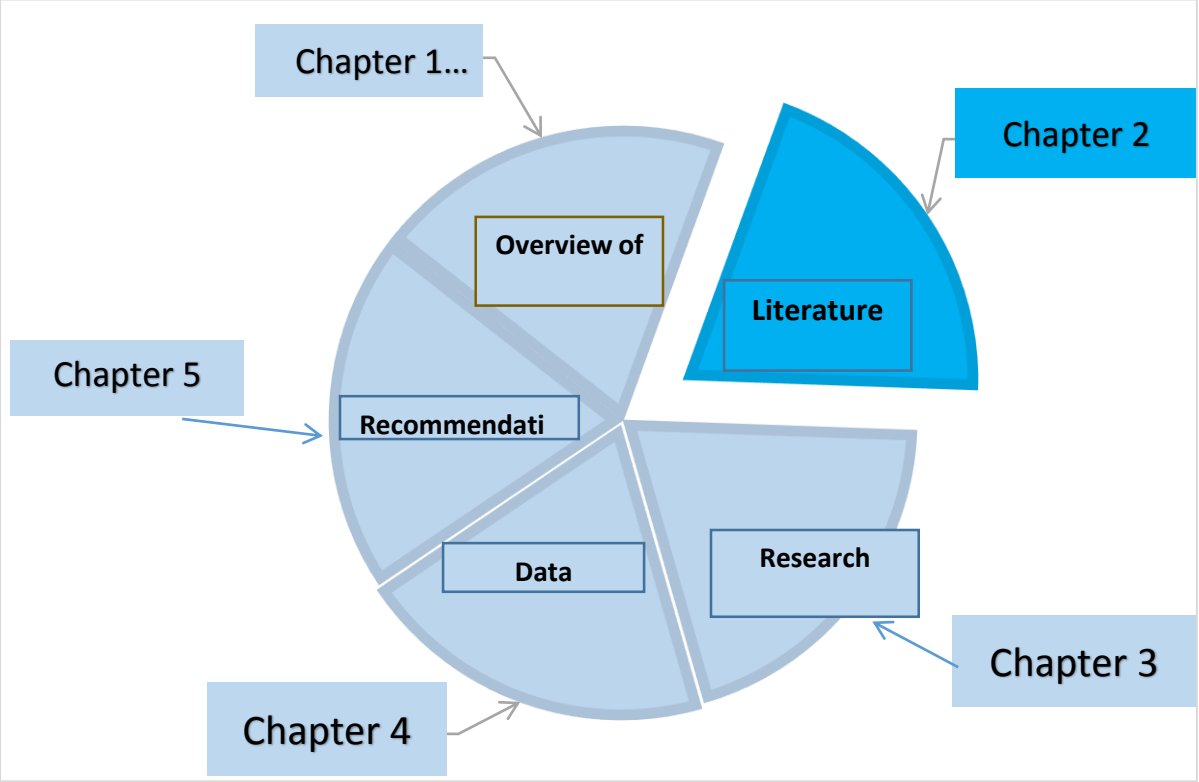

Figure 2.1: *Literature review discussion as adapted from De Vos et al. (2012: 70)*

The movement of the gears in Figure 2.2 and the arrows indicate that the aspects, namely the healthcare system used in South Africa, the disease profile of diabetes mellitus, knowledge, attitude and practices of HCWs working with T2DM adult patients in the Free State, influence one another and are dependent on one another. The interrelatedness of the aspects mentioned will be highlighted in the discussion to follow.

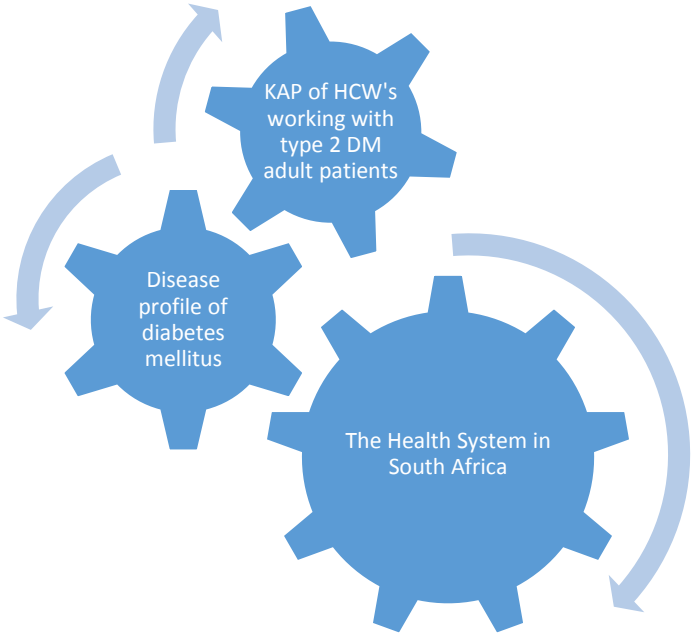

Figure 2.2: *Interrelatedness of aspects discussed in Chapter 2*

2.2 THE HEALTHCARE SYSTEM IN SOUTH AFRICA

The public healthcare system in South Africa provides healthcare services to the majority of the population. The strategies employed in the healthcare system aims to increase the life expectancy of all South Africans by decreasing morbidity and mortality. In order to improve the current mortality figures in South Africa, the South African National Department of Health has identified that life expectancy should improve from 53,9 years for males and 57,2 years for females to 58 years for males and 60 years for females. The South African Department of Health further aims to decrease morbidity figures by decreasing the number of non-communicable diseases, which will increase the wellness of the population (South Africa Department of Health, 2013b:12). Strategies used to increase the life expectancy take place within a well-structured healthcare system. A discussion of the legal structures within the public healthcare system will follow.

2.2.1 Legal structures within the public healthcare system

The public healthcare system in South Africa is outlined in *the Negotiated Service Level Delivery Agreement* (NSDA). This NSDA describes the commitment of sectoral and intersectoral partners in the implementation of the goals and activities identified by Department of Health. The NSDA outlines how service delivery should be

implemented within the Integrated Primary Health Care approach, where the emphasis is on the provision of services that concentrate on preventative and promotive delivery of health care (South Africa Department of Health, 2011c:3).

The IPHC approach plays a crucial role in the implementation of the *National Health Insurance Plan* (NHI). Dr Aaron Motsoaledi, Minister of Health, announced the implementation of the NHI plan in 2010. The NHI plan aims to ensure that all South African citizens have access to appropriate, efficient and quality healthcare services, regardless of their socio-economic status (South Africa Department of Health, 2011c:3; Sibiya & Gwele, 2013:388; Van Rensburg, 2012:134). The aim of the NHI is furthermore closely linked with strengthening healthcare effectiveness.

Strengthening healthcare effectiveness has been identified as Output 4 by the Department of Health in order to improve service delivery. The District Health Information System, which is the management tool used by the Department of Health's PHC and CHCs, contains the collection, compilation, analysis and maintenance of health-related data. This management tool is used as the basis of decision-making and information within the various levels of health care. Identified indicators are reported on a monthly basis (Naledi, Barron & Schneider, 2011:22). A detailed discussion concerning the various levels within which public health care is provided will follow.

Health care is provided at three levels, namely Primary, Secondary and Tertiary Health Care.

2.2.1.1 Primary health care

According to the Alma atta Declaration of 1978, primary health care has to provide health care to a specific community (Sibiya & Gwele, 2013:388). Primary health care is the first level of contact between individuals and families with the healthcare system. Primary care in South Africa is delivered at PHCs and CHCs. PHCs are nurse driven, as nurses form the backbone of the services rendered, doctors visit on certain days, whereas CHC centres have doctors on the premises at all times. Should patients not be able to be assisted by nurses at the PHC, a referral to the CHC is done. The doctor at the CHC diagnoses T2DM patients and initiates treatment. Nurses and other HCWs provide socially appropriate, universally

accessible, scientifically sound health services at this first level of health care. Services on PHC level focus mainly on prevention, promotion, cure, rehabilitation and maintaining the ideal health of the population. However, diabetes mellitus will be the focus of this study (South Africa Department of Health, 2014:2; South Africa Department of Health, 2011c:3).

In South Africa, the majority of the population making use of public health services attend PHC clinics and CHC centres (South Africa Department of Health, 2011a:3-5; Sibiya & Gwele, 2013:392). The difference between a PHC and a CHC is the presence of a doctor in CHCs (South Africa Department of Health, 2011a:3). In order to ensure that patients with DM receive appropriate management, clients are screened for DM in the CHC, diagnosed, provided with appropriate treatment, education, counselling and referred back to the PHC for follow-up management (South Africa Department of Health, 2013b:3).

An integrated primary healthcare approach was introduced for eight hours a day over five days at the PHCs and CHCs (South Africa Department of Health, 2011a:3). To further ensure that the health care is strengthened and effective the supermarket approach was introduced. The term *supermarket approach* was used, as a patient could receive many services during one consultation visit by one HCW at the PHC or CHC. Therefore, patients are referred from PHC clinics to CHC centres to receive the needed doctor-initiated care (South Africa Department of Health, 2010:9-10). Should further care be needed that cannot be supplied at the PHC and CHC centres, such patients are referred to the secondary level of care. A prescribed referral plan is followed.

2.2.1.2 Secondary health care

Secondary health care refers to a second level of health care in which patients from PHC and the CHC centres are referred to another level, referred to as district hospitals. Doctors, nurse management and professional nurses are some of the prominent HCWs who provide health care at district hospitals. The services provided at the district hospital are more specialised than the services provided at the PHC and CHC. Doctors at the district hospital refer patients who require specialised treatment to a tertiary institution.

2.2.1.3 Tertiary health care

Tertiary health care refers to a third level of health care in the system, in which specialised consultative care is provided usually on referral by doctors from district hospitals. The prominent HCWs at tertiary level comprise nurse management and doctors. However, these personnel are most often specialists in their field and often involved with advanced medical research. Specialised intensive care units, and advanced diagnostic support services are provided at this level (South Africa Department of Health, 2011a:3). A description of the healthcare workers working within the public South African healthcare system will follow.

2.2.2 Prominent healthcare workers at Primary Healthcare Clinics and Community Healthcare Centres

Within the healthcare system, multiple HCWs are involved in providing health care. The HCWs forming part of this study refer only to the NM, PN and the CHCW, since they play a significant role in the treatment of the majority of patients with chronic diseases served in the public health sector. The qualifications obtained by the HCWs should enable them to be multi-skilled in order to provide health care to patients with a supermarket approach at the PHC and CHC (Sibiya & Gwele, 2013:393). A detailed discussion concerning the role of the nurse manager, who coordinates activities at the PHC and CHC, will be described.

2.2.2.1 The nurse manager

The nurse manager is registered with the South African Nursing Council (SANC) in order to practise as a professional nurse, as stipulated in SANC Regulation R2598, as amended (South African Nursing Council, 2005:6). Nurse managers are appointed in positions of authority where they are involved in decision making. The decisions involve ensuring that the patient is provided with optimum, timely, effective care and ensuring that the targets set at the National Department of Health are achieved (Thompson, Buchbinder & Shaks, 2010:1-16).

The function of the nurse manager entails ensuring that services are rendered according to the goals, standards and policies as provided by the National

Department of Health. The manager ensures that effective utilisation of resources occurs at all times (South Africa Department of Health, 2010:129-131).

The main functions of the nurse manager within non-communicable diseases during service delivery in PHCs and CHCs include making time available to perform their role as a nurse manager, planning of activities for the day, determining which HCWs will do what and when as well as be aware of the political environment in which the service is provided. Management of human and financial resources, by delegating HCWs according to their scope of practice and controlling to ensure that service delivery is provided within the guidelines set by the National Department of Health is also included in the role of the nurse manager (Marie, 2009:97-98). This cadre of nurse attends meetings and training regarding updates on guidelines and specialised training on non-communicable diseases, including DM at district and provincial levels. They provide feedback to the HCWs on a regular basis in order to update HCWs regarding changes in national guidelines, including DM (South Africa Department of Health, 2010:129-131). Since professional nurses are managed by nurse managers within the PHC and CHC context of this study, it is important to unpack the role and function of this specific healthcare worker.

2.2.2.2 Professional nurse

The professional nurse is someone who has undergone training as set down by the South African Nursing Council, has met the requirements for registration as a professional nurse and practise comprehensive nursing in the manner and to the level prescribed (South African Nursing Council, 2005:6). In the context of this study, *professional nurse* will refer to a person who works as a professional nurse in the CHC and PHC. Professional nurses provide health care to patients suffering from communicable and non-communicable diseases, including DM.

Professional nurses should be able to assess and treat patients comprehensively according to the supermarket approach. Independent, dependent and interdependent functions are performed at all times (Searle, Human & Mogotlane*.,* 2009:63-65). Under specific circumstances, the professional nurses at the PHC are responsible for identifying patients who suffer from diabetes and refer them to CHCs. It is important to note that the professional nurse is not able to make the final DM

diagnosis, but provide follow-up care (South Africa Department of Health, 2011c:7). The functions performed by the professional nurse have a direct impact on the quality of service provided. The community healthcare worker often acts as assistants to the professional nurses. A description of the role of the CHCW will be provided.

2.2.2.3 Community healthcare worker

A CHCW is a lay health worker who has been selected from the catchment area of the community in which they live to work in PHCs, CHCs, and non-profit organisations, faith-based organisations or community-based organisations. In 2004, the term CHCW was used to refer to all lay workers working within the healthcare system (Schneider *et al.*, 2008:179-187). The group has been referred to as CHCWs, because it encompasses the group as a whole, irrespective from which organisation they originate.

Due to the shortage of staff at the PHC and CHCs, the CHCWs are traditionally used within TB and HIV services, but are exposed to a lesser extent to the non-communicable diseases such as DM. The responsibilities of the CHCWs involved with non-communicable diseases include assisting in the supervision of long-term treatment, counselling and education, and referring patients with possible serious conditions in the community (South Africa Department of Health, 2010:129-131).

The South African Nursing Council is in the process of incorporating CHCW as part of the curriculum development for nurses (Kigozi *et al.,* 2011:71-80). There are various training courses but these courses are not standardised. These CHCWs are trained in basic nursing care in order to provide preventative services and going the extra mile (Rosenberg, 2011:1). According to O'Brien (2011:12), the lack of standardisation inhibits the expansion and development of the CHCW workforce. Although lack of standardisation in the training of CHCWs has been identified, other problems in the healthcare system will now be focused on.

2.2.3 Problems within the healthcare system

2.2.3.1 Budgetary allocation for South Africa

South Africa is graded as an upper middle-income country and has more than double the financial resources allocated to health expenditure compared to other countries in the same category such as India (World Bank, 2014:5). The Free State Province in South Africa had a steady growth in the health budget allocation over the medium-term expenditure framework, namely 12,9% in the 2012/13 allocation representing a 12,9% growth on the expenditure of the 2011/12 financial year (South Africa Department of Health, 2013a:25-26).

2.2.3.1.1 Description of possible reasons for the problem in the Free State

The Free State Province, having a much higher health budget compared to other middle-income countries, was still unable to provide in all resources needed to provide quality health care. The challenges with regard to the current financial crisis dating back to 2008 in the Free State Department of Health were due to poor financial management systems, human resources and equipment shortages, weak monitoring and evaluation systems and bureaucratic malfunctioning (Sello & Dambisya, 2014:1). The Department of Health had overspent its budget and as a result had to implement cost containment measures. At the end of the 2013/14 financial year, the Free State Department of Health had incurred debts of R700m (Sello & Dambisya, 2014:1). The challenges the Free State Department of Health faced had a major impact on service delivery, namely with regard to the filling of critical posts, procuring of sufficient resources and effective management (South Africa Department of Health, 2013a:25-26). The problems discussed have an impact on all services provided, also on the management of non-communicable diseases in the public health sector, such as T2DM.

2.2.3.1.2 The impact of the problem on service delivery within the Department of Health in the Free State

The serious financial constraints had an effect on the Free State Department of Health's ability to manage human resources. According to the annual performance plan of the Free State Department of Health (2015/2016:14), 3 954 professional

nurses were employed. This number represents 21,90% of the total percentage nurses employed in the Free State. Due to the shortage of human resources, the Department of Health utilises CHCWs to assist the professional nurses at the PHC and CHCs. The Department is still in the process of appointing and training CHCWs. Currently, the department has employed 3 388 CHCWs and volunteers who are retained on stipends (South Africa Department of Health, 2013a:24). Against the backdrop of this human resource shortage, patient attendance increased (South Africa National Department of Health, 2013a:24).

There has been an increase from 6,52 to 7,19 million in the number of patients visiting the PHCs and CHCs during 2011/12. Due to the increased patient attendance, clinical workloads increased for the professional nurse from consulting on average 34,2 patients in 2011 to consulting 36,9 patients daily in 2012 in PHCs in South Africa. A similar picture transpired in CHCs with professional nurses consulting 33 and 38,3 patients daily in 2011 and 2012, respectively (South Africa National Department of Health, 2013a:24). These limited financial and human resources resulted in the South African healthcare system being characterised as fragmented.

Fragmented care refers to the process whereby a patient is not cared for holistically and only the immediate problem the patient presents with is addressed (Coovadia *et al.,* 2009:826). Fragmentation of service delivery occurs as the result of limited access to care. The limited access could develop due to a lack of trained or specialised HCWs, specialist drugs and equipment (Kautzky & Tollman, 2009:21), which can be linked to the current financial and human resource situation in the Free State. The problem therefore is that the majority of South Africans make use of the public health sector, with the public health sector experiencing specific challenges as already discussed (Coovadia *et al*., 2009:826). A detailed description of DM will follow.

2.3 TYPE 2 DIABETES MELLITUS (T2DM)

Diabetes mellitus has increased dramatically globally as well as in Sub-Saharan Africa (Hall *et al*., 2011:1). Worldwide, approximately 382 million people are suffering from DM and 175 million are undiagnosed. According to the WHO, 36 million people

died globally from non-communicable diseases in 2008, of which DM comprised 3% (Amod *et al*., 2012:2). The death rate of non-communicable diseases was 80% in low and middle-income countries (South Africa Department of Health, 2013b:16). The global death rate for South Africa in 2011 for DM reached 19 530 or 3,27% of total deaths (World Health Organisation, 2013:16).

Sub-Saharan Africa also experiences an increase in the prevalence of DM. South Africa, as part of Sub-Saharan Africa, is no exception, being identified as the country with the highest prevalence of DM in the region. South Africa has been estimated to have approximately 2,6 million people diagnosed with T2DM (Coovadia *et al.,* 2009:817). The Free State Province has a prevalence of 5% of the DM population (Bradshaw *et al.*, 2007:701). The prevalence of DM was reported to be higher in the Free State Province, compared to all other provinces in 1996 (Levitt, 1996:41).

Diabetes Mellitus affects all people (International Diabetes Federation, 2013:9; South Africa National Department of Health, 2014:6-7; Amod *et al*., 2012:2). Although DM affects all people, the prevalence of DM amongst the SA population varies between the race groups. The highest prevalence of DM is among the Indian population in South Africa (11-13%). This group is predisposed genetically. This is followed by 8-10% in the coloured community, 5-8% among the blacks and 4% among whites (International Diabetes Federation, 2013:9; Otterman *et al.*, 2012:1).

2.3.1 Classification of diabetes mellitus

Table 2.1 provides a summary of the classification of DM, namely Type 1, Type 2, gestational DM and malnutrition-related DM (Amod *et al*., 2012:8-9; Magotlane *et al.*, 2013:837; Hinkle & Cheever, 2014:1411-1420; Smeltzer *et al*., 2008:1377-1380).

Table 2.1: *Classification of DM linked with cause of disease*

Classification of DM	Description of Cause
Type 1	The cause of type 1 DM is a lack of sufficient insulin secretion by the pancreas (Amod *et al*., 2012:8-9; Magotlane *et al*., 2013:837)
Type 2	Type 2 diabetes is associated with insulin secretion being normal, but the insulin-sensitive tissue such as the liver, adipose tissue, and skeletal muscles are unable to respond normally to insulin-stimulated glucose uptake (Amod *et al*., 2012:8-9; Magotlane *et al*., 2013:837)
Gestational DM	DM occurring in pregnancy due to glucose intolerance (Amod *et al*., 2012:8-9; Magotlane *et al.,* 2013:837-838)
Malnutrition-related DM	DM with the onset in individuals between ages 10-40 in underdeveloped countries. The role of malnutrition in this type of diabetes is not known (Magotlane *et al.,* 2013:837-838).

In this research study, the researcher will concentrate on patients living with Type 2 DM. This type of diabetes mellitus is more common in older and obese people, although it can also be found in young people (Magotlane *et al*., 2013:840). In order to understand diabetes, it is necessary to have an overview of the pathophysiology of the disease.

2.3.2 Pathophysiology of diabetes mellitus

Diabetes Mellitus is a chronic disorder, which is characterised by elevated blood glucose a condition known as hyperglycaemia (Amod *et al*., 2012:8; Magotlane *et al*., 2013:837; National Department of Health, 2014:9; Hinkle & Cheever, 2014:1417). Due to this abnormal condition, the physiological functioning of the body is affected.

Diabetes Mellitus is associated with the body's inability to maintain a glucose level ranging between 4-7 mmol/ℓ (South Africa Department of Health, 2014:17). The inability of the body to maintain the glucose level is caused by the inability of glucose in the blood to be absorbed into the cells, causing the glucose to be excreted into the urine (Amod *et al*., 2012:9; Hinkle & Cheever, 2014:1419; International Diabetes Federation, 2013:23; Magotlane *et al*., 2013:838-839; Smeltzer *et al*., 2008:1381-1382).

Glucose is stored in the form of glycogen in the liver. Insulin also controls the release of glucose by the liver and enables the storage of dietary fats in adipose tissue. Insulin increases the movement of amino acids and controls insulin release (Amod *et al*., 2012:9; Hinkle & Cheever, 2014:1419; International Diabetes Federation, 2013:23; Magotlane *et al.,* 2013:838; Smeltzer *et al*., 2008:1381-1382). When a patient fasts, the beta cells situated in the islets of Langerhans in the pancreas secrete insulin. The blood-glucose level decreases and the alpha cells secrete glycagen, which stimulates the liver to secrete glucose (Amod *et al*., 2012:9; Hinkle & Cheever, 2014:1419; International Diabetes Federation, 2013: 23; Magotlane *et al.*, 2013:838-839; Smeltzer *et al.,* 2008:1381-1382). In order to understand diabetes, it is necessary to provide an overview of how the diagnosis of DM is confirmed.

2.3.3 Diagnosis of diabetes mellitus

According to the National Guidelines, namely the Management of type 2 diabetes in adults at primary-care level, patients who present with signs suggestive of DM should be tested by means of biochemical tests to confirm the diagnosis of DM. A fasting plasma-glucose test can be done. The fasting glucose test is an accurate test in confirming DM. A result of more than 4-7 mmol/ℓ in non-diabetic individuals can confirm a diagnosis of DM (South Africa Department of Health, 2014:10). In diagnosed DM patients a blood glucose of more than 11,1 mmol/ℓ and a two-hour plasma glucose of more than 11,1 mmol/ℓ during oral glucose tolerance test can confirm a diagnosis of hyperglycaemia (Amod *et al.,* 2012:7). A urine test should be done to determine whether ketones, glucose and blood are present, as it will further assist in confirming the diagnosis of DM (Magotlane *et al*., 2013:839-843). In order to understand diabetes, it is necessary to provide an overview of the signs and symptoms associated with DM.

2.3.4 Signs and symptoms of diabetes mellitus

Patients presenting with T2DM are often asymptomatic (Li *et al.,* 2013:189). The common signs and symptoms for T2DM include polydipsia, polyphagia and polyuria. Other symptoms include listlessness, fatigue, irritability and recurring infections (Amod *et al.,* 2012:22; International Diabetes Federation, 2013:22; Magotlane *et al*.,

2013:839-843; Smeltzer *et al*., 2008:1382; Sudore *et al*., 2012:1674). In order to understand diabetes, it is necessary to have an overview of the complications of DM.

2.3.5 Complications of diabetes mellitus

Due to patients being asymptomatic, complications often arise before the patient is diagnosed. It is estimated that 20% of patients diagnosed with T2DM are only diagnosed when they present with complications (Amod *et al*., 2012:S4). The following common complications, namely hypoglycaemia, hyperglycaemia, retinopathy, renal failure, cardiovascular conditions, and foot and leg problems will be discussed (Hinkle & Cheever, 2014:1448-1455; International Diabetes Federation, 2013:24-26; National Department of Health, 2014:25-44).

2.3.5.1 Hypoglycaemia – short-term complication

The cause of hypoglycaemia with a patient diagnosed with DM can result from the administration of oral hypoglycaemic agents or insulin, no food intake or decreased food intake, excessive exercise, the administration of large amounts of insulin, or excessive ingestion of alcohol (South Africa National Department of Health, 2014:25).

Signs and symptoms of hypoglycaemia include change of behaviour, confusion, seizures, hunger, sweating, palpitations, tremors and a tingling sensation (South Africa National Department of Health, 2014:25).

The treatment of hypoglycaemia is dependent upon the signs and symptoms the patient presents with. In the treatment of mild hypoglycaemia (when the blood glucose is less than 4 mmol/ℓ), the factors causing the hypoglycaemic state should be ascertained. Irrespective of the cause, patients need to be informed how to manage hypoglycaemia. It can be treated by immediately ingesting 2-4 teaspoons of sugar in a little water. The patient can then eat a carbohydrate to assist in normalising the blood glucose (Amod *et al*., 2012:41; Casey, 2011:19; South Africa National Department of Health, 2014:26).

If a patient's condition does not improve, he should be taken to hospital immediately. If mild hypoglycaemia is not treated, it can result in severe hypoglycaemia.

In the case of severe hypoglycaemia (when the patient presents with a blood glucose of below 4,mmol/ℓ), the patient will not be able to treat himself but will need the assistance of another person. The patient will not be able to ingest sugar water. An intravenous line should be established. An intravenous infusion can be commenced immediately by the professional nurse with 50 ml of 50% dextrose solution intravenously (Magotlane *et al*., 2013:839-843).

The patient's blood glucose and clinical signs and symptoms should be assessed after 5-10 minutes. If the blood glucose remains below 4 mmol/ℓ, a second intravenous infusion of 50 ml of 50% dextrose solution can be administered. After the blood glucose has been raised, 5% dextrose solution in 1 000 ml of water should be continued intravenously over six hours and then over twelve hours. This treatment is provided in order to prevent the blood glucose from dropping again (Amod *et al*., 2012:41; South Africa National Department of Health, 2014:26). If hypoglycaemia is not treated, it can result in damage to the brain resulting into death. A discussion of hyperglycaemia will follow.

2.3.5.2 Hyperglycaemia – short-term complication

Causes of hyperglycaemia of patients with DM, according to Hinkle & Cheever (2014:1443), are infection, discontinuation of insulin, incorrect administration of insulin, diarrhoea and vomiting or abuse of alcohol, drugs and excessive intake of food or drinks.

According to Hinkle & Cheever (2014:1443), the patient with hyperglycaemia presents with the following signs and symptoms, namely polyuria, dehydration, acidosis, nausea and vomiting, loss of appetite, with ketones present in the urine, hypertension, listlessness and a low serum bicarbonate (South Africa National Department of Health, 2014:29).

The treatment for hyperglycaemia is to rehydrate the patient urgently with 0,9% sodium chloride administered intravenously, ensuring 1,5 ℓ administered in the first hour and 1 ℓ over the next two hours. Administer 10 IU (units) of short-acting insulin intramuscularly. The patient should be referred urgently to hospital in order to prevent any further complications (South Africa National Department of Health, 2013-2014:71). If hyperglycaemia is not treated, it can lead to a coma.

2.3.5.3 Diabetic retinopathy – long-term complication

Diabetic retinopathy is a condition that is caused by continuous, uncontrolled hyperglycaemia causing a number of biochemical changes to the basement membrane of the eye, thickening it many times more than the normal thickness (Casey, 2011:16; Hinkle & Cheever, 2014:1449; Smeltzer *et al*., 2008:1422). It is one of the first five main causes of visual impairment in diabetic patients in the world (WHO, 2010:1).

The signs and symptoms for diabetic retinopathy are asymptomatic, resulting in visual impairment and blindness (Casey, 2011:20).

The treatment of diabetic retinopathy includes the prevention of raised blood glucose in the management of the condition. The HCW should educate patients to maintain blood-glucose levels that are close to the normal blood-glucose level by taking their medication regularly, eating a healthy diet, exercising regularly and stop smoking. In advanced cases argon laser photocoagulation is done (Hinkle & Cheever, 2014:1448-1449). If the condition is not diagnosed and treated early, it can lead to total loss of eyesight. A discussion of renal failure follows.

2.3.5.4 Renal failure – long-term complication

The cause of renal failure refers to the process where the microvascular system of the kidney is affected. Renal failure is responsible for significant morbidity and mortality. Approximately 40% of patients with DM develop chronic renal failure (South Africa National Department of Health, 2014:36).

The signs and symptoms include the continuous presence of protein in the urine, oedema and the inability to pass urine. Diabetes mellitus and hypertension are the main causes of chronic kidney disease (Amod *et al.,* 2012:63).

The treatment for renal failure includes screening of patients by the HCWs every six months in order to determine the progress of the condition. A urine sample and blood are drawn for serum creatinine concentration in order to determine the level of renal function (Amod *et al*., 2012:64).

Aggressive control of elevated blood glucose is important in the management of the condition. The treatment entails educating patients to maintain a blood glucose that is near to the normal blood glucose level by taking their medication regularly, eating a healthy diet, exercising regularly and stop smoking. Blood pressure and cardiovascular conditions should also be controlled aggressively. The patient should ingest a low salt diet in order to prevent the accumulation of fluid in the body and a low-protein diet (Hinkle & Cheever, 2014:1452). In advanced cases of renal failure, peritoneal dialysis or haemodialysis is the method of treatment (Magotlane *et al.,* 2013:839-843).

If renal failure is not treated, it could lead to the death of the patient. A description of cardiovascular conditions will follow.

2.3.5.6 Cardiovascular conditions – long-term complication

Contributing factors to this condition are smoking, hyperglycaemia, unhealthy eating habits, obesity, raised basal metabolic index and hypertension (Amod *et al*., 2012:57).

The signs and symptoms that are common in cardiovascular conditions associated with DM are angina pectoris, myocardial infarction, cerebral-vascular accident, peripheral artery disease and heart failure (Casey, 2011:19; International Diabetes Federation, 2013:24).

Treatment of lipid abnormalities in every DM patient is imperative by adhering to recommended LDL cholesterol levels. Statins are the first-line agents for lowering LDL cholesterol in DM patients. Statin therapy should be added to lifestyle therapy, regardless of lipid level (South Africa National Department of Health, 2014:33). Next, foot and leg problems will be discussed.

2.3.5.7 Vascular complications – long-term complication

The cause for foot and leg problems is due to damage to the nerves and blood vessels supplying the feet and legs. Foot problems are a major cause of morbidity and mortality in DM patients (International Diabetes Federation, 2013: 26).

The signs and symptoms include claudication, rest pain, ulceration and gangrene (South Africa National Department of Health, 2014:40).

The treatment for complications of the blood vessels and nerves supplying feet and legs include patients being taught the importance of managing blood glucose to near 4-7 mmol/ℓ, how to inspect their feet daily, looking for discolouration of the feet, blisters, temperature change and changes to the shape of the feet. Care should also be taken that feet are dried properly. No lotion should be allowed to keep feet moist, shoes should be closed and well fitting, and not have rough surfaces that will cause ulcers on the feet. Toenails should be cut straight. Patients should be encouraged to seek medical assistance if they observe abnormalities and they should refrain from using home remedies (Hinkle & Cheever, 2014:1454). If the condition is not diagnosed and treated early, it could lead to the limb developing gangrene and being amputated. The management of DM, which forms an integral part in the prevention of complications, will be discussed.

2.3.6 Management of diabetes mellitus

The main aim of the management of DM is to control the insulin and glucose levels in the body and maintain a near normal glucose level of between 4-7 mmol/ℓ. If the blood glucose level is maintained, the vascular and neurological complications will be reduced (Hinkle & Cheever, 2014:1420-1424). According to Hinkle & Cheever, (2014:1420-1428), the following aspects are important in the management of DM, namely diet, exercise, glucose monitoring, education and pharmacologic therapy.

2.3.6.1 Diet

The management strategy provided for maintaining a healthy diet is health education. Patient education forms the basis of dealing with persons living with DM as knowledgeable patients have the potential to reduce the risk of complications significantly. Type 2 diabetes mellitus is a chronic condition that requires the patients to be well educated regarding the management of the condition. The patient has to manage his blood glucose daily and take the necessary precautions to prevent long-term complications (Hinkle & Cheever, 2014:1420-1424). The patient should receive health education on what a healthy diet entails, as weight control forms an integral part of glucose control in the diabetic patient. If the patient controls his calorie intake,

body weight and blood pressure may be controlled and heart disease may be prevented (Hinkle & Cheever, 2014:1420-1424).

The reason why the patient should be educated regarding the diet is that DM is a life-threatening disease. According to the World Health Organisation (WHO), obesity is one of the major challenges of the 21st century. South Africans are amongst the fattest people in Africa. South Africa is the only country in Southern Africa where the average BMI is higher than 24,9 (International Diabetes Federation, 2013:32). Health education is of the utmost importance, as the following process is followed before treatment is prescribed for a patient diagnosed with DM. Firstly, the patient is encouraged to lose weight, which includes exercise. Secondly, if the diet and exercise are not adequate to lower blood glucose levels, then oral hypoglycaemic agents are prescribed (International Diabetes Federation, 2013:32).

Patients should be encouraged to eat at least five different fruits and vegetables daily. For example, the vegetables can be added to meals and fruit can be eaten in between as snacks. Fish should be eaten at least twice a week. Dairy products with a low fat content, namely yogurt, milk and cheese should be ingested. The patient should drink at least eight glasses of water a day and limit fruit juices, as fruit juices are high in glucose, increasing the blood glucose of the patient. It is therefore advisable that patients should rather ingest a fruit, which has high fibre content, rather than drinking fruit juice or fizzy drinks. Carbohydrates should make up the bulk of the diet. The intake of salt should be limited as it retains water in the body and elevates blood pressure (Amod *et al*., 2012:18; Brown & Heeley-Creed, 2013:80-82; Hinkle & Cheever, 2014:1420-1421; Magotlane *et al*., 2013:842; Smeltzer *et al*., 2008:1384). All health education provided is planned in line with the guidelines provided by the National Department of Health (South African food – based dietary guidelines, 2013:4).

The responsibility of providing health education rests with all HCWs providing care to diabetic patients at the PHCs and CHCs. HCWs should be knowledgeable about the nutritional needs of patients diagnosed with diabetes, so that patients can be educated at all times (Amod *et al*., 2012:18; Brown & Heeley-Creed, 2013:80-82; Hinkle & Cheever, 2014:1420-1421; Magotlane, *et al*., 2013:842; Smeltzer, *et al.,* 2008:1384). The HCWs should also understand the culture of the patient in order to

educate patients accordingly to manage DM effectively (Li *et al.,* 2013:194). It is necessary to utilise an effective strategy when conveying health education.

Mass-media campaigns are conducted to influence community norms regarding health behaviours. Campaigns can reach large populations at relatively low cost to influence awareness, knowledge and beliefs through to intention and changes in behaviour (Cavill & Bauman, 2007:771-790). The study regarding capitalising on social media to enhance diabetes has evidenced that patients find it more convenient to obtain information regarding management of their diabetes via social media, even when they are outside the clinical setting. Patients refer to it as a mechanism of empowerment (Girgis, 2014:1). A similar study on the perceptions of patients regarding diabetes-related health communication strategies in the Free State, has found that patients attending PHCs and CHCs indicated that they found it easier to obtain their health education from social media (Nyoni, 2016:4).

Education should be done when the patient is diagnosed with DM in the CHC or PHC. Health education should also be done on every visit to the PHC and CHC. Patients should be provided with information if they request or have any concerns (International Diabetes Federation, 2013:32). Exercise forming an important component of weight loss will now be discussed.

2.3.6.2 Exercise

The management strategy for exercise is health education, which highlights the benefits of exercise, including decreasing blood glucose and reducing cardiac complications (Amod *et al.,* 2012:S13).

The reason why exercise is encouraged is that the blood glucose is lowered as the glucose is absorbed by the muscles. Exercise increases blood circulation in the body, decreases stress, assists with weight loss and promotes a feeling of wellbeing (Magotlane *et al*., 2013:842).

Patients suffering from DM are educated to exercise at least 150 minutes per week, doing moderate activity. Recommended exercises include using stairs instead of taking a lift, cycling, brisk walking and swimming. Patients should also be encouraged to do resistance training at least three times a week (Magotlane *et al*.,

2013:842; Amod *et al*., 2012:22). A patient should not exercise if his blood glucose is uncontrolled, as it causes stress to the body. Exercise should preferably be done at the same time daily, after a meal, when the blood glucose is high. It is advisable that individualised exercise programmes should be developed, as the patient's age, health status, ability to perform exercises consistently and the patient's ability to control his blood glucose should be considered (Hinkle & Cheever, 2014:1421-1423; Magotlane *et al*., 2013:842). Health education should be provided by the HCWs, providing follow-up care at the PHC and CHC. Although exercise is important, the patient should be able to monitor his blood glucose level.

2.3.6.3 Glucose monitoring

The management strategy used in glucose monitoring is again health education and the practical demonstration of the finger prick by the HCW to the patient when testing blood glucose. Blood glucose testing assists the patient in being aware of blood glucose levels in order to become aware of the normal and abnormal limits of his or blood glucose (Tomlin & Asimakopoulou, 2014:22-27).

The reason why the patient should be able to monitor his blood glucose is that it improves the quality of life, as blood levels are controlled, hyperglycaemia and hypoglycaemia will be detected and long-term complications will be reduced (Tomlin & Asimakopoulou, 2014:22-27). It is of the utmost importance that the patient is able to interpret a blood glucose reading (Brown & Heeley-Creed, 2013:80; Hinkle & Cheever, 2014:1426-1428; Magotlane *et al*., 2013:842; Smeltzer *et al*., 2008:1389). Blood glucose levels are also linked to the presence of glucose and ketones in urine. The absence of glucose in urine may indicate well-controlled blood glucose (Hinkle & Cheever, 2014:1426-1428). A description of the National Department of Health guidelines regarding when the blood glucose should be tested will follow (South Africa National Department of Health, 2014:33).

A patient should also monitor the blood glucose if there is a sudden change in signs and symptoms (Magotlane *et al.,* 2013:843).

The health education regarding glucose monitoring and the demonstration of the finger prick when testing the blood glucose will be provided by the HCWs working with T2DM patients.

Health education regarding monitoring of blood glucose should be provided when a patient is diagnosed and it should be reinforced with every follow-up. Aspects regarding pharmacological therapy follow next.

2.3.6.4 Pharmacological therapy

The management strategy used for pharmacological therapy is likewise health education and the practical demonstration of medication prescribed. During health education regarding pharmacological therapy, the patient is educated regarding the aim of using pharmacological therapy, namely to normalise the glucose levels (South Africa National Department of Health, 2012:86). The reason why pharmacological therapy is administered to Type 2 non-insulin DM patients is to regulate blood glucose levels. The patients produce insulin, but it is not adequate to decrease their blood glucose levels (Hinkle & Cheever, 2014:1427-1434). According to the Standard Treatment Guidelines and Essential Medicines list (2012:86) oral hypoglycaemic agents that should be prescribed within the South African public health system are sulphonylureas and biguandes. Prescribing these drugs is common practice, even outside the South African health system (Amod *et al*., 2012:S23-S40; Hinkle & Cheever, 2014:1427-1434; Magotlane, *et al.*, 2013:842-846; Smeltzer *et al*., 2008:1398).

Although insulin is not normally part of the regime of patients, it is more and more popular in T2DM now (Magotlane *et al*., 2013:842-846), patients who do receive insulin need to be educated regarding the use of insulin. It is important that patients should be educated to eat food before taking insulin, to prevent the insulin from lowering the blood glucose to very low levels, which will cause the patient to go into a hypoglycaemic coma (Hinkle & Cheever, 2014:1427-1434). Patients should be educated to continue taking their medication if they are not feeling well, or when they are stressed (Amod *et al*., 2012:S35; Magotlane *et al.,* 2013:842-846; National Department of Health, 2014:23). Patients tend to think that when they do not eat, they do not need insulin, whereas a basal bolus of insulin is normally needed during these sick episodes. If the patient vomits, or becomes dehydrated, a drug such as Metformin should not be discontinued and the patient should visit the clinic urgently for medical advice. If the blood glucose continuously remains out of control, more

frequent monitoring of the blood glucose should be done (Amod *et al.*, 2012:S35; South Africa National Department of Health, 2014:23).

The health education regarding pharmacological therapy and the demonstration of the medication prescribed will, as with other management strategies, be provided by the HCWs who work with T2DM patients and the pharmacist.

Health education regarding pharmacological therapy should be provided when a patient is diagnosed, and reinforced with every follow-up visit. HCWs should consult with patients suffering from DM regarding the regimen to be used. Various factors are considered regarding the regimen used namely, the intellectual ability, knowledge regarding DM, willingness and health of the patient (Hinkle & Cheever, 2014:1427-1434). Next, a discussion of the Theory of Planned Behaviour follows.

2.4 THEORY OF PLANNED BEHAVIOUR (TPB)

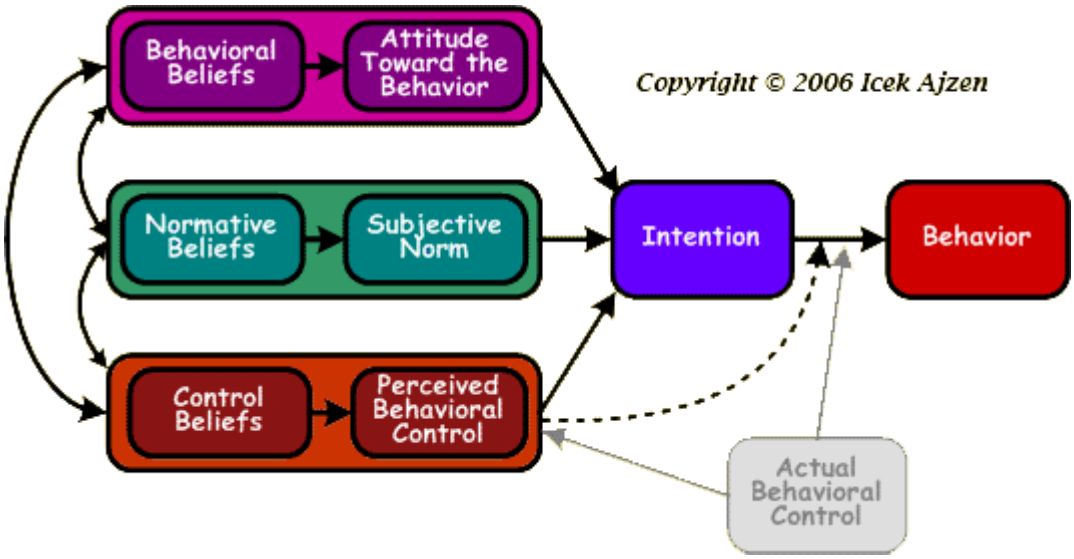

Figure 2.4: *Ajzen's Theory of Planned Behaviour (Ajzen, 1991:179)*

The Theory of Planned Behaviour is an amended version of the Theory of Reasoned Action that was developed by Icek Ajzen in 1988 (Kagee & Van Der Merwe, 2006:700). The theory (see Figure 2.3) explains that there are specific determinants that motivate an individual to perform specific behaviours. The determinants are attitude, subjective norm and perceived behavioural control. A description of how the

determinants influence one another, according to the theory of planned behaviour, will be described.

In Figure 2.4, it can be seen that behavioural beliefs influence attitude and that normative beliefs influence subjective norms. The variables that predict behavioural intentions are the attitude towards the behaviour. Behavioural beliefs refer to the individual's belief about the outcome of the behaviour. The readiness to perform the behaviour, or as Ajzen refers to, the "intention", is influenced by the normative beliefs and subjective norms of the individual. Normative beliefs refer to what others think of the behaviour in question, whereas subjective norms refer to how the individual perceives the behaviour in question. The difference between behavioural beliefs and normative beliefs is the consequences of behaviour versus the expectations of others (Ajzen, 1991:102-103). Individuals tend to practise behaviours that they believe will be achievable and acceptable by others (Armitage & Conner, 2001:472).

Control beliefs influence perceived behavioural control, which refers to a person's assessment of his or her ability to perform the behaviour (Bilic, 2005:245). Control beliefs refer to beliefs about potential facilitating or inhibiting factors and perceived behavioural control refers to an individual's belief that he or she can perform certain types of behaviour by considering internal and external control factors. Internal factors refer to the individuals' abilities and skills, whereas external factors refer to opportunities or challenges that the individual experiences (Kagee & Van Der Merwe, 2006:701). Internal and external control factors are linked to experiences and achievements (Kagee & Van der Merwe, 2006:701). Perceived behavioural control is similar to self-efficacy. Self-efficacy beliefs determine how people feel, think, motivate themselves and behave. Attitudes, subjective norms and perceptions of control combine to produce intentions, which in turn, together with actual control, determine performance of behaviour (Ajzen, 1991:102-103). Intention and actual behaviour control therefore influences behaviour. It is thus clear that the more the individual feels in control, the more likely he or she would be motivated to perform the behaviour. The application of Theory of Planned Behaviour to adult patients with T2DM will be described below.

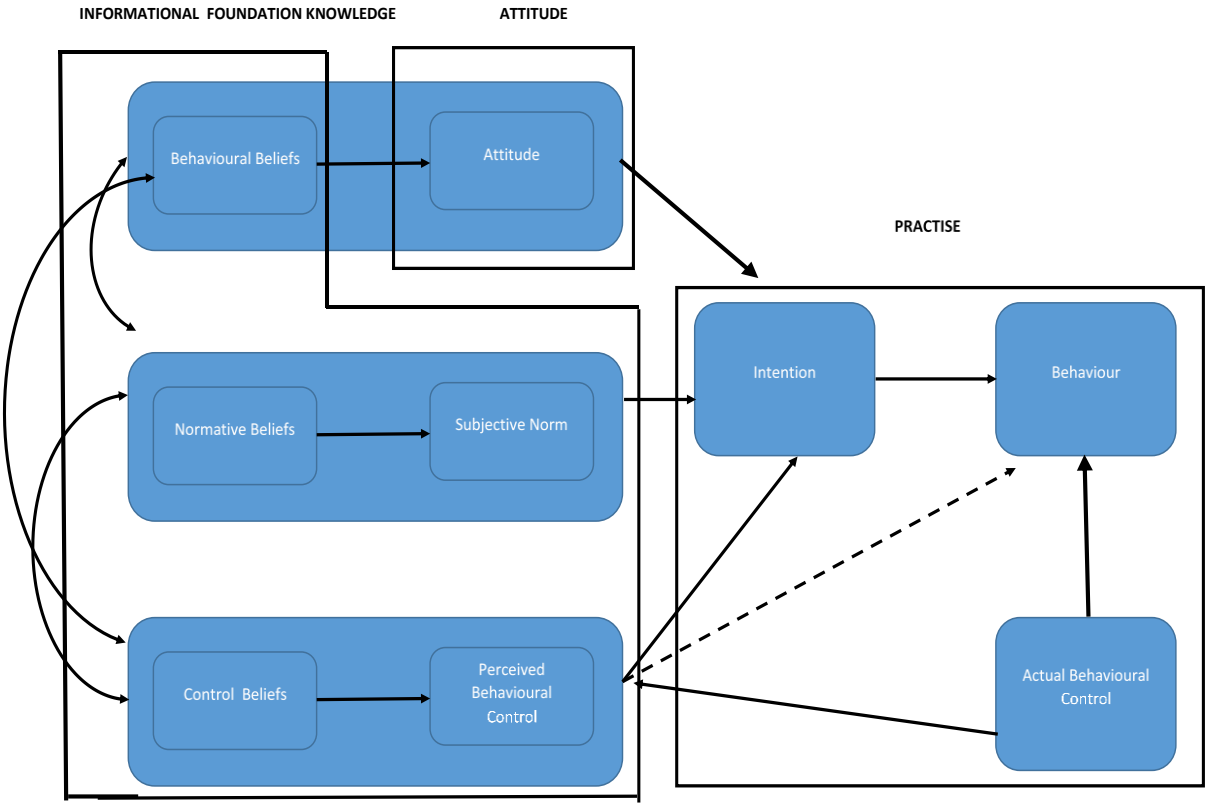

Figure 2.5: *Ajzen's Theory of Planned Behaviour as applied within this KAP study*

2.5 APPLICATION OF THE THEORY OF PLANNED BEHAVIOUR TO ADULT PATIENTS WITH T2DM

The researcher will now apply the Theory of Planned Behaviour to the knowledge, attitude and practices of the HCWs working with T2DM patients. Figure 2.4 shows the knowledge, attitude and practice as depicted by the Theory of Planned Behaviour. The same manner in which behavioural beliefs influence attitude, normative beliefs influence subjective norms and control beliefs influence the perceived behavioural control, as shown in Figure 2.5. A discussion of knowledge, attitude and practices will follow based on the aforementioned.

2.5.1 Knowledge

The determinants forming part of knowledge are behavioural beliefs, normative beliefs, subjective norms, control beliefs and perceived behavioural control (see Figure 2.4). It is important to note that Ajzen does not refer to knowledge in this theory but rather to the informational foundation (see Figure 2.4), which the

researcher applied to the knowledge section in this study. The first determinant within the knowledge component is *behavioural beliefs*.

Behavioural beliefs refer to an indication of the individual's readiness to perform a behaviour, which is based on the attitude toward the behaviour, subjective norm and perceived behavioural control. Each determinant involved is weighted for its importance in relation to the behaviour and population of interest. Behavioural beliefs refer to an individual's belief about consequences of a particular behaviour (Ajzen, 1991:102-103). A study conducted by Chin-Joe *et al.* (2001:268-274) indicates a need to enhance behavioural change in diabetic patients. The results highlighted the difference between what the HCWs considered as important to the care of T2DM patients in relation to what the patients valued as important to their own care. In addition to this, HCWs perceived that the patients did not value them as highly as they would have expected.

The second determinant within the knowledge component is *normative beliefs*. Normative beliefs refer to the beliefs of others, which influence the subjective norms. It further refers to how others view this behaviour, as the viewpoints of others are important. A study conducted by Bonds *et al.* (2004:6) has found that an understanding relationship between the HCWs and the patient could encourage optimal adherence to self-management activities. The researcher has highlighted in this study that family, friends and HCWs influence the patient's normative beliefs and, subsequently, his or her behaviour as well.

The third determinant within the knowledge component is *control beliefs*. Control beliefs influences perceived behavioural control referring to the person's ability to perform the behaviour or not (Ajzen *et al*., 2011:103). Sax *et al*. (2007:1267-1274) evidence that adherence is driven by peer pressure and the perception of high self-efficacy. This study explains that perceived behavioural control is similar to self-efficacy, which refers to how people feel, think, motivate themselves and behave, as well as the ability of the individual to be proactive in health care. It is thus clear that the more the individual feels in control, the more likely he or she would be encouraged to perform the behaviour.

2.5.2 Attitude towards the behaviour

According to the Theory of Planned Behaviour, a person's intention is influenced by the strength of his attitude towards that behaviour. The stronger one's attitude towards something is, the stronger it will influence the person's intention to perform the specific behaviour in the end (Ajzen, 1991:102-103). This was confirmed by Delamater (2006:75). It was found that HCWs should not force patients to comply, but rather emphasise an attitude shift, which will lead to assist patients to manage their DM better.

It was evidenced by Sibiya and Gwele (2013:393) that, although HCWs working in overcrowded and understaffed PHCs and CHCs in KwaZulu-Natal, the strength of their attitude influenced their intention and behaviour, namely caring for T2DM patients. This strong attitude of HCWs determined a favourable climate conducive to performance and productivity, irrespective of the conditions that prevailed. The attitude of the HCW had a positive influence on the outcome of the treatment regime for T2DM patients at the PHC and CHCs, with the result that the care of the patients is not compromised. A description of practice will follow.

2.5.3 Practice

Practice is closely linked with control beliefs and perceived control beliefs. The higher the level of internal factors the more efficient care will be provided by the HCWs (Kagee & Van Der Merwe, 2006:701). In the study, the researcher grouped the following determinants to represent practice within the KAP survey, namely intention, actual behaviour control and behaviour (see Figure 2.4). A study conducted at the University of East Anglia in the UK (Hargreaves, 2011:79-99) has found that practice is equal to behaviour. Practice refers to the delivery of interventions guided by the principles of behaviourism. Professional practice seeks to deliver care with the aim to change behaviour most effectively in specific instances. Intention, which is linked to the importance of the HCWs' position in health behaviours will follow.

2.5.3.1 Intention

The intention to perform a particular behaviour varies according to behaviours and situations based on the importance of control, subjective norm and perceived behavioural control (Armitage & Conner, 2001:472). A study conducted by Delamater (2006:76) has found that it is important for HCWs to ascertain what patients place as important, and the confidence they feel with respect to certain health behaviours in order to perform certain behaviours. This study highlight the fact that HCWs should be aware of what patients view as important, because it will determine what the intention of the patient is as well as their readiness to perform a particular behaviour.

2.5.3.2 Actual behavioural control

Actual behavioural control refers to the degree to which a person has the skills and resources needed to perform a particular behaviour (Ajzen, 1991:102-103). A study conducted by Arent (2002:218) states that HCWs should assess DM patients individually and treatment should be planned accordingly. The importance of individually planned care needs to take a more prominent place, since aspects such as actual behavioural control would influence the outcome of behaviour.

2.5.3.3 Behaviour

According to the Theory of Planned Behaviour, intention influences actual behavioural control, which in turn influences behaviour (Ajzen, 1991:102-103). Control beliefs influence perceived behavioural control, which refers to the individual's assessment of his or her ability to perform the particular behaviour. A study conducted by Boudreau and Godin (2014:918) has found, in terms of the prediction of behaviour, that moral norm did not directly influence behaviour, but indirectly through behavioural intention. The study highlights that the strength of the intention influenced by the actual behavioural control leads to the actual performance of the behaviour. A similar study by Gherman *et al.* (2011:406) evidences that the aim of HCWs should be to strengthen patients' behavioural, normative and control beliefs because patients who believe they are able to manage their DM, will most likely adhere to treatment guidelines.

2.6 CONCLUSION

This chapter provided the reader with a literature review of Diabetes Mellitus (see Figure 2.1). The healthcare system in South Africa, which includes the legal structures and the levels of health care, was described. A description of prominent HCWs at the PHC and CHC, comprising the nurse manager, professional nurse and the community healthcare worker was highlighted. Problems in the healthcare system were discussed. A detailed description of the signs and symptoms, complications and management of DM was provided. The Theory of Planned Behaviour was discussed. The next chapter will provide the reader with the research methodology used in the study.

CHAPTER 3
METHODOLOGY

3.1 INTRODUCTION

The previous chapter provided a literature overview of aspects relevant to the study, while this chapter will provide the reader with a description of the research design and the method of study (see Figure 3.1). Attention will be given to the descriptive, cross-sectional and quantitative research design used. The strengths and limitations of quantitative research design are described. The research technique, namely a structured questionnaire, will be explained. The strengths and limitations of the structured questionnaire are discussed. The various processes followed in order to develop the questionnaire were highlighted as well as the population, sampling and pilot study, which is done before the data collection commences, are explained. A flow chart describing the various steps followed and CHC and PHCs visited during the data-collection process is depicted. Validity, reliability and maintaining ethical issues for the participants in the study will also be highlighted. The chapter will conclude by describing the manner of data analysis followed.

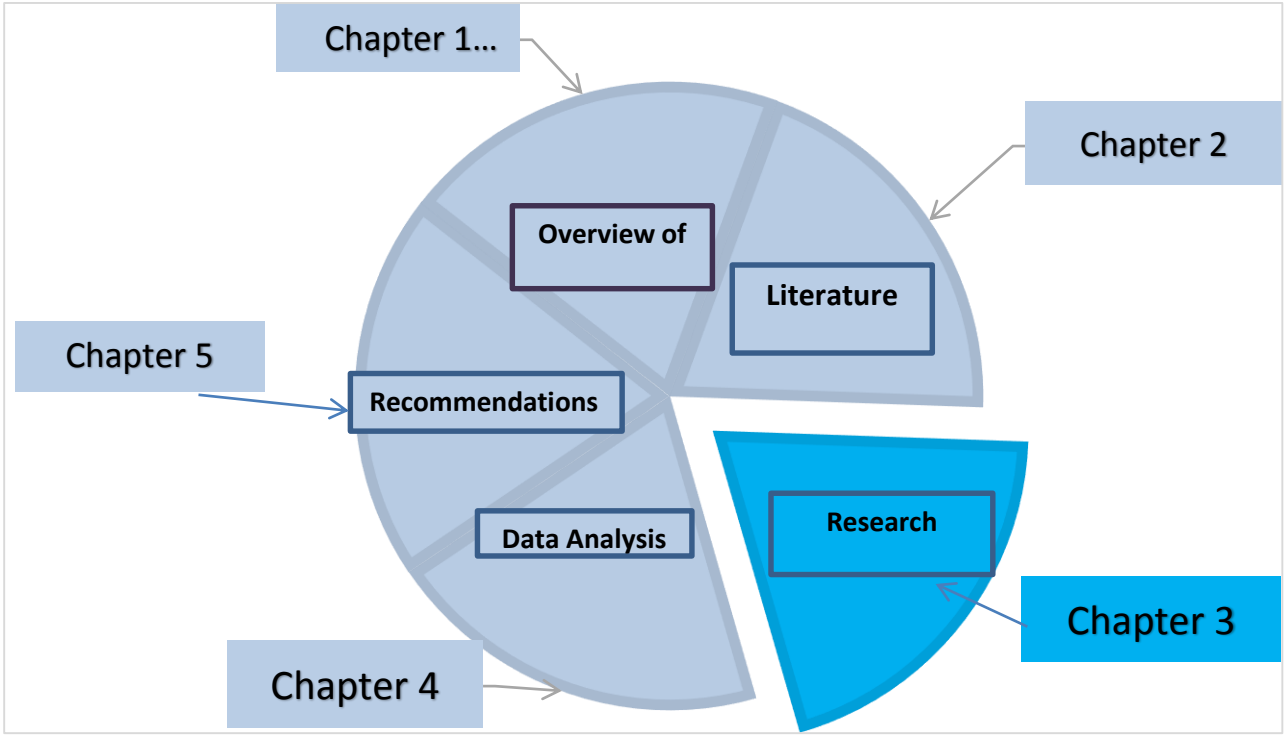

Figure 3.1: *Research methodology as adapted from De Vos et al. (2012:70)*

3.2 RESEARCH DESIGN

A research design refers to the framework or plan that the researcher uses to investigate the aims and objectives of the study (Botma *et al.,* 2010:39*;* Polit & Beck, 2012:58*).* A research design entails all the decisions the researcher makes in planning the study (De Vos *et al.,* 2012:171; Polit & Beck, 2012:58*).* It guides the researcher regarding the planning and the implementation of the study (Botma *et al*., 2010:39). The research design determines which research technique will be utilised, the population and sample that will be chosen, and the method the researcher will use to collect data.

A structure is provided according to which data is collected in order to measure the variables identified in the most inexpensive manner (De Vos *et al.,* 2012:171*;* Moule & Goodman, 2009:169; Polit & Beck, 2012:58). The variables referred to are the knowledge, attitude and practices (KAP) of healthcare workers working with adult T2DM patients in the Free State.

The researcher makes use of a descriptive, cross-sectional, quantitative design (Bryman, 2012:58). A discussion explaining this specific design follows.

3.2.1 Descriptive research

A descriptive design is a non-experimental design (Botma *et al.,* 2010:110; Polit & Beck, 2012:226). The researcher normally uses this design to describe the variables identified as they occur naturally. The main aim of a descriptive design is to observe, count and classify phenomena. This study is a descriptive design, as very little is known regarding the knowledge, attitude and practice of healthcare workers working with T2DM patients in the Free State, South Africa. This study manipulated no variables. It can also prove no causal relationship between the variables. A description of a cross-sectional design will follow.

3.2.2 Cross-sectional design

Cross-sectional design refers to the process of collection of data that took place only at one point in time during the research process (Botma *et al.*, 2010:113; Brink *et al.,* 2009:102; Bryman, 2012:62; Polit & Beck, 2012:184-186). The cross-sectional

design is used to answer the questions of the study. Data were collected by the researcher from a representative sample at the PHCs and CHCs on a specified day as outlined in the data collection plan. The same questionnaire was presented to each selected participant on the days planned at the CHC and PHC. Apart from cross-sectional studies collecting data at a specific point in time, it also focuses on various groups simultaneously (Brink, Van der Walt & Van Rensburg, 2009:105). During the data collection, information was obtained from the nurse managers responsible for non-communicable diseases, professional nurses and the community healthcare workers simultaneously. As a quantitative research approach was used, a brief description will be provided.

3.2.3 Quantitative research

Quantitative research is an approach that concentrates on human behaviour that can be measured (Brink *et al*, 2009:10; Bryman, 2012:159). The approach followed is systematic, objective and formal (Moule & Goodman, 2009:177). The researcher could follow an objective, systematic and formal approach, since a structured questionnaire enables the researcher to investigate the level of knowledge, attitude and practice of the healthcare workers identified. From these characteristics of quantitative research, the researcher tried to capitalise on specific strengths embedded in quantitative research. A discussion of strengths within quantitative research follows.

3.2.3.1 Strengths of quantitative research

- This approach aids the *measurement and quantification of data* (Botma *et al.,* 2010:109-113; Bryman, 2012:159). In this study, 106 HCWs were interviewed. The knowledge, attitude and practice of healthcare workers employed in the PHC and CHCs in the Free State Province of South Africa were assessed regarding T2DM. The measurement and quantification of data will be presented with the assistance of a biostatistician.

- The study enhanced the fact that *many HCWs could be interviewed in a short period of time* (Botma *et al.*, 2010:109-113; Bryman, 2012:175). 106 participants could be interviewed within 12 days;

- There was *no misinterpretation of questions asked* (Botma *et al.,* 2010:82-83). The researcher was closely involved with the study as no field workers were used and all questionnaires were completed by the *researcher.* A guideline was used in order to ensure interpretation is always correct (see Addendum C1-C3);

- *Data collection was done by the researcher, which ensured that objectivity was maintained at all times* (Bryman, 2012:408). The researcher was the only field worker involved in data collection. The guidelines in Addendum C1-C3 were used in order to ensure that interpretations of questions were the same; and

- *Information obtained can be generalised* (Botma *et al*., 2010:82-83). The knowledge accumulated of T2DM patients at CHC and PHCs can be generalised to CHCs and PHCs in the Free State.

Although there are strengths of quantitative research, there are also limitations.

3.2.3.2 Limitations of quantitative research

The aim of this section is to identify what the limitations of quantitative research are in this research study and to explain what the researcher did to limit the impact of these limitations on the study. A discussion of the limitations of quantitative research follows:

- It has been found that the *questions asked in the questionnaire have fixed choice answers,* which limit the participant's viewpoints when answering (Creswell, 2009:15-17; Polit & Beck, 2012:3-14). Questions depicting knowledge, attitude and practice were adapted from the Diabetes Knowledge Scale (DKN) and the Psychological Adjustment to Diabetes Scale (ATT19) (Bradley, 2013), as well as the EQ-5D value set of the EuroQol System (EuroQol Group, n.d.: online; Szende, Oppe & Devlin, 2010:7). The content of the questions and adapted questions were literature based. Since answers were literature based, the data obtained from the participants were valid. Participants were given the limited opportunity to expand. Open questions

were asked in questions 1.9, 1.11, 2,11, 3.1.5, 3.2.5, 3.3.5, 3.4.5, 5.1.5, 5.2.6, 5.3.6 and 6.1;

- The *findings of a quantitative research are also limited to the questions that have been asked* by the researcher (Creswell, 2009:15-17; Polit & Beck, 2012:13-14). The questionnaire actually assisted the researcher to focus on the aim and objectives of the study; and

- In quantitative *research, the content is described and no interpretation is provided* (Botma *et al.*, 2010:82-83). Although this limits the findings of the study, it also enables the researcher to focus on the objective of the study, which is the knowledge, attitude and practices survey of healthcare workers working with adult diabetes patients in the Free State. The objectives of the study were measured by the questions asked in the questionnaire.

The research technique, namely the structured questionnaire, will be described.

3.3 RESEARCH TECHNIQUE-STRUCTURED QUESTIONAIRE

A research technique refers to the methods or measurement strategies that were used in order to collect data (Burns & Grove, 2011:345; Polit & Beck, 2012:305). The researcher made use of a structured questionnaire, which was completed by the researcher in the structured questionnaire.

The structured questionnaire is conducted by means of a dialogue that refers to the engagement between the researcher and the research participants occurring within the context of the research problem. Questions drafted beforehand are asked to the participant *(*Burns & Grove, 2011:406; Bryman, 2012:210; De Vos *et al.,* 2012:186-196). Open-ended and closed-ended questions were incorporated in the questionnaire. Questions addressed the participants' knowledge, attitude and practices of T2DM patients. The environment where the questionnaire was completed had to be well ventilated and private. This process yielded similar results for all interviews when conducted under similar circumstances (Burns & Grove, 2011:406; Bryman, 2012:210; De Vos *et al.,* 2012:186-196). In the PHC and CHC, a consultation room was used, which was conducive to the collection of data and adhered to all aspects identified.

Using a structured questionnaire during an interview has a number of strengths:

3.3.1 Strengths of a questionnaire

The various types of strengths are as follows:

- Participants who are interviewed can come from *different population groups* (Brink *et al.,* 2009:147). The population for the study was the nurse managers, professional nurses and community healthcare workers working with patients diagnosed with T2DM. These HCWs were interviewed in the five districts in the Free State Province, all having different cultural backgrounds and providing the same service at the CHCs and PHCs;

- The *researcher is able to observe verbal and non-verbal responses* (Brink *et al.,* 2009:147). These non-verbal responses give an accurate picture of how the participant feels. The researcher noted it on the participants questionnaire so that it could be incorporated in analysis;

- *Yes or no questions make coding easier for the researcher* (Bryman, 2012:211; Polit & Beck, 2012:298). Close-ended questions forming part of the questionnaire did assist in the coding of data;

- All questions are *completed as accurately as answered by the participant*, resulting that the chances of the *researcher being biased* was minimal (Bryman, 2012:211; Polit & Beck, 2012:298). The researcher was the only person responsible for data collection and ensured that all questions were answered. The structured nature of the questionnaire and the questionnaire guideline (see Addendum C1-C3) assisted in limiting possible bias during data collection.

- *The researcher is present at all times and will clarify any misunderstandings immediately* (Brink *et al.,* 2009:147; Burns & Grove, 2011:406; Bryman, 2012:210; De Vos *et al.,* 2012:186-196). The researcher was responsible for the completion of the questionnaires. Since the researcher was guided by the questionnaire guideline (see Addendum C1-C3), participants were given the opportunity to clarify any misunderstandings;

- *The participant who is interviewed needs not be literate* (Brink *et al.,* 2009:147). In this study, participants' questionnaires were completed by the researcher, since it was not a prerequisite for participants to be able to read and write. As professional nurses and managers had formal qualifications and community healthcare workers had a school qualification, illiteracy was in any case not an obstacle in this study;

- Descriptive research is *inexpensive and is not time consuming* (Botma, 2010:110). Although the collection of data was an expensive exercise, the data collection cost was shared with other researchers who collected their data at the same sites at the same time. The data collection was completed within 12 days.

Although a structured questionnaire is a reliable method used to collect data during quantitative research, this technique also has limitations.

3.3.2 Limitations of questionnaire

The limitations of using a questionnaire are discussed.

- When a research design as structured questionnaire is used, *it is imperative that those individuals who conduct the interview should be trained* (Brink *et al.,* 2009:147; Bryman, 2012:211; Polit & Beck, 2012:298). Since the researcher was the only fieldworker collecting data, she was the only person that needed training. The training was conducted by the supervisor with a further opportunity during the pilot interviews to make sure that the interview skill was captured. The researcher was further guided by the guideline (see Addendum C1-C3) to assist in accuracy in answering of questions;

- It can be very *difficult to finalise the interviews* in that participants do not respond timeously to the invitation to participate (Brink *et al.,* 2009:147). All participants were very cooperative, with the result that the data collection process could commence immediately;

- *The participant can feel uncomfortable in the presence of the researcher* and not provide all the information required (De Vos *et al.,* 2012:196-198). The

researcher was able to complete all questions on all forms. This serves as proof that the approach did not have this effect on participants.

A discussion of the development of the structured questionnaire used during the data collection process will follow.

3.3.3 Development of questionnaire

A questionnaire was compiled by the researcher in order to collect data for the study.

A literature *search for existing instruments* used in KAP surveys on patients with diabetes was done. *Consultation of existing validated instruments* from studies where the conceptual and as far as possible, the operational definitions correspond with the planned study,was identified (Dineshm *et al*., 2012; Makwero, 2011). The instruments consulted were the *Diabetes Knowledge Scale (DKN) and the Psychological adjustment to Diabetes scale (ATT19)* (Bradley 1994) as well as the EQ-5D value set of the EuroQol System (EuroQol Group, n.d.: online; Szende *et al.*, 2010:7);

A table of specifications covering the questions depicting the sections of the questionnaire namely knowledge, attitude and practice *was drafted*; (Amod *et al*., 2012:12).

The completed KAP questionnaire was discussed by a panel of research and Diabetes experts and biostatistician prior to receiving approval from the Health Sciences Research Ethics Committee.

The questions were arranged in a logical flow, according to the set objectives of the study. The format of the questionnaire depicts the following headings as depicted in Table 3.1 below as taken from Addendum B1 to B3.

***Table 3.1**: The format of questionnaire used for data collection*

Demographic information	**Knowledge regarding Diabetes Mellitus**	**Attitude regarding Diabetes Mellitus**	**Practice regarding Diabetes Mellitus**
Question 1 – 1.12, 6.1	Question 2.1 – 3.4	Question 4.1	Question 5.1 – 5.3

Clear instructions were listed above each question and a guideline (see Addendum C1-C3) was drafted for the researcher to clarify how questions had to be asked to participants.

The relevant questionnaire (Addendum B1-B3) was conducted with each of the three identified groups of HCW.

3.4 POPULATION AND SAMPLING

The *population* refers to all those individuals or objects adhering to certain criteria in a demarcated area that forms part of the research study (Bryman, 2012:187; Burns & Grove, 2011:344, Polit & Beck, 2012:273). The population in this study was compiled from three categories of HCWs working at CHC centres and PHC clinics in the five districts in the Free State.

According to Statistics South Africa (2012:5), the Free State Province is divided into five districts, namely the Mangaung Metro, Fezile Dabe, Lejweleputsa, Thabo Mafutsane and Xariep. Each district is divided into sub-districts. Within the sub-districts, CHC centres and PHC clinics are found. There are 10 (n=10) CHC centres in the five districts. The population further consisted of the 42 (n=42) PHC clinics in the Mangaung Metro, one of the five districts. See Figure 3.2 depicting the layout of the districts as various colour-coded areas. The distribution of the CHC centres in the districts and the PHC clinics in Mangaung Metro are also depicted in the figure.

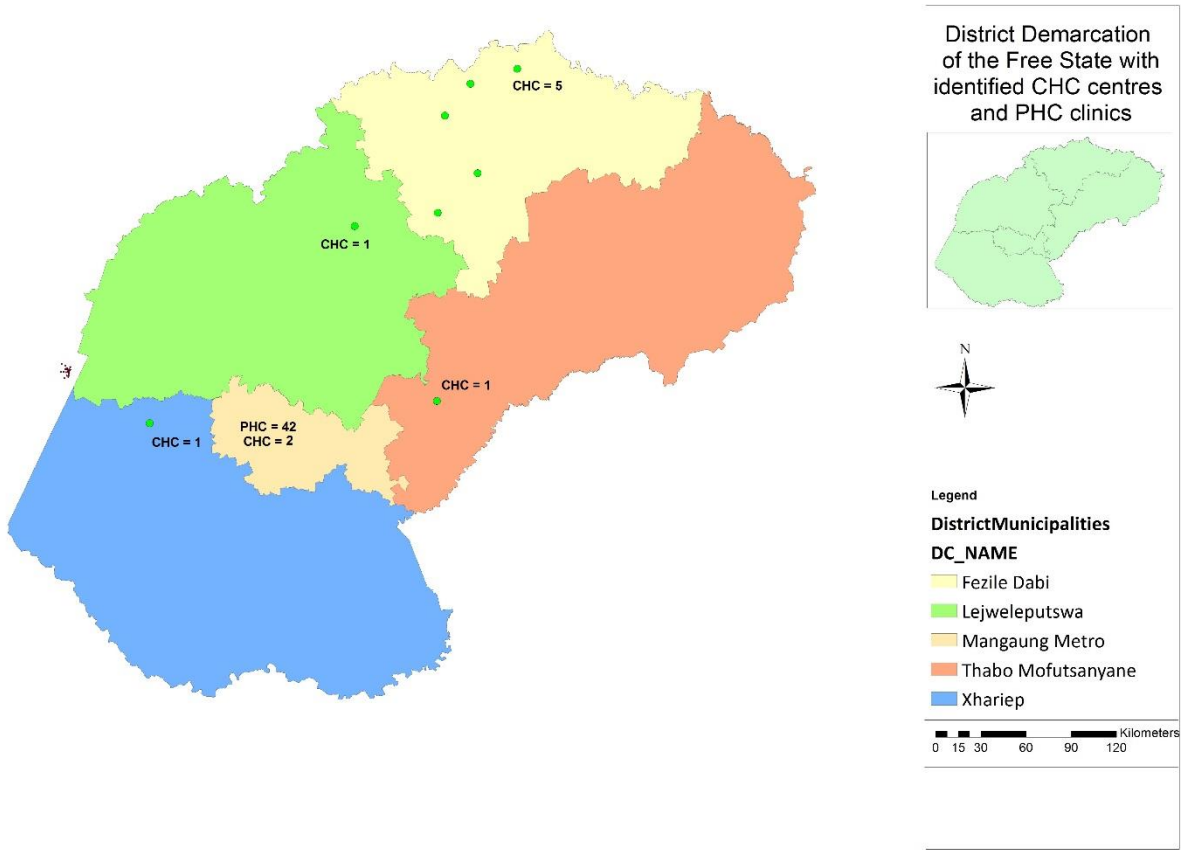

Figure 3.2: *District demarcation of the Free State with identified CHC centres and PHC clinics identified in study*

Three categories of HCWs, namely the nurse manager, professional nurse and community healthcare worker providing care to T2DM patients in all 10 CHC centres and at all 42 PHC clinics in the Mangaung Metro constitute the participant population. See Table 3.2 depicting these categories of HCWs. However, the Free State Department of Health could not provide exact numbers of professional nurses and community healthcare workers providing care to T2DM patients. After consultation with the Free State Department of Health, the researcher therefore calculated an average of two professional nurses per either CHC or PHC and five CHCW per CHC and PHC.

Table 3.2: *Population of HCWs determined according to CHCs and PHCs*

District	Nurse manager	Professional nurse	Community healthcare worker
Fezile Dabi – 5 CHCs	1	10	25
Lejweleputswa – 1 CHC	1	2	5
Mangaung Metropolitan – 42 PHC + 2 CHC	1	84 4	210 10
Thabo Mofutsanyana – 1 CHC	1	2	5
Xhariep – 1 CHC	1	2	5
Total	**5+1 Assist manager**	**104**	**260**

Since it is not possible to collect data from the entire population, as it will be too costly and time consuming, it is often necessary to select sample from a population.

Sampling refers to a sub-unit of the population. It is the process whereby individuals, objects or elements are selected from the population in order to obtain information regarding a certain phenomenon in a way that represent the population of interest (Bryman, 2012:186-200; Moule & Goodman, 2009:266; Polit & Beck, 2012:273-296). All five districts and all CHC centres (n=10) were included in the study. However, the Mangaung Metro District was purposefully selected to perform a random selection of 25% of PHC clinics (n=11). The purposive selection of Manguang Metro was due to practicality and cost factors that the researcher had to consider. The same guidelines and policies, as well as a similar infrastructure to other PHCs in other districts in the Free State exist (see Table 3.3 providing a summary of sampled CHC centres and PHC clinics).

Table 3.3: *A summary of CHC centres and PHC clinics sampled in the study*

District	Town	PHC	CHC
Fezile Dabi District Municipality	Sasolburg Kroonstad Viljoenskroon Vredefort Koppies Kroonstad		Zamdela Lesedi Pax Kanaelo Kganya
Lejweleputswa District Municipality	Ventersburg		Hope
Mangaung Metropolitan Municipality	Bloemfontein	T.S. Mothloko Thusong Clinic Itumeleng Kagisanang Clinic Industrial Clinic Thaba Nchu Dinaane Jazzman Maletsatsi Mabaso Mafane Clinic Bainsvlei	Heidedal MUCPP
Thabo Mofutsanyana District Municipality	Marquard		Mamello
Xhariep District Municipality	Petrusburg		Bophelong
Total		**11**	**10**

After having sampled the CHC centres and PHC clinics as depicted in Table 3.3, a convenient selection of the three categories of HCWs per CHC centre or PHC clinic was performed. Table 3.4 reflects the HCW sampled per CHC centre or PHC clinic. Inclusion criteria for nurse managers included:

- The nurse manager responsible for chronic diseases in each district; and
- The provincial manager responsible for chronic diseases in the Free State province

Professional nurses included in the study had to adhere to the following inclusion criteria:

- All professional nurses who provide care to patients with chronic diseases

Community health workers were only included if they adhered to the following criteria:

- All CHCWs who provided care to patients with chronic diseases at the CHC or PHC

The HCWs sampled in the study is per CHC and CHC are presented in Table 3.4.

Table 3.4: *HCWs sampled per CHC or PHC*

District	**CHC**	**PHC**	**Nurse manager**	**Professional nurse**	**Community health worker**
Fezile Dabi District Municipality	Zamdela Lesedi Pax Kanaelo Kganya		1	2 2 2 2 2	5 5 5 5 5
Lejweleputswa District Municipality	Hope		1	2	5
Mangaung Metropolitan Municipality	Heidedal MUCPP	T.S. Mothloko Thusong Itumeleng Kagisanang Industrial Thaba Nchu Dinaane Jazzman Maletsatsi Mabaso Mafane Clinic Bainsvlei Clinic	1	PHC=22 CHC=4)	PHC=55 CHC=10
Thabo Mofutsanyana District Municipality	Mamello		1	2	5
Xhariep District Municipality	Bophelong		1	2	5
TOTAL	**N=10**	**N=11**	**5+1 assist manager**	**42**	**105**

Table 3.5 provides a summary of the final sampling of participants who actually did take part in the study. The discrepancy in clinic sampling depicted in Tables 3.4 and 3.5 is due to the logistical obstacle to include all sampled clinics in the actual data

collection, or participants being unavailable. Since the actual population was not known to either the researcher or the Department of Health, in practice, the researcher found some clinics not having the estimated two professional nurses or five CHCW per site. The researcher therefore had to adapt the numbers per site as can be seen in Table 3.5.

Table 3.5: *HCWs included in study*

District	**CHC**	**PHC**	**Nurse manager**	**Professional nurse**	**Community health worker**
Fezile Dabi District Municipality	Zamdela Lesedi Pax Kanaelo Kganya		1	6 4 9 2	0 4 16 4
Lejweleputswa District Municipality	Hope		1	2	2
Mangaung Metropolitan Municipality	Heidedal MUCPP	 Bainsvlei T.S. Mothloko Thusong clinic Itumeleng Kagisanang clinic Industrial clinic Thaba Nchu Dinaane Jazzman Mangaung	1	 5 3 4 1 1 4 5 1 0 0	 0 2 1 2 4 0 4 0 1 3 1
Thabo Mofutsanyana District Municipality	Mamello		**1**	5	2
Xhariep District Municipality	Bophelong		**1**	2	0
TOTAL	**N=10**	**N=10**	**5+1 assist manager**	**54**	**46**

3.5 PILOT STUDY

A pilot study can be referred to as the process where the researcher conducts a similar study on a small scale before the actual research is done (Bryman, 2012:263; Burns & Grove, 2011:544; Polit & Beck, 2012:195-196). This process is followed to identify weaknesses in the data collection process and to correct errors identified

(Burns & Grove, 2011:544). The pilot study would also indicate what budget was needed as well as how long the research study will take (Burns & Grove, 2011:544).

The main aim of the pilot study was to identify how easy questions were understood and adjusting the questionnaire if needed, in order to make it more feasible. The researcher was the most suited person for conducting the interviews because she was responsible to bring about the changes as identified from the pilot study and were responsible to conduct the interviews.

The researcher conducted the interview at the Gabriel Dichabe Clinic in the Mangaung Metro district. The questionnaires for the pilot study was completed with one professional nurse and one community health worker providing care to patients with chronic diseases of which DM is one such a disease. The time needed to complete each questionnaire had to be determined. After the pilot study, the Adapted SA-Diabetes KAP questionnaire was revised in order to bring about changes identified namely:

One question that was misinterpreted by participants was rephrased, 34 questions which gave participants the option to answer questions as either *No* or *Yes*, sequence was changed to rather place the *Yes* option first, followed by the *No* option. This was done to prevent possible coding mistakes by the researcher who would most likely assume the first option to be *Yes* and not *No* as it was originally in the questionnaire, spelling mistakes were corrected.

Nineteen questions were presented on a Likert scale, where five options were initially provided. These five options were reduced to three options after completion of the pilot study. After the pilot study had been completed and the necessary changes made, the questionnaires were duplicated and data collection could proceed. The pilot interviews were excluded from data analysis. The data collection will be discussed next.

3.6 DATA COLLECTION

Data collection refers to the systematic gathering of data from the sample applicable to the aims and objectives of the research study (Bryman, 2012:14, Burns & Grove, 2011:535, Creswell, 2010:3). The aim of data collection was to obtain information

regarding the knowledge, attitude and practices of HCWs in the PHC and CHCs by using a structured questionnaire.

The data collection process started when ethical approval was obtained for the research by the Health Research Ethics Committee (see Figure 3.3 and Addendum A1). Written permission was obtained from the Department of Health in the Free State to do the research, since this specific study formed part of a larger study aimed at developing a health dialogue model for patients with diabetes in the Free State. The permission from the Department of Health reflects the permission granted towards the overarching study (see Figure 3.3 and Addendum D2).

An appointment was made with the provincial nurse manager and the nurse managers responsible for chronic diseases to interview them regarding the data collection plan that will be followed. These role-players were involved as practical arrangements were made with them, but they also had to be interviewed themselves. This data collection plan is shown by means of a flow chart in Figure 3.3.

Figure 3.3: *Data collection process*

The process of data collection was discussed with each nurse manager when interviews were conducted as follows:

- The target group, namely the nurse manager, professional nurses and the community health workers caring for T2DM patients has been identified to participate in the study.
- The information leaflet (Addendum A2) was read and discussed with each participant. Each participant was given an opportunity to sign a consent form (Addendum A3).
- Interviews were held with each HCW where a questionnaire (Addendum B1-B3), depending on the category of the HCW, was completed.
- Interviews were conducted in the PHCs and CHCs in a quiet environment. Minimal disruption of activities at the various clinics occurred and uncertainties experienced by the participant were clarified by the researcher. Consent forms were signed and completed questionnaires were stored in locked fireproof cabinets before providing the data-coded forms to the biostatistician to assist in data analysis.

Validity and reliability, which play an important part in research, will now be discussed.

3.7 VALIDITY APPLICABLE TO THIS STUDY

Validity refers to a process whereby an instrument is measuring what it is supposed to measure. Validity is measured along a continuum to determine whether it is good for one purpose and not for another (Bryman, 2012:47, 170; De Vos *et al.,* 2011:172; Polit & Beck, 2012:174-175; 236-253). The types of validity namely *face validity, content validity* and *external validity* will be discussed.

3.7.1 Face validity

Face validity refers to the process whereby a researcher can merely look at the instrument and conclude that it is measuring what it is supposed to measure (De Vos *et al.,* 2012:174). The layout of the questionnaire appears to be similar to other questionnaires; therefore, on face value, it could be seen to be a questionnaire. The

layout of the questionnaire made it easy to read, because it was typed and it reflected the various sections addressing the objectives of the study.

Closed-ended questions responses were listed vertically, making it easier for the researcher to save time and to record and code data. An option such as “other” was present where responses of the participant could be listed (Bryman, 2012:237-258; Burns & Grove, 2011:406-408; Polit & Beck, 2012:293-300). Clear instructions were listed above each question and a guideline was drafted for the researcher to have a good understanding of how to structure questions in the questionnaire. Content validity, which measures the concepts of the study accurately, will be discussed next.

3.7.2 Content validity

Content validity refers to whether the questions asked in the questionnaire measures the concepts it was intended to measure. It also determines if the questionnaire addressed the objectives of the study (De Vos *et al.,* 2012:173). *Content validity* in this study means that the data to be collected in the questionnaire focused on the actual knowledge, attitude and practice of the healthcare workers involved with the care of T2DM patients in the PHC and CHC clinics.

The questionnaire had a clear focus, as the first section obtained information regarding demographic aspects; the second section described the knowledge regarding DM; and the third section attitude regarding DM. The content of the questionnaire was adapted from various other questionnaires and based on an in depth literature review.

The researcher also sent questionnaires to expert researchers forming part of the research team working towards the aim of the overarching research project, namely to develop a health dialogue model for patients with diabetes in order to view the questionnaire for correctness, validity and applicability. The instrument was also handed to the biostatistician at the University of the Free State for evaluation before it was utilised for data collection. Content validity was further strengthened as neutrality was ensured as no leading questions were asked and participants could express their own opinion under the section “other” indicated on the questionnaire. It is important for an instrument to be valid. External validity, a construct of validity, will be discussed next.

3.7.3 External validity

External validity refers to the generalisability of the results of this study to other settings. If the sample is representative of the population, one can automatically generalise one's results back to the population, across populations, treatment and settings (Botma *et al*., 2010:233).

In enhancing the external validity of this study, the researcher provided a description of the population and sample selected for the study. The sampling process and the key characteristics were stipulated. In addressing the design issues of the study, the researcher described the context from which the study was undertaken. The selection of CHC centres and PHC clinics with the resultant HCW linked to these centres/clinics mirror the structure of CHC and PHC in other provinces. Since all provincial health departments are governed by policies and guidelines originating from the National Department of Health in South Africa, it is possible that researchers will apply findings from this study within other similar settings.

3.8 RELIABILITY

Reliability refers to the process where the instrument used with different participants or in different settings yields the same results (De Vos *et al.,* 2011:172; Bryman, 2012:46; 168; Polit & Beck, 2012:174-175). Reliability is concerned with the accuracy and the consistency of the instrument (De Vos *et al.,* 2011:172; Polit & Beck, 2012:174-175). The researcher sent the questionnaire to experts for their inputs and conducted a pilot study prior to the actual data collection process, with the aim of ensuring the accuracy as well as the consistency of the questionnaire. Fewer errors lead to better reliability.

Reliability is not only measured by the instrument used. The research design and methodology used in the study should also be evaluated in order to determine the accuracy and correctness and if used repeatedly and if they consistently yield the same results (Brink *et al.,* 2009:164-165).

The research design and technique used, namely descriptive, cross-sectional, quantitative design was of assistance to the researcher, as it enhanced the reliability of the study in the following ways. The aim of the researcher was to observe, count

and classify phenomena, while a cross-sectional design was used to answer questions regarding knowledge, attitude and practice of HCWs working with T2DM patients. Data were collected from a representative sample at the PHCs and CHCs on a specified day as outlined in the data collection plan. The same questionnaire was asked to each selected participant. The researcher focused on various groups simultaneously. Internal consistency a criteria for reliability follows.

3.8.1 Internal consistency

Internal consistency refers to the process where all questions included in the questionnaire are valid and measure the variable they are supposed to measure (Brink *et al.,* 2009:164). In this study, questions are divided into three sections, namely the knowledge, attitude and practice of the HCWs. The questions under each section focus on the specific aspects of KAP.

The questionnaire used was based on a literature review and previously researched instruments that were adapted in the context of this study. The Diabetes Knowledge Scale (DKN) and the Psychological Adjustment to Diabetes Scale (ATT19) were consulted (Bradley, 1994), as well as the EQ-5D value set of the EuroQol System (EuroQol Group, n.d.: online; Szende *et al.*, 2010:7). The questionnaire was first presented to a pilot study to ensure that the pilot study gave the researcher the opportunity to get to the correct answers to the study. The researcher further sent the questionnaire to expert researchers to ensure that the questions asked were applicable to the study.

During the interview, the researcher maintained internal consistency, as questions were asked systematically, namely knowledge, attitude and practice. The fact that the researcher completed the questionnaire resulted in all clarifications on the part of the participant being ensured. There was no confusion with regard to the interpretation of the questions, as only one researcher was involved. Reliability was shown by the participants answering all questions. Although reliability has been assured, adherence to ethical issues forming an important aspect throughout the practice of research is important.

3.9 ETHICAL ISSUES

Ethical guidelines refer to those standards that the researcher should adhere to in order to prevent any discomfort or harm to the participant. Every researcher should be involved with ethical issues, as ethics should be integrated into every phase of the research process (Bryman, 2012:130-140; De Vos, 2010:4; Polit & Beck, 2012:150). Ethical approval starts with the ethical committee before any investigation commences in order to comply with the research procedures (Bryman, 2012:130-140; De Vos, 2010:4; Polit & Beck, 2012:150). Ethical issues are concerned with the agreement that the researcher reaches with the participants before the investigation commences, leading to the signing of the consent form. Different guidelines are drafted in order to protect participants. For example, the Nuremberg Code, the Declaration of Helsinki and the South African Medical Research Council developed guidelines for human sciences. This study has been approved by the Ethic Committee of the University of South Africa ECUFS Nr 39/2013 and will be guided by the three primary ethical principles on which standards of ethical conduct in research should be based, as was expressed in the Belmont Report (National Commission for the Protection of Human Subjects of Biomedical and Behavioural Research, 1979). The principles of beneficence, respect for human dignity and justice will be briefly discussed, followed by procedures the researcher adopted to comply with each of these principles.

3.9.1 Principle of beneficence

Beneficence is a fundamental ethical principle in research that encourages researchers to prevent harm to participants and maximise benefits. The researcher should protect the participant from being exposed to any form of harm, namely physical, social, psychological, religious and economical (National Commission, 1979). The benefits of the research should outweigh the risks for the research for it to be justifiable (Bryman, 2012:130-135; Human & Fluss, 2000:1-24; Polit & Beck, 2012:152-154).

The researcher could not foresee any harm be inflicted on participants. This was a non-experimental study where no participant received any treatment. The information letter (see Addendum A2) and informed consent (Addendum A1) signed

by all participants prior to participating in research strived to ensure that no harm is inflicted on participants as they were aware of what the study entailed. Participants were given the opportunity to withdraw from research activities at any stage. Next, the principle of respect is discussed.

3.9.2 The principle of respect for human dignity

Respect for human dignity is supported in research when participants' right to full disclosure, right to self-determination and right to informed consent is adhered to. (Bryman, 2012:136; Polit & Beck, 2012:152-154).

The right to full disclosure

The *right to full disclosure* means that the participant should be informed of each step of the research process (National Commission, 1979). Before data collection commenced, information and consent letters were provided to all participants indicating what would be expected from each participant taking part in the research. Addendums A1 and A2 demonstrate this intent. This letter also outlines how the actual research would be conducted. Each participant was also reminded that he/she would decide voluntarily to participate in this study. The terminology used in the letter was very simple, which made it easy for the participant to understand. Next, the right to self-determination is discussed.

Right to self-determination

The *right to self-determination* means that the participant can decide whether he wants to be part of the research study after he has studied and understood the research process. This process of information provided, enables the participant to understand the research process and be able to practise the right to self-determination (National Commission, 1979). If any participant therefore decides not to participate, all the necessary information is provided, in order to make an informed decision. Next, informed consent is discussed.

Informed consent

Informed consent is concerned with the process whereby the participant participates voluntarily in the study and is protected from harm (National Commission, 1979). The

researcher provided the participants with all the necessary information, which enabled participants to sign the informed consent (Bryman, 2012:136; Polit & Beck, 2012:152-154). The consent signed by participants prior to participating in any project of the research programme explains the researcher's sincere intent to respect the dignity of participants and so uphold their right to full disclosure, self-determination, informed consent and confidentiality. Addendums A1 and A2 demonstrate this intent. The principle of justice, according to the Belmont report, is discussed next.

3.9.3 Principle of justice

Justice, according to the Belmont Report, means fairness in the distribution of benefits and adherence to the information that is shared (National Commission, 1979). The principle of justice refers to *the right to be selected fairly and to be treated fairly*. Participants should not be selected because they can be manipulated easily or are easily accessible. The selection of the participant should be linked to his contribution to research (National Commission, 1979). Participants were treated fairly and their rights were respected at all times. In this study, all HCWs who adhered to the criteria were selected purposefully. The researcher maintained all agreements made with the participants, for example, being on time and being respectful at all times. Aspects namely privacy and autonomy will be described next.

Privacy

The right to privacy is critical during the research process. The researcher has no right to intrude on the privacy of the participant (Brink *et al.*, 2009:33-34). The researcher asked personal questions regarding the attitude of the participant that comprised the invasion of privacy. Participants could withdraw at any time and participants were not identifiable due to the coding of questionnaires. During the interview process, the researcher constantly reminded participants that they had a right not to answer questions that invaded their privacy and they could withdraw at any time. During the data collection process, no participant withdrew. Anonymity, which forms an important part of privacy, will now be discussed.

Anonymity

Anonymity refers to the process where the researcher should not be able to link the participant to the information obtained (Brink *et al.,* 2009:34). In this study, it was not possible to maintain complete anonymity, as the researcher collected the data personally.

A code number was allocated to the data collection sheet. The signed informed consent was not stored with the data collection sheets (Botma *et al.,* 2010:19). Due to the coding of questionnaires, confidentiality could be upheld, since the patients' identities could not be traced back to a specific participant.

3.10 DATA ANALYSIS

Data analysis refers to the process where all data obtained during the research study will be explored and presented in various forms, for example, tables and graphs in order to identify and eliminate errors, as it can influence the finding (Bryman, 2012:249-251; Polit & Beck, 2012:463-465). Descriptive statistics were used to describe the data. The following process was followed during the data-analysis process:

Questionnaires were coded by the researcher and data were captured by the Information and Communication Technology Services on the UFS Campus. Information obtained by the structured questionnaire was then analysed by a biostatistician at the Department of Biostatistics at the UFS. The analysis was generated as follows, using SAS software:

For the analysis, descriptive statistics were used to describe data obtained in a systematic way, namely frequencies and percentages for categorical data, referring to, for example, the HCW category who participated in the study. The medians and percentiles for continuous data were calculated. Groups were compared for continuous data by means of 95% confidence intervals for the median percentage difference.

3.11 CONCLUSION

In this chapter, attention was given to descriptive, cross-sectional and quantitative research design used. Strengths and limitations of quantitative research design were described. The research technique used, including the strength and limitations of a questionnaire, was discussed. The various processes followed in order to develop the questionnaire was highlighted, as well as the selection of the population, sampling and pilot study, which was done before the data collection commenced was explained. A flow chart describing the various steps followed as well as CHCs and PHCs visited during the data collection process were explained. Validity, reliability and maintaining ethical issues for the participants in the study were also described. The chapter was then concluded with the description of data analysis followed. The results of data analysis will be discussed in Chapter 4.

CHAPTER 4
ANALYSIS OF DATA

4.1 INTRODUCTION

The aim of this chapter is to provide a description of findings of analysed data as obtained from the structured questionnaire. Figure 4.1 depicts the stage of the research process related to this chapter. The discussion will be guided by the objectives of the study. Findings from all HCWs, namely the nurse managers, professional nurses and the community healthcare workers will be described.

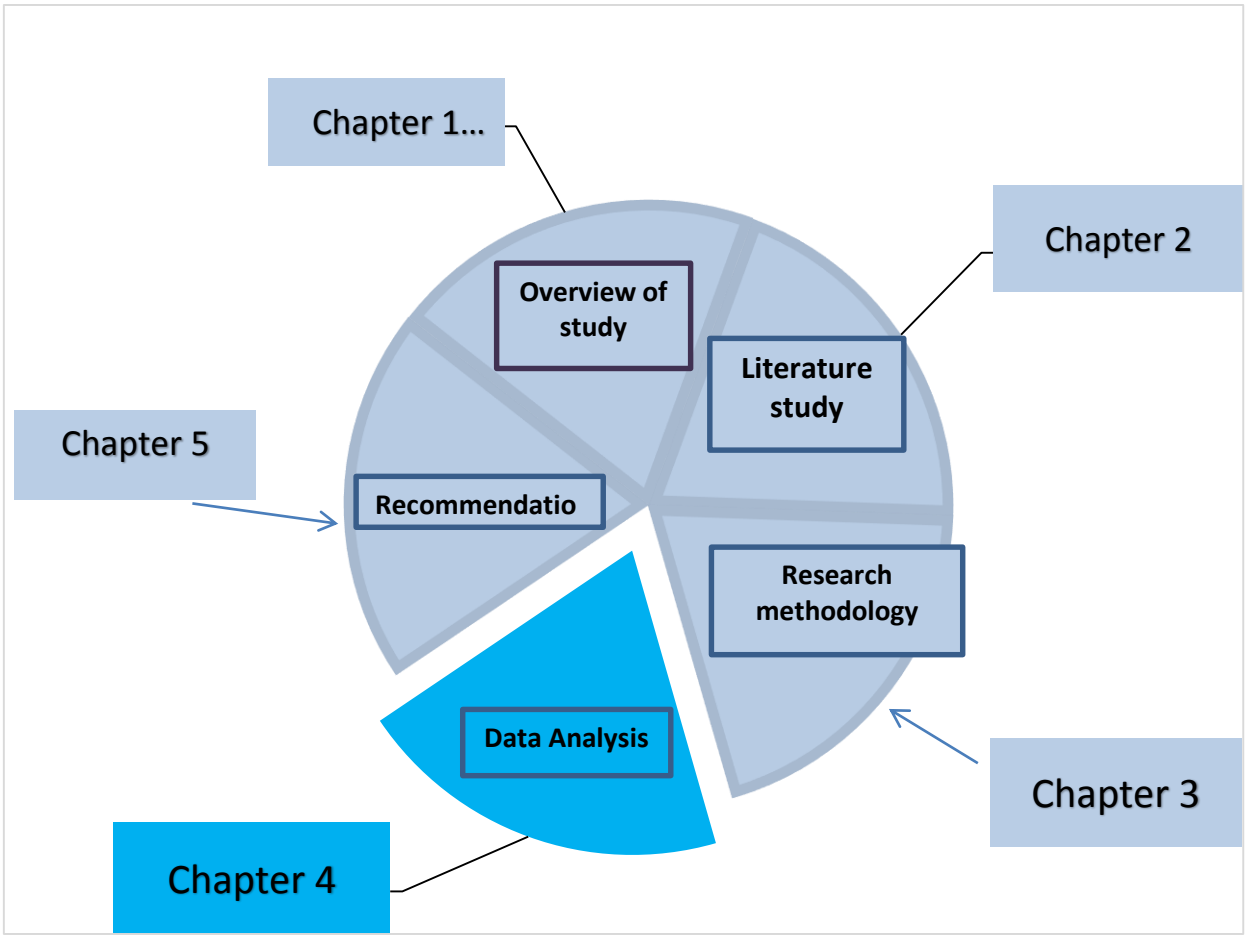

Figure 4.1: *Research data analysis discussion as adapted from De Vos et al. (2012: 70)*

Table 4.1 highlights the link between questions in the questionnaire and the study objectives.

Table 4.1: *Link between questions in the questionnaire and study objectives*

Objective	Nurse manager	Professional nurse	Community healthcare worker
Describe the demographic information of ○ Free State nurse management in chronic diseases management programmes on district and provincial level; ○ Professional nurses providing chronic care at CHCs and PHCs in the Free State public health sector; and ○ Community healthcare workers assisting professional nurses at CHCs and PHC clinics in the Free State public health sector	1.3-1.11	1.3-1.11	2.1-2.9
○ Describe the knowledge of, ○ attitude towards and ○ practice of diabetes management of above-mentioned study participants.	2.1 – 3.4 4.1 5.1-5.3	2.1 – 3.4 4.1 5.1-5.3	3.1-3.15 4.1 5.1-5.4

The data will be presented systematically according to the objectives and questions as depicted in Table 4.1, namely:

The **demographic information** of the three participating groups will be presented separately, as indicated in Figure 4.2. The discussion for the **systems issues** will also discuss the causes of frustration experienced by the three participating groups separately, where after the discussion on the available infrastructure for the nurse manager and professional nurse will follow.

The response from the **knowledge** questions for the nurse manager and the professional nurse will be discussed simultaneously, as the same questions were posed to this cadre of HCWs. The knowledge component of the CHCWs will be described separately, as highlighted in Figure 4.2.

Since the same **attitude** questions were put to all three groups of HCWs, the responses to the attitude questions will be discussed simultaneously as shown in Figure4.2.

The researcher will combine discussions for the **practice** questions on nurse managers and professional nurses and then discuss CHCW practice separately, since different questions were posed to this group of HCWs.

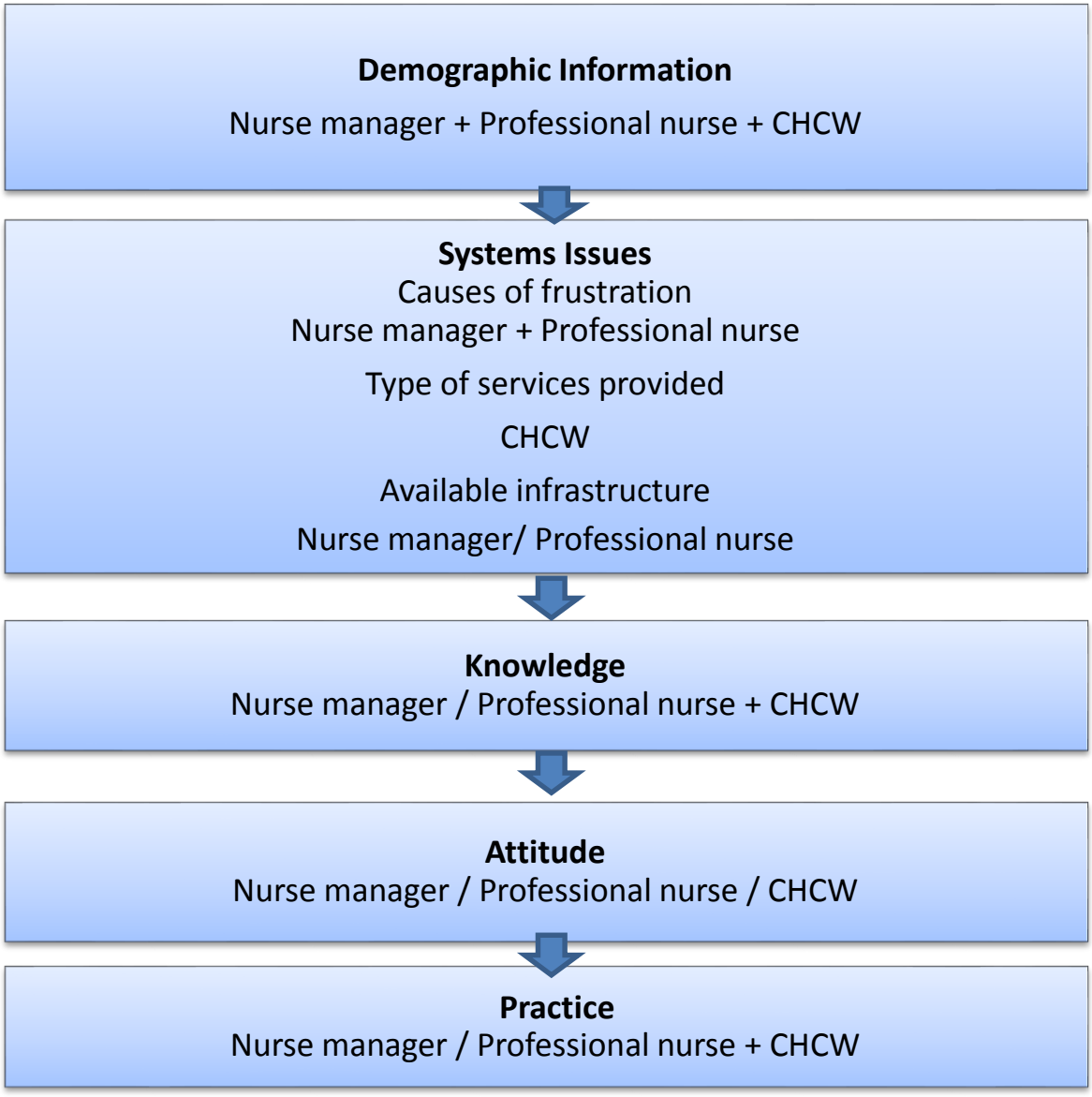

Figure 4.2: *Flow chart representing layout of analysed data*

Table 4.2 provides a layout of HCWs who participated in the study as distributed per district at the identified CHCs and PHCs.

Table 4.2: *HCWs who participated in the study*

District	CHC	PHC	Nurse manager	Professional nurse	Community health worker
Fezile Dabi District Municipality	Zamdela Lesedi Pax Kanaelo Kganya		1	6 4 9 2	0 4 16 4
Lejweleputswa District Municipality	Hope		1	2	2
Mangaung Metropolitan Municipality	Heidedal MUCPP	Bainsvlei T.S. Mothloko Thusong Clinic Itumeleng Kagisanang Clinic Industrial Clinic Thaba Nchu Dinaane Jazzman Mangaung	1	5 3 4 1 1 4 5 1 0 0	0 2 1 2 4 0 4 0 1 3 1
Thabo Mofutsanyane District Municipality	Mamello		1	5	2
Xhariep District Municipality	Bophelong		1	2	0
TOTAL	**N=10**	**N=10**	**5+1 assist manager**	**54**	**46**

4.2 PART I: Respondent profile

The respondents' profile in the study refers to the demographic information of the HCWs and the systems issues highlighted in the questionnaire. A discussion of the demographic information of the HCWs will follow.

4.2.1 Demographic information of healthcare workers

The demographic information in this study entails aspects such as the HCWs' gender, as both males and females provide services to patients at the CHCs and PHCs. Demographic information includes the age group of the HCWs and the home language spoken by the HCWs, as well as the position of employment. Demographics furthermore includes the education level of the HCWs, as the level of education and the specific training regarding DM could influence the knowledge attitude and practices these workers display.

4.2.1.1 Demographic information of nurse managers

Gender distribution in South Africa reflects that females (51,3%) exceed the male population (48,7%) by almost 2% (Statistics South Africa, 2014:3). Although the national gender distribution is nearly equal, female nurse managers were by far in the majority in this study (83,33% n=5), compared to male nurse managers (16,67% n=1). The reason for the majority of female nurse managers most likely relates to nursing historically being a female-dominated profession.

The Free State District Health Information System (2015:1) shows evidence that the median *age* of nurse managers in the Free State Province is 51 years of age, with 32 years being the minimum and 65 years the maximum.

According to the democratic Constitution of South Africa, promulgated on 4 February 1997, eleven official *languages* are recognised (Statistics South Africa, 2014:6-10). Each of the nine provinces has a unique language distribution. However, in the Free State, 64,2% of South Africans speak Sesotho, 12,7% Afrikaans and 7,5% speak IsiXhosa (Statistics South Africa, 2014:6-10). The nurse managers' language distribution for this study in percentage terms is portrayed in Table 4.3, where the Sesotho language distribution closely reflects the language distribution of the Free State.

Table 4.3: *Language distribution of nurse managers according to frequency and percentage*

Language	Frequency N=6	%
Setswana	n=2	33.33%
Sesotho	n=4	66.67%,

According to the nurse managers interviewed in the Free State, 83,33% (n=5) were employed as nurse managers supervising chronic diseases, eye and geriatric services and one (16,67%, n=1) assistant manager for partnerships and PHC re-engineering.

Education is an important aspect for the development of a country and furthermore has a positive impact on the development of living standards. Tertiary qualifications among South Africans increased from 9,2% to 11,5% during the period 2002-2011 (Statistics South Africa, 2014:6-10).

According to the Free State District Health Information System (2015:1), there are 1 257 nurse managers across various programmes in the Free State, all of whom all have diplomas. Eight have degrees and six have a master's qualification.

In the present study, a significant percentage of the nurse managers only have a diploma (33,33%, n=2), while the majority (66,67%, n=4) managed to obtain a degree, as indicated in Figure 4.3 below.

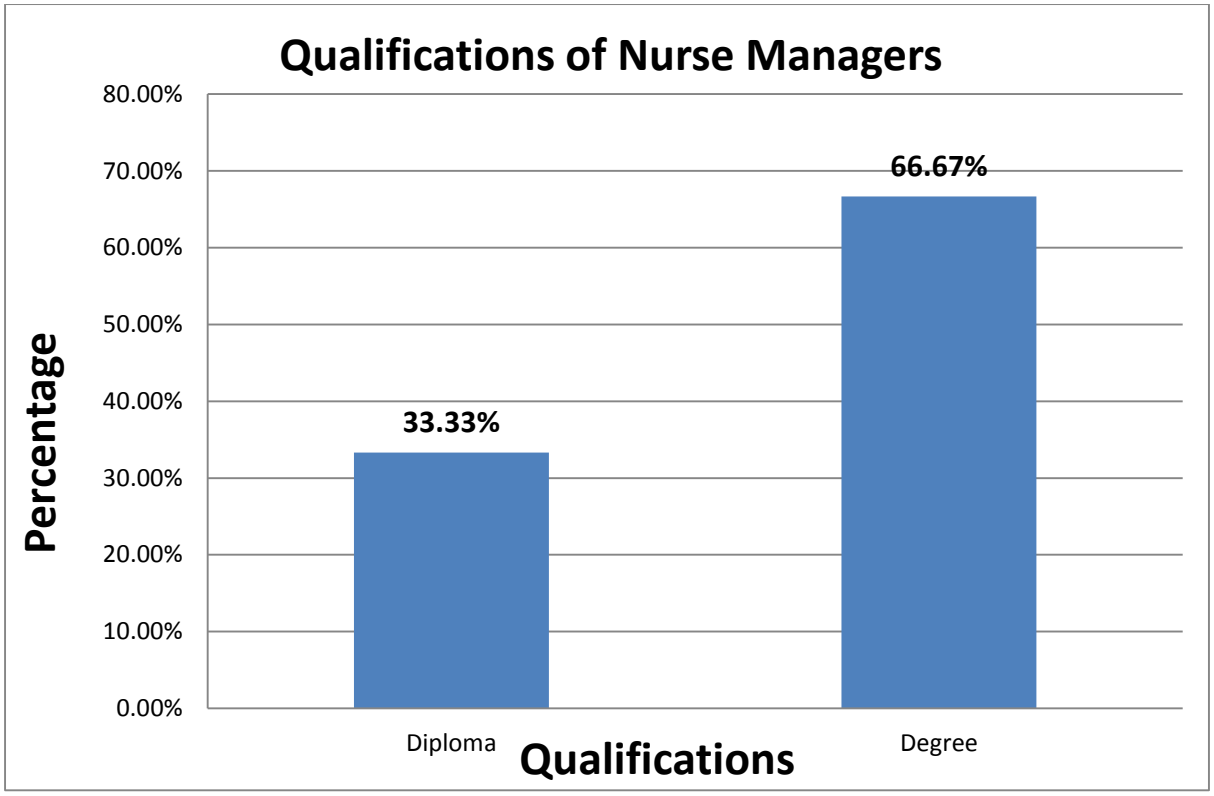

Figure 4.3: *Level of qualification of nurse managers*

In-service *training* is of the utmost importance, as it keeps HCWs updated with the latest developments. According to the study, 83,33% (n=5) of the nurse managers received specific training on how to provide care and support to a diabetic patient after completion of their basic nursing qualifications and 16,67% (n=1) attended diabetic conferences regarding endocrinology at the University of the Free State. It is important to note, as explained by the nurse managers, that in-service training occurred shortly after they had completed their basic training and regular in-service training did not take place, influencing the care provided to patients in the CHC and PHC.

4.2.1.2 Demographic information of professional nurses

According to the South African Nursing Council (2014:1), 87,6% of the professional nurses appointed in the Free State were female and 12.4% were male. The *gender* distribution amongst Professional Nurse in this study is similar to the gender distribution in the Free State. In this study, 81,48% (n=44) of the professional nurses were female, compared to 18,52% (n=10) males.

The median age of the professional nurses in the study was 48,5 years, with 40 years the minimum and 63 years the maximum age. Because the South African Nursing Council did not publish the raw data regarding age distribution of nurses in South Africa, the researcher was not able to compare the data with that found in the study.

The Professional Nurses' *language* distribution is depicted in Table 4.4 according to frequency and percentage. The fact that the majority of the professional nurses (61,11%) was Sesotho speaking could be expected, since the Free State is predominantly a Sesotho-speaking province (Statistics South Africa, 2014:6-10).

Table 4.4: *Language distribution of professional nurses according to frequency and percentage*

Language	Frequency (N=54)	%
Afrikaans	n=3	5,56%
English	n=2	3,70%
Sesotho	n=32	61,11%
Setswana	n=9	16,67%
isiXhosa	n=6	11,11%
isiZulu	n=2	3,70%

Within the Public Health sector in South Africa, professional nurses generally fill three titles within posts, namely that of Professional Nurse, Senior Professional Nurse and Chief Professional Nurse (South Africa, Department of Public Service and Administration, 2007:1-22) .The distribution of *job titles* amongst professional nurses in this study were as follows: professional nurses 83,33% (n=45), senior professional nurses 14,81% (n= 8) and chief professional nurses 1,85% (n= 1).

Furthermore, a significant percentage of the professional nurses' educational levels obtained were reflected as 74,07% (n=40) being on diploma level, while 24,07% (n=13) had managed to obtain a degree and 1,85% (n=1) had completed a master's degree, as indicated in Figure 4.4 below.

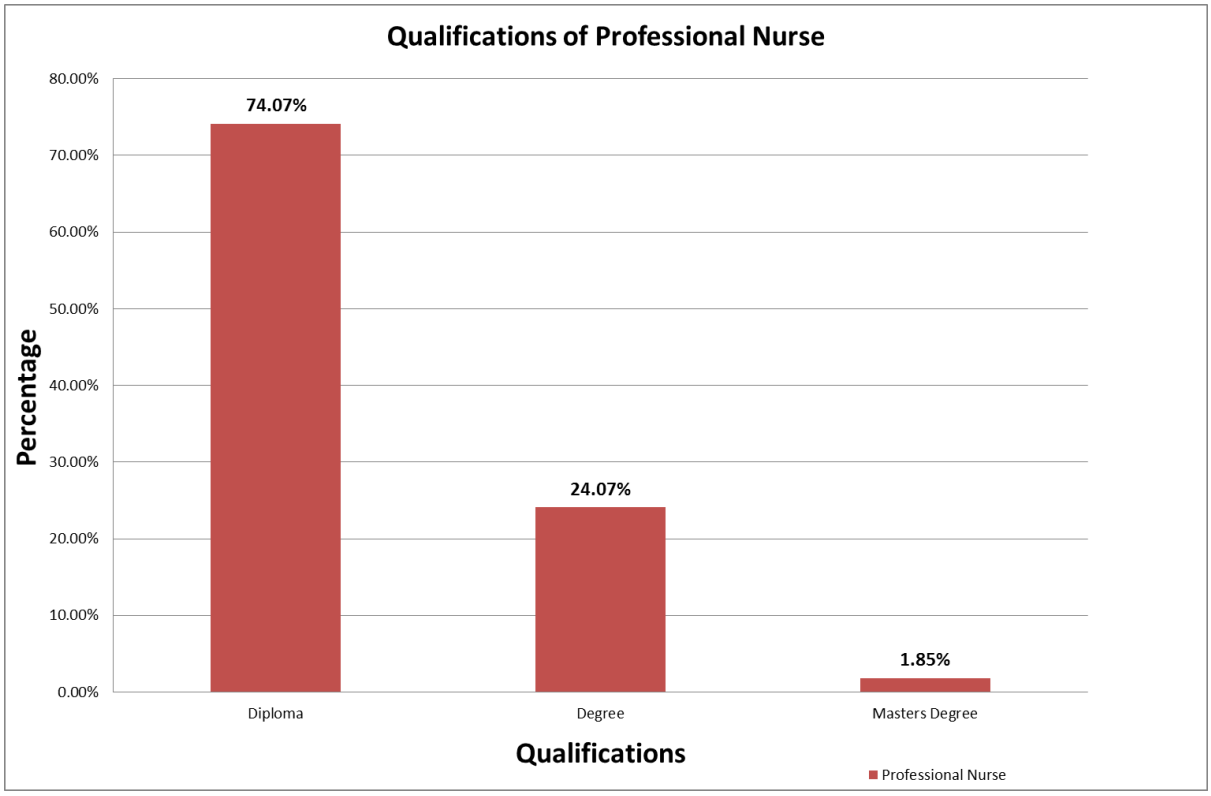

Figure 4.4: *Level of qualification of professional nurses*

According to the study, 17,31% (n=9) professional nurses had received specific *training* on how to provide care and support to a diabetic patient after completion of their basic nursing qualifications and 82,69% (n=43) had not received any training regarding DM after completion of basic training. Emferm (2010:16) states in a study on training of professionals in Diabetes Mellitus education that HCWs have insufficient knowledge regarding diabetes mellitus and require continuous education.

4.2.1.3 Demographic information of community healthcare worker

A Nigerian study exploring the effectiveness and feasibility of CHCWs found more female workers than male workers within a community health context (Lehmann & Sanders, 2007:7). The majority of the CHCWs in this study were also female. Females constituted 86,96% (n=40), compared to 13,04% (n=6) males. Lehmann and Sanders (2007:7) further state that the age of CHCWs in Nigeria varies between 20 years and 45 years. The minimum age for CHCWs in the study also appears to be similar, with 23 years being the minimum, 35,5 years the median age and 54 years the maximum age distribution.

The CHCWs' *language* distribution in frequency and percentage is depicted in Table 4.5. Again, this language distribution can be expected in a predominantly Sesotho-speaking province where the majority of CHCWs (60,87%) is Sesotho-speaking (Statistics South Africa, 2014:6-10).

Table 4.5: *Language distribution of community healthcare workers according to frequency and percentage*

Language	Frequency (n= 46)	%
English	n=1	2,17%
Setswana	n=5	10,87%
Sesotho	n=28	60,87%
IsiXhosa	n=9	19,57%
IsiZulu	n=2	4,35%
Other	n=1	2,17%

Less than a third (32,61%, n=15) of the CHCWs' *job titles* reflected them as being CHCWs, (23,91%, n=11) *HIV counselling and testing,* (17,39%, (n=8) *Community-based monitoring,* (21,74%, n=10) *lay counsellors and* (4,35%, n=2) as *support group facilitators*. Dudley (2016:1) explains that all laypersons providing care in health facilities or communities are appointed as CHCWs, irrespective of the functions (or other job titles they may have). A similar finding was seen in this study, where CHCWs reported various job titles, although they all performed health-related duties as CHCWs.

Statistics South Africa, (2012:1) states that less than a third of South Africans have completed Grade 12. A grade equals one year's schooling, with children in South Africa therefore completing school after 12 years or Grade 12. According to the results, 28,4% of the South African population completed Grade 12 in 2014, an increase when compared to the 20,4% in 2001. When comparing the Census results, the group of HCWs participating in the study had a much higher educational level than the national average, namely 58,70% (n=27) Grade 12 completion. Almost half the CHCWs (36,96%, n=17) had some high school education (Grade 8-12). See Figure 4.5 reflecting the qualification status of the CHCWs.

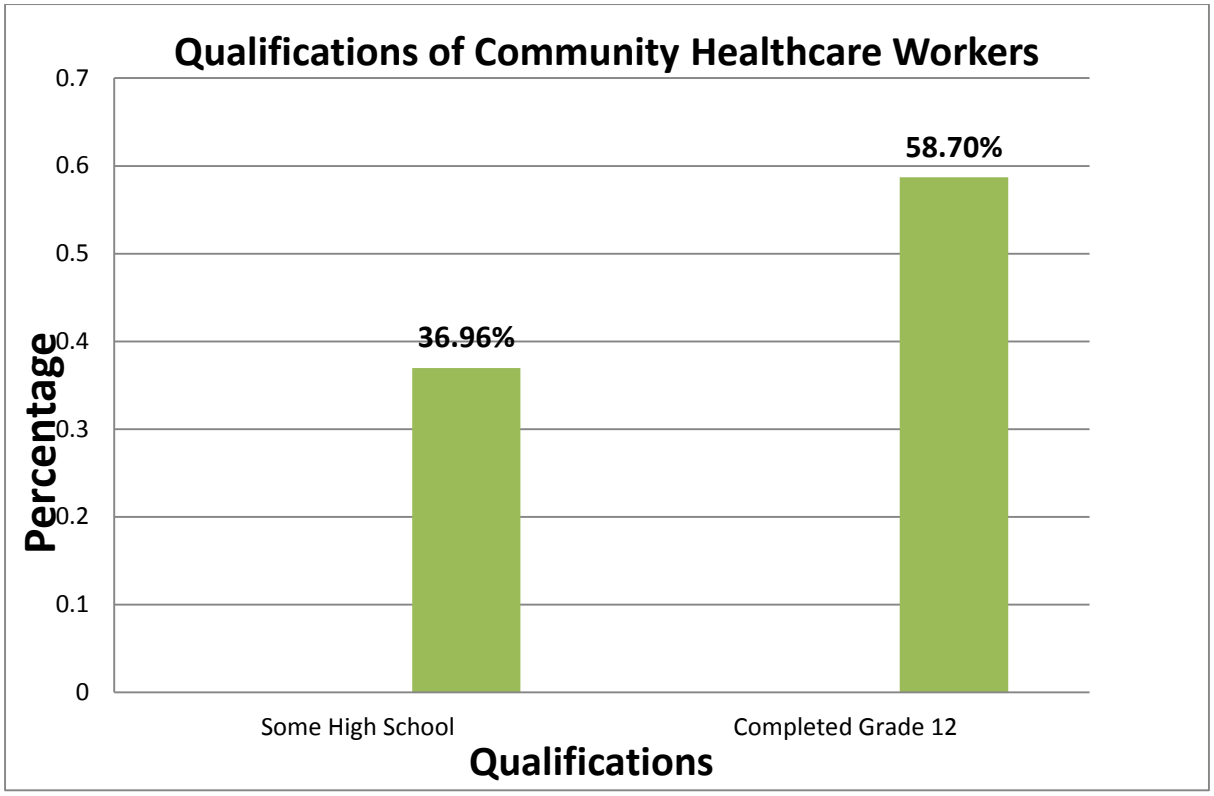

Figure 4.5: *Level of qualification for community healthcare workers*

Shah, Kaselitz & Heisler (2013:163-171) point out in a study the role of CHCWs in diabetes amongst underserved Latino and African American patients, which CHCWs interventions have been found to be a promising strategy for improving diabetes outcomes as they not only address aspects of the patients at individual level but also at community level. Due to this finding, it is evident that the CHCWs form an integral part in the management of T2DM patients in the community and being lay workers they need to be trained on a regular basis in order to meet the needs of the community.

In the study, 4,3% (n=2) CHCWs indicated that they had received *training* on how to take care of ill people at home; 2,17% (n=1) CHCW indicated that he or she had received training on diabetes; and only 2,17% (n=1) CHCW indicated he or she had received training on a healthy diet for a diabetic patient. 91,3% (n=42) of the CHCWs, however, preferred not to answer, as they had not received any training. Ngwabe and Govender (2014:133-143) have reviewed the health-worker programme in South Africa and indicate that CHCWs should receive ongoing training, which would enable them to respond to the particular needs of the community and to the

changing policy priorities. The challenges experienced with system issues will be described next.

4.3 SYSTEMS ISSUES

In this study, system issues refer to work-related aspects the HCWs may have difficulty in dealing with, possibly causing frustration to the HCWs. This section will describe the aspects causing frustration for the nurse manager and the professional nurse. The type of care provided by CHCWs will be highlighted and the available infrastructure at the PHC and CHC, according to the nurse manager and the professional nurse, will be explained.

4.3.1 Causes of frustration for the nurse manager

On the question related to aspects that mostly cause frustration in the work place, responses received were grouped thematically under health-system issues. Health-system issues as identified by the nurse managers referred to aspects such as inadequate equipment, understaffing and no support from senior managers.

According to a report in the *Volksblad* (2014:1), the Free State Department of Health had inadequate equipment in order to provide a medical service to patients. Only emergency cases were addressed. Dudley (2016:1) who had explored human resource crises within the Public Health sector in South Africa proved that although the level of responsibility of nurses has increased, the availability of nurses has diminished. A similar study conducted in California, Pennsylvania, New Jersey and Florida regarding HCWs' frustrations and problems with patient care revealed, patient satisfaction were much lower when nurses were frustrated or burned out, due to staff shortages (McHugh *et al.,* 2011:202-210). In another study conducted among primary healthcare workers in Tanzania, it was shown that nurse managers were not systematic with their supervision and were not supportive of the HCWs (Manongi, Merchant & Bygbjerg, 2006:10). All (n=6) the nurse managers indicated that they were frustrated and identified that their frustrations were caused due to health-systems issues.

4.3.2 Causes of frustration for the professional nurse

The causes of frustration identified by the professional nurses in the workplace were health-system issues and patient care. Professional nurses identified health-system issues such as staff shortage, shortage of equipment, political interference and low salaries. Issues related to patient care, included responses such as patients not knowing their conditions and defaulters increasing daily.

Professional nurses are challenged with frustrations on a daily basis. Similar problems experienced by HCWs in various other studies will be highlighted. Ward (2014:1) has proved in a report regarding common problems of HCWs that shortage of staff is identified as one of the nine common problems that nurses experience. Bowman (2013:1) has indicated in a study conducted in the United Kingdom that professional nurses perceive the core of their frustration to be their workload, lack of resources and increased pressure to cope with their work. According to the *Modern Ghana News* (2006:1), a newspaper distributed in Ghana, people were given appointments in the public sector; not for integrity, but as a reward for political patronage, which demotivated officials appointed, as these unfair appointments had a negative effect on HCWs who worked extremely hard in achieving qualifications for the service they are appointed to. This situation is also experienced in South Africa.

In another study regarding human resource crises in the public sector, Dudley (2016:1) has found that nurses leave South Africa due to low salaries. Visagie and Schneider (2014:1) verify that the principles of primary healthcare cannot be implemented, as patients do not understand their condition and are not able to be involved in their healthcare management. A study conducted amongst the Labuan community, situated close to the South China Sea, has shown that patients default due to long waiting times, improper management in the diabetic clinic and lack of knowledge of the HCWs (Norheizum, 2012:6). In this study the majority of the professional nurses 72,22% (n=39) indicated that their frustration was caused due to health-system issues, while 27,78% (n=15) of the professional nurses indicated that their frustration was due to patient-systems issues (See Figure 4.7).

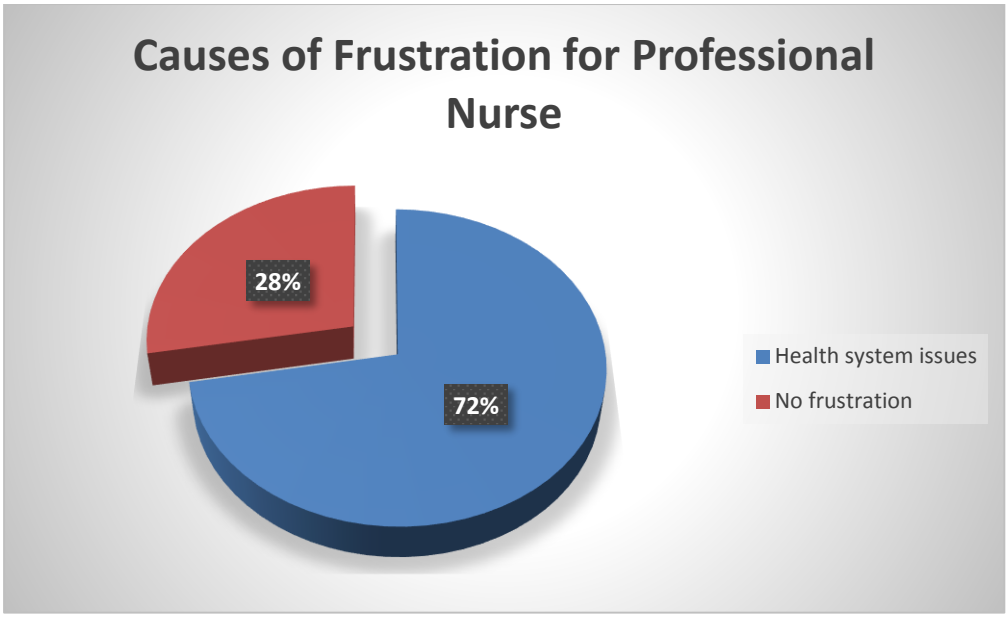

Figure 4.7: *Causes of frustration for professional nurses*

4.3.3 Type of care provided by the community healthcare worker

Lehmann and Sanders (2007:6-8) have explored the roles of CHCWs in the Western Cape and verified that they often provide some basic direct services such as first aid, treating minor illnesses, promotion of sanitation and hygiene to members in the community. These researchers further stated that CHCWs also provide some types of health screening such as screening for communicable diseases, performing health-education activities, collecting statistics, maintaining records and providing healthcare referrals.

The responses received from the type of care provided by the CHCWs were grouped into basic healthcare and screening tests. Basic healthcare as identified by CHCWs included activities such as home visits, washing and weighing of patients. Screening tests include taking the blood glucose, blood pressure, urine testing, health education and administration of medication. The majority (56,52%, n=26) CHCW indicated that they provided basic healthcare.

Available infrastructure, a factor contributing to frustration among HCWs, will be described next. A description of the responses of the nurse managers and professional nurses regarding available infrastructure in the PHC and CHC, will be highlighted next.

4.3.4 Available infrastructure

The available infrastructure at the PHCs and CHCs is of the utmost importance in order to provide a quality service to the patients diagnosed with DM. Equipment form an important part of infrastructure. *Volksblad* (2014:1), a provincially distributed newspaper, reported the Free State as not having the basic equipment needed in order to provide healthcare to communities. In another African study conducted in Nigeria at PHC facilities, poor quality of services was directly linked to a lack of equipment (Ehiri *et al*., 2005:181-191). Figure 4.8 depicts how the nurse managers and professional nurses reported on the available infrastructure in PHC clinics and CHC centres.

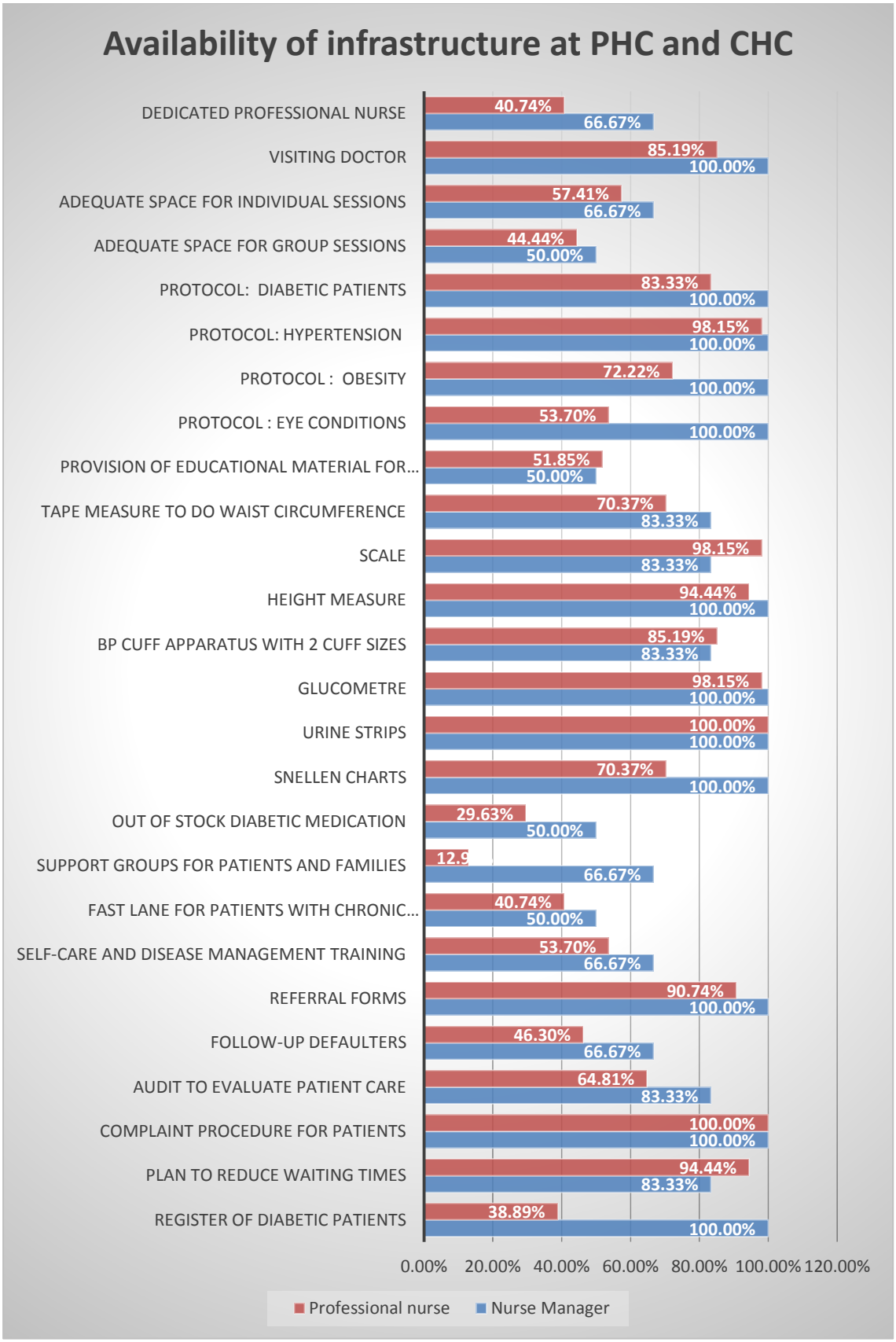

Figure 4.8: *Availability of infrastructure according to nurse managers and professional nurses*

Research conducted in the United Kingdom regarding the *diabetes specialist nurse* revealed that the diabetes specialist nurse plays an important role in caring for and supporting patients and families throughout the duration of an illness while the dedicated nurse gives individual attention to the patient and provides holistic care (Lawal, 2015:1). In this study, the majority (66,67%, n=4) of the nurse managers and 40,74% (n=22) of the professional nurses reported that the PHCs and CHCs had a dedicated professional nurse attending to DM patients. The availability of a diabetes specialist nurse at the majority of the PHC clinics and CHC centres, will contribute positively to individualised and holistic attention provided to patients.

A study related to primary healthcare practice conducted in the Eastern Cape by Brady (2013:1) verifies that PHC clinics should be led by nurses, but *doctors* should visit the clinic regularly in order to see patients who present with conditions that lie outside the scope of practice of the professional nurses. An opportunity for training and mentoring is also provided during such doctor visitation sessions at clinics. In the study all (100%, n=6) of the nurse managers and 85,19% (n=46) of the professional nurses reported that the PHCs and CHCs have a doctor visiting the PHC and CHC. Regular doctors' visits to clinics will allow patients to be treated promptly and staff to be developed on a regular basis.

Parker (2008:57) declares in a study conducted in the Western Cape PHCs that a lack of space prevents the provision of counselling and education at the PHC, as confidentiality and privacy are required. More than half the nurse managers (66,67%, n=4) and 57,41% (n=31) of the professional nurses agreed that adequate *space* is available for *individual sessions* with patients. It is therefore evident that confidentiality and privacy can be maintained at the majority of PHC clinics and CHC centres in the Free State.

A Brazilian study that explored the advantages of group sessions has revealed that *group sessions* for chronic patients were a therapeutic strategy used for health education, sharing of uncertainties and anxieties, as well as providing care and support in the event of complications (Enfermagen, De Melo & De Campos, 2014:984). Half (50%, n=3) the nurse managers and 44,44% (n=24) of the professional nurses indicated that the PHC and CHCs could accommodate patients for *group sessions*. As only 50% of the PHC and CHCs are able to accommodate

patients for group sessions, half the patients at the PHC clinics and CHC centres will be excluded from the positive effects of sharing information experienced by patients where group sessions are possible.

Set *protocols* enables workflow to become smooth and more purposeful (South Africa Department of Health, 2011c:xv; The South African Department of Health, 2011a:7: Primary Care 101b:5). Guidelines provide protocols used in the treatment of patients with type 2 DM, namely the protocols for diabetes management, hypertension, obesity and eye conditions (South Africa Department of Health, 2011b:xv).

It was confirmed, according to the World Health Organisation regarding protocols for health promotion, prevention and management of non-communicable diseases at primary care level that the main purpose of a protocol is to assist health personnel and managers nationally or locally to implement algorithms for Non-Communicable Diseases with prevention and control at primary-care level (WHO, 2015:1). All nurse managers (100%, n=6) and 83,33% (n=45) of the professional nurses indicated availability of *protocols for diabetes management.* If such a high percentage of HCWs declares the availability of protocols, it should have a positive influence on health promotion, and the prevention and management of non-communicable diseases.

All the nurse managers (100%, n=6) and 98% (n=53) of the professional nurses indicated *protocols for hypertension* was available.

The WHO (2015:1) has further verified that the purpose of a protocol is also to prevent non-communicable diseases locally and at the first contact with the patient. HCWs should be able to identify signs and symptoms of non-communicable diseases. All the nurse managers (100%, n=6) and more than half (72,22%, n=39) of the professional nurses (See Figure 4.8) indicated the availability of *protocols for obesity.* If the majority of the HCWs indicated the availability of protocols for obesity, then the protocols should assist them in identifying, supporting and referring patients presenting with obesity.

Stivala (2011:2) has confirmed in *protocols* of eye conditions, that it is important for HCWs to understand the signs and symptoms of eye conditions and utilise the

protocol for eyes when screening diabetic patients, as DM causes complications of the eyes. All the nurse managers (100%, n=6) and 53,70% (n=29) of the professional nurses indicated the availability of *protocols for eye conditions.* The availability of protocols as indicated by the nurse managers and the professional nurses would enhance the identification of eye complications and prompt referrals, when necessary.

Due to the high volume of patients attending PHCs and CHCs, it is not always possible for HCWs to provide all information to patients; therefore, educational material provided is crucial in assisting the patient to manage his blood glucose at home (Cavanaugh, 2012:1). A study conducted at the PHC clinics in the Western Cape points out that educational material is beneficial as patients that can read while waiting to see the HCWs, or they can read it later when they have time (Parker, 2008:139). *Educational material* is designed to complement continuous dialogue between HCWs and patients. In the study half the nurse managers (50%, n=3), and more than half (51,85%, n=28) the professional nurses indicated that the PHC and CHCs could provide educational material to patients diagnosed with DM. The low availability of health education material, as indicated in this study, could have a negative impact on the health outcome of the patient, as the patient is not given the opportunity of taking education material home to read it at leisure.

Diabetes professional care (2015:1) recorded larger waists as being closely associated with type 2 diabetes, which is generally more accurate than a body mass index reading. Almost all the nurse managers (83,33%, n=5) and 70,37% (n=38) of the professional nurses indicated that the PHC and CHCs had a *tape measure* to do waist circumference (See Figure 4.8). The availability of a tape measure at the CHC and PHC is important as it is used to measure the waist circumference in diagnosing and following up of patients with DM.

Sokehela (2013:1) states in a study at selected primary healthcare facilities in the EThekwini Municipality, that an accurate body mass index cannot be calculated accurately without a *height measurement and a scale.* All the nurse managers (100%, n=6) and 98,15% (n=53) of the professional nurses reported the availability of scale and height measurement at the PHC and CHC. Due to the majority of the PHCs and CHCs reporting availability of height measurement and a scale, HCWs

should not experience problems in calculating an accurate body mass index for DM patients.

Research done in the United States of America focusing on blood pressure guidelines, has found that the accuracy of readings are influenced negatively when the *blood pressure cuff* is too big or too small (Frese, Fick & Sadowsky, 2011:5-12). Having at least two different cuff sizes, are therefore important to ensure correct readings. The majority of the nurse managers (83,33%, n=5) and 85,19% (n=46) of the professional nurses reported that the PHC and CHCs had a *BP cuff apparatus with two cuff sizes.* Based on the availability of blood pressure cuffs in two sizes, HCWs should be able to detect abnormal blood pressure readings, irrespective of the width of the patient's arm, resulting in prompt diagnosing.

A study conducted in Eastern and Central Europe emphasised the important role a glucometer plays in being able to adjust treatment guidelines as optimally as possible (Czupryniak *et al.,* 2014:460-475). All the nurse managers (100%, n=6) and 98,15% (n=53) of the professional nurses indicated the *availability of glucometers* at PHCs and CHCs. The availability of glucometers in the public health facilities of the Free State should influence optimal blood glucose readings positively as well as prompt treatment and referral of DM patients, when necessary.

Magotlane *et al*. (2013:837-845) have verified that *urine tests* are done amongst diabetic patients to evaluate severe hyperglycaemia. Magotlane *et al*. (2013:837-845) further confirm that ketones and proteins in the urine gives an indication of kidney failure. All the nurse managers and professional nurses reported the availability of *urine strips* at the PHCs and CHCs. As urine strips are readily available it should result that hyperglycaemia is easily detected and treated.

According to Casey (2011:20), regarding the use of *snellen charts* in New Zealand, it was found that these charts are important to determine the degree of eyesight patients have, as blindness has been identified as a complication of diabetes mellitus. All the nurse managers and 70,37% (n=38) of the professional nurses indicated the availability of snellen charts. The unavailability of snellen charts at some PHCs and CHCs, as indicated by the professional nurses' results that those

clinics that do not have snellen charts are excluded from the eye-care service with the result that eye complications will not be detected early.

In 2014, *Volksblad* (2014:1), a provincially distributed newspaper, reported that the Free State was experiencing *drastic shortages of medication*. This problem was evident in the study as 50% (n=3) of the nurse managers and 29,63% (n=16) of the professional nurses reported that the PHCs and CHCs had been out of stock of diabetic medication for the past month, which would affect consistently controlling the blood glucose of DM patients negatively.

According to the Joslin Diabetes Centre (2015:1), it is important for a patient diagnosed with diabetes to have a support system where patients can discuss best practices and provide support to one another. On the question of *support groups* for patients and families, more than half the nurse managers (66,67%, n=4) and very few 12,96%, n=7) of the professional nurses indicated that they provided support to DM patients. If a patient diagnosed with DM is not able to get support from the PHC and CHC, it will affect the self-management of the patient negatively.

Sokehela (2013:1), who has explored fast queues at selected primary healthcare facilities in the eThekwini Municipality, has found that the *fast lane* is a strategy of addressing waiting times of patients. Half the nurse managers (50%, n=3), compared to less than half (40,74%, n=22) the professional nurses indicated that facilities provided for a *fast lane* for patients with chronic diseases. It is evident from the findings of this study that a fast lane is not implemented at the majority of the PHC clinics and CHC centres, which will affect patients' attendance negatively due to long waiting times at the clinic.

On the question of patients' *training in self–care and disease management* more than half the nurse managers (66,67%, n=4) and 53,70% (n=29) of the professional nurses indicated that they provided such training. Self-care within a PHC environment afforded patients with chronic diseases the opportunity to manage their own disease by identifying their own problems and finding techniques to address such problems (Bodenheimer *et al.,* 2010:2471).

In order to ensure continuity of care of patients between clinics and hospitals, *referrals* need to be managed in such a way that a two-way communication between

the institutions exists (Brady, 2013:1). A prominent DM guideline used at PHC clinics and CHC centres, the Primary Care 101 Symptom-based integrated approach to the adult in primary care 2013/2014 provides guidelines to HCWs regarding referring patients diagnosed with DM from PHCs and CHCs to hospitals (South Africa Department of Health, 2014:70). All the nurse managers and the majority (90,74%, n=49) of the professional nurses agreed that the PHCs and CHCs had referral forms. The availability of referral forms at the public health centres will influence the communication and referral of patients to the level of care required positively.

The National-Level Conference Report, Strengthening Chronic Diseases in Ethiopia confirms that defaulter tracing assists with follow-up, data capturing and a proper reporting system of DM patients (Sugar, 2011:15). The majority of the nurse managers (66,67%, n=4) and 46,30% (n=25) of the professional nurses stated that the PHCs and CHCs followed up on defaulters. As defaulters in this study are not followed up at all PHC clinics and CHC centres, it will result in patients not being reported or followed up regularly, as well as complications developing.

A study conducted in 53 countries of the World Health Organisation European Regions by Flotterp *et al.* (2010:iv) proves that *audit* and feedback can be used in all health settings as either individual mentoring or in multi-professional teams. Almost all the nurse managers (83,33%, n=5) and more than half the professional nurses (64,81%, n=35) indicated that audits were done to evaluate patient care. It is evident from the study that audits are implemented at the majority of the public health clinics, which influence the identification of strengths and weaknesses of the HCWs positively and highlight areas requiring development.

Miller (2013:1) states that a *complaint procedure* provides the institution with the opportunity to improve the service and maintain respect and loyalty of the patient. All the nurse managers and professional nurses indicated that PHCs and CHCs had a complaint procedure in place for patients. The availability of the complaint procedure at all PHCs and CHCs will affect the type of service provided by the HCWs positively, as the community is permitted to raise problems experienced during patient care without fear of victimisation.

A study conducted in the Western Cape involved HCWs in suggesting practical solutions to reduce *waiting times* of patients. Procedures were adjusted and technology improved, leading to a substantial reduction in waiting times for patients (Sastry *et al*., 2015:1-26).The majority of the nurse managers (83,33%, n=5) and 94,44% (n=51) of the professional nurses indicated that the PHCs and CHCs planned to reduce waiting times by implementing the decanting process of the reengineering of health care. If all PHCs and CHCs could reduce waiting times, it would influence the attitude of the patient positively towards regular clinic attendance and decrease the number of defaulters.

In order to ensure that all diabetic patients are identified and tracked, a study conducted by the Centre for Diabetes and Endocrinology in Houghton (Brown, 2015:4) recorded the importance of *a diabetic register*. The diabetic register helps HCWs to ensure that patients receive the care they need, when they need it. All the nurse managers (100%, n=6) and less than half the professional nurses (38,89%, n=21) indicated availability of a register for diabetic patients. The researcher's personal experience was that these registers where unfortunately not readily available or if they were, then they were not kept updated. It was therefore not possible for the researcher to estimate the number of patients with diabetes being cared for in the Free State public health sector.

The researcher hereby wishes to note that the actual availability of infrastructural elements depicted in Figure 4.8 was not evaluated or audited by the researcher. The researcher noted a difference in available infrastructure reported by the nurse managers and professional nurses. The reason as to why this discrepancy was reported was not investigated during this study. One possible reason may be that communication between professional nurses and nurse managers may not be optimal.

4.4 PART II KNOWLEDGE REGARDING DIABETES

In this study, knowledge regarding DM comprised details regarding signs and symptoms of DM, complications, management as well as levels of blood glucose. The knowledge information of the nurse manager and the professional nurse will be discussed.

4.4.1 Knowledge information of the nurse manager and professional nurse

The response from the *knowledge* questions for the nurse manager and the professional nurse will be discussed simultaneously, as the same questions were posed to this cadre of HCWs. The knowledge component of the CHCWs will be described separately as highlighted in Figure 4.2. The discussion will be structured according to data analysed and presented in Table 4.6. The question numbering in Table 4.6 reflects numbering of questions as in questionnaire (see Addenda B1 and B3).

Table 4.6: *Knowledge regarding diabetes for the professional nurse and nurse manager*

Knowledge element	**Nurse manager (N=6)**			**Professional nurse (N=54)**		
	True % n=	**False**	**Unsure**	**True % N=**	**False**	**Unsure**
2.1 1 Poor control of diabetes could result in a greater chance of complications	100% n=6			96,30%, n=52	1,85% n=1	1,85% n=1
2.1.2 A substantial decrease in BMI will lower a patients' risk profile	100% n=6			81,48% n=44	5,56% n=3	12,96% N=7
2.1.3 Eating a diet high in sodium will assist with blood glucose control	33,33% n=2	66,67% n=4		24,07% n=13	50% n=27	25,93% n=14
Signs and symptoms of hyperglycaemia						
2.2.1 Chest pain	50% n=3	33,33% n=2	16,67 % n=1	16,67% n=9	61,11% n=33	22,22% n=12
2.2.2 Polydipsia	100% n=6			90.74% n=49	5,56% n=3	3,70% n=2
2.2.3 Confusion	100% n=6			87.04% n=47	7,40% n=4	5,56% n=3
The following is a possible complication associated with diabetes						
2.3.1 Retinopathy	100% n=6			98,15% n=53		1,85% n=1
2.3.2 Chronic kidney disease	100% n=6			88.89% n=48	3,70% n=2	7,41% n=4
2.3.3 Chronic obstructive pulmonary disease	66,67% n=4	33,33% n=2		25,93% n=14	50% n=27	24,07% n=13
Regular exercise would benefit the DM patient						
2.4.1 Glycaemic control	100% n=6			90,74% n=49	3,70% n=2	5,56% n=3
2.4.2 Peripheral neuropathy	100% n=6			68,52% n=37	18,52% n=10	12,96% n=7
2.4.3 Weight loss	100% n=6			96,30% n=52		3,70% n=2

Knowledge element	Nurse manager (N=6)			Professional nurse (N=54)		
	True % n=	False	Unsure	True % N=	False	Unsure
Metformin is contraindicated in						
2.5.1 Chronic kidney disease	33,33% n=2	16,67% n=1	50% n=3	24,05% n=13	27,75% n=15	48,10% n=24
2.5.2 Patients on insulin	50% n=3	50% n=3		27,45% n=14	43,14% n=22	33,30% n=18
2.5.3 Impaired lung function	33,33% n=2	50% n=3	16,67 % n=1	13,46% n=7	32,69% n=17	53,85% n=30
2.5.4 I don't know						
2.5.5 Other, specify						
2.6.1 Retinopathy is a possible complication associated with diabetes						
Retinopathy is a possible complication associated with diabetes	100% n=6			98,15% n=53		1,85% n=1
What would give you a high index of susceptibility for diabetes?						
2.7.1 Polycythaemia	50% n=3	50% n=3		17,31% n=9	42,31% n=22	40,38% n=23
2.7.2 Polyphagia	100% n=6			57,69% n=30	21,15% n=11	21,15% n=13
2.7.3 Polyuria	100% n=6			94,44% n=51	3,70% n=2	1,85% n=1
Aggravating factors for diabetes are ...						
2.8.1 Hypertension	83,33% n=5	16,67% n=1		77,36% n=41	11,32% n=6	11,32% n=7
2.8.2 Epilepsy	66,67% n=4	33,33% n=2		11,32% n=6	58,49% n=31	30,19% n=17
2.8.3 Obesity	100% n=6			96,23% n=51		3,77% n=3

The Heart and Stroke Foundation of South Africa (2015:2) states that uncontrolled diabetes can damage different body systems of a patient. All the nurse managers and the majority (96,30%, n=52) of the professional nurses knew that *poorly controlled diabetes mellitus* could result in a greater chance of complications. One professional nurse disagreed with the statement that poorly controlled diabetes mellitus can result in a greater chance of complications, and one was uncertain. The good understanding of HCWs regarding poorly controlled DM should assist these HCWs in providing health education to patients in order for patients to understand the importance of controlling their blood glucose regularly and so limit possible systemic complications.

According to the American Diabetes Association (2015:3), the *body mass index* of all patients who are obese and overweight should be determined in order to detect T2DM. All the nurse managers and the majority of the professional nurses (81,48%, n=44) agreed with the statement that a substantial decrease in BMI would lower a patient's risk profile. However, the minority of the professional nurses (5,56%, n=3) disagreed and 12,96% (n=7) were unsure. As the majority of the HCWs understood the implications of being obese and the relation to the body mass index, they should be able to implement preventative strategies to make patients aware of the negative impact of being overweight or obese.

The Heart and Stroke Foundation of South Africa (2015:2) further states that sugar, salt and alcohol should only be used in limited quantities, and only by well-controlled diabetics. The American Diabetes Association (2015:3) recommends that people with diabetes should aim to have 2 300 mg or less salt per day. The majority (66,67%, n=4) of the nurse managers and half (50%, n=27) the professional nurses correctly indicated that *eating a diet high in sodium would not assist with blood glucose control,* whereas less than half (33,33%, n=2) the nurse managers and 24,07% (n=13) of the professional nurses agreed with this statement. 25,93% (n=14) of the professional nurses indicated that they were uncertain. As some of these HCWs were aware that a high salt intake did not directly, affect glucose control but impacts on the blood pressure that affects glucose control. They should be in a position to inform patients what the side effects of high salt intake would be on DM patients.

It has been proven by Hamdy (2015:1), who explored diabetic ketoacidosis clinical presentation, that *chest pain* is a symptom of hyperglycaemia if associated with heart attack. The questionnaire duplicated exploring the link of chest pain to hyperglycaemia (2.2.1 and 3.3.1). The following data were obtained for questions 2.2.1 and 3.3.1. Half (50%, n=3) of the nurse managers and 16,67% (n=9) of the professional nurses agreed with the statement in question 2.2.1 that chest pain is a symptom of hyperglycaemia, whereas in question 3.1.1, 50% (n=3) of the nurse managers and 12,96% (n=7) of the professional nurses agreed with the statement. The total of these HCWs who responded do not add up to 6 for the nurse managers and 54 for the professional nurses because they chose to answer more than one

option. The fact that the nurse managers and the professional nurses provided different answers to the same question implies that these HCWs were not sure about these facts, implies that they will not be able to educate the patients that chest pains could be a symptom of hyperglycaemia.

Amod *et al.* (2012:22) identify excessive thirst, polyuria, polydipsia, weight loss and blurred vision as symptoms of hyperglycaemia. This question was also duplicated in questions in 2.2.2 and 3.1.2 and the following results were obtained. Initially, all the nurse managers (100%, n=6) and 90,74% (n=49) of the professional nurses correctly indicated *polydipsia* as a sign of hyperglycaemia. The minority (5,56%, n=3) of the professional nurses disagreed with the statement and 3,70% (n=2) of the professional nurses were uncertain. In question 3,.1.2, 83,33% (n=5) of the nurse managers and 59,2% (n=32) of the professional nurses agreed with the statement. The fact that these HCWs responded differently to the same question, also means that they were not sure of the answer. The total of the HCWs also do not add up to 6 for the nurse managers and 54 for the professional nurses, because they selected more than one answer. This uncertainty, whether polydipsia is a sign of hyperglycaemia, means that the nurse managers and professional nurses will not be able to identify possible patients suffering from DM at the PHC and CHC during screening.

Magotlane *et al*. (2013:837) have verified that if a patient presents with hyperglycaemia, he will complain of confusion. This question was also duplicated by the researcher in question 3.1.3 and the following results were obtained. All the nurse managers (100%, n=6) and 87,04% (n=47) of the professional nurses indicated *confusion* as a sign of hyperglycaemia, whereas 7,40% (n=4) of the professional nurses did not think confusion was associated with hyperglycaemia and 5,56% (n=3) were uncertain; they did not think confusion was associated with hyperglycaemia. In question 3.1.3, 83,33% (n=5) of the nurse managers and 70,37% (n=38) of the professional nurses agreed with the statement that confusion is a sign of hyperglycaemia. These HCWs once again responded differently to the same question, which also indicated the uncertainty of the nurse managers and the professional nurses regarding confusion as a sign of hyperglycaemia. The total of

these HCWs also do not add up to 6 for the nurse managers and 54 for the professional nurses, as they selected more than one answer.

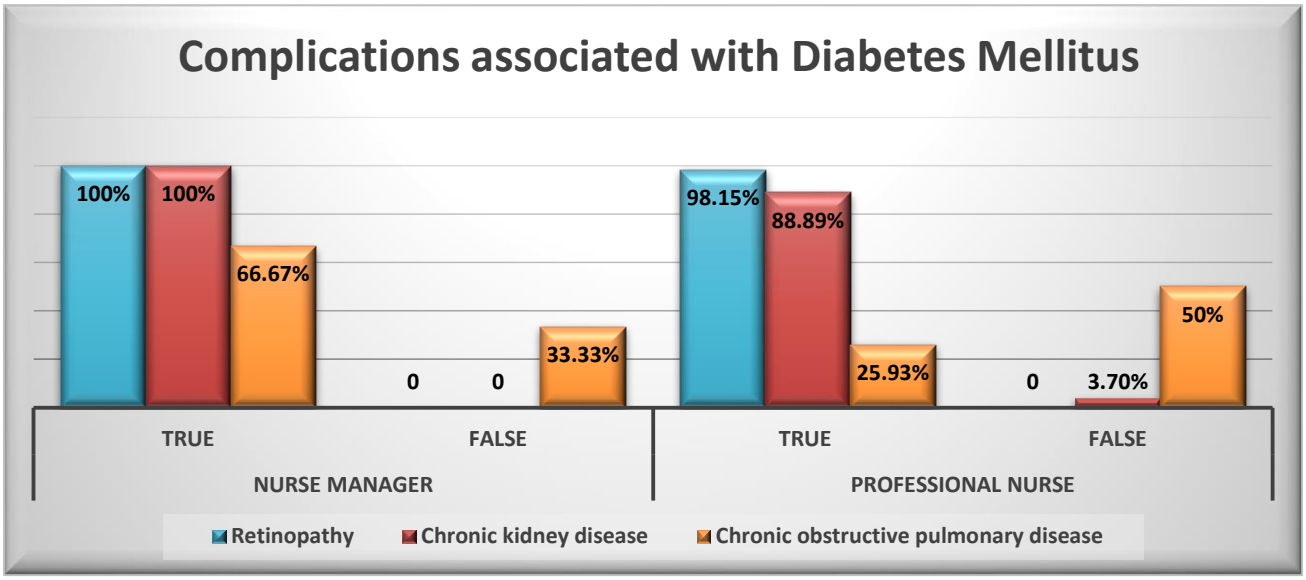

Figure 4.9: *Complications reported to be associated with diabetes mellitus.*

Amod *et al*. (2012:S67), in the 2012 SEMDSA guideline for the management of T2DM, state that many people who suffer from DM may develop some form of eye disorder such as retinopathy if blood glucose control is not good. All the nurse managers (100%, n=6) and 98,15% (n=53) of the professional nurses indicated that *retinopathy is a possible complication* associated with diabetes, whilst 1,85% (n=1) of the professional nurses indicated they were unsure. However, in question 2.6.1, all nurse managers and 98,15% (n=53) of the professional nurses agreed with the statement that retinopathy is a complication of DM. It is therefore once again evident that the nurse managers provided a consistent answer whilst the professional nurses were uncertain regarding whether retinopathy is a complication of DM. This shows that the professional nurses did not have the knowledge regarding retinopathy may be a complication of DM and would not be able to ensure that DM patients are screened to ensure prompt referral, if necessary.

Amod *et al*. (2012:S67), in the 2012 SEMDSA guideline for the management of T2DM, further state that approximately 40% of patients who suffer from DM will develop chronic kidney disease. This question was duplicated by the researcher in question 3.2.2. The following data were collected. All the nurse managers (100%, n=6) and the majority (88,89%, n=48) of the professional nurses indicated *chronic*

kidney disease as a complication of DM, whilst the minority (3,70%, n=2) of the professional nurses indicated that they did not associate chronic kidney disease with diabetes, compared to 7,41% (n=4) of the professional nurses who were unsure whether there was an association or not (See Figure 4.9). From these results, one can deduce that these HCWs do not understand the relation between DM and chronic kidney diseases. The totals of the nurse managers and the professional nurses also do not add up to 6 and 54, respectively, because they selected more than one answer.

According to a study done on recognising serious chronic obstructive pulmonary disease complications, it was found that chronic obstructive pulmonary disease is not a complication of diabetes (Faris, 2015:1). This question was once again duplicated in question 3.2.3. The majority of the nurse managers (66,67%, n=4) and 25,93% (n=14) of the professional nurses incorrectly agreed to *chronic obstructive pulmonary disease being a possible complication* associated with diabetes, whereas 33,33% (n=2) of the nurse managers and 50% (n=27) of the professional nurses indicated that there was no association between COPD and DM. Less than a third (24.07%, n=13) of the professional nurses were unsure whether chronic obstructive pulmonary disease was a possible complication associated with diabetes (see Figure 4.9). In question 3.2.3, all the nurse managers and 90,74% (n=49) of the professional nurses agreed with the statement that chronic obstructive pulmonary disease is a possible complication associated with diabetes. Due to the nurse managers' poor understanding of chronic obstructive pulmonary disease being a possible complication associated with diabetes, they would not be able to educate patients in this regard. The totals of the nurse managers and professional nurses do not add up to 6 and 54, respectively, because these HCWs selected more than one answer.

The American Diabetes Association (2015:2) has proven regular exercise as being key to managing diabetes mellitus by lowering cholesterol, control blood glucose, helping to lose weight and improving the quality of life. All the nurse managers (100%, n=6) and 90,74% (n=49) of the professional nurses indicated that *exercise* would assist to control blood glucose not on its own but in combination with another lifestyle strategy. The minority (3,70%, n=2) of the professional nurses did not agree and 5,56% (n=3) of the professional nurses were unsure. The understanding of the

importance of exercise by these HCWs should assist them to encourage patients to exercise and to advise patients regarding activities considered effective during exercises.

All the nurse managers and more than half (68,52%, n=37) the professional nurses indicated that regular exercise would reduce the possibility of developing *peripheral neuropathy* with 18,52% (n=10) of the professional nurses indicating that exercise would indeed lead to the development of peripheral neuropathy and 2,96% (n=7) were unsure. The majority of these HCWs understood that regular exercise would lessen a positive peripheral neuropathy, as they would encourage diabetic patients to exercise regularly in order to prevent peripheral neuropathy.

According to the South African Department of Health Guideline (2014:20), Management of T2DM in adults at primary healthcare level, regular exercise will assist with weight loss and decreasing the blood glucose. Regarding weight loss, all nurse managers and the majority (96,30%, n=52) of the professional nurses indicated that regular exercise would assist with *weight loss,* while 3,70% (n=2) of the professional nurses were unsure. The good understanding of the benefits of weight loss for diabetic patients by the HCWs shows that they should be able to educate patients regarding the effect of weight loss on blood glucose control.

The use of metformin is contra-indicated in renal impairment (Mestrovic, 2015:1). In this study, 33,33% (n=2) of the nurse managers and 24,05% (n=13) of the professional nurses indicated that *metformin is contra-indicated in chronic kidney disease*. The minority of the nurse managers (16,67%, n=1) and 27,75% (n=15) of the professional nurses disagreed with the statement. Half (50%, n=3) of the nurse managers and 48,10% (n=24) of the professional nurses indicated that they were unsure. The fact that the HCWs did not understand that metformin was contra-indicated in patients with renal impairment will result in them not being able to educate patients regarding the use of metformin, should the patients have renal impairment.

Amod *et al.* (2012:14) state that metformin is an antidiabetic medication, taken orally, and is the first-line drug of choice for the treatment of type 2 diabetes. The American Diabetes Association (2015:2) has revealed that a combination of insulin and

metformin results in excellent glycaemic control. Fifty percent of the nurse managers and a third (27,45%, n=14) of the professional nurses indicated that metformin was contraindicated in patients on insulin, whereas half (50%, n=3) of the nurse managers and 43,14% (n=22) of the professional nurses disagreed with the statement. More than a third (33,30%, n=18) of the professional nurses indicated that they were unsure. It is therefore evident that the nurse managers and the professional nurses did not understand the effect of combining insulin with metformin as a first-line drug choice for DM patients. This will result in patients not being able to control their blood glucose, as the choice of medication provided by these HCWs will not be accurate.

According to Mestrovic, (2015:1), three contra-indications for the use of metformin have been identified, namely renal impairment, congestive heart failure and advanced age above 80 years. It is evident that *meformin is not contra-indicated in patients with impaired lung function.* 33,33% (n=2) of the nurse managers and 13,46% (n=7) of the professional nurses indicated that metformin was contra-indicated in patients with impaired lung function. Half (50%, n=3) of the nurse managers and 32,69% (n=17) of the professional nurses disagreed with this statement and 16,67% (n=1) of the nurse managers and 58,85% (n=30) of the professional nurses indicated that they were unsure. This poor response of the nurse managers and the professional nurses means that these HCWs will not be able to educate patients regarding contraindications of metformin.

Simcox and Mc Clain (2013:329-341) state that high levels of iron in the blood indicates a diabetes risk. 50% (n=3) of the nurse managers and 17,31% (n=9) of the professional nurses indicated that *polycythaemia* would give one a high index of susceptibility for diabetes, whilst half (50%, n=3) of the nurse managers and 42,31% (n=22) of the professional nurses disagreed with this statement. Less than half (40,38%, n=23) of the professional nurses indicated that they were uncertain. The poor responses received clearly indicate these HCWs did not understand the relation between DM and polycythaemia. Therefore, the opportunity to diagnose such a patient would most probably be lost.

Polyphagia is a term used to describe increased appetite and is one of the main signs of diabetes (Magotlane *et al.*, 2013:837). All the nurse managers and 57,69%

(n=30) of the professional nurses agreed with the statement that polyphagia would give one a high index of susceptibility for diabetes, whereas 21,15% (n=11) of the professional nurses disagreed with the statement and 21,15% (n=13) of the professional nurses were uncertain. Their understanding regarding polyphagia should assist these HCWs in identifying possible patients suffering from DM at the PHCs and CHCs during screening.

Brown (2015:1) states that patients presenting with *polyuria can have a high susceptibility to diabetes,* as it is one of the major symptoms of the condition. In this study, all the nurse managers and 94,44% (n=51) of the professional nurses agreed with the statement. Only 3,70% (n=2) of the professional nurses disagreed with the statement that polyuria would give one a high index of susceptibility for diabetes, while 1,85% (n=1) of the professional nurses were unsure. The positive response obtained from the nurse managers and professional nurses indicates that they should be able to advise patients about polyuria and the relevance of polyuria as a symptom associated with DM.

According to the South African Department of Health Guideline, Management of T2DM in adults at primary healthcare level (2014:35), the majority of patients who present with uncontrolled hypertension may present with uncontrolled blood glucose levels. Hypertension would therefore aggravate DM. 83,33% (n=5) of the nurse managers and 77,36% (n=41) of the professional nurses agreed to *hypertension being an aggravating factor for diabetes,* whilst only one (16,67%, n=1) nurse manager and 11,32% (n=6) of the professional nurses disagreed with the statement. The minority (11,32%, n=6) of the professional nurses indicated that they were uncertain. The relationship between hypertension and diabetes is understood by most of the nurse managers and professional nurses in this study. These HCWs should then be able to provide health education on a regular basis to patients regarding the effects of hypertension on DM.

According to research done by the Epilepsy Foundation (2015:1), epilepsy is an aggravating factor for DM. The majority of the nurse managers (66,67%, n=4) and 11,32% (n=6) of the professional nurses agreed with the statement that epilepsy i*s an aggravating factor for diabetes,* whereas 33,33% (n=2) of the nurse managers and 58,49% (n=31) of the professional nurses disagreed with the statement and

30,19% (n=17) of the professional nurses were unsure. It is clear from the study that the professional nurses had a poor understanding of epilepsy and DM. This poor understanding means that the professional nurses will not be able to advise patients on the effect of epilepsy on diabetes.

According to the Amod *et al*. (2012:S55), *obesity* is closely related to the prevalence of diabetes and cardiovascular disease. All the nurse managers and 96,23% (n=51) of the professional nurses agreed that obesity was an aggravating factor for diabetes, while 3,77% (n=3) of the professional nurses were uncertain. Data obtained from this study show that the nurse managers and the professional nurses understand the negative effect of obesity. The nurse managers and professional nurses should be able to educate DM patients regarding these conditions. Table 4.7 depicts the professional nurses and nurse managers' knowledge regarding diabetes.

Table 4.7: *Professional nurses and nurse managers' knowledge regarding diabetes*

Knowledge element	Nurse manager (N=6)	Professional nurse (N=54)
2.9 What is the blood glucose level of a patient with uncontrolled blood glucose level		
Levels below 3 and above 6 mmol/L	100%, n=6	88,68%, n=47
Levels between 3-6 mmol/l		11,32%, n=6
2.10 Should a diabetic patient exercise?		
Should a diabetic patient exercise?	100%, n=6	90,75%, n=49
2.11 If yes, how often? Three times per week/150 min per week	83,33%, n=5	83,33%, n=45
Signs and symptoms of hyperglycaemia		
3.1 1Chest pain	50%, n=3	12,96% n=7
3.1.2 Polydipsia	83,33% n=5	59,26%, n=32
3.1.3 Confusion	83,33%, n=5	70,37%, n=38
3.1.4 I don't know		
3.1.5 Other, specify		
Diabetes has many complications. Identify which of the following possible complications is not associated with diabetes		
3.2.1 Retinopathy		
3.2.2 Chronic kidney disease		
3.2.3 Chronic obstructive pulmonary disease		90,74%, n=49
3.2.4 I don't know		
3.2.5 Other, specify		
If you had to treat an unconscious patient with a glucose of <3.5 mmol/ℓ, what would you do?		
3.3.1 Immediately administer sugar 1-3 teaspoons	33,33%, n=2	14,81%, n=8
3.3.2 Immediately administer 50 ml 50% dextrose IV	66,67%, n=4	79,63%, n=43
3.3.3 Dextrose 10%, 5 ml/kg via nasogastric tube	100%, n=6	741%, n=4
3.3.4 I don't know		185%, n=1
3.3.5 Other, specify		
People with diabetes should take care of their feet because …		
3.4.1 Metformin causes oedema of the lower limbs	16,67%, n=1	370%, n=2
3.4.2 Flat feet are common in people with diabetes		7,41%, n=4
3.4.3 People with diabetes may have poor peripheral circulation	100%, n=6	96, 30%, n=52
3.4.4 I don't know		
3.4.5 Other, specify		

The South Africa Department of Health (2012:154) state that an *uncontrolled blood glucose level* of a patient is any level below 3 mmHg and any level above 6 mmHg. All the nurse managers (100%, n=6) and 88,68% (n=47) of the professional nurses were knowledgeable regarding the blood glucose of an uncontrolled DM patient (See

Figure 4.10). It is evident from the study that the nurse managers and professional nurses knew what is deemed an uncontrolled blood glucose level. This knowledge will assist these HCWs to detect the abnormal blood glucose levels of patients easily.

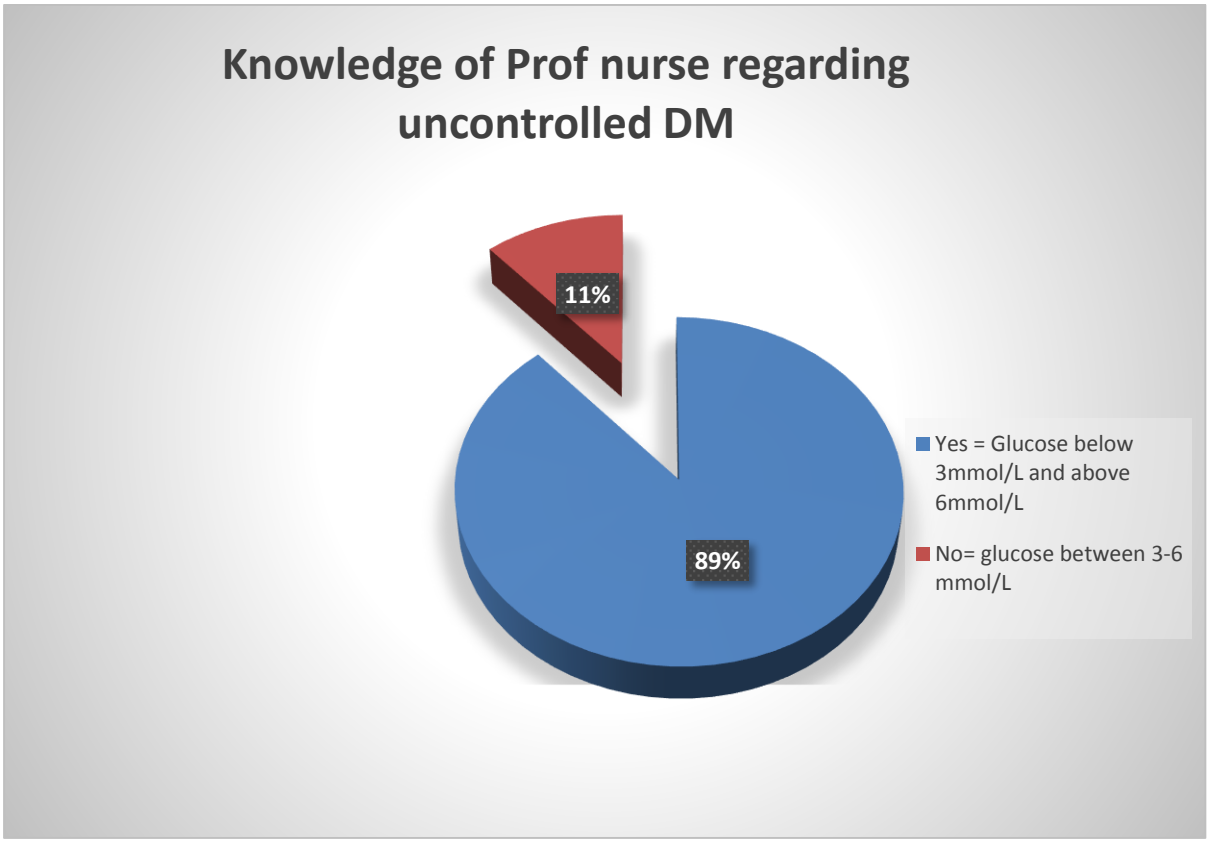

Figure 4.10: *Knowledge of professional nurses regarding uncontrolled diabetes mellitus*

A study conducted by the International Diabetes Federation (2013:24) indicates that exercising consistently can lower blood glucose. All the nurse managers (100%, n=6) and 90,75% (n=49) of the professional nurses agreed to the statement that a *diabetic patient should exercise*. The nurse managers and professional nurses would most probably advise patients to exercise, as they understood the importance of exercise for DM patients.

According to the Standard Treatment Guidelines and the Essential Medicine List for South Africa for adults (2012:20), a total number of 150 minutes of exercise can be accumulated over a week. Exercises such as jogging, swimming for 20-30 minutes a day can be done 3–5 times per week. The majority of the nurse managers (83,33%, n=5) and 83,33% (n=45) of the professional nurses correctly indicated *how often a*

patient diagnosed with DM should exercise. As the majority of the nurse managers and professional nurses showed an understanding of the importance of exercise, they should advise patients regarding the time that should be spent exercising daily and weekly.

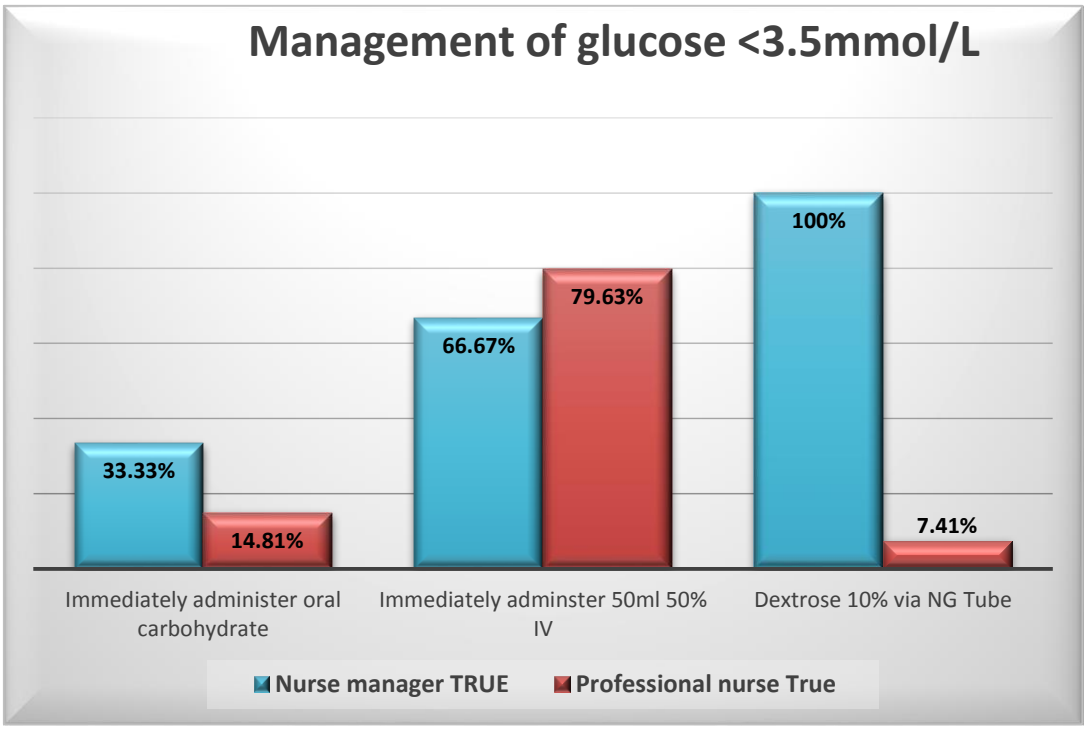

Figure 4.11: *Management of an unconscious patient with glucose <3,5 mmol/ℓ*

According to South Africa Department of Health (2012:8.1-8.10), a patient who is unconscious should not be provided with anything to eat or drink as this may cause suffocation and ultimate death of the patient. In this question the nurse managers and the professional nurses had to choose the correct answer, namely "*What would you do if you had to treat an unconscious patient who had a blood glucose of <3,5 mmol/ℓ?"* As can be seen from Figure 4.11 depicting the management of an unconscious patient with a low glucose, a third (33,33%, n=2) of the nurse managers and 14,81% (n=8) of the professional nurses indicated that they would immediately administer oral glucose, e.g. sugar (1-3 teaspoons). This response is a major concern, as this patient is unconscious and these HCWs indicated that they would administer oral glucose to the patient. The total of responses once again does not add up to 6 and 54 for the nurse manager and the professional nurses, respectively,

as they could select more than one response. More than one option is chosen as more than one correct option could be chosen.

According to South Africa Department of Health (2012:8.1-8.10), *50 ml of 50% dextrose* can be administered intravenously to raise the blood glucose of a patient. The blood glucose should be monitored 12 to 24 hours after the infusion has been completed. More than half (66,67%, n=4) of the nurse managers and 79% (n=43) of the professional nurses indicated administering 50 ml of 50% dextrose intravenously. The understanding of administration 50 ml of 50% dextrose intravenously shown by these HCWs indicates that they understand how to raise the blood glucose of patients in PHC and CHC. The total of responses once again does not add up to 6 and 54 for the nurse managers and the professional nurses, respectively, as they selected more than one response.

The South Africa Department of Health (2012:8.1-.8.13) further states than an immediate intravenous injection of 10%, dextrose, 5 ml/kg via the nasogastric tube can be administered after hypoglycaemia has been confirmed if no intravenous line is available and the patient is unconscious. All (100%, n=6) the nurse managers and a minority (7,41%, n=4) of the professional nurses indicated administering dextrose *via nasogastric tube was a possible option* (See Figure 4.11). This poor understanding by the nurse managers and the professional nurses regarding the administration of dextrose via nasogastric tube is a concern, as the majority were not aware of how the blood glucose of an unconscious patient could be raised if hypoglycaemia was confirmed and no intravenous infusion was *in situ*. The total of responses once again does not add up to 6 and 54 for the nurse managers and the professional nurses, respectively, as they selected more than one response.

Drugs.com (2011:2) reports that swelling of feet when taking metformin is considered a serious side effect. In this question, the nurse managers and professional nurses had to select the appropriate answer. These HCWs once again selected more than one answer resulting that the responses do not add up to 6 and 54 for the nurse managers and the professional nurses, respectively.

A minority of the nurse managers (16,67%, n=1) and 3,70% (n=2) of the professional nurses agreed with the statement that people with diabetes should *take care of their*

feet because *metformin causes oedema of the lower limbs*. The poor response of HCWs regarding the side effects of metformin indicates that the nurse managers and the professional nurses would not be able to detect the side effects of metformin in DM patients who present with the symptoms.

A study conducted on adult-acquired *flat foot* found that people diagnosed with DM could develop *flat foot,* due to the damage to poor peripheral circulation (American Academy of Orthopaedic Surgeons, 2016:1). Only 7,41% (n=4) of the professional nurses agreed with the statement about *flat feet being common in people with DM.* The nurse managers and professional nurses in this study had a poor understanding of the causes of flat feet in DM patients, which will result in these HCWs not being able to educate patients regarding the care of flat feet. The total of responses once again does not add up to 6 and 54 for the nurse managers and the professional nurses, respectively, as they selected more than one response.

According to Diabetes Professional Care (2015:1), patients presenting with uncontrolled blood glucose levels over a period of years, results in blood vessels becoming damaged leading to *poor peripheral circulation.* All the nurse managers and 96,30% (n=52) of the professional nurses agreed that people diagnosed with DM may have *poor peripheral circulation*. The nurse managers and professional nurses showed a good understanding of the effects of uncontrolled blood glucose levels on the peripheral circulation. This implies that patients will be educated accordingly.

4.4.2 Knowledge information of the community healthcare worker

The knowledge regarding diabetes mellitus for CHCWs include questions comprising details regarding signs and symptoms of DM, complications, management and levels of blood glucose. The data related to the knowledge of the CHCWs follow.

According to Magotlane *et al*. (2013:837), diabetes mellitus is caused due to insufficient insulin secretion by the pancreas or insulin secretion being normal but sensitive tissues such as the liver, adipose tissue, and skeletal muscles are unable to respond normally therefore decreased insulin taken up by the muscles. A minority (13,04%, n=6) of the CHCWs could identify *causes of diabetes*, while 23,91% (n=11) identified the wrong causes of diabetes and the majority (63,04%, n=29) indicated

they were unsure regarding causes of DM (See Figure 4.12). Due to the lack of understanding of the CHCWs regarding DM, they will not be able to educate patients regarding causes of DM.

According to Tomlin and Asimakopoulou (2014:2-27), a normal blood glucose ranges between 3-6 mmol/ℓ. Only 21,74% (n=10) of the CHCWs were knowledgeable regarding *the normal range of blood glucose,* 15,22% (n=7) CHCWs did not know and 63,04% (n=29) indicated that they were unsure. The poor understanding of the normal ranges of blood glucose will result in CHCWs not knowing what care to provide to patients in the community if they should present with abnormal blood glucose readings.

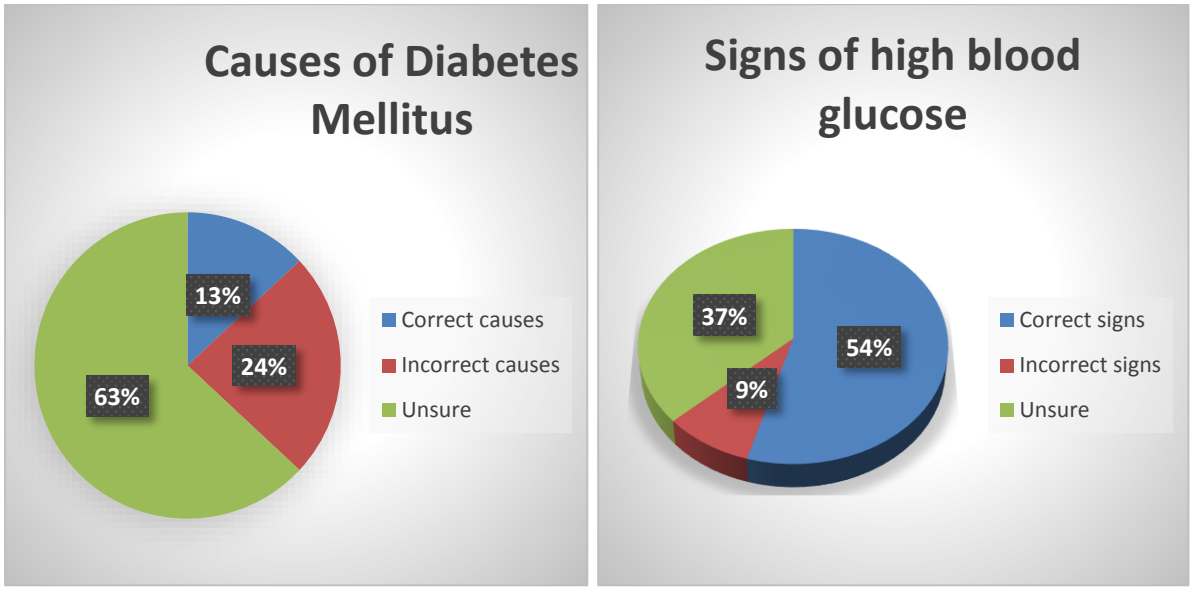

Figure 4.12: *Knowledge regarding the causes of Diabetes Mellitus as depicted by CHCW*

The South Africa Department of Health (2012:154) states that *thirst,* especially in the *evening, polyuria, tiredness* and *changes in vision* are common signs of high blood glucose. The CHCWs who correctly indicated the *common signs of high blood glucose* were 54,35% (n=25), whereas 8,70% (n=4) were incorrect and 36,66% (n=13) indicated they were unsure (See Figure 4.12). The majority of the CHCWs understood what the signs and symptoms of diabetes were and therefore should be able to detect patients in the community and refer them to the PHC and CHC.

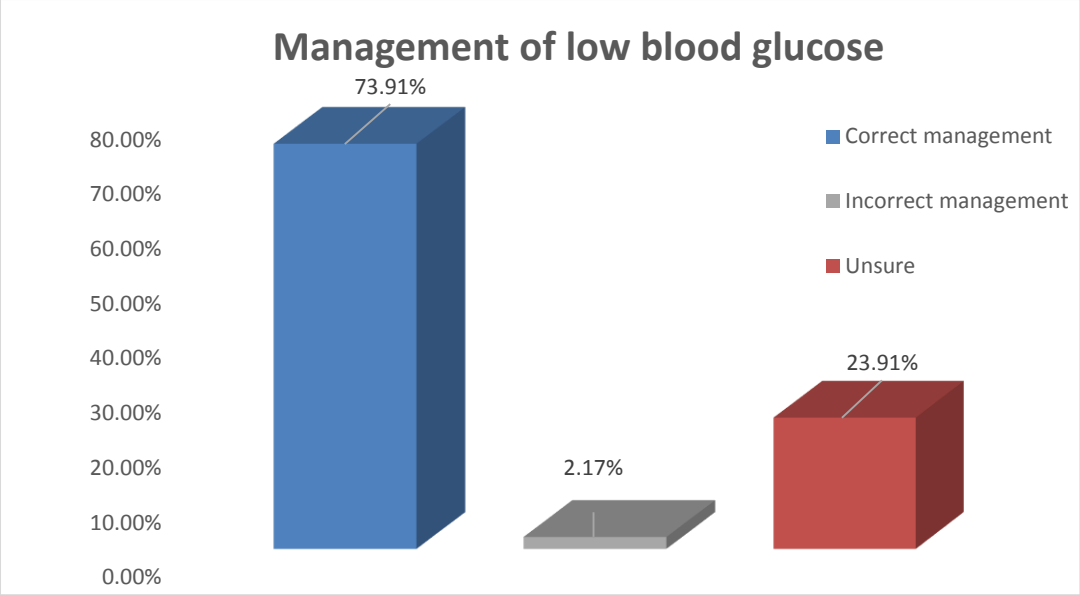

Figure 4.13: *Management of low blood glucose by CHCWs*

The patient who present with is low blood glucose could be managed by giving water with 2-4 teaspoons of sugar to drink if the patient is conscious, a sandwich or a glass of milk can be given to the patient after 10-20 minutes (South Africa Department of Health. 2012:14-15). Seventy three percent of the CHCWs responded correctly to the *most important thing to do when one's blood sugar was low*, 2,17% (n=1) indicated incorrectly and 23,91% (n=11) were uncertain (See Figure 4.13). CHCWs showed a good understanding of what to do if a patient's blood glucose was low, which should assist them in providing first aid to patients presenting with low blood glucose.

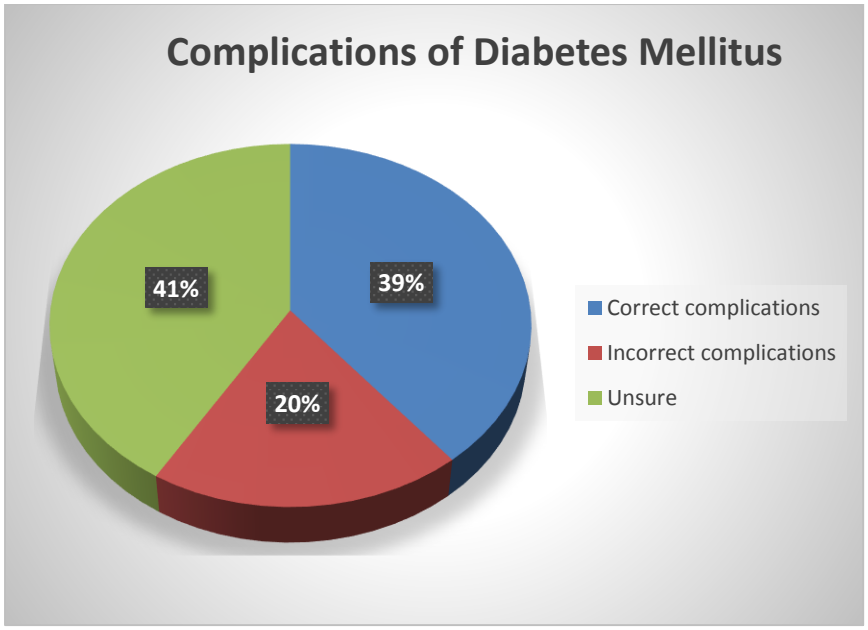

Figure 4.14: *Complications of diabetes according to CHCWs*

The *complications associated with DM,* according to South Africa Department of Health (2012:153) are ischaemic heart disease, peripheral artery disease, stroke, deteriorating eyesight and foot ulcers. On the question regarding types of health complications usually associated with diabetes, 39,13% (n=18) of the CHCWs correctly identified, 19,57% (n=9) of the CHCWs could not identify, and 41,30% (n=19) were unsure (see Figure 4.14). A poor understanding of the type of health complications associated with DM is shown by the majority of the CHCWs, which will result in them not being able to educate patients regarding the prevention of complications.

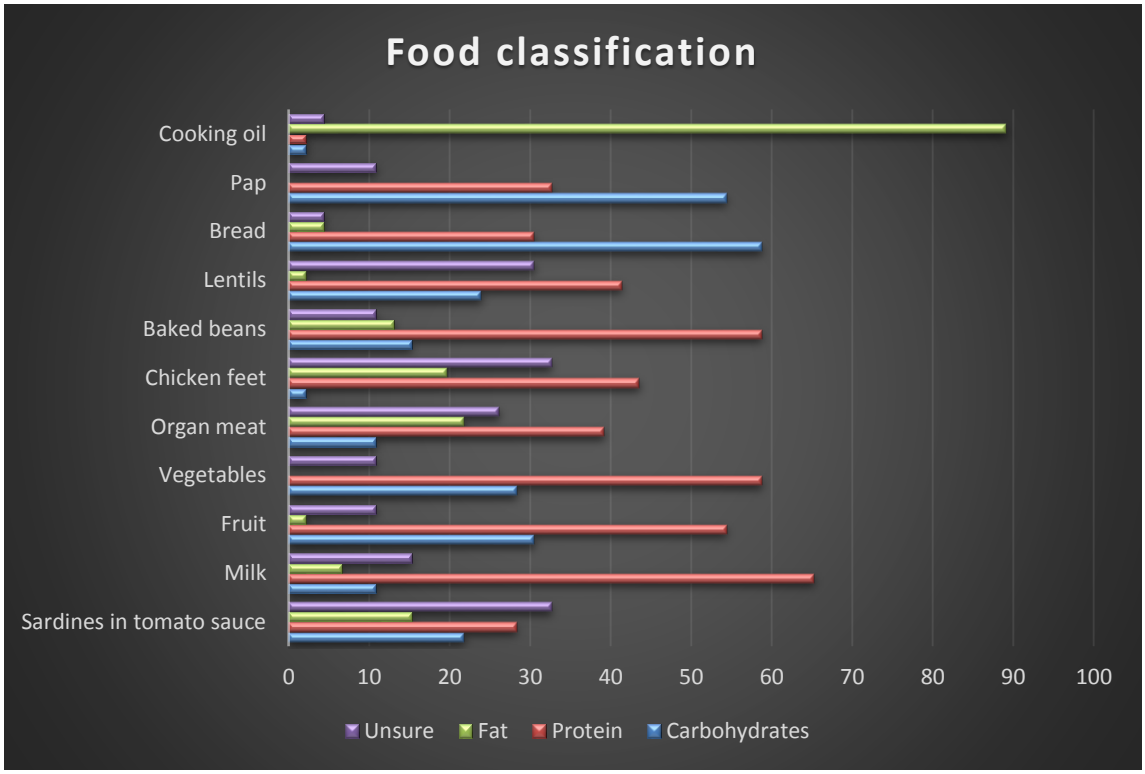

Figure 4.15: *Food classification according to carbohydrates, protein and fat according to CHCWs*

Most of the participants were unsure about the classification of food into food groups and those who classified them, mostly did so incorrectly.

The SANHANNES-1 study reported that high fat scores range between 1 and 20, and refer to a person who ingests large amounts of fatty meat, fried foods and eats snacks that has a high fat content (Shisana *et al*., 2013:171). The majority (89,13%, n=41) of the CHCWs classified *cooking oil* as a fat (see Figure 4.15). This good understanding of what a fat was should assist these CHCWs in advising patients to prepare their food in a healthy way containing less fat.

According to Vorster (2013:32-33), a study regarding South African food-based dietary guideline indicates that most people eat starchy food, as it is readily available and affordable. Vorster (2013:32-33) further states that starchy foods comprise cereals, such as maize, oats, rice, dried beans, peas, soya, potatoes and sweet potatoes. Starch should form the basis of all meals. The majority of the CHCWs classified *pap* (54,35%, n=25) and *bread* (58,70%, n=27) correctly as *carbohydrates*. The fact that that the majority of CHCWs knew what a starch was indicates that they were able to identify and educate patients regarding the classification of a starch.

Lentils can be classified as a starch and a protein containing no fat (Dr Gourmet, 2015:1). 41,30% (n=19) classified lentils as a protein, 23,91% (n=11) of the CHCWs classified lentils as a carbohydrate (starch), 32,60% (n=15) of the CHCWs indicated that they were unsure and 2,17% (n=1) indicated lentils as being a fat (see Figure 4.15). The CHCWs had a mixed understanding of the classification of lentils and could perhaps encourage patients to eat proteins, which is healthy and affordable.

Baked beans can fall in the starch group, but can also be classified with meat, as they contain more protein, iron and zinc than other vegetables do (*Diet in Review*, 2015:1). The majority (58,70%, n=27) of the CHCWs classified *baked beans* as a protein; 15,22% (n=7) classified it as a carbohydrate; 13,04% (n=6) indicated that they were unsure; and 13,04% (n=6) indicated baked beans as being a fat (see Figure 4.15). This understanding regarding the classification of baked beans by the CHCWs shown, will enable CHCWs to explain the classification of baked beans to patients.

Research at a Taiwanese University reported chicken feet is a protein (Hub pages, 2015:1). The majority of the CHCWs (43,48%, n=20) classified *chicken feet* as a protein; 2,17% (n=1) classified it as a carbohydrate; 34,78% (n=16) indicated that they were unsure; and 19.57% (n=9) indicated chicken feet as being a fat (see Figure 4.15). The mixed understanding regarding chicken feet by the CHCWs could send contradicting messages to patients.

Organ meats are high in protein, omega 3 fats, cholesterol and vitamin E (Mercola, 2013:1). The majority of CHCWs (39,13%, n=18) classified organ meat as a protein; 10,87% (n=5) classified it as a carbohydrate; 28,26% (n=13) indicated that they were unsure; and 21,74% (n=10) indicated organ meat as a fat (see Figure 4.15). The varied classification of organ meat by the majority of these HCWs will not enable the CHCWs to educate patients regarding the classification of organ meat.

According to Kwon *et al*. (2015:S549), fruits and vegetables are grouped together. Vegetables are all the other parts of the plant, including the leaves, such as lettuce and spinach. Fruit and vegetables are classified as fruits and vegetables. The majority (58,70%, n=27) of CHCWs also wrongly classified *vegetables* as a protein, whilst 28,26% (n=13) classified vegetables as a carbohydrate and 2,17% (n=1)

classified it as a fat. The minority 10,87% (n=5) of CHCWs indicated they were unsure (See Figure 4.15).

More than half (54,35%, n=25) of the CHCWs classified *fruit* incorrectly as a protein, while 30,43% (n=14) classified fruit as a carbohydrate and 2,17% (n=1) classified it as a fat, while 15.22% (n=7) indicated they were unsure. Similar results are stated by The poor understanding of fruit and vegetables will result in CHCWs not being able to educate patients regarding the classification of fruit and vegetables, respectively.

Vorster (2013:32-33) further indicates that *milk* can be classified as a dairy product. Although milk is classified as a dairy product, it could also contains fat, carbohydrate and protein. None of the CHCWs opted to identify milk as a classification of all three options; instead, the majority of the CHCWs (65,22%, n=30) classified *milk* as a protein; 10,87%, (n=5) classified it as a carbohydrate; 17.39% (n=8) indicated they were unsure; and 6,52% (n=3) indicated milk as being a fat (see Figure 4.15). The majority of the CHCWs indicated that they did not understand the classification of milk and would not be able to provide health education to patients.

Ayam Brand (2015:1) classifies *sardines in tomato sauce* as being fattier and rich in omega 3 and as a protein. Sardines provide the body with iron, magnesium, zinc, phosphorus, copper, manganese, lycopene and vitamin B. A portion of CHCWs (28,26%, n=13) classified sardines in tomato sauce as a protein; 21,74% (n=10) classified it as a carbohydrate; 34,78% (n=16) were unsure; and 15,22% (n=7) indicated sardines in tomato sauce as being a fat (see Figure 4.15). The poor classification of sardines in tomato sauce by the CHCWs will result in the CHCWs sending contradicting messages to patients.

Table 4.8: *Knowledge regarding diabetes for community healthcare workers*

Knowledge element	**Community healthcare worker N=46**		
	True % n=	**False**	**Unsure**
3.7.1 Diabetes medication can cure diabetes” Unsure	23,91%, n=11	6,.57%, n=32	6.52%, n=3
3.7.2 Diabetes medication should be taken for life”	89,13%, n=41	6,52%, n=3	4,35%, n=2

Knowledge element	Community healthcare worker N=46		
	True % n=	False	Unsure
3.7.3 You should stop taking your diabetes medication when you feel sick”	2,17%, n=1	89,13%, n=41	8,70%,n=4
3.7.4 Poor control of diabetes could result in a greater chance of complications”	71,74%, n=33	2,17%,n=1	26,09%, n=12
3.7.5 “Eating less bread will make me lose weight”	13,04%,n=6	63,04%,n=29	23,91%,n=11
3.7.6 “Salty food will prevent my sugar levels from dropping”	21,74%,n=10	71,74%,n=33	6,52%,n=3
3.8.1 Diabetic medication may cause swelling of the feet”	50%,n=23	26,09%,n=12	23,91%,n=11
3.8.2 Sore feet are common in people with diabetes”	54,35%,n=25	26,09%,n=12	19,57%,n=9
3.8.3 “People with diabetes may have poor circulation of blood in the feet”	56,52%,n=26	15,22%,n=7	28,26%,n=13

No medication for diabetes can cure DM, according to the International Diabetes Federation (2013:21). Most of the CHCWs were knowledgeable about diabetes medication. The minority (23,91%, n=11) indicated that they thought *diabetes medication could cure diabetes*, while the majority (69,57%, n=32) of the CHCWs knew that diabetes medication could not cure diabetes, and 6,52% (n=3) were uncertain (see Table 4.8). The CHCWs showed an understanding regarding diabetes medication, which will enable them to educate patients about the effects of diabetes medication.

According to the South African Department of Health Guideline (2014:20), Management of T2DM in adults at primary healthcare level, (2014:20) diabetic medication should be taken for life, as diabetes is an incurable condition. The majority of CHCWs (89,13%, n=41) correctly indicated that *diabetes medication should be taken for life,* 6,52% (n=3) indicated that it needed be taken for life and 4,35% (n=2) were uncertain (see Table 4.8). This general understanding of diabetes medication by the CHCWs will once again assist them in educating patients regarding how medication should be taken.

Amod *et al*. (2012:S23), in the 2012 SEMDSA Guideline for the Management of T2DM, has proven that patients can report gastrointestinal side effects when taking non-insulin therapies. These side effects can be minimised by decreasing the dose over one to two months. Amod *et al*. (2012:S23) further state that less than 10% of patients will need to discontinue the drug if gastrointestinal intolerance is experienced. Only one (2,17%, n=1) of the CHCWs agreed with the statement "*whether you should stop taking your diabetes medication when you feel sick",* whilst 89,13% (n=41) of the CHCWs indicated that one should not stop taking one's medication when feeling sick, and 8,70% (n=4) were uncertain (see Table 4.8). In this study, it is shown that the majority of CHCWs understood what to do if a patient felt sick when taking medication. They would be able to encourage patients to seek medical help when necessary.

More than half (71,74%, n=33) the CHCWs correctly indicated that *poor control of diabetes could result in a greater chance of complications,* whereas 2,17% (n=1) reported that this statement was false and another 26,09% (n=12) were unsure (see Table 4.8). The Heart and Stroke Foundation of South Africa (2015:2) states that poorly controlled DM can result in complications. This positive understanding of the effect of poor control of diabetes by the CHCWs will assist them to educate patients regarding the complications caused due to poor control of DM.

The SANHANES -1 study reports that the majority of participants in the Free State wrongly believe that "starchy foods like bread, potatoes and rice make people fat (Shisana *et al*., 2013:14). The minority (13,04%, n=6) of the CHCWs reported that this statement was true, more than half (63,04%, n=29) the CHCWs indicated that the statement *eating less bread will make you lose weight* was false, while another 23,91% (n=11) were uncertain (see Table 4.8). The CHCWs understood that eating carbohydrates did not cause one to put on weight and they should therefore encourage patients to eat carbohydrates, as outlined in the SANHANES-1 report.

According to Dave (2014:1), a high intake of salt leads to potassium losses resulting in a drop in blood glucose levels. Less than a third (21,74%, n=10) agreed with the statement that *salty foods will prevent my sugar level from dropping,* whereas more than half (71,74%, n=33) the CHCWs disagreed with the statement and another 6,52% (n=3) were uncertain (see Table 4.8). It is evident from the study that the

majority of CHCWs indicated that they did not understand the effect salt had on the blood glucose of a diabetic patient. The HCWs will not to be able to educate patients regarding the effect that salt has on blood glucose levels.

Swelling of feet when taking metformin is a side effect, according to the South African Department of Health Guideline, Management of T2DM in adults at primary healthcare level (2014:40-43). Half (50% n=23) of the CHCWs correctly indicated that *diabetes medication may cause swelling of the feet,* 26,09% (n=12) disagreed and 23,91% (n=11) were uncertain. As only half the CHCWs showed a proper understanding of the side effects of metformin, it implies that the CHCWs would not be able to educate patients regarding the side effects of metformin.

The American Diabetes Association (2013:10) declares that hyperglycaemia affects limbs and feet in various ways. More than half the CHCWs (54,35%, n=25) correctly indicated *that sore feet were common in diabetic patients with poor glucose control*, 26,09% (n=12) disagreed and 19,57% (n=9) were uncertain. Health education regarding sore feet should be provided by the CHCWs, as more than half understood that sore feet was common in DM patients.

The American Diabetes Association (2013:10) reveals diabetic patients with poor control are having a poor circulation of blood in their feet as these patients develop motor neuropathy. More than half (56,52%, n=26) of the CHCWs correctly indicated that *people with diabetes may have poor circulation of blood in their feet,* while 15,22% (n=7) incorrectly indicated that this was not the case and 28,26% (n=13) were unsure. Some CHCWs should be able to educate DM patients regarding poor circulation of blood in the feet, as more than half the HCWs showed an understanding.

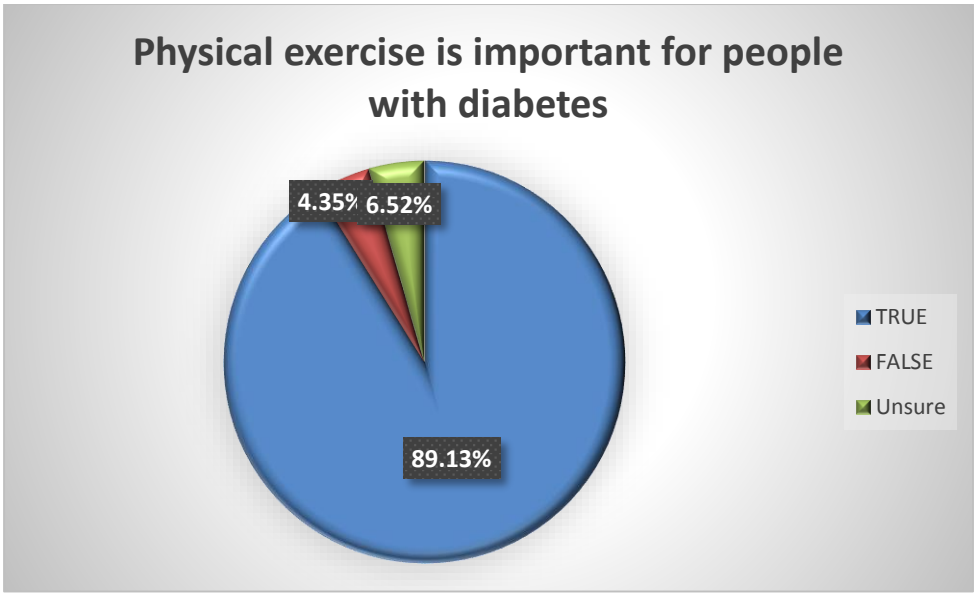

Figure 4.16: *The importance of physical exercise for diabetic patients according to CHCWs*

Gestaldelli (2008:1118), states physical inactivity, a fatty diet and obesity increase the risk of people living in middle- and lower-income countries of developing diabetes. Nearly all CHCWs (89.13%, n=41) indicated that *physical exercise was important* for people with diabetes, 4.35% (n=2) disagreed and 6.52% (n=3) were uncertain (See Figure 4.16). The effects of inactivity were well understood by the CHCWs, which would assist them to educate patients regarding the importance of exercise.

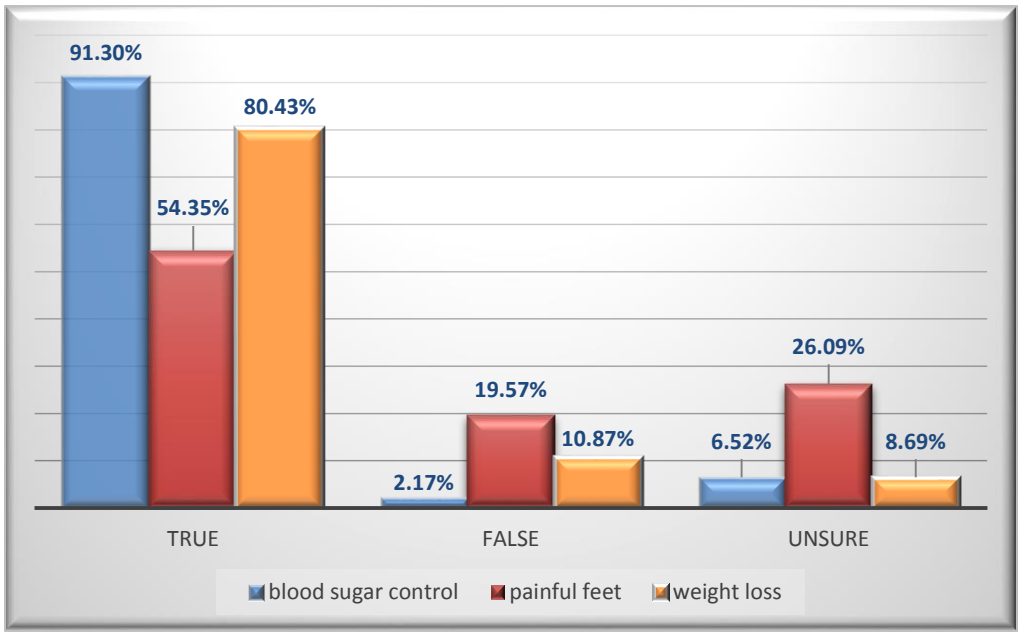

Figure 4.17: *Benefits of exercise according to CHCWs*

The majority (91,30%, n=42) of CHCWs indicated that physical exercise helped with blood glucose control; 2,7% (n=1) disagreed with the statement that physical exercise helped with blood glucose control, whereas 6,52% (n=3) indicated that they were uncertain (See Figure 4.17). Regular *exercise may lower blood glucose* and reduce the amount of insulin needed by the patient (Gestaldelli, 2008:1118). The CHCWs will then be able to educate the patients regarding the benefits of exercise as the majority indicated that they understand the benefits of exercise.

The American Diabetes Association (2013:10) has proven that exercising assists with the blood flow in the limbs of the patient and may decreases painful feet. More than half (54,35%, n=25) the CHCWs indicated that *exercising regularly helped with painful feet*, 19,57% (n=9) disagreed with the statement and 26,9% (n=12) indicated they were uncertain (See Figure 4.17). This result is positive once again, as the majority of the CHCWs would be able to educate patients as more than half understood that exercising assisted with blood flow in the limbs of the patient and decreased painful feet.

According to Gestaldelli (2008:1118), exercise assists with *weight loss*. The majority (80,43%, n=37) of the CHCWs indicated that exercising regularly helped with weight loss, 10,87% (n=5) disagreed with the statement *that exercising regularly helps with weight loss* and 8,69% (n=4) indicated that they were unsure (See Figure 4.17). The majority of CHCWs will educate patients regarding exercise, as they understood the effects of exercise and weight loss.

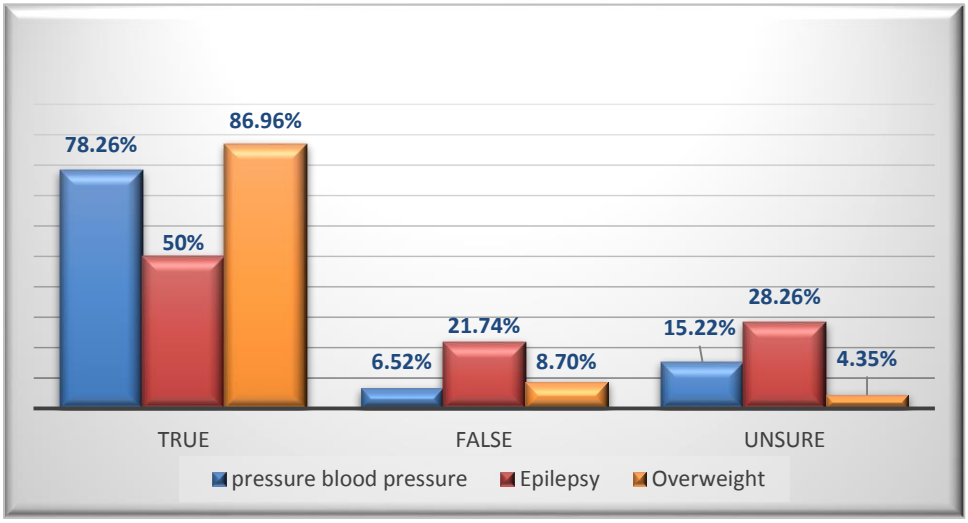

Figure 4.18: *Factors aggravating diabetes according to CHCWs*

The South African Department of Health Guideline, Management of T2DM in adults at primary healthcare level (2014:35-36) verifies that patients who suffer from hypertension and T2DM simultaneously have a risk of developing macro- and microvascular complications. When participants were asked about *factors that can make diabetes worse,* the majority (78,26%, n=36), reported that blood pressure made diabetes worse, 6,52% (n=3) disagreed with the statement that *blood pressure* made diabetes worse and 15,22% (n=7) indicated they were uncertain (See Figure 4.18). The effects of hypertension on DM is well understood by the CHCWs and shows that these HCWs will be able to advise patients regarding the effects hypertension could have on a diabetic patient.

According to the Epilepsy Foundation (2015:1), epilepsy can aggravate DM when the blood glucose control is poor. Half the CHCWs (50%, n=23) indicated that *epilepsy* aggravated diabetes, 21,74% (n=10) disagreed with the statement that epilepsy aggravated diabetes and 28,26% (n=13) were uncertain (See Figure 4.18). Only half the CHCWs will then be able to educate DM patients that epilepsy can aggravate diabetes.

The South African Department of Health Guideline, Management of T2DM in adults at primary healthcare level (2014:30-31) verifies that the heavier one is, the more insulin one will require to keep the blood glucose within normal range and the higher one's insulin resistance. The majority (86,96%, n=40) of the CHCWs indicated that *overweight* aggravated diabetes, 8,70% (n=4) disagreed with the statement and 4,35% (n=2) indicated they were unsure (see Figure 4.18). It is evident in this study that the effects of obesity is mostly understood by the CHCW which should encourage these HCWs to educate patients regarding the importance of losing weight when being diabetic in order to control the blood glucose.

4.5 PART 111 Attitude regarding diabetes

In this study, attitude regarding DM comprised statements to see how the HCW felt about diabetes and its effect on a patient's life. The attitude of the HCWs regarding diabetes will be discussed.

4.5.1 Attitude of nurse managers/professional nurses and community healthcare workers

This section will describe the attitude regarding DM as answered by the nurse managers, professional nurses and the community health worker to questions 4.1.1-4.19 in the questionnaire (see Figure 4.2). Table 4.9 provides a layout of the discussion to follow. The question numbering in Table 4.9 reflects the numbering of the questions in the questionnaire (see Addenda B1, B2 and B3).

Table 4.9: *Attitude regarding diabetes for healthcare workers*

Attitude element	Nurse manager (N=6)			Professional nurse (n=54)			Community healthcare worker (N=46)		
	Agree %	Disagree %	Neutral %	Agree %	Disagree %	Neutral %	Agree %	Disagree %	Neutral %
4.1.1 I think diabetes would change a person	50% n=3	33,33% n=2	16,67% n=1	85,19% n=46	12,96% n=7	1,85% n=1	76,09% n=35	15,22% n=7	8,70% n=4
4.1,2 I think you can refer to a patient as “A DIABETIC”	16,67 n=1	83,33% n=5		85,19% n=46	12,96% n=7	1,85% n=1	50% n=23	41,30% n=19	8,70% n=4
4.1.3 Diabetes is the worst thing that can ever happen to one.	50% n=3	50% n=3		25,93% n=14	61,11% n=33	12,96% n=7	63,04% n=29	34,78% n=16	2,17% n=1
4.1.4 Most people would find it difficult to adjust to having diabetes.	100% n=6			90,74% n=49	7,41% n=4	1,85% n=1	76,09% n=35	19,57% n=9	4,35% n=2
4.1.5 I would feel embarrassed about having diabetes.	33,33% n=2	66,67% n=4		16,67% n=9	74,07% n=40	9,26% n=5	34,78% n=16	58,70% n=27	6,52% n=3
4.1.6 There is not much one seem to be able to do to control diabetes.	33,33% n=2	66,67% n=4		7,41% n=4	90,74% n=49	1,85% n=1	32,61% n=15	50% n=23	17,39% n=8
4.1.7 There is little hope of leading a normal life with diabetes.	100% n=6			9,26% n=5	90,74% n=49		47,83% n=22	36,96% n=17	15,22% n=7
4.1.8 The proper control of diabetes involves a lot of	50% n=3	50% n=3		46,30% n=25	46,30% n=25	7,41% n=4	58,70% n=27	28,26% n=13	13,04% n=6

Attitude element	Nurse manager (N=6)			Professional nurse (n=54)			Community healthcare worker (N=46)		
	Agree %	Disagree %	Neutral %	Agree %	Disagree %	Neutral %	Agree %	Disagree %	Neutral %
sacrifice and in-convenience									
4.1.9 I would not disclose to if I had diabetes.	100% n=6			5,56% n=3	90,74% n=49	3,70% n=2	17,39% n=8	78,26% n=36	4,35% n=2
4.1.10 Being told you have diabetes is like being sentenced to a lifetime of illness.	50% n=3	50% n=3		12,96% n=7	85,19% n=46	1,85% n=1	39,13% n=18	52,17% n=24	8,70% n=4
4.1.11 A diabetic diet does not really spoil a social life.	66,67% n=4	33,33% n=2		68,52% n=37	27,78% n=15	3,70% n=2	60,87% n=28	26,09% n=12	13,04% n=6
4.1.12 In general, I need to be more sympathetic in the treatment of people with diabetes.	33,33% n=2	66,67% n=4		50% n=27	46,30% n=25	3,70% n=2	54,35% n=25	26,09% n=12	19,57% n=9
4.1.13 Having diabetes over a long period changes the personality	33,33% n=2	66,67% n=4		38,89% n=21	57,41% n=31	3,70% n=2	50% n=23	32,61% n=15	17,39% n=8
4.1.14 Diabetic patients often have difficulty to decide whether they feel sick or well.	66,67% n=4	16,67% n=1	16,67% n=1	31,48% n=17	64,81% n=35	3,70% n=2	54,35% n=25	32,61% n=15	13,04% n=6
4.1.15 Diabetes is not	100%			85,19%	14,81%		93,48%	4,35%	2,17%

Attitude element	Nurse manager (N=6)			Professional nurse (n=54)			Community healthcare worker (N=46)		
	Agree %	Disagree %	Neutral %	Agree %	Disagree %	Neutral %	Agree %	Disagree %	Neutral %
really a problem because it can be controlled.	n=6			n=46	n=8		n=43	n=2	n=1
4.1.16 There is really nothing you can do if you have diabetes.		83,33% n=5	16,67% n=1	7,41% n=4	92,59% n=50		19,57% n=9	80,43% n=37	
4.1.17 Diabetes patients do not always have a good support system.	50% n=3	50% n=3		40,74% n=22	53,70% n=29	5,56% n=3	36,96% n=17	52,17% n=24	10,87% n=5
4.1.18 I believe I could adjust well to having diabetes.	83,33% n=5	16,67% n=1		83,33% n=45	7,41% n=4	9,26% n=5	71,74% n=33	13,04% n=6	15,22% n=7
4.1.19 I often think it is unfair that some patients should have diabetes when other people are so healthy.	20% n=1	80% n=4	16,67% n=1	9,26% n=5	75,93% n=41	14,81% n=8	32,61% n=15	47,83% n=22	19,57% n=9

Diabetes mellitus can affect one's moods and personality mainly when one's blood glucose is uncontrolled (Denver Diabetes Counselling, 2010:2). Barbagallo, & Dominguez, (2014:14) has also proven that biological changes occur in the brain of people with DM. Half the nurse managers (50%, n=3), the majority (85,19%, n=46) of the professional nurses and 76,09% (n=35) of the CHCWs felt that diabetes could change a person. It is evident from this study that the majority of the HCWs felt that DM could change a person, with the result that these HCWs could be more empathetic to the patients.

According to Haque and Waytz (2012:176-186), HCWs often dehumanise patients unintentionally, which leave patients feeling demoralised. The majority (83,33%, n=5) of the nurse managers, 64,81% (n=35) of the professional nurses and 41,30% (n=19) of the CHCWs disagreed to *a patient being referred to as "a diabetic"*. The majority of the HCWs agreed that patients should not be referred to as a diabetic, which implies that these HCWs had a positive attitude towards diabetic patients' and felt that patients should be treated with respect in order to minimise negative reactions.

A study conducted at a healthcare centre in Brazil verified that patients were negative about being diagnosed with DM (Enfermagen *et al.*, 2014:986). 50% (n=3) of the nurse managers had no consensus, whereas the majority of the professional nurses (61,11%, n=33) did not think it was the worst thing that could happen, while the majority (63,04%, n=29) of the CHCWs thought it was. There was therefore no consensus amongst the three groups of HCWs on this matter, which would influence the support provided to patients.

According to Enfermagen *et al.* (2014:986), most people have difficulty accepting and adjusting to DM. All (100%, n=6) the nurse managers, 90,74% (n=49) of the professional nurses and 76,09% (n=35) of the CHCWs felt that *most people found it difficult to adjust to having diabetes.* It is evident from the study that the HCWs were aware of patients having difficulty in adjusting to DM.

Patients diagnosed with DM express negative feelings regarding DM (Enfermagen *et al.*, 2014:986). Nearly all (66,67%, n=4) of the nurse managers, the majority (74,07%, n=40) of the professional nurses and 58,70% (n=27) of the CHCWs

disagreed about feeling embarrassed about having diabetes. The HCWs indicated that they did not see any reason for embarrassment by these patients, which could imply that they accepted the patients as they were.

Van der Does and Mash (2013:289-295) substantiate that, although patients diagnosed with DM can do much to control their blood glucose, they are negative about blood glucose control. All of the nurse managers (100%, n=6) and 90,74% (n=49) of the professional nurses disagreed with the statement that "*There is not much I seem to be able to do to control my diabetes*". Less than half (32,61%, n=15) of the CHCWs did not think that there was much one could do to control DM. The majority of the nurse managers and the professional nurses felt that a patient with DM could control his disease; they would therefore project positivity into these patients.

Enfermagen *et al.* (2014:986) have found that patients diagnosed with DM believe that they cannot live a normal life. All the nurse managers (100%, n=6) and the majority (90,74%, n=49) of the professional nurses thought that patients diagnosed with DM could live a normal life, while 47,83% (n=22) of the CHCWs believed that "*There is little hope of leading a normal life with diabetes*". These different viewpoints held by the HCWs imply that different messages will be conveyed to patients based, on what the viewpoint of the HCW educating the patient is.

A study conducted in Hong Kong regarding psychological implications of DM, shows that diabetes involves complex treatment and demands for the patient (Lam Chun-Yin, 1997:64-74). Half (50%, n=3) of the nurse managers believed being diagnosed with diabetes involves a lot of sacrifice and inconvenience, while seemingly less than half 46,30% (n=25) of the professional nurses felt that the proper control of diabetes did not involve a lot of sacrifice. The majority 58,70% (n=27) of the CHCWs did think that the proper control of diabetes involved a lot of sacrifice and inconvenience. It is evident that the majority of the HCWs were aware that DM involved a lot of sacrifice and inconvenience. The HCWs showed a positive attitude towards the management of DM, which should encourage patients not to see DM as a lot of sacrifice and inconvenience.

A study conducted at a healthcare centre in Brazil supported the notion that group discussions assisted patients in disclosing concerns to other patients with the same condition, circumstances and concerns (Enfermagen *et al.*, 2014:986). All (100%, n=6) the nurse managers felt that they would not disclose if they had diabetes, while the majority (90,74%, n=49) of the professional nurses and 78,26% (n=36) of the CHCWs believed there was nothing wrong in disclosing the fact if they were diagnosed with diabetes. Different viewpoints were shown by the nurse managers compared to the professional nurses and CHCWs regarding disclosure of DM. This negative attitude by the nurse managers regarding DM could influence the support and guidance the HCWs provide to the professional nurses and the CHCWs during service delivery, whilst the positive attitude of the professional nurses and CHCWs will make it easier for the HCWs to discuss disclosure with the patients.

Enfermagen *et al.* (2014:986) verify that group discussions assist patients in dealing with feelings of being sentenced to a lifetime of illness and putting life in perspective. In the study half (50%, n=3) of the nurse managers believed being diagnosed with diabetes is *like being sentenced to a lifetime of illness,* whereas the majority 85,19% (n=46) of the professional nurses and (52,17%, n=24) of the CHCWs thought that being diagnosed with diabetes should not be seen as a lifetime illness. The different attitudes portrayed by these HCWs imply that different messages will be conveyed to patients, with the result that these HCWs will not be able to assist patients in perceiving DM in a positive light.

Formosa and Vella (2012:111-114) have investigated the influence of diabetes-related knowledge on foot ulceration amongst patients in Malta. They have found that food culturally valued by the Maltese populations is not healthy or recommended for diabetic patients. According to the Maltese tradition, failing to participate in cultural traditions causes social conflict. Unlike in this study, the majority (66,67%, n=4) of the nurse managers, 68,52% (n=37) of the professional nurses and 60,87% (n=28) of the CHCWs agreed with the statement *"A diabetic diet does not really spoil a social life".* This means that the HCWs will encourage patients to eat a healthy diet, irrespective of the occasion.

Brady (2013:1) states that HCWs should be more sympathetic when treating patients with diabetes. The majority (66,67%, n=4) of the nurse managers and more than half

(50%, n=27) of the professional nurses disagreed with the statement "*In general, I need to be more sympathetic in the treatment of people with diabetes*", whereas 54,35% (n=25) of the CHCWs felt that the HCWs should be more sympathetic when treating diabetic patients. These different attitudes portrayed by the HCWs will influence the type of treatment provided to DM patients.

Brown (2015:1), who has proven in the Diabetes, Attitudes, Wishes and Needs (DAWN) study conducted on T2DM patients in 13 American countries that diabetic patients have psychosocial stressors that has serious consequences, which affect the personality of the patient. The majority (66,67%, n=4) of the nurse managers and 57,41% (n=31) professional nurses did not agree that, "*Having diabetes over a long period changed the personality",* while half (50%, n=23) the CHCWs felt that having diabetes over a long period changed the personality. The fact that the majority of the nurse managers and professional nurses disagreed on this matter, implies that these HCWs will not be able to support patients regarding the effects of DM on the personality.

Lam Chun-Yin (1997:64-74) have proven that different modes of treatment have different effects on patients, which causes patients to have difficulty in deciding whether they feel sick and well. The majority (66,67%, n=4) of the nurse managers agreed, "*Diabetic patients often have difficulty to decide whether they feel sick or well",* whilst more than half (64,81%, n=35) the professional nurses and 54,35% (n=25) of the CHCWs disagreed with the statement. Different attitudes are once more presented by the nurse managers, professional nurses and the CHCWs, which implies that the HCWs will present different attitudes to patients regarding DM, which will result in different messages provided to patients.

Brown (2015:1) has verified in a study in the United Kingdom that diabetes is a chronic condition that can be controlled. All (100%, n=6) the nurse managers, the majority (85,19%, n=46) of the professional nurses and 93,48% (n=43) of the CHCWs agreed with the statement that diabetes *is not really a problem because it can be controlled*. This understanding shown by HCWs implies that the HCWs will inform patients that diabetes can be controlled.

The South African Department of Health Guideline, Management of T2DM in adults at primary healthcare level (2014:20) states that diabetes is a condition where much can be done to manage the disease. Almost all (83,33%, n=5) the nurse managers, 92,59% (n=50) of the professional nurses and the majority (80,43%, n=37) of the CHCWs disagreed with the statement, "*There is really nothing you can do if you have diabetes"*. This implies that these HCWs had a positive attitude towards caring for the diabetic patients.

Delamater (2006:72), in an article that reviews studies documenting the extent of and factors related to adherence problems among patients with diabetes has proven that HCWs are not capable of identifying psychological problems among patients and therefore are not able to provide the support required by the patient. In this study (50%, n=3) of the nurse managers felt that *patients did not always have a good support system,* whilst more than half (53,70%, n=29) the professional nurses and (52,17%, n=24) of the CHCWs believed that patients did have a good support system. These HCWs showed that they were not aware that some patients did not have a good support system, with the result that their patients are ensured of receiving psychological support when needed.

According to the South African Department of Health Guideline, Management of T2DM in adults at primary healthcare level (2014:20), many strategies and treatment regimens are available for patients, which will enable them to adjust to diabetes. The majority (83.33%, n=5) of the nurse managers, 83,33% (n=45) of the professional nurses and 71,74% (n=33) of the CHCWs agreed with the statement, *"I believe I could adjust well to having diabetes".* This positive attitude showed by the HCWs will motivate patients that they can adjust well to DM.

People diagnosed with DM must continue living with illness in a world that is healthy (Lam Chun-Yin, 1997:64-74). Most of the nurse managers (80%, n=4), the majority (75,93%, n=41) of the professional nurses and 47,83% (n=22) of the CHCWs disagreed with the statement "*I often think it is unfair that some patients should have diabetes when other people are so healthy*". As the majority of the HCWs disagreed about the unfairness that some people were healthier than others they will be able to motivate patients diagnosed with diabetes.

4.6 PART 1V PRACTICE REGARDING DIABETES

In this study, practice regarding DM comprised details regarding which asymptomatic patients are screened for diabetes, the topics which are discussed with the patient at diagnosis and annually, as well as the advice given to patients who need to lose weight. Information obtained from the nurse managers and the professional nurses will be discussed simultaneously, as the same questions were posed to these HCWs (See Figure 4.2). Table 4.10 provides a layout of the discussion to follow. As can be seen in Addenda B1 and B3 in the questionnaire for professional nurses and nurse managers, participants had the opportunity to choose from a possible list of options. The correct options are presented as *True*, whereas the incorrect options chosen are presented as *False*. The question numbering in Table 4.10 reflects the numbering of the questions in the questionnaire (See Addenda B1 and B3).

Table 4.10: *Practice information regarding diabetes for nurse managers and professional nurses*

Knowledge element	**Nurse manager (N=6)**	**Professional nurse (N=54)**
	True %, N=	**True %, N=**
5.1 Which asymptomatic patients do you advise to go for diabetes testing?		
5.1.1 None	16,67%,n=1	
5.1.2 All patients above 45 years	66,67%,n=4	46,30%, n=25
5.1.3 Family history of diabetes (1st degree)	33,33%,n=2	81,48%, n=44
5.1.4 On request		53,70%, n=29
5.1.5 Other, specify		3,70%, n=2
5.2 Which topics do you discuss with your diabetic patient at diagnosis and annually?		
5.2.1 None		
5.2.2 Avoidance of alcohol	100%, n=6	62,96%, n=34
5.2.3 Cessation of smoking	100%, n=6	48,15%, n=26
5.2.4 Community and family support	83,33%, n=5	40,74%, n=22
5.2.5 Complications of diabetes	83,33%, n=5	83,33%, n=45
5.2.6 Other, specify	16,67%, n=1	14,81%, n=8

Knowledge element	Nurse manager (N=6)	Professional nurse (N=54)
	True %, N=	True %, N=
5.3 What should you advise a patient to do if they need to lose weight?		
5.3.1 Nothing		
5.3.2 Moderate intensity physical exercise	100%, n=6	62,96%, n=34
5.3.3 Low-fat diet	16,67%, n=1	62,96%, n=34
5.3.4 Low-carbohydrate diet	50%, n=3	51,85%, n=28
5.3.5 Refer to a dietician	33,33%, n=2	74.07%, n=40
5.3.6 Other, specify	16,67%, n=1	1,85%, n=1

4.6.1 Practice information regarding diabetes of nurse managers and professional nurses

This section will describe practice regarding DM as answered by the nurse managers and professional nurses to questions 5.1-5.3 in the questionnaire and reflected in Table 4.10.

The American Diabetes Association (2015:4) demonstrates that *all patients 45 years or older,* as well as patients presenting with a number of risk factors regardless of age should be screened for diabetes. The screening of the patients should be performed on a three-year interval. A similar guideline is found in the South African Department of Health Guideline, Management of T2DM in adults at primary healthcare level (2014:12), that patients who do not present with risk factors and are older than 45 years should be screened for diabetes. The majority (66,67%, n=4) of the nurse managers and 46,30% (n=25) of the professional nurses indicated that a patient above 45 years old should be screened. Since the nurse managers seem to be better aware of the feasibility of screening patients above the age of 45 and the professional nurses not, patients above 45 years would most probably not be screened at CHCs and PHCs in the Free State.

The American Diabetes Association (2015:4) has further proven that patients who have a family history of T2DM in the first and second degree should be screened. A similar guideline is once again provided by the South African Department of Health

Guideline, Management of T2DM in adults at primary healthcare level (2014:12), namely that patients presenting with a family history of diabetes (1st degree) should be screened for type 2 diabetes. Less than half (33,33%, n=2) of the nurse managers and the majority (81,48%, n=44) of the professional nurses screened asymptomatic *patients who had a 1st degree family history of diabetes*. The fact that the majority of the nurse managers showed a poor understanding, is a concern, as these HCWs should advise the professional nurses at the PHC and CHC, whilst the good understanding shown by the professional nurses", implies that their patients will be identified and treated promptly.

Screening of patients on request is done to identify asymptomatic individuals who are likely to have diabetes or have a family history of DM (Magothlane, 2013:837-838). More than half (53,70%, n=29) of the professional nurses indicated that they *screen on request*. The poor screening of patients on request implies that patients who are suffering from DM will not be detected promptly and complications will not be minimised.

According to the Diabetes UK (2015:1), people with diabetes should be very careful when consuming alcohol as it increases the risk of hypoglycaemia. Alcohol should not be substituted for meals. All (100%, n=6) the nurse managers and the majority (62,96%, n=34) of the professional nurses discussed *avoidance of alcohol* at diagnosis and annually, thus ensuring that their patients will be educated regarding avoidance of alcohol.

The Centre for Disease Control and Prevention (2015:1) demonstrates that people with diabetes who smoke have a problem with insulin dosing and controlling their blood glucose. All (100%, n=6) the nurse managers and half (48,15%, n=26) of the professional nurses discussed *cessation of smoking*. It is a concern that half the professional nurses indicated that they did not advise patients regarding effects of smoking.

Delamater (2006:71), in an article improving patient adherence, substantiates that it is important to determine the support and social reinforcement, not only in the patients' homes but also in the clinical settings. The majority (83,33%, n=5) of the nurse managers and only 40,74% (n=22) of the professional nurses discussed

community and family support with the patients, which implies that these HCWs will not be sensitive in providing support to the diabetic patients.

Amod *et al*. (2012:S4) state that screening of diabetes and discussing of complications with patients ensures prompt treatment and reduces complications. The majority (83,33%, n=5) of the nurse managers and 83,33% (n=45) of the professional nurses indicated that *complications of diabetes* are discussed with patients at diagnosis and annually, indicating that HCWs would ensure that complications would be discussed with patients.

According to the World Health Organisation, obesity is one of the major challenges of the 21st century (International Diabetes Federation, 2013:32). On the question of *other*, only one (16,67%, n=1) nurse manager and 3,70% (n=2) of the professional nurses indicated that they *discussed the importance of diet and exercise*, while 3,70% (n=2) of the professional nurses indicated that treatment and when to seek help was discussed with the patient. These nurse managers and professional nurses will ensure that patients are educated regarding diet and exercise because they showed an understanding of the importance of diet and exercise for the diabetic patient. This question will once again not add up to 6 for nurse managers and 54 for professional nurses, since participants could opt to answer the question or not.

Regular exercises will help one's body respond to insulin and can lower blood glucose and possibly, as well as reduce the amount of medication one needs (Amod *et al.,* 2012:S4). All (100%, n=6) the nurse managers and the majority (62,96%, n=34) of the professional nurses encouraged patients to undertake *moderate intensity physical activity.* These nurse managers and professional nurses will ensure that patients are educated regarding the importance of moderate intensity physical activity, as they understand the importance of this exercise.

According to Hinkle and Cheever (2014:1420-1424), patients should be advised to eat a *low-fat diet*. The minority (16,67%, n=1) of the nurse managers and 62,96% (n=34) of the professional nurses agreed that patients should be advised to eat a low-fat diet. The understanding shown by the HCWs regarding eating a low-fat diet, will assist them in educating patients regarding a low-fat diet.

The National Food Based Dietary Guideline encourages the intake of adequate carbohydrates, where small frequent portions of carbohydrates should be eaten (Vorster, 2013:28). Half (50%, n=3) of the nurse managers and 51,85% (n=28) of the professional nurses agreed that patients should eat a low-carbohydrate diet. As only 50% of the HCWs showed an understanding of intake of a low-carbohydrate diet, they will not be able to educate all patients regarding a low-carbohydrate diet.

According to the American Diabetes Association (2015:4), the dietician assists the patient with lifestyle modifications and other health goals. The American Diabetes Association (2015:4) further recommends that doctors and HCWs must *refer patients to a dietician* if they do not work with one. A similar finding was provided by the South African Department of Health Guideline, Management of T2DM in adults at primary healthcare level (2014:62-63), namely that patients who have a weight problem should be referred to a dietician. In this study less than half (33,33%, n=2) the nurse managers and the majority (74,07%, n=40) of the professional nurses felt that the *patients should be referred to a dietician if they needed to lose weight*. Their understanding of the importance of a patient consulting with a dietician, implies that these HCWs would refer patients to a dietician.

Amod *et al*. (2012:S4) support the notion that diet forms an integral part of the management of the blood glucose of diabetic patients. On the question of *other, specify*, all nurse managers and professional nurses were not requested to respond. The total will therefore not add up to 6 and 54, respectively. One (16,67%, n=1) nurse manager and one (1,85%, n=1) professional nurse indicated that diet would be discussed with the patient if they needed to lose weight.

4.6.1 Practice information of the community healthcare worker

This section will describe practice regarding DM as answered by the CHCWs to questions 5.1-5.4 in the questionnaire (See Figure 4.2). Table 4.11 provides a layout of the discussion to follow. The question numbering in Table 4.11 reflects the numbering of questions as in the questionnaire (See Addendum B2).

Table 4.11: *Practice information regarding diabetes for community healthcare workers*

Knowledge element	**Community Healthcare Worker (N=46)**
	True %, n=
5.1 Which asymptomatic patients do you advise to go for diabetes testing?	
5.1.1 None	17,3%, n=8
5.1.2 All patients above 45 years	50%, n=23
5.1.3 Patients that are overweight	45,6%, n=21
5.1.4 Do not exercise	28,2%, n=13
5.1.5 Hypertension	52%, n=24
5.1.6 Family history of diabetes (1st degree)	69,5%, n=32
5.1.7 Dyslipidaemia (elevated cholesterol)	17,3%, n=8
5.1.8 Polycystic ovarian syndrome	4,3%, n=2
5.1.9 History of cardiovascular disease	28,2%, n=13
5.10 Developed diabetes when pregnant or had a big baby (4 kg at birth)	41,3%, n=19
5.11 On request	17,3%, n=8
5.12 Other, specify	
5.2 Which topics do you discuss with your diabetic patients when you see them?	
5.2.1 None	2,1%, n=1
5.2.2 Avoidance of alcohol use	56,5%, n=26
5.2.3 Cessation of smoking	45,6%, n=21
5.2.4 Community and family support	52%, n=24
5.2.5 Complications of diabetes	52%, n=24
5.2.6 Depression	36,9%, n=17
5.2.7 Eating patterns	50%, n=23
5.2.8 Feet care	26%,

Knowledge element	Community Healthcare Worker (N=46)
	True %, n=
	n=12
5.2.9 Home monitoring glucose	39,1%, n=18
5.2.10 Managing diabetic emergencies	39%, n=18
5.2.11 Medication use	67,3%, n=31
5.2.12 Need for physical activity	41,3%, n=19
5.2.13 Weight loss	56,5%, n=26
5.3 What would you do if a patient with a hyperglycaemic emergency comes to your clinic?	
Check blood glucose	30,43%, n=14
Check blood pressure	4,35%, n=2
Ask when last did the patient eat	2,17%, n=1
Ask patient how does he feel	6,52%, n=3
5.4 What would you advise a patient to do if they need to lose weight?	
5.4.1 Nothing	
5.4.2 Moderate intensity physical exercise	67,39%, n=31
5.4.3 Do resistance training	41,30%, n=19
5.4.4 Quantity (portion) adjustment with calorie restriction	15,22%, n=7
5.4.5 Low fat	82,61%, n=38
5.4.6 Low carbohydrate	43,48%, n=20
5.4.7 Refer to a dietician	

It is important to note that participants could choose an option, with the result that the totals will not add up to 46 in this section.

The general population who are not at risk of developing DM should be screened at 45 years (South African Department of Health Guideline, Management of T2DM

2014:12). Half (50%, n=23) of the CHCWs advised *patients from 45 years and above* to go for diabetes testing, which implies that HCWs will encourage these patients to go for screening.

Obesity is one of the major challenges of the 21st century. South Africa is the only country in Southern Africa where the average BMI is higher than 24,9% (International Diabetes Federation, 2013:32). Less than half (45,6%, n=21) of the CHCWs advised patients who were *overweight to go for screening*. It is evident that the CHCWs showed a limited understanding in this regard.

According to Amod *et al*. (2012:S18-S19), in the 2012 SEMDSA Guideline for the Management of T2DM, physical activity assists with a decrease in morbidity and mortality in T2DM. The minority (28,2%, n=13) of the CHCWs indicated they advised *patients who do not exercise to go for screening*. Patients will not be educated regarding the importance of exercise, as only the minority of these HCWs indicated that they would advise patients who do not exercise to go for screening.

Hypertension is common in T2DM patients (IDF, 2013:24-26). More than half (52%, n=24) of the CHCWs indicated that they advised *patients who were diagnosed with hypertension to go for diabetes screening,* which indicates that the majority of the CHCWs will educate patients regarding hypertension.

The American Diabetes Association (2015:5) has revealed that screening should be done in high-risk patients who have a family history of T2DM in first- and second-degree family relatives. Similarly, the South African Department of Health Guideline, Management of T2DM in adults at primary healthcare level (2014:12) also indicates that screening should be done in patients who have a first-degree family history of DM. In this study more than half (69,5%, n=32) the CHCWs advised *patients who had a first degree family history of diabetes to go for screening,* which will assist in the prompt diagnosing of patients.

The American Diabetes Association (2015:4) verifies that cholesterol in the body is good, but too much is harmful. According to the South African Department of Health Guideline, Management of T2DM in adults at primary healthcare level (2014:32), blood is drawn to determine the cholesterol level of diabetic patients, which should ideally be less than 2,5 mmol/ℓ. Very few (17,3%, n=8) of the CHCWs indicated that

patients with a high cholesterol level were advised to go for screening, which implies that the majority of the HCWs will not advise all patients with a high cholesterol level to go for screening.

According to the American Diabetes Association (2015:2), the majority of female patients diagnosed with DM suffer from polycystic ovarian syndrome. The American Diabetes Association further reports that sufficient evidence is not available to explain the relation of polycystic ovarian syndrome and the body's ability to secrete insulin. The researcher could not find South African guidelines applicable to polycystic ovarian syndrome and could therefore not expect CHCWs to have knowledge regarding the condition. In this study, the minority (4,3%, n=2) of the CHCWs indicated that *patients diagnosed with polycystic ovarian syndrome was advised to go for screening*. A limited understanding of polycystic ovarian syndrome and the body's ability to secrete insulin is shown by the HCWs, which implies that they will not be able to educate patients in this regard.

The SANHANES-1 reported cardiovascular disease as one of the leading known causes of morbidity and mortality amongst DM patients (Shisana *et al*., 2013:14). A quarter (28,2%, n=13) of the CHCWs indicated they advised *patients with cardiovascular disease to be screened.* Due to the limited understanding of cardiovascular disease shown by the HCWs, the CHCWs will not be able to educate patients with cardiovascular disease to go for screening.

According to the American Diabetes Association (2015:8), all women of childbearing age with diabetes should be educated about the importance of glucose control before pregnancy. A similar finding was reported in the *Guideline for Maternity Care in South Africa*, the manual for clinics, community health centres and district hospitals (2016:96). Less than half (41,3%, n=19) the CHCWs advised *patients who developed diabetes when they were pregnant or had a very big baby (e.g. 4 kg) at birth to go for screening.* It is evident that CHCWs will not be able to educate women of childbearing age with diabetes about the importance of glucose control before pregnancy, as a limited understanding is shown.

Screening of patients on request is done to identify asymptomatic individuals who are likely to have diabetes (Magothlane, 2013:837-838). A similar finding is reported

in the South African Department of Health Guideline, Management of T2DM in adults at primary healthcare level (2014:12), where asymptomatic patients are screened at the PHC and CHC on request. Only 17,3% (n=8) of the CHCWs indicated that they *advised patients on request to go for DM screening,* which means that very few CHCWs will encourage patients on request to go for screening.

On the question, topics that CHCWs discussed with diabetic patients when they see them, the following responses were provided:

According to Amod *et al*. (2012:S16), in the 2012 SEMDSA Guideline for the Management of T2DM, patients who are diabetic should consume alcohol in moderation; one unit or less per day for woman and two units or less for men. In spite of the guideline stating that alcohol must be taken in moderation, 56,5% (n=26) of the CHCWs discussed *avoidance of alcohol,* which is extreme. This implies that patients will be educated regarding the use of alcohol.

Patients diagnosed with DM should either stop smoking or reduce smoking, as it affects blood circulation (Amod *et al.,* 2012:S74). Less than half (45,6%, n=21) the CHCWs indicated they discussed *cessation of smoking* with patients. As less than half the HCWs indicated that they discussed cessation of smoking, the result would be that patients would not be informed about the dangers of smoking.

Lindsay, Mayberry and Osborn (2012:1239-1245), in the study on family support medication adherence and glycaemic control among adults with T2DM, revealed that all measures of family support showed a relation with one or more indicators of metabolic control. More than half (52%, n=24) the CHCWs indicated that they discussed *community and family support with the patients*. This means that not all patients will be educated about the importance of community and family support.

It is often only when patients present with complications associated with DM that they are diagnosed with the illness (IDF, 2013:38). Just more than half (52%, n=24) the CHCWs indicated that *complications of diabetes* were discussed with the patient, which is a cause for concern.

The American Diabetes Association Standards of Medical Care in Diabetes Abridged for Primary Care Providers (2015:1) states that people who are diagnosed with

diabetes have a greater chance of developing depression compared to someone who is not diabetic. Less than half (36,9%, n=17) of the CHCWs indicated that *depression was discussed* with patients as they showed a poor understanding of this fact.

The SANHANES 1 (2013:171) manifests that diabetics have a high risk of glucose intolerance; therefore, they require a special diet like low carbohydrate and fats, high fibre and low glycaemic foods. Half (50%, n=23) of the CHCWs indicated that they *discussed eating patterns with patients*. Healthy eating habits were understood by half the CHCWs, which imply that only half the HCWs would encourage patients to eat healthy food.

According to Amod *et al*. (2012:S69), in the 2012 SEMDSA Guideline for the Management of T2DM, feet problems are one of the major causes of morbidity and mortality amongst diabetic patients. The minority (26%, n=12) of CHCWs indicated that they discussed *aspects of foot care* with the patients. A limited understanding of foot care was shown by the CHCWs, which means that HCWs will not educate patients regarding aspects of foot care.

Less than half (39,1%, n=18) the CHCWs indicated that they discussed *home monitoring of glucose.* The International Diabetes Federation (2013:20) states that home monitoring of glucose by the patient should only be implemented if the patient has been taught how to test the blood glucose. The International Diabetes Federation further recommends that patients should be taught at diagnosis and it should form part of the patient's care plan. According to the South African Department of Health Guideline, Management of T2DM in adults at primary healthcare level (2014:22), self-monitoring of blood glucose is encouraged among patients receiving insulin, as it improves the confidence and the self-management of the patient. Many overweight patients do not have access to glucose testing devices, as the Department of Health has insufficient funds to procure these (*Volksblad*, 2014:6). As a limited understanding is shown by the CHCWs, it implies that patients will not be taught how to monitor their glucose at home.

According to the South Africa Department of Health (2012:8.10), the blood glucose of the patient should first be determined in order to ascertain the blood glucose level.

If the blood glucose is low, an oral sugar drink can be given to the patient to drink. Less than half (39,1%, n=18) the CHCWs indicated that they discussed *managing diabetic emergencies*. Health education regarding managing diabetic emergencies will not be done by the HCWs, as they showed a poor understanding.

The South Africa Department of Health (2012:8.10-8.14) supports the notion that diabetic medication should be taken as prescribed and if complications exist, then the patient should inform the HCW at the PHC or CHC as soon as possible. More than half (67,3%, n=31) the CHCWs indicated that they discussed *medication use* with patients. This is positive, as the majority of the CHCWs will educate patients regarding diabetic medication.

Less than half (41,3%, n=19) the CHCWs indicated that they discussed the *importance of physical activity* with the patient. A total number of 150 minutes of exercise can be accumulated over a week and exercises such as jogging, swimming for 20-30 minutes a day can be done 3-5 times per week (South Africa Department of Health, 2012:20). It is evident from the study that the majority of the CHCWs will not educate patients regarding the importance of physical activity as they showed a poor understanding of the content.

Amod *et al*. (2012:S55), in the SEMDSA Guideline for the Management of T2DM, state that the aim of diabetic patients should be to lose 5-10% of body weight, maintain weight loss and prevent regaining the weight. More than half (56,5%, n=26) the CHCWs indicated that they discussed *weight loss* with patients.

If a patient presents with hyperglycaemia, the CHCW should first determine the blood glucose of the patient, ask the patient how he feels and ascertain when last the patient had something to eat (South Africa Department of Health, 2012:8.12-8.14). A third (43%, n=14) of the CHCWs indicated that they would *check the blood glucose of the patient*, whereas the minority (4,35%, n=2) of the CHCWs indicated that they *would check the blood pressure* of the patient. Only one (2,17, n=1) CHCW indicated that she would *ask the patient when last he had had something to eat,* while very few (6,52%, n=3) of the CHCWs indicated that they would *ask the patient how he felt*. It would appear as if patients who present with a hyperglycaemic

emergency will not be treated effectively at the PHCs and CHCs, since a poor understanding of hyperglycaemic emergencies were shown by the HCWs.

Many diabetic patients are overweight and inactive, which results in glucose control being very difficult. According to the South African Department of Health Guideline, Management of T2DM in adults at primary healthcare level (2014:39), patients are encouraged to lose weight with lifestyle modification and exercises. According to the South Africa Department of Health (2012:20), a diabetic patient should exercise at least 30 minutes per day. This does not have to be continuously.

In this section, the CHCWs were requested to indicate what advice they would provide to patients to lose weight. More than half (67,39%, n=31) the CHCWs advised patients to do *moderate-intensity physical exercise.*

Studies have shown that resistance training is not effective for a weight-loss programme (Amod et al., 2012:S55). In this study, less than half (41.30%, n=19) the CHCWs advised patients to do *resistance training*. It is not clear why the majority CHCWs did not advise resistance training, but this assumption was correct.

The minority (15,22%, n=7) of CHCWs advised patients to apply *portion adjustment with calorie restriction in their diet*. According to Vorster (2013:S28-S35), patients should eat small meals more frequently, apply portion adjustment and have a low calorie intake. A limited understanding of portion adjustment was shown by the CHCWs, which implies that patients treated by them will not be educated regarding the importance of portion adjustment.

Amod *et al*. (2012:S16) further proves that patients should be advised that their fat intake should be less than 35% of the total energy intake. The majority (82,61%, n=38) of the CHCWs advised patients about a *low-fat diet*. This is positive, as the majority of the patients will be educated with regard to fat intake, which will assist patients with their glucose control.

Monitoring of carbohydrates intake is crucial in maintaining optimum blood-glucose levels (Amod et al., 2012:S16). In this study, less than half (43,48%, n=20) the CHCWs indicated they discussed a *carbohydrate diet* with the patient. This will be

problematic, as the majority of the CHCWs did not understand what a carbohydrate diet entails, which will influence the blood glucose levels of patients.

4.7 SUMMARY OF FINDINGS

Community Health Care Workers' knowledge was tested on a set of 22 items with Nurse Managers and Professional Nurses being tested on an additional 14 items for a maximum of 36. Nurse Managers and Professional Nurses showed moderately high knowledge scores, with the lower quartile of 22 still being well above the 50% mark of 18 (out of 36). The median was 23, which does indicate, however, that there is still much room for improvement. Community Health Care Workers knowledge scores ranged from 7 to 20, a higher median of 14, and an interquartile range of 11 to 16.

Attitudes scoring was constructed in such a way that a score of zero would indicate an equal mix of positive and negative attitude items, and the higher the score above zero (up to +18), the more positive the attitude, and the lower the score below zero (down to -18), the more negative the attitude. The same attitude scale was used for all HCWs. The Nurse Managers and Professional Nurses displayed the most positive attitudes, with a minimum of only -4, and a maximum of 16. More importantly, the median was 12.5, and the lower quartile score was still a moderately positive 9.5. The attitude scores of the Community Health Care Workers CHWs was more positive, with a median of 7 and an interquartile range from 1 to 10 (although the lowest attitude score was still -11).

Practice scores were calculated with different item sets for each of the three groups, related to their differing roles and responsibilities. Nurse Managers and Professional Nurses could obtain scores from 0 to 16, with higher scores indicating better practices, and Community Health Care Workers a score for 0 to 28. . Nurse Managers and Professional Nurses showed good practice scores, with a low of 6 and a high of 15 (out of 16), and a median of 12. For the Community Health Care Workers, the practice scores were moderately high, with a minimum of 5, but a maximum of 28 (out of 28). The median here was 16, and the interquartile range from 10 to 21.

4.8 CONCLUSION

Attention was given to the demographic information of the Nurse Manager, Professional Nurse and the CHCWs. Systems issues, namely causes of frustration for the Nurse Manager, Professional Nurse and the CHCWs were described. The available infrastructure at the PHC and CHC according to the Nurse Manager and Professional Nurse was explained. Knowledge regarding DM, according to the Nurse Manager and the Professional Nurse, was discussed, followed by the knowledge discussion of the CHCWs. Attitudes regarding DM, according to the Nurse Manager, Professional Nurse, and the CHCWs were discussed. A description of practice according to the Nurse Manager and Professional Nurse followed. The chapter concluded with the discussion of practice according to the CHCWs. In the next chapter, the conclusion and recommendations will be provided.

Chapter 5

Recommendations of the study

5.1 INTRODUCTION

HCWs provide a number of care and support services to people diagnosed with diabetes in many healthcare systems. The current study was carried out to understand the knowledge of, attitude towards and practice of HCWs working with type 2 DM. Knowledge regarding subject content of diabetes was inadequate, various beliefs pertaining to diabetes were evident and practices of the HCWs regarding diabetes was a concern. Prior to providing recommendations, the researcher will summarise the findings of the study as was presented in chapter 4. Figure 5.1 illustrates the final stage of the research process, namely recommendations.

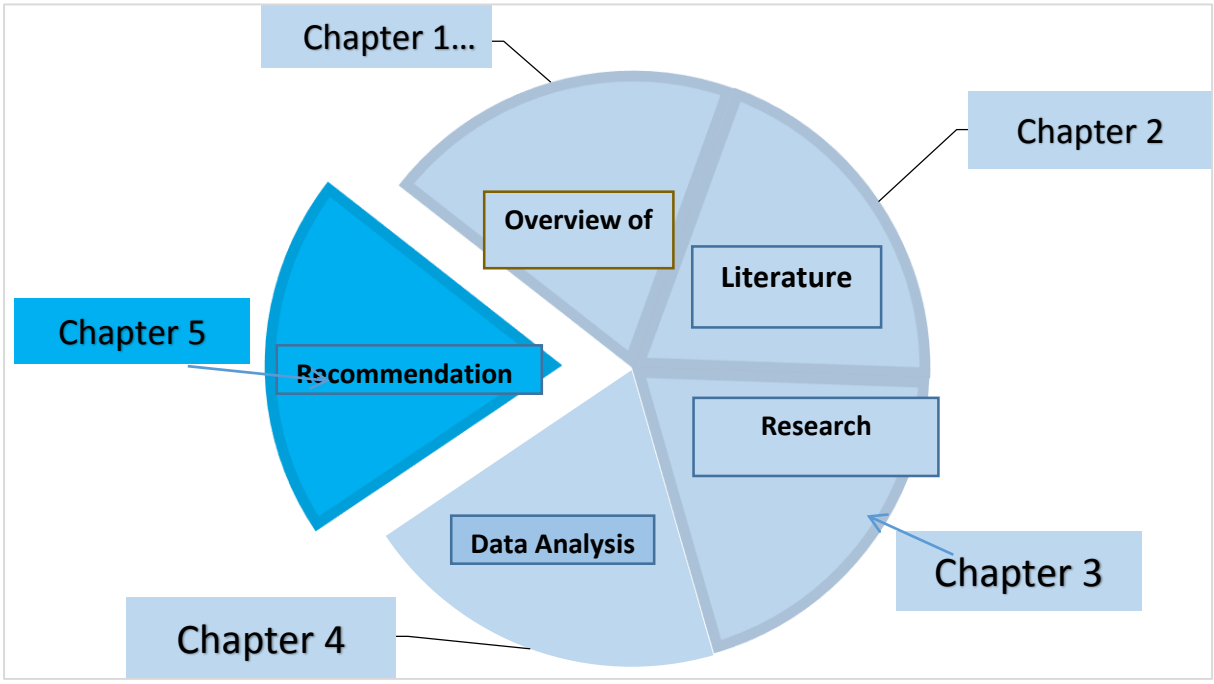

Figure 5.1: *Research recommendations discussion as adapted from De Vos et al. (2012:70)*

5.2 OVERVIEW OF DATA COLLECTED

An overview of the data collected of the nurse manager, professional nurse and the community healthcare workers will be provided. The response from the **knowledge** questions for the nurse manager and the professional nurse will be discussed simultaneously and the knowledge component of the CHCWs will be described separately, as highlighted in Figure 5.2.

The same **attitude** questions were put to all three groups of HCWs, and the responses to the attitude questions will be discussed simultaneously, as shown in Figure 5.2.

The researcher will provide an overview for the **practice** questions on nurse managers and professional nurses and then discuss CHCW's practice separately.

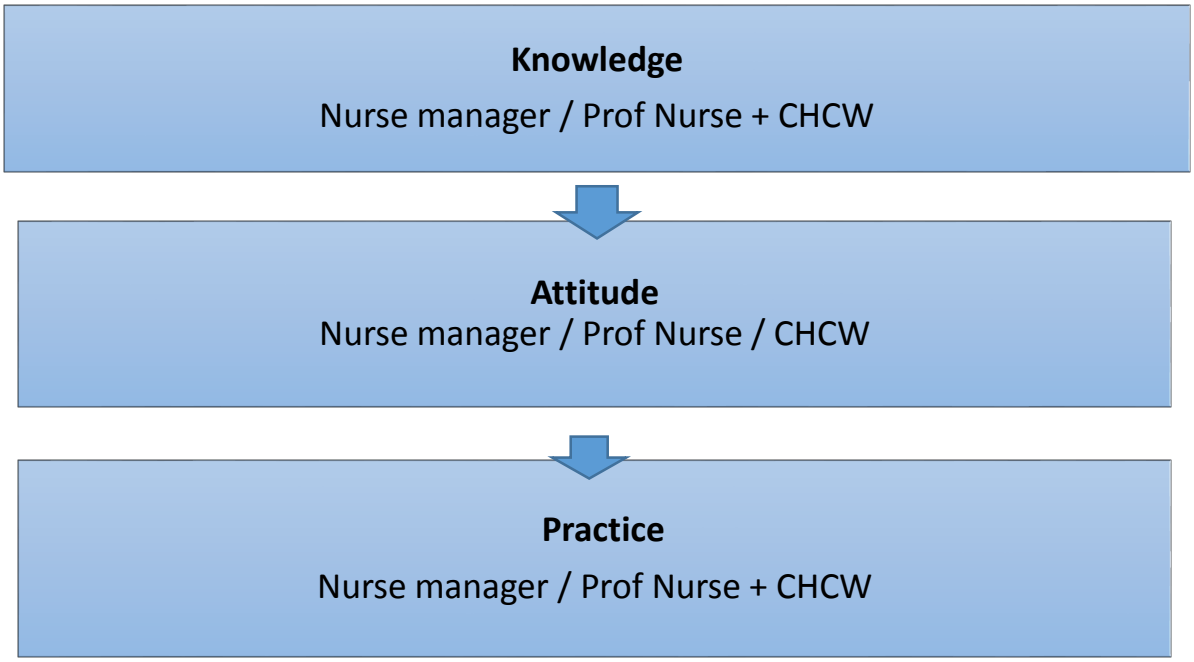

Figure 5.2: *Flow chart representing layout summary of research findings*

5.2.1 Knowledge of nurse manager/professional nurse regarding diabetes

The knowledge questions for the nurse manager and the professional nurse comprise questions such as, "*The poor control of DM could result in a greater chance of complication*", and "*Hyperglycaemia is a sign of chest pain".*

The theoretical maximum score that a participant could have obtained if they answered all items on the questionnaire correctly regarding knowledge of the nurse managers and professional nurses, would be 36. In this study, the median for the knowledge of the nurse managers and professional nurses for the questions answered correctly is 26.5 for the nurse managers and 23 for the professional nurses.

A difference exists between the knowledge scores obtained by the nurse managers and the professional nurses. It seems evident that the nurse managers have a better understanding of diabetes compared to the professional nurses.

5.2.2 Knowledge of CHCW regarding diabetes

The knowledge questions for the CHCWs comprise questions such as" *What causes diabetes"* and "*What do you think are the most common signs of high blood sugar".*

The maximum theoretical score that a participant could obtain if they answered all items on the questionnaire correctly regarding knowledge of the CHCWs would be 22. The median for the knowledge score obtained of the CHCWs for the questions answered correctly is 14. The median indicates room for improvement in knowledge of CHCWs regarding diabetes.

5.2.3 Attitude of nurse manager/professional nurse and CHCWs regarding diabetes

In this section, the HCWs were responsible for assuming the role of being a diabetic patient and had to answer the questions listed honestly based on their attitude. Amongst the questions included were, "*I think diabetes will change a person*" and "*I would feel embarrassed about having diabetes*".

A total number of 19 questions were asked in the attitude section of the questionnaire for the nurse managers, professional nurses and the CHCWs. It is important to note that the researcher did not consider answers right or wrong.

In this study, the HCWs tended to have different viewpoints regarding diabetes. For example, nurse managers indicated that they did not feel comfortable in disclosing their status, should they be diabetic. The majority of the professional nurses felt one could refer to a patient as "*A DIABETIC*", whereas the majority of the CHCWs believed that HCWs should be more sympathetic in the treatment of people with diabetes. These beliefs will influence the type of support provided to patients by the HCWs.

5.2.4 Practice of nurse managers/professional nurses regarding diabetes

Examples of questions asked in the practice section were, *"Which asymptomatic patients do you screen for diabetes?*", or "*Which topics you discuss with your diabetic patients"* and "*What would you advise a patient to do if they need to lose weight?"*

The theoretical maximum score that participants could obtain if they answered all items on the questionnaire correctly for practice of the nurse managers and professional nurses, would be 16. In this study, the median for practices for the questions answered correctly was 11,5 for the nurse managers and 12 for the professional nurses.

It is evident from the study that a level of understanding of practice is shown, but there is still some room for improvement.

5.2.5 Practice of CHCW regarding diabetes

Examples of questions asked in the practice section of the CHCWs were "*Which asymptomatic patients do you screen for diabetes?*", "*Which topics do you discuss with your diabetic?*", "*What would you do if a patient with hyperglycaemic emergency come to your clinic?"* and "*What would you advise a patient to do if they need to lose weight?"*

The theoretical maximum score that participants could obtain if they answered all items on the questionnaire correctly for practice of the CHCWs would be 38. The median score for practices for the questions answered correctly was 16. The low median reflecting practice of CHCW regarding diabetes is a concern.

5.3 RECOMMENDATIONS: KNOWLEDGE OF, ATTITUDE TOWARDS AND PRACTICE OF HCWS WORKING WITH T2DM

Recommendations for the study will be provided in this section and will be discussed according to the Knowledge, Attitude and Practice survey conducted. Wherever possible, these recommendations will be linked to the Theory of Planned Behaviour.

5.3.1 Recommendations for knowledge regarding T2DM

The recommendations for knowledge are reflected in Table 5.1.

Table 5.1: *Recommendations for knowledge related to T2DM*

Recommendation	***NM***	***PN***	***CHCW***	***Link to Theory of Planned Behaviour***
Training: Interactive short (hourly) workshops presented on a regular basis. During these workshops, guidelines such as the Primary Care 101 guidelines and other documentation can be used to update Nurse Manager and Professional Nurse alike.	X	X	X	Creating a platform to understand the beliefs and norms that inform the informational foundation of a HCW
The emphasis during these workshops needs to be on the interactive nature of the workshop – this will create a platform for feedback from these HCWs regarding all knowledge-related aspects pertaining to diabetes.	X	X	X	
The scope of practice of CHCWs needs to be stipulated at national level and the possible regulation of this category of HCW should be investigated. Such actions would inform content to be covered during workshops attended by CHCWs.			X	

CHCWs should be trained by the Regional Training Centre according to the Quality Council for Trades and Occupations Curriculum, and the CHCW Assessment Policy.			X	
Policy Guidelines: The nurse managers responsible for sub-districts should ensure the availability of policy guidelines in clinics on a monthly basis.	X	X	X	
Monitoring and Evaluation: Monitoring and evaluation about the knowledge component of chronic disease such as diabetes by the nurse manager on a quarterly basis.	X	X	X	

5.3.2 Recommendations for attitude regarding T2DM

The recommendations for attitude are the following:

Table 5.2: *Recommendations for Attitude related to T2DM*

Recommendation	***NM***	***PN***	***CHCW***	***Link to Theory of Planned Behaviour***
Value clarification: The Provincial Department of Health should create platforms to explore value clarifications with all HCWs in all sub-districts on a monthly basis to allow everyone to share their experiences. This strategy gives HCWs the opportunity to affirm and explain their stand on various value issues. This can be done through : • role play • interactive group discussions • Proud Whip (strategy used to identify good deeds) provides a simple means for HCWs to become aware of their beliefs and actions.	**X**	**X**	**X**	Since a person's attitude informs the intention to perform or not to perform specific behaviour, it is of the utmost importance to clarify values that could inform a person's attitude.

The strategy will encourage the Nurse Manager and Professional Nurse to do more things to be proud of.				
Research: Further exploration needs to be done to understand the attitudes of HCWs caring for patients with chronic diseases such as diabetes. The very limited information obtained through the survey needs to be explored through qualitative research, preferably within a dedicated research niche area focusing on care for patients with chronic diseases	**X**	**X**	**X**	

5.3.3 Recommendations for practice regarding T2DM

The recommendations for practice are the following:

Table 5.3: *Recommendations for practice related to T2DM*

Recommendation	NM	PN	CHCW	Link to Theory of Planned Behaviour
Interpretation of practice: The nurse managers responsible for chronic diseases in the various sub-districts should build into the monitoring and evaluation instruments a section providing the opportunity for HCW to identify elements that influence their practice in either a positive or negative manner. Quarterly review meetings conducted by the nurse manager in order to discuss practice related to management of patient with diabetes, which should specifically address elements identified as influencing practice negatively	X	X	X	Since practice, as referred to in the theory as "behaviour", is directly influenced by a person's intention and actual behaviour control, it is of the utmost importance to understand these mentioned elements clearly.
Research: In order to develop innovative models and	X	X	X	

approaches to diabetes practice, research should investigate the possible use of : Remote consultations, done on line or by using mobile devices or computers Culturally acceptable techniques used in performing arts, i.e. drama, song or dance Such research should preferably be conducted within a multi-professional research team.				

5.4 LIMITATIONS OF STUDY

The Department of Health in the Free State Province was not able to provide the researcher with the total number of HCWs employed in the province, which affected the sampling process. The researcher then interviewed two professional nurses from each CHC and PHC. A total number of 6 nurse managers, 54 professional nurses and 46 CHCWs were interviewed. However, personal experience and communication with nursing personnel in the department indicated that on average at least two professional nurses and five CHCWs per clinic are dedicated to service delivery for patients diagnosed with chronic diseases such as diabetes.

The questionnaire used was not 100% aligned with the Theory of Planned Behaviour, since the questionnaire was adapted from a combination of other standardised questionnaires. However, in spite of this, the researcher attempted to explain the alignment of the questionnaire (Addendum B1 and B3) content with that of the Theory of Planned Behaviour, as could be seen in Figure 2.4, Chapter 2 and recommendations provided in Chapter 5.

Limiting the KAP survey to the Free State as one province within a middle-income country limits the generalisability to all low and middle-income countries, since it would not be possible to have one province representing all these countries. However, the researcher collected valuable data, which could be applied to other South African provinces, as the same guidelines are used and similar clinical environments exist amongst the provinces. Due to financial and practical restraints, all PHC clinics were selected from the Mangaung Metro. The researcher attempted to acknowledge the possible urban bias of these clinics by including all CHC centres

in the Free State. These CHC centres fall in peri-urban and rural areas; therefore balancing the possible urban bias in PHC clinics.

5.5 VALUE OF THE STUDY

The knowledge, attitude and practices of the HCWs providing care to T2DM patients influence the wellness of the patients as well as the workload at the PHCs and CHCs. They can benefit the HCWs and the healthcare systems alike. Knowledge regarding diabetes can assist the HCW regarding management of the disease, early detection and referral of patients. An approachable and understanding attitude by the HCWs can encourage the patient to have a healthy lifestyle as well as ensuring that negative attitudes amongst the patients' and communities are decreased. Good practices will ensure that policies are available, understood and implemented correctly, ensuring that services rendered are effective and efficient.

This study also creates the platform for follow-up studies as has been suggested with the various recommendations. The data obtained from the study will further be used as part of a complex intervention-research project, consisting of four other studies, to be combined in the development of a health dialogue model for patients with diabetes in the Free State public health sector.

5.6 CONCLUSION

This chapter concluded the study with a summary of the research findings and recommendations made by the researcher. The research was conducted in the PHC and CHC where the knowledge, attitude and practice of three categories of HCWs who provided care to T2DM patients were ascertained. Through recommendations, the researcher hopes to address needs that emanated from the data. All recommendations are made with the aim of strengthening the role of the HCWs within the healthcare system and the community.

The value of the research may be found in the belief that HCW's knowledge, attitude and skills play an important part in how the patient diagnosed with diabetes will be treated in the public health sector.

Success is the result of perfection, hard work, learning from failure, loyalty and persistence. (Colin Powell)

BIBLIOGRAPHY

Adams, P. & Carter, A. 2010. Diabetes and hypertension guidelines and the primary health care practitioner in Barbados: Knowledge, attitude, practices and barriers – a focus group study. [Online] Available at: http://wwwbiomedcentral.com/1471-2296/11/96 [Accessed 5 January 2015].

American Academy of Orthopaedic surgeons. 2016. *Adult acquired flat foot*. [Online] Available at: http://www.orthoinfo.aaos.org/topic [Accessed 6 February 2016].

American Diabetes Association 2015. Standards of Medical Care in Diabetes - 2015 Abridged for Primary Care Providers. [Online] Available at: http://www.endocrinologia.org.mx/sitioEndos/smne2014/admin/descargas/guiasEndocrinologia/DM2%20primary%20care%20ADA%202015.pdf [Accessed 26 November 2015].

Ajzen, I. 1991. The theory of planned behaviour*. Organizational Behaviour and Human Decision Processes,* 50(2):179-211. http://www.utwente.nl/cw/theorieenoverzicht/theory%20clusters/health%20communication/theory-planned-behaviour [Accessed 30 November 2014].

Ajzen, I., Joyce, N., Sheikh, S. & Cote, N. 2011. Knowledge and the prediction of behaviour: The role of information accuracy in the theory of planned behaviour. *Basic and Applied Social Psychology, 33(2):101-117.* [Online] Available at: http://dx.doi.org/10.1080/01973533.2011.568834 [Accessed 16 October 2014].

Amod, A., Ascott-Evans, B.H., Berg, G.I., Blom, D.J., Brown, S.L., Carrihill, M.M., Dave, J.A., Distiller, L.A., Ganie, Y.N., Grobler, N., Heilbrum, A.G., Huddle, K.R.L., Janse van Rensburg, G., Jivan, D., Joshi, P., Khutsoane, D.T., Levitt, N.S., May, W.M., Pirie, F.J., Raal, F.J. & Rauff, S. 2012. The 2012 SEMDSA Guideline for the Management of Type 2 Diabetes. *Journal of Endocrinology, Metabolism and Diabetes of South Africa,* 17(2), Supplement 1:S1-S95. [Online] Available at: www.jemdsa.co.za [Accessed 19 December 2014].

Arent, S. 2002. The role of diabetes healthcare professionals in diabetes discrimination issues at work and school. *The Diabetes Educator*, 28(6):1021-7.

Armitage, C.J. & Conner M. 2001. Efficacy of the theory of planned behaviour: A meta-analytic review. *British Journal of Social Psychology*, 40:471-499.

Ayam Brand. 2015. Sardines in tomato sauce. [Online] Available at: http://www.ayambrand.com.my/sardines-in-tomatosauce [Accessed 14 January 2016].

Barbagallo, M. & Dominguez, L.J. 2014. Type 2 diabetes mellitus and Alzheimer's disease *World Journal of Diabetes*, 5(6):889-93.

Bilic, B. 2005. The theory of planned behaviour and health behaviours: Critical analysis of methodological and theoretical issues. *Hellenic Journal of Psychology,* 2:243-259.

Bodenheimer, T., Lorig, K., Holman, H. & Grumbach, M. 2010. Patients' self-management of chronic diseases at Primary Care. *JAMA*, 288(19): 2469-2475. [Online] Available at: http://jama.ama-assn.org/cgi/content/full/288/19/2469 [Accessed 22 November 2015].

Bonds, D., Camacho, F., Bell, R., Duren-Winfield, V., Anderson, R. & Goff, D. 2004. The association of patient trust and self-care among patients with diabetes mellitus. *BMC Family Practice,* 5(26):1-7.

Booysen, l., Erasmus, H. & Van Zyl, M. 2009. *The auxiliary nurse.* Cape Town: Juta and Company Ltd.

Botma, Y., Greef, M., Mulaudsi, M. & Wright, S. 2010. *Research in health sciences.* Pretoria: Pearson.

Boudreau, F. & Godin, G. 2014. Participation in regular leisure – time physical activity among individuals with Type 2 diabetes not meeting Canadian guidelines: the influence of intention, perceived behavioural control and moral norm, Pubmed, 21(6):9 18-26 [Online] Available at: http://www.ncbi.nlm.nih.gov/pub med/2444932 [Accessed 30 November 2015].

Bowman, M. 2013. The professional nurse coping with change now and the future. [Online] Available at: https://www./books.google.Co.zaid=2R4GCAAAQ [Accessed 22 December 2015].

Bradley, C. 2013. *Handbook of psychology and diabetes.* Poststrasse: Harwood Academic Publishers. [Online] Available at: https://books.google.co.za/books?id=NS_hAQAAQBAJ&pg=PA225&lpg=PA225&dq=In+general,+I+need+to+be+more+sympathetic+in+the+treatment+of+people+with+diabetes"&source=bl&ots=aQVBurWs9R&sig=qF5D9t--fGDdiTJgvD [Accessed 15 January 2016].

Bradshaw, D., Norman, R., Pieterse, D. & Levitt, N. 2007. Estimation of the burden of disease attributable to diabetes in South Africa in 2000. *South African Medical Journal,* (97)7:700-706.

Brady, L 2013. Putting primary health care into practice. [Online] Available at: http://www.nspreview.org/2013/12/11 [Accessed 1 January 2016].

Brink, H., Van der Walt, C. & Van Rensburg, G. 2009. *Fundamentals of research methodology for healthcare professionals.* Cape Town: Juta & Company.

Brown, K. & Heeley-Creed, D. 2013. Hypoglycaemia and nutrition. *Common Concerns for Staff Nursing and Residential Care,* 15(2):78-82.

Brown, M. 2015. *Core concepts of Diabetes Mellitus Centre for diabetes and endocrinology*. Houghton. [Online] Available at: http://web.cdediabetes.co.za/for-people-with-diabetes/about-diabetes/core-concepts-in-diabetes-mellitus [Accessed 15 January 2015].

Bryman, A. 2012. *Social research methods.* 4th edition. New York: Oxford University Press.

Burns, N. & Grove, S. 2011. *Understanding nursing research building an evidence-based practice*. 5th edition. St Louis: Saunders Elsevier:

Casey, G. 2011. The sugar disease: Understanding type 2 diabetes mellitus. Kai Tiaki Nursing New Zealand. *Continuing Professional Development,* 17(2):16-21.

Cavanaugh, K. 2012. Health literacy in diabetes care: explanation, evidence and equipment, 1(2) 191-199. [Online] Available at: http://www.ncbi.nlm.gov/pmc/article [Accessed 3 November 2015].

Cavill, N. & Bauman, A. 2004. Changing the way people think about health-enhancing physical activity: do mass media campaigns have a role? *Journal of Sports Sciences*, 22(8):771-90.

Centre for Disease Control and Prevention. 2015. Smoking and Diabetes. [Online] Available at: http://www.cdc.gov/tabacco/campaign/tips/diseases/diabetes. html [Accessed 30 December 2015].

Chin-Joe, I., Straathof, A., Prank, J., Jongejan, J. & Heijnen, J. 2001. Influence of the ethanol and glucose supply rate on the rate and anantioselectivity of 3-oxo ester reduction by baker's yeast, 75(1)29-38. [Online] Available at: http://www.yeastgenome.org/reference/5000142580 [Accessed 30 December 2015].

Coovadia, H., Jewkes, R., Barron, P., Saunders, D. & McIntyre, D. 2009. The health and health system of South Africa: Historical roots of current public health challenges. *The Lancet,* 374:817-834.

Coulson, N., Goldstone, G., Ntuli, A. & Pillay, N. 2010. *Developing capacity for health.* Johannesburg: Heinemann.

Creswell, J.W. 2009. Research design qualitative, quantitative and mixed methods approaches. London: American SAGE publications.

Creswell, J.W. & Plano Clark, V.L. 2011. *Designing and conducting mixed methods research.* 2nd edition. London: SAGE publications.

Czupryniak, L., Barkai, L., Bolgarska, S., Bronisz, A., Broz, J., Cypryk, K., Honka, M., Janez, A., Krnic, M., Lalic, N., Martinka, E., Rahelic, D., Roman, G., Tankova, T., Varkonyi, T., Wolnik, B. & Zherdova, N. 2014. *Diabetes Technology and Therapeutic Journal*, 16(7):460-475. Available at: http://www.ncbi.nlm.nih.gov/ pmc/articles/pmc 470747 [Accessed 31 December 2015].

Dave, S. 2014. Can salt lower blood glucose. [Online] Available at: https://www.paleo hacks.com/diabetes/can [Accessed 16 March 2016].

Delamater, A.M. 2006. Improving patient adherence. *Clinical Diabetes*, 24(2):71-77.

Denver Diabetes Counselling. 2010. How does diabetes affect our emotions? How do our emotions affect diabetes? [Online] Available at http://www.denverdiabetescounselling.com [Accessed 14 January 2016].

De Vos, A.S., Strydom, H., Fouche, C.B. & Delport, C.S.L. 2012. *Research at grass roots for the social sciences and human service professions.* 4th edition. Pretoria: Van Schaik.

Diabetes professional care. 2015. The global diabetes community. [Online] Available at: www.diabetes,co.uk

Diabetes UK. 2015. *Managing your diabetes (Guide to managing your diabetes).* [Online] Available at: http://www.diabetes.org.uk [Accessed 30 December 2015].

Diet in Review. 2015. Do baked beans count as a veggie? [Online] Available at: http://www.dietsinreview.com/diet-column [Accessed 8 January 2016].

Dinesh, K.M., Izham, M., Vijay, M., Pranaya, M. & Subish, P. 2012. Evaluation of knowledge, attitudes and practice of newly diagnosed diabetes patients – a baseline study from Nepal. *International Journal of Pharmacy Teaching and Practices,* 3(2):245-252.

Dr Gourmet.2015. Ingredients lentils. [Online]Available at: http://www.drgourmet.com/ingredients/lentils [Access 8 January 2016].

Drugs.com. 2016. *Metformin*. Available at: http://www.drugs.com/metformin.html [Accessed on 6 May 2016].

Dudley, L. 2016. *Nurses strike action highlights human resources crisis within public health system*. Health Systems Trust. [Online] Available at: http://www.hst.org.za/news/opinion-piece-nurses-strike-action-highlights-human-resources-crisis-within-public-health-system [Accessed 9 February 2016].

Ehiri, J.E., Oyo-Ita, A.E., Anyanwu, E.C., Meremikwu, M.M. & Ikpeme, M.B. 2005. Quality of child health services in primary health care facilities in south-east

Nigeria. *Child: Care, Health and Development*, 31:181-91. doi: 10.1111/ j.1365-2214.2004.00493.x

Emfermagem, L.-Ann, De Melo, L. & De Campos, E. 2014. The group facilitates everything: meaning patients with type 2 diabetes-mellitus assigned to health education groups. *Scielo,* 22(6):980-987. [Online] Available at http://www.eerp.usp. br/rlae [Accessed 28 January 2016].

Enferm, A.P. 2010. Training of professionals, acting in primary health care. *Diabetes Mellitus education,* 23(6). [Online] Available at: http://dx.doi.org/10.1590/s0103-21002010000600006 [Accessed 19 November 2015].

Epilepsy Foundation. 2015. *Epilepsy and diabetes-confusion or common "cure".* [Online] Available at: http://www.epilepsy.com/connect/forums/living [Accessed 9 January 2015].

EuroQol Group. n.d. *EQ-5D A standardised instrument for use as a measure of health outcome.* [Online] Available at: http://www.euroqol.org [Accessed 13 March 2014].

Faris, S. 2015. Recognizing serious COPD Complications. [Online] Available at: http://www.healthline.com/health/copd/serious [Accessed 4 January 2016].

Flotterp, S., Jamtvedt, G., Gibis, B. & McKee, M. 2010. Using audit and feedback to health professionals to improve the quality and safety of health care. [Online] http://www.euro.who.int/-data/asstes/pdf-file/003 [Accessed 3 January 2016].

Formosa, C. & Vella, L. 2012. Influence of diabetes-related knowledge on foot ulceration. *Journal of Diabetes Nursing*, 16(3):111-115.

Free State Department of Health, District Health Information System. 2015. [Accessed 3 March 2015].

Frese, E., Fick, A. & Sadowsky, H. 2011. Blood pressure measurement guidelines for physical therapist. *Cardiopulmonary Therapy Journal*, 22(2):5-12.

Gagliardino, J., Gonzalez, C., Coporale, J. & Group, A. 2007. The diabetes-related attitudes of health care professionals and persons with diabetes in Argentina *Pubmed*, 22(5):304-307.

Gestaldelli, A. 2008. Abdominal fat does it predict the development of type 2 diabetes? *The American Journal of Clinical nutrition*. [Online] Available at: http://ajcn.nutrition.org/content/87/5/1118 [Accessed 9 January 2015].

Girgis, S. 2014. Philosophy of a life well-lived. [Online] Available at: http://www.thepublicdiscourse.com/2014/02/119 [Accessed 20 November 2015].

Goodman, G.R., Zwarenstein, M.F., Robinson, I.I. & Levitt, N.S. 1997. Staff knowledge, attitude and practices in public sector primary care of diabetes in Cape Town. *Pubmed*, 87(3):305-309.

Gherman, A., Schnur, J., Montgomery,G., Sassu, R., Veresiu, I. & David, D. 2011. How are adherent people more likely to think? A meta-analysis of health beliefs and diabetes self-care. *Diabetes Education*, 37(3):392-408.

Hargreaves, Tom. 2011. Practice-ing behaviour change: Applying social practice theory to pro-environmental behaviour change, in *Journal of Consumer Culture*, 11:79-99, doi:10.1177/1469540510390500.

Hall, V., Thompsen, R., Henriksen, O. & Lohse, N. 2011. *Biomedical Central Public Health.* [Online] Available at: http://www.biomedcentral.com/1471-458/11/564 [Accessed 13 December 2014].

Hamdy, O. 2015. Diabetic ketoacidosis clinical presentation. [Online] Available at: http://www.emedicine.medscape.com/article/118361 [Accessed 5 January 2016].

Haque, O.S. & Waytz, A. 2012. Dehumanization in medicine: Causes, solutions, and functions. *Perspectives on Psychological Science*, 7(2):176-186. [Online] Available at: http://www.insight.kellogg.northwestern.edu/article/a-patient-not-a-person [Accessed 6 May 2016].

Heart and Stroke Foundation of South Africa. 2015. Are you eating too much salt? [Online] Available at: http://www.heartfoundation.co.za [Accessed 14 January 2016].

Hinkle, J.L. & Cheever, K.H. 2014. *Brunner and Suddarth's text book of medical - surgical nursing*. 13th edition. London: Wolters Kluwer; Lippincott Williams and Wilkins.

Hub Pages. 2015. Are there any benefits in eating chicken feet? [Online] Available at: http://www.hubpages.com/foods/isthereany benefits in eating chicken feet. [Accessed 8 January 2016].

Human D. & Fluss, S. 2000. The World Medical Association's Declaration of Helsinki. Historical and Contemporary Perspectives. *Journal of American Medical Association.*

International Diabetes Federation. 2012. *Diabetes at a glance*. [Online] Available at: www.idf.org/regions/africa [Accessed 12 July 2013].

International Diabetes Federation. 2013. IDF *Diabetes atlas*. 6th edition. [Online] Available at: http://www.idf.org/diabetesatlas [Accessed 14 January 2014].

Joslin Diabetes Centre. 2015. Finding the right diabetes support group. [Online] Available at: http://www.joslin.org/info/findingtherightdiabetessupport [Accessed 31 December 2015].

Kagee, A. & Van der Merwe, M. 2006. Predicting treatment adherence among patients attending primary health care clinics: The utility of the theory of planned behaviour. *South African Journal of Psychology*, 36(4):699-714.

Kautzky, K. & Tollman, S. 2009. *A perspective on primary health care in South Africa*. Johannesburg: Wits University Press.

Kheir, N., Greer, W., Yousif, A., Al Geed, H. & Al Okkah, R. 2011. Knowledge, attitude and practices of Qatari patients with type 2 diabetes mellitus. [Online] Available at: doi:10.1111/j.2042-7174.2011. 00118 [Accessed 14 July 2013].

Kigozi, N.G., Heunis, J.C., Wouters, E. & Van den Berg, H.S. 2011. Tuberculosis patients' reasons for, and suggestions to address non-uptake of HIV testing: a cross-sectional study in the Free State Province, South Africa. *BMC Health Services Research*, 11:110.

Kwon, S.C., Wyatt, L.C., Kranick, J.A., Islam, N.S., Devia, C., Horowitz, C. & Trinh-Shevrin, C. 2015. Physical activity, fruit and vegetable intake, and health-related quality of life among older Chinese, Hispanics, and Blacks in New York City. *American Journal of Public Health* 3(105):S544-S552.

Li, J., Drury, V. & Taylor, B. 2013. Diabetes is nothing: The experience of the older Singaporean woman living and coping with Type 2 diabetes. Older Singaporean Women Coping With Type 2 Diabetes, 45(2):188-196.

Lindsay, S., Mayberry, M. & Osborn. 2012. Family Support, Medication Adherence, and Glycaemic Control among Adults with Type 2 Diabetes. Pub Med Central, 35(6):1239-1245. [Online] Available at: http://www.care.diabetesjournals.org/content/35/ 6/12 [Accessed 24 January 2016].

Lam Chun-Yin, J. 1997. Psychosocial correlates of illness control and adjustment in patients with diabetes. [Online] Available at: www.hub.hku.hk/bitstream/10722/31859/15 [Accessed 18 March 2016].

Lawal, M. 2015. The importance of diabetes specialist nurses. Nursing in practice. [Online] Available at: http://www.nursinginpractice.com/article/importance-diabetes-specialist-nurses [Accessed 24 November 2015].

Lehmann, U. & Sanders, D. 2007. Community health workers: What do we know about them? The state of the evidence on programmes, activities, costs and impact on health outcomes of using community health workers. School of Public Health. University of Western Cape. [Online] Available at: http://www.who.int/hrh/documents/community [Accessed 19 November 2015].

Levitt, N. 1996. Diabetes mellitus in Black South Africans. *Int J Diab Dev Countries*, 16:41-45.

Magotlane, S., Chauke, M., Mokgadi, M. & Mokoena, J. 2013. *Juta's complete textbook of medical and surgical nursing.1st edition.* Cape Town: Juta & Company Ltd.

Makwero, M.T. 2011. The influence of diabetic patients' knowledge, attitude and practices regarding diet, lifestyle and their diabetes on glycaemic control and complications at Maluti Adventist Hospital: a cross-sectional study. Unpublished MMed dissertation. Bloemfontein: University of the Free State.

Manongi, N., Marchant, T. & Bygbjerg, I. 2006. Improving motivation among primary health care workers in Tanzania: A health worker perspective. [Online] Available at: www.http://human–resources-health.biomedcentral [Accessed 1 March 2016.

Marie, M. 2009. *Nursing dynamics.* 4th edition. Johannesburg: Heinemann.

McHugh, M., Kutney-Lee, A., Cimiotti, J., Sloane, D., & Aiken, L. 2012. *Nurses' widespread job dissatisfaction, burnout, and frustration with health benefits signal problems for patient care*. *PMC*, 30(2):202-210. [Online] Available at: www.ncbi.nlm.nih.gov/pmc [Accessed 3 November 2015].

Mestrovic, T. 2015. *Metformin contraindications 2015*. News Medical Life sciences and Medicine. [Online] Available at: http://www.newsmedicalnet/health/metformin [Accessed 4 December 2016].

Mercola, J. 2013. *Take control of your health*. [Online] Available at: http://articles mercola.com/sites/articles/archive [Accessed 8 January 2016].

Miller, C., Ketlhapile, M., Rybasack-Smith, H., & Rosen, S. 2010. Why are antiretroviral treatment patients lost to follow-up? A qualitative study from South Africa. *Tropical Medicine International Health*, 15(s1):48-54. [Online] Available at: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3060335 [Accessed 22 November 2015].

Miller, T. 2013. How organisations benefit from complaints. [Online] Available at http://www.complaintexpert.co.uk/how-organisationsbenefitfromcomplaints [Accessed 30 January 2016].

Modern Ghana News. 2006. Political interference lowers performance in public sector. [Online] Available at: http://www.modernghana.com/news/94628/political-interference-lowers-performance-in-public-sector.html [Accessed 2 March 2016].

Moule, P. & Goodman, M. 2009. *Nursing research.* London: SAGE.

Naledi, T., Barron, P. & Schneider, H. Primary health care in SA since 1994 and implications of the new vision for PHC Re-engineering. In: Padarath, A. & English R. (eds). *South African Health Review 2011*. Durban: Health Systems Trust, 2011. 17-28.

National Commission for the Protection of Human Subjects of Biomedical and Behavioural Research. 1979. *Belmont Report,* Washington: United States Department of Health and Human Services.

Ngwabe, S. & Govender, K. 2014. A review of a community health care workers' programme in South Africa. *International Journal of Medical and Health Sciences Research1*,(11):133-143. [Online] Available at: http://www.pak insight.com/?ic=journal&journal9 [Accessed 30 December 2015].

Norheizum, D. 2012. Diabetic defaulter in Lebuan community. Participation as one of the solutions. [Online] Available at: http://www.ihm.moh.gov.my/images Accessed 24 February 2016].

Nyoni, C.N. 2016. Perceptions of patients regarding health communication strategies in the Free State, South Africa. Unpublished MA dissertation. Bloemfontein: University of the Free State.

O'Brien, C.A. 2011. Nursing strategies to facilitate self-management in persons living with diabetes mellitus type 2. Port Elizabeth: PhD thesis, Nelson Mandela Metropolitan University.

Otterman, N., Van der Schaaf, M., Busch-Westbroek, T., Van Schie, L. & Nollet, F. 2012. The use and safety of combined resistance and aerobic training in a patient with complications related to type 2 diabetes: a case report, *Pub Med,*

34(17):1495-1500. [Online] Available at: http://www.fysiond-evidencebased.nl [Accessed 30 December 2015].

Parker, W. 2008. Lifestyle modification education in chronic diseases of lifestyle: Insight into counselling provided by health professionals at primary health care facilities in the Western Cape, South Africa. PhD thesis, University of Cape Town.

Polit, D.F. & Beck, C. T 2012. *Nursing research generating and assessing evidence for nursing practice*. Philadelphia: Wolters Kluwer/Lippincott Williams & Wilkins.

Powel, C 2015. Brainy Quotes. [Online] Available at: http://www.brainyquote.com/ quotes/authors/c/colin. [Accessed 12 May2016].

Reddy, R. 2012. *Standard treatment guidelines and essential medicines list: Hospital Level Adults-2012.* [Online] Available at: http://www.kznhealth.gov.za/ pharmacy/edladult_2012.pdf [Accessed 2 January 2014].

Republic of South Africa, 2005. *Nursing Act 33 of 2005.* Pretoria: Government Printer.

Rheeder, P. 2006. Type 2 Diabetes: The emerging epidemic. *South African Family practice*, 48(10):20.

Rodrigues, F., Zanetti. M., Dos Santos, M., Martins, T., Sousa, V. & De Sousa Teixera, C. 2009. Knowledge and attitude: important components in diabetes education. *Rev Latino-am Enfermagen,* July-Aug, 17(4):468-473.

Rodrigues, F.F. 2012. Relationship between knowledge, attitude, education and duration of disease in individuals with diabetes mellitus. *Acta Paul Enferm,* 25(2):284-290.

Rosenberg, T. 2011. [Online] http://opinionator.blogs.nytimes.com/2011/02/14 [Accessed 10 March 2015].

Sastry, M.A., Long, K.N.G., De Sa, A., Salie, H., Topp, S.M., Sanghvi, S. & Van Niekerk, L. 2015. Collaborative action research to reduce patient wait times: Results in two high-demand public clinics in Western Cape, South Africa.

Unpublished manuscript submitted to PLoS on 24 January 2015. [Online] Available at http://www.gsb.uct.ac.za/files/Wait_Time_Study.pdf [Accessed on 3 January 2015].

Sax, H., Allergranzi, B., Uckay, I., Larson, E., Boyce, J.& Pitter, D. 2007. My five moments for hand hygiene: a user-centred design approach to understand, train, monitor and report hand hygiene. Pub Med, 67(1): 9-12. [Online] Available at: http://www.journalofhospitalinfection.com/article/50195-6701 [Accessed 15 November 2015].

Schneider, H., Hlengiwe, H. & Van Rensburg, D. 2008. Communality health care workers and the response to HIV/AIDS in South Africa: Tensions and prospects. *Health Policy and Planning,* 23:179-187.

Searle, C., Human, S.P. & Mogotlane, S.M. 2009. *Professional practice: a Southern African nursing perspective*. 5th edition. Johannesburg: Heinemann.

Sello, D.A. & Dambisya, Y.M. 2014. Views of pharmacists on involvement in ward rounds in selected public hospitals in Limpopo Province. *Health SA Gesondheid*, 19(1):1-7.

Shah, M., Kaselitz, E. & Heisler, M. 2013. The role of the community health workers in diabetes: update on current literature. *Pub Med*, 13(2):163-177. doi 10.007/s 11892-012-0359-3.

Shisana, O., Labadarios, D., Rehle, T., Simbaya, L., Zuma, K., Dhansay, A., Reddy, P., Parker, W., Hoosain, E., Naidoo, P., Hongoro, C., Mchiza, Z., Steyn, N.P., Dwane, N., Makoae, M., Maluleke, T., Ramlagan, S., Zungu, N., Evans, M.G., Jacobs, L., Faber, M. & Sanhanes-1 Team. 2013. *South African National Health and Nutrition Examination Survey (SANHANES-1).* Cape Town: HSRC Press.

Sibiya, M. & Gwele, N. 2013. A model for the integration of primary health-care services in the Province of KwaZulu-Natal, South Africa. *Journal of Nursing Management,* 21:387-395.

Simcox, J. & McClain, D. 2013. Iron and diabetes risk. *Pubmed*, 17(3):329-341. [Online] http://www.ncbi.nlm.nih.gov/pubmed [Accessed] 2 January 2106].

Smalls, B.L., Walker, R., Hernandez-Tejadda, M., Campbell, J., Davis, K. & Egede, L. 2012. Associations between coping, diabetes knowledge, medication adherence and self-care behaviour in adults with type 2 diabetes. [Online] Available at: www.sciencedirect.com [Accessed 22 July 2013].

Smeltzer, S., Bare, B., Hinkler, K. & Cheever, H. 2008. *Brunner & Suddarth's textbook of medical surgical nursing*. 11th edition. [Online] Available at: http://www.amazon.com/suddarths [Accessed 20 November 2015].

Sokhela, D.G. 2013. Assessment of the experiences of users of the fast queue in selected Primary Health facilities in the EThekwini Municipality. [Online] Available at: www.http://hdl.handle.net/10321/618

South Africa. Department of Health. 2010. *Re-engineering primary health care in South Africa.* Pretoria: Department of Health.

South Africa. Department of Health. 2011a. National Core Standards for Health establishment in South Africa. [Online] Available at: http://www.section27.org.za/content/uploads/2013/01/NationalCoreStandards.pdf [Accessed 11 September 2012].

South Africa. Department of Health. 2011b. *Primary Care 101.* Cape Town: Government Printer. Pretoria: Department of Health.

South Africa. Department of Health. 2011c. *Provincial guidelines for the implementation of three streams of PHC re-engineering*. Pretoria: Department of Health 4 September. 1-67.

South Africa. Department of Health, 2012. *Standard treatment guidelines and essential medicines list.* Pretoria: Government Printer.

South Africa. Department of Health. 2013a. *Annual Performance Plan 2013/2014.* Free State: Department of Health.

South Africa Department of Health. 2013b. *Negotiated service delivery agreement: A long and healthy life South Africans: Department of Health*. [Online] http://www.hst.org.za/publications/NSDA

South Africa. Department of Health, 2013c. *South African National Health and Nutrition Examination Survey SANHANES 1.* [Online] Available at: http://www.hsrc.ac.za/en/media-briefs/population-health/results-sanhanes1 [Accessed 13 December 2014].

South Africa Department of Health. 2013d. *Strategic plan for the prevention and control of the non-communicable diseases.* Pretoria: Department of Health.

South Africa Department of Health. 2014. M*anagement of type 2 diabetes in adults at primary health care level.* Department of Health. Pretoria. Department of Health.

South Africa. Department of Health, 2016. *Guidelines for Maternity Care in South Africa. A manual for clinics, community health centres and district hospitals*. 4th edition. Pretoria. Department of Health.

South Africa. Department of Public Service and Administration, 2007. Implementation of the Occupational Specific dispensation (OSDs) for the occupations professional nurse, staff nurse and nursing assistants in the Public Service. [Online] Available at: www.fshealth.gov.za [Accessed 8 November 2015].

South African Nursing Council. 2005. *Nursing Act, 33 of 2005*. http://www.sanc.co.za/pdf/nursing% [Accessed 11 February 2014].

South African Nursing Council. 2015. *Registrations and listed qualifications – calendar year 2015*. Available via the internet at http://www.sanc.co.za/stats/Stat2015/Year%202015%20Registrations%20of%20Practitioners%20Stats.pdf [Accessed on 6 May 2016Afr].

Statistics South Africa. 2012. http://ww.statssa.gov.za./publications [Accessed 04 December 2014].

Statistics South Africa. 2014. http://ww.statssa.gov.za./publications [Accessed 04 December 2015].

Stivala, B.M. 2011. Protocols in eye conditions. Protocol booklet. University of Malta. [Online] Available at: https://www.um.edu.mt/-data [Accessed 14 January 2016].

Sudore, L.S., Karter, A.J., Huang, E.S., Moffet, H.H., Laiteerrapong, N., Schenker, Y., Adams, A., Whitmer, R.A., Lui, J.Y., Miau, Y., John, P.M. &, Schillinger, D. 2012. *Symptom burden of adults with type 2 diabetes across disease course: Diabetes & Aging Study.* [Online] Available at: doi10.1007/s11606-012-21 32-3 [Accessed 24 December 2014].

Sugar, N. 2011. *Strengthening chronic disease services in Ethiopia: Lessons learned from HIV/AIDS program implementation*. [Online] Available at http://www.ghdonline.org/uploads/icap [Accessed 30 January 2016].

Szende, A., Oppe, M. & Devlin, N. (eds). 2010. *EQ-5D value sets; inventory, comparative review and user guide.* 2nd edition. Dordrecht: Springer.

TAC ruk op oor stand van VS gesondheid. 2014.*Volksblad*. 20 Maart, 4.

Thompson, J.M., Buchbinder, S.B. & Shaks, N.H. 2010. Understanding health care management. [Online] Available at: http://Samples:Jbpub.com9780763790868/90868 [Accessed 7 March 2015].

Tomlin, A. & Asimakopoulou, K. 2014. Supporting behaviour change in older people with Type 2 Diabetes. *British Journal of Community Nursing,* 19(1):22-27.

Van der Does, A. & Mash, R. 2013. Evaluation of the “Take Five School”: An education programme for people withType2 Diabetes in Western Cape, South Africa. *Elsevier*, 7:289-295. [Online] Available at: http://www.elsevier.com/locate/pcd [Accessed 27 January 2016].

Van Rensburg, H.C. 2012. National health care systems: structure, dynamics and types. In: H.C. van Rensburg (ed.). *Health and health care in South Africa.* 2nd edition. Pretoria: Van Schaik Publishers. 1-50.

Van Zyl, S., Van der Merwe, L.J., Walsh, C.M., Groenewald, A.J. & Van Rooyen, F.C. 2012. Risk-factor profiles for chronic diseases of lifestyle and metabolic syndrome in an urban and rural setting in South Africa. *Afr J Prm Health Care Fam Med,* 4(1), Art. #346, 10 pages. [Online] Available at: http://dx.doi.org/ 10.4102/phcfm.v4i1.346 [Accessed 15 November 2015].

Vorster, H.H. 2013. "Make starchy foods the basis of every meal": A food-based dietary guideline for South Africa. *South African Journal of Clinical Nutrition,* 26(3):S28-S35.

Visagie, S. & Schneider.2014. Implementation of the principles of primary health care in a rural area of South Africa. [Online] Available at: http://www.scielo.org.za/pdf/ phcfm/v6n1/04pdf [Accessed 2 March 2016].

VS-gesondheid in erge knyp. 2014. *Volksblad*, 7 Julie, 6.

Ward, J. 2014. Nine common problems in the nursing profession. [Online] Available at: http://www.nursetogether.com/9-common-problems-nursing-profession#sthash.uW6rHbsI.dpuf [Accessed 24 February 2016].

Webster, M. 2015. Learner Essential Dictionary. [Online] Available at: http://www.merriam-webster.com/dictionary/knowledge Accessed 15 December 15

Weiten, W. 2013. *Psychology themes and variations.* 9th ed. Las Vegas: Jon-David Hague.

World Bank. 2014. World Bank site. [Online] Available at: http://data.worldbank.org/indicator/SH-xpd.totl.zs [Accessed 30 March 2015].

World Health Organization. 2010. *Innovative care for chronic conditions: building blocks for action*. Geneva: World Health Organization.

World Health Organisation. 2013. *Health Services.* [Online] Available at: http://www.who.int/topics/health_services/en [Accessed 11 February 2013].

World Health Organisation. 2015. *Protocols for health promotion, prevention and management of non-communicable diseases at primary care level*. [Online]

Available at: http://www.afro.who.int/en/clusters-a-programmes/dpc/non-communicable-diseases-managementndm/npc-features/2257-who-pen-protocols.html [Accessed 30 January 2016].

Addendum A1 Consent form

UNIVERSITY OF THE FREE STATE
UNIVERSITEIT VAN DIE VRYSTAAT
YUNIVESITHI YA FREISTATA

UFS·UV
HEALTH SCIENCES
GESONDHEIDSWETENSKAPPE

REPUBLIEK VAN SUID-AFRIKA / REPUBLIC OF SOUTH AFRICA
Tel:(051) 401 9747
Faks / Fax: (051) 401 9140 SA
E-Pos/E-mail:reidm@ufs.ac.za

✉ 339 BLOEMFONTEIN 9300

You have been asked to participate in a research study titled: **DIABETES RELATED KNOWLEDGE, ATTITUTE(S). AND PRACTICES [KAP] survey OF HEALTH CARE WORKERS WORKING WITH PATIENTS WITH TYPE 2 DIABETES IN THE FREE STATE, SOUTH AFRICA**

You have been informed about the study by ……

You may contact Ms C. Hassan at (083) 447 8652 any time if you have questions about the research or if you are injured as a result of the research. You may contact the Secretariat of the Ethics Committee of the Faculty of Health Sciences, UFS at telephone number (051) 4052812 if you have questions about your rights as a research subject.

Your participation in this research is voluntary, and you will not be penalized or lose benefits if you refuse to participate or decide to terminate participation. If you agree to participate, you will be given a signed copy of this document as well as the participant information sheet, which is a written summary of the research.

The research study, including the above information has been verbally described to me. I understand what my involvement in the study means and I voluntarily agree to participate.

_____ _____
Signature of Participant Date

_____ _____
Signature of Translator/ Witness Date
(Where applicable)

205 Nelson Mandela
Drive/RylaanPark West/Parkwes
Bloemfontein 9301
South Africa/Suid-Afrika

P.O. Box/Posbus 339
Bloemfontein 9300
South Africa/Suid-Afrika
T: +27(0)51 401 9111

Addendum A2 Information document:

UNIVERSITY OF THE FREE STATE
UNIVERSITEIT VAN DIE VRYSTAAT
YUNIVESITHI YA FREISTATA

UFS·UV
HEALTH SCIENCES
GESONDHEIDSWETENSKAPPE

REPUBLIEK VAN SUID-AFRIKA / REPUBLIC OF SOUTH AFRICA
Tel:(051) 401 9747
Faks / Fax: (051) 401 9140 SA
E-Pos/E-mail:reidm@ufs.ac.za

INFORMATION DOCUMENT: Diabetic patients/Professional nurses/Community Health Workers/Nurse Manager

Title of research: KNOWLEDGE, ATTITUTE(S). AND PRACTICES [KAP] OF HEALTH CARE WORKERS IN THE FREE STATE, SOUTH AFRICA REGARDING Type 2 DIABETES MELLITUS

Good day

I, C. E. Hassan, am doing research on the knowledge, attitude and practice of diabetic care.

Research is just the process to learn the answer to a question. In this study we want to learn about diabetic care in the Free State to inform decision makers on what is going on and to develop better care for patients.

Invitation to participate: We are asking/inviting you to participate in a research study

What is involved in the study – You will be asked questions by the researcher regarding yourself, what you know, how you feel about and what you do about diabetes. A questionnaire will be completed by yourself. The interview will last about 30 minutes. This study will be done at 11 clinics in the Free State.

Risks of being involved in the study: Some of the questions might be upsetting to you, but it should last for only a short time. You will not be punished if you cannot answer a question.

Benefits of being in the study are that your voice will be heard. Your opinions will be put together with others and this information will lead to better future care for patients with diabetes.

The subject will be given pertinent information on the study while involved in the project and after the results are available.

Participation is voluntary, and refusal to participate will involve no penalty or loss of benefits to which the subject is otherwise entitled; the subject may discontinue participation at any time without penalty or loss of benefits to which the subject is otherwise entitled. No costs will be payable by you as participant and you will also not be paid for your participation in the research.

Confidentiality: Efforts will be made to keep personal information confidential. Results will only be presented in collective format. All data will be stored in a locked safe.

Absolute confidentiality cannot be guaranteed. Personal information may be disclosed if required by law.

Contact details of researcher – for further information

Ms C Hassan Tel: (083) 447 8652

Contact details of REC Secretariat and Chair – for reporting of complaints/problems.

(051) 4052812

ADDENDUM B1: PROFESSIONAL NURSE'S QUESTIONNAIRE

Proffesional Nurse Questionaire

Adapted SA - Diabetes KAP Questionnaire

PART I: THE RESPONDENT

Provide care to diabetes patients

Instructions - Circle the appropriate number or write your answer on the space provided. 1-3 Interview number

1.1 Name of facility …… 4-5

1.2 Date questionnaire is completed …… / …… / …….. (dd/mm/yy) 6-11 (d d m m y y)

Demographic information

1.3 Note respondent's gender

1 Male 12
2 Female

1.4 What is your birthdate? …… / …… / …….. (dd/mm/yy) 13-18 (d d m m y y)

1.5 What is your home language?

1 Afrikaans 19
2 English 20
3 Sotho 21
4 Tswana 22
5 Xhosa 23
6 Zulu 24
7 Other, specify…….. 25

1.6 Are you currently employed as a?

1 Professional Nurse 26
2 Senior Professional Nurse 27
3 Chief Professional Nurse 28

1.7 What is your highest level of education?

1 Diploma 29
2 B- Degree
3 M Degree
4 PhD

1.8 Did you have any specific training on how to provide care and support to a Diabetic patient after completion of your basic nursing qualification?

1 No 30
2 Yes 31

1.9 If yes, list the type of training?

…… 32-33
…… 34-35
…… 36-37
…….. 38-39
…… 40-41
…… 42-43
…… 44-45

System issues

1.1 Many Professional nurses are frustrated in the work situation today, are you frustrated? 46

1 yes
2 no

1.11 If yes, name the one aspect that mostly cause frustration in your place of work? 47-48

……

……

1.12 When providing care to your Diabetic patients, do you have the following available?

		yes	no		
1	Dedicated, professional nurse	1	2	1	49
2	Visiting doctors	1	2	2	50
3	Adequate space for individual sessions	1	2	3	51
4	Adequate space for group sessions	1	2	4	52
5	Protocol for the management of Diabetic patients	1	2	5	53
6	Protocol for the management of hypertention	1	2	6	54
7	Protocol for the prevention and management of obesity	1	2	7	55
8	Protocol for the management of eye conditions	1	2	8	56
9	Educational material for patients with diabetes	1	2	9	57
10	Tape measure to do waist circumference	1	2	10	58
11	Scale	1	2	11	59
12	Height measurement	1	2	12	60
13	BP apparatus with two cuff sizes	1	2	13	61
14	Glucometer	1	2	14	62
15	Urine strips	1	2	15	63
16	Snellen chart	1	2	16	64
17	Out of stock (past 1 month) of diabetic medication	1	2	17	65
18	Support groups for patients and families	1	2	18	66
19	A fast lane for patients with chronic diseases	1	2	19	67
20	Patient training in self-care and disease management	1	2	20	68
21	Referral forms	1	2	21	69
22	System to follow-up defaulters (non-attenders)	1	2	22	70
23	Audits to evaluate patient care	1	2	23	71
24	Complaint procedure for patients	1	2	24	72
25	Plan to reduce waiting times	1	2	25	73
26	Register of diabetes patients	1	2	26	74

PART II: KNOWLEDGE REGARDING DIABETES

Indicate whether the following statements are true, false or if you are unsure.
You may indicate that you don't know what the answer is for any of the questions.

1 - T 2 - F 3-U

2.1	T	F	U	Poor control of diabetes could result in a greater chance of complications	75
	T	F	U	A substantial decrease in BMI will lower a patient's risk profile	76
	T	F	U	Eating a diet high in sodium will assist with blood glucose control	77
2.2	The following is a sign of hyperglycemia				
	T	F	U	Chest pain	78
	T	F	U	Polydipsia	79
	T	F	U	Confusion	80
2.3	The following is a possible complication associated with diabetes				
	T	F	U	Retinopathy	81
	T	F	U	Chronic kidney disease	82
	T	F	U	Chronic obstructive pulmonary disease	83
2.4	Regular exercise would benefit the diabetic patient with…				
	T	F	U	Glycemic control	84
	T	F	U	Peripheral neuropathy	85
	T	F	U	Weight loss	86

2.5 Metformin is contraindicated in

T	F	U	Chronic kidney disease		87
T	F	U	Patients on insulin		88
T	F	U	Impaired lung function		89
T	F	U	I don't know		100
T	F	U	Other specify		101

…… 102-103

…… 104-105

2.6 Retinopathy is a possible complication associated with diabetes

T	F	U		106

2.7 What would give you a high index of suspectability for diabetes

T	F	U	Polycythemia	107
T	F	U	Polyphagia	108
T	F	U	Polyuria	109

2.8 Aggrevating factors for diabetes are…

T	F	U	Hypertention	110
T	F	U	Epilepsy	111
T	F	U	Obesity	112

2.9 What is the blood glucose level of a patient with uncontrolled blood glucose level

…… 113-114

115-116

2.10 Should a diabetic patient exercise

1	yes		117
2	no		

2.11 If yes how often?

…… 118-119

…… 120-121

……

3.1 **Choose the correct answer**

The following is a sign of hyperglycemia

1	Chest pain		1
2	Polydipsia		2
3	Confusion		3
4	I don't know		4
5	Other specify		5

…… 6-7

…… 8-9

3.2 Diabetes has many complications. Identify which of the following possible complications is usually **not** associated with diabetes?

1	Retinopathy			10
2	Chronic kidney disease			
3	Chronic obstructive pulmonary disease			
4	I don't know			
5	Other specify			11-12
				13-14

……

……

3.3 If you had to treat an unconscious patient with a glucose of <3.5 mmol/l what would you do?

1	Immediately administer oral carbohydrate eg. Sugar 1- 3 teaspoons		15
2	Immediately administer 50ml 50% dextrose IV		16
3	Dextrose 10%, 5ml/kg via nasogastric tube		17
4	I don't know		18
5	Other specify		19
			20-21

…… 22-23

……

3.4 People with diabetes should take care of their feet because…

1	Metformin causes oedema of the lower limbs	24
2	Flat feet are common in people with diabetes	25
3	People with diabetes may have poor peripheral circulation	26
4	I don't know	27
5	Other specify	28
		29-30
	……	31-32
	……	33-34

PART III: ATTITUDE REGARDING DIABETES

4.1 This section consist of 19 statements to see how you feel about diabetes and its effect on a patient's life. There are only 3 possible answers. Give your first natural answer that can happen to you. There is no "right" or "wrong" answer because everyone has the right to their own opinion.

		I agree	I disagree	Neutral		
1	I think diabetes would change a person	1	2	3	1	35
2	I think you can refer to a patient as "A DIABETIC"	1	2	3	2	36
3	Diabetes is the worst thing that can ever happened to you…	1	2	3	3	37
4	Most people would find it difficult to adjust to having diabetes	1	2	3	4	38
5	I would feel embarrassed about having diabetes	1	2	3	5	39
6	There is not much one seem to be able to do to control diabetes	1	2	3	6	40
7	There is little hope of leading a normal life with diabetes	1	2	3	7	41
8	The proper control of diabetes involves a lot of sacrifice and inconvenience	1	2	3	8	42
9	I would not disclose to others if I had diabetes	1	2	3	9	43
10	Being told you have diabetes is like being sentenced to a lifetime of illness	1	2	3	10	44
11	A diabetic diet does not really spoil a social life	1	2	3	11	45
12	In general, I need to be more sympathetic in the treatment of people with diabetes	1	2	3	12	46
13	Having diabetes over a long period changes the personality	1	2	3	13	47
14	Diabetic patients often have difficulty to decide whether they feel sick or well	1	2	3	14	48
15	Diabetes is not really a problem because it can be controlled	1	2	3	15	49
16	There is really nothing you can do if you have diabetes	1	2	3	16	50
17	Diabetes patients do not always have a good support system	1	2	3	17	51
18	I believe I could adjust well to having diabetes	1	2	3	18	52
19	I often think it is unfair that some patients should have diabetes when other people are so healthy	1	2	3	19	53

E REGARDING DIABETES

5.1 Which **asymptomatic** patients do you screen for diabetes?

1	None	54
2	All patients above 45 years old	55
3	Family history of diabetes (1st degree)	56
4	On request	57
5	Other specify	58
		59-60
	……	61-62
	……	

5.2 Which topics do you discuss with your Diabetic patient at diagnosis and annually?

1	None	63
2	Avoidance of alcohol use	64
3	Cessation of smoking	65
4	Community and family support	66
5	Complications of diabetes	67
6	Other specify	
		68-69
.....		70-71
.....		

5.3 What would you advise a patient to do if they need to loose weight?

1	Nothing	72
2	Moderate intensity physical activity	73
3	Low-fat diet	74
4	Low-carbohydrate diet	75
5	Refer to a dietitian	76
6	Other specify	77
.....		78-79
.....		80-81

PART VI: PRACTICE REGARDING DIABETES

6.1 Is there anything that you would like to discuss regarding diabetes?

.....	82-83
.....	84-85
.....	86-87
.....	88-89
.....	90-91
.....	92-93

ADDENDUM B2: COMMUNITY HEALTH CARE WORKER

Community Health Worker

Addapted SA - Diabetes KAP Questionnaire

Only interview CHWs: That signed consent — **For Office use**

Instructions - Circle the appropriate number or write your answer on the space provided. ☐☐☐ 1-3 Interview number

1.1 Name of facility …… ☐☐ 4-5

1.2 Date questionnaire is completed …… / ……. / …….. (dd/mm/yy) ☐☐☐☐☐☐ 6-11 (d d m m y y)

PART I: RESPONDENT PROFILE

Demographic information

2.1. Note respondent's gender

1 Male — ☐ 12
2 Female

2.2 How old are you in years?..... ☐☐ 13-14

2.3 What is your home language?

1 Afrikaans — ☐ 15
2 English — ☐ 16
3 Sotho
4 Tswana
5 Xhosa
6 Zulu
7 Other, specify……..……..

2.4 What is your job title?

…… ☐ 17

2.6 What is your highest level of education?

0 Some high school — ☐ 18
1 Completed high school
2 Diploma
3 Degree
6 Other (Specify)……

2.7 Did you have any specific training on how to provide care and support to a Diabetic patient?

1 No — ***If no, go to 2.9*** — ☐ 19
2 Yes

2.8 If yes, list the type of training?

…….. 20-21
…… 22-23
…… 24-25

Sytem issues

2.9 Do you provide any type of care to Diabetic patients?

1 No ***If no, go to 3.1*** 26
2 Yes

2.1O If yes, list the type of care?

…… 27-28
…… 29-30
…… 31-32
…… 33-34
…… 35-36
…… 37-38

PART II: KNOWLEDGE REGARDING DIABETES

In the next few questions I will be asking you about your knowledge about diabetes.

3.1 Indicate whether the following statements are true, false or if you are unsure

T	F	U	Poor control of diabetes could result in a greater chance of complications	39
T	F	U	It does not matter if you lose weight, as long as you do not eat too much bread	40
T	F	U	Its better to eat salty food as it would prevent my sugar levels from dropping	41

3.2 Many people find terminology like starch, protein and fat confusing. What about you?
In which group would you place the following items?

	1 Starch	2 Protein	3 Fat	
Cooking oil/Fish oil				42
Pap				43
Bread				44
Lentils				45
Baked Beans				46
Chicken feet				47
Organ meat				48
Vegetables				49
Fruit				50
Milk				51
Sardines in Tomato sauce				52

3.3 What do you think are the most common signs of high blood sugar?
Mention as many signs as you want to.

…… 53-54
…… 55-56
…… 57-58
…… 59-60
…… 61-62
…… 63-64
…… 65-66

3.4 What type of health complications are usually associated with diabetes?

…… 67-68
…… 69-70
…… 71-72
…… 73-74
…… 75-76
…… 77-78
…… 79-80

3.5 Is exercise (or activities that make you sweat) important for people with diabetes?

1 Yes
2 No
3 Unsure

81

3.6 Indicate whether the following statements are true, false or if you are unsure.

T	F	U	Diabetic medication can cure diabetes	82
T	F	U	Diabetic medication should be taken for life	83
T	F	U	Diabetic medication should not be taken when you feel sick	84

3.7 What is the most important thing to do when you feel the beginning of hypoglycaemia (Low blood sugar)?

…… 85-86
…… 87-88
…… 89-90

3.8 Indicate which of the following statements are true, false or if you are unsure.
People with diabetes should take care of their feet because…

T	F	U	Diabetic medication may cause swelling of the feet	91
T	F	U	Sore feet are common in people with diabetes	92
T	F	U	People with diabetes may have poor circulation of blood in the feet	93

3.9 What causes diabetes……

…… 94-95
…… 96-97
…… 98-99
…… 100-101
…… 102-103

3.10 If you do physical work, exercise or activities that make you sweat regularly, it will help with...

Blood sugar control:
1 Yes
2 No

1

3.11	Painful feet	
	1 Yes	☐ 2
	2 No	
3.12	Weight loss	
	1 Yes	☐ 3
	2 No	
3.13	The following factors can make diabetes worse:	
	High blood pressure	
	1 Yes	☐ 4
	2 No	
3.14	Epilepsy	
	1 Yes	☐ 5
	2 No	
3.15	Overweight	
	1 Yes	☐ 6
	2 No	

PART III: ATTITUDE REGARDING DIABETES

4.1 This section consist of 19 statements to see how you feel about diabetes and its effect on your life. There is no "right" or "wrong" answer because everyone has the right to their own opinion. Give your first, natural answer as it occurs to you. There are 3 possible answers.

		I disagree	Neutral	I agree		
1	I think diabetes would change a person	1	2	3	1	7
2	I think you can refer to a patient as "A DIABETIC"	1	2	3	2	8
3	Diabetes is the worst thing that can ever happened to you…	1	2	3	3	9
4	Most people would find it difficult to adjust to having diabetes	1	2	3	4	10
5	I would feel embarrassed about having diabetes	1	2	3	5	11
6	There is not much one seems to be able to do to control diabetes	1	2	3	6	12
7	There is little hope of leading a normal life with diabetes	1	2	3	7	13
8	The proper control of diabetes involves a lot of sacrifice and inconvenience	1	2	3	8	14
9	I would avoid telling people I have diabetes	1	2	3	9	15
10	Being told you have diabetes is like being sentenced to a lifetime of illness	1	2	3	10	16
11	A diabetic diet does not really spoil a social life	1	2	3	11	17
12	In general, I need to be more sympathetic in the treatment of people with diabetes	1	2	3	12	18
13	Having diabetes over a long period changes the personality	1	2	3	13	19
14	Diabetic patients often find it difficult to decide whether they feel sick or well	1	2	3	14	20
15	Diabetes can be controlled	1	2	3	15	21
16	There is really nothing you can do if you have diabetes	1	2	3	16	22
17	Diabetes patients do not always have a good support system	1	2	3	17	23
18	I believe I could adjust well to having diabetes	1	2	3	18	24
19	I often think it is unfair that some patients should have diabetes when other people are so healthy	1	2	3	19	25

PART IV: PRACTICES REGARDING DIABETES

5.1 Which asymptomatic patients do you advise to go for diabetes testing?

1	None	26
2	All patients above 45 years old	27
3	Family history of diabetes (1st degree)	28
4	On request	29
5	Other specify	30
.....		31-32
.....		33-34

5.2 Which topics do you discuss with your Diabetic patient when you see them?

1	None	35
2	Avoidance of alcohol use	36
3	Cessation of smoking	37
4	Community and family support	38
5	Complications of diabetes	39
6	Others specify	40
.....		41-42
.....		43-44

5.3 What would you do if a patient with a hyperglycemic (very high blood glucose)emergency come to your clinic ?

.....	45-46
.....	47-48
.....	49-50

5.4 What would you advise a patient to do if they need to loose weight?

1	Nothing	51
2	Moderate intensity physical activity	52
3	Do resistance training	53
4	Quantity (portion) adjustments with calorie restriction	54
5	Low-fat diet	55
6	Low-carbohydrate diet	56
7	Other specify	
.....		57-58
.....		59 60

GENERAL

6.1 Is there anything else that you would like to discuss regarding diabetes?

.....	61-62
.....	63-64
.....	65-66
.....	67-68
.....	69-70
.....	71-72
.....	73-74
.....	75-76

ADDENDUM B3: NURSE MANAGER'S QUESTIONNAIRE

NURSE MANAGER QUESTIONNAIRE

Adapted SA - Diabetes KAP Questionnaire

PART I: THE RESPONDENT

Provide care to diabetes patients

Instructions - Circle the appropriate number or write your answer on the space provided. [ ][ ][ ] 1-3 Interview number

1.1 Name of facility …… [ ][ ] 4-5

1.2 Date questionnaire is completed …… / …… / …….. (dd/mm/yy) [ ][ ][ ][ ][ ][ ] 6-11 (d d m m y y)

Demographic information

1.3 Note respondent's gender

[ ] 1 Male [ ] 12
[ ] 2 Female

1.4 What is your birthdate? …… / …… / …….. (dd/mm/yy) [ ][ ][ ][ ][ ][ ] 13-18 (d d m m y y)

1.5 What is your home language?

[ ] 1 Afrikaans [ ] 19
[ ] 2 English [ ] 20
[ ] 3 Sotho [ ] 21
[ ] 4 Tswana [ ] 22
[ ] 5 Xhosa [ ] 23
[ ] 6 Zulu [ ] 24
[ ] 7 Other, specify…….. [ ] 25

1.6 Are you currently employed as a?

[ ] 1 Professional Nurse [ ] 26
[ ] 2 Senior Professional Nurse [ ] 27
[ ] 3 Other [ ] 28

1.7 What is your highest level of education?

[ ] 1 Diploma [ ] 29
[ ] 2 B- Degree
[ ] 3 M Degree
[ ] 4 PhD

1.8 Did you have any specific training on how to provide care and support to a Diabetic patient after completion of your basic nursing qualification?

[ ] 1 No [ ] 30
[ ] 2 Yes [ ] 31

1.9 If yes, list the type of training?

…… [ ][ ] 32-33
…… [ ][ ] 34-35
[ ][ ] 36-37
…….. [ ][ ] 38-39
[ ][ ] 40-41
…… [ ][ ] 42-43
…… [ ][ ] 44-45

System issues

1.10 Many Professional nurses are frustrated in the work situation today, are you frustrated?

[ ] 1 yes [ ] 46
[ ] 2 no

1.11 If yes, name the one aspect that mostly cause frustration in your place of work? 47-48

……

……..

1.12 When providing care to your Diabetic patients, do you have the following available in the majority of your clinics?

		yes	no		
1	Dedicated, professional nurse	1	2	1	49
2	Visiting doctors	1	2	2	50
3	Adequate space for individual sessions	1	2	3	51
4	Adequate space for group sessions	1	2	4	52
5	Protocol for the management of Diabetic patients	1	2	5	53
6	Protocol for the management of hypertention	1	2	6	54
7	Protocol for the prevention and management of obesity	1	2	7	55
8	Protocol for the management of eye conditions	1	2	8	56
9	Educational material for patients with diabetes	1	2	9	57
10	Tape measure to do waist circumference	1	2	10	58
11	Scale	1	2	11	59
12	Height measurement	1	2	12	60
13	BP apparatus with two cuff sizes	1	2	13	61
14	Glucometer	1	2	14	62
15	Urine strips	1	2	15	63
16	Snellen chart	1	2	16	64
17	Out of stock (past 1 month) of diabetic medication	1	2	17	65
18	Support groups for patients and families	1	2	18	66
19	A fast lane for patients with chronic diseases	1	2	19	67
20	Patient training in self-care and disease management	1	2	20	68
21	Referral forms	1	2	21	69
22	System to follow-up defaulters (non-attenders)	1	2	22	70
23	Audits to evaluate patient care	1	2	23	71
24	Complaint procedure for patients	1	2	24	72
25	Plan to reduce waiting times	1	2	25	73
26	Register of diabetes patients	1	2	26	74

PART II: KNOWLEDGE REGARDING DIABETES

In the next few questions I will be asking you about knowledge about diabetes. Indicate whether the following statements are true, false or if you are unsure.
You may indicate that you don't know what the answer is for any of the questions.

1 - True 2 - False 3-Unsure

2.1	T	F	U	Poor control of diabetes could result in a greater chance of complications	75
	T	F	U	A substantial decrease in BMI will lower a patient's risk profile	76
	T	F	U	Eating a diet high in sodium will assist with blood glucose control	77
2.2	The following is a sign of hyperglycemia				
	T	F	U	Chest pain	78
	T	F	U	Polydipsia	79
	T	F	U	Confusion	80
2.3	The following is a possible complication associated with diabetes				
	T	F	U	Retinopathy	81
	T	F	U	Chronic kidney disease	82
	T	F	U	Chronic obstructive pulmonary disease	83
2.4	Regular exercise would benefit the diabetic patient with…				
	T	F	U	Glycemic control	84
	T	F	U	Peripheral neuropathy	85
	T	F	U	Weight loss	86

2.5 Metformin is contraindicated in

T	F	U	Chronic kidney disease		87
T	F	U	Patients on insulin		88
T	F	U	Impaired lung function		89
T	F	U	I don't know		100
T	F	U	Other specify		101
			.....		102-103
			.....		104-105

2.6 Retinopathy is a possible complication associated with diabetes

T	F	U		106

2.7 What would give you a high index of suspectability for diabetes

T	F	U	Polycythemia	107
T	F	U	Polyphagia	108
T	F	U	Polyuria	109

2.8 Aggrevating factors for diabetes are…

T	F	U	Hypertention	110
T	F	U	Epilepsy	111
T	F	U	Obesity	112

2.9 What is the blood glucose level of a patient with uncontrolled blood glucose level

.....	113-114
	115-116

2.10 Should a diabetic patient exercise

1	yes	117
2	no	

2.11 If yes how often?

.....	118-119
.....	120-121
.....	

3.1 **Choose the correct answer**

The following is a sign of hyperglycemia

1	Chest pain	1
2	Polydipsia	2
3	Confusion	3
4	I don't know	4
5	Other specify	5
.....		6-7
.....		8-9

3.2 Diabetes has many complications. Identify which of the following possible complications is usually **not** associated with diabetes?

1	Retinopathy		10
2	Chronic kidney disease		
3	Chronic obstructive pulmonary disease		
4	I don't know		
5	Other specify		11-12
			13-14
.....			
.....			

3.3 If you had to treat an unconscious patient with a glucose of <3.5 mmol/l what would you do?

1	Immediately administer oral carbohydrate eg. Sugar 1- 3 teaspoons		15
2	Immediately administer 50ml 50% dextrose IV		16
3	Dextrose 10%, 5ml/kg via nasogastric tube		17
4	I don't know		18
5	Other specify		19
			20-21
.....			22-23
.....			

3.4 People with diabetes should take care of their feet because…

1	Metformin causes oedema of the lower limbs	24
2	Flat feet are common in people with diabetes	25
3	People with diabetes may have poor peripheral circulation	26
4	I don't know	27
5	Other specify	28
		29-30
	…….	31-32
	…….	33-34

PART III: ATTITUDE REGARDING DIABETES

4.1 This section consist of 19 statements to see how you feel about diabetes and its effect on a patient's life. There is only 3 possible answers. Give your first natural answer that can happen to you. There is no "right or wrong" answer because everyone has the right to their own opinion.

		I agree	I disagree	Neutral		
1	I think diabetes would change a person	1	2	3	1	35
2	I think you can refer to a patient as "A DIABETIC"	1	2	3	2	36
3	Diabetes is the worst thing that can ever happened to you…	1	2	3	3	37
4	Most people would find it difficult to adjust to having diabetes	1	2	3	4	38
5	I would feel embarrassed about having diabetes	1	2	3	5	39
6	There is not much one seem to be able to do to control diabetes	1	2	3	6	40
7	There is little hope of leading a normal life with diabetes	1	2	3	7	41
8	The proper control of diabetes involves a lot of sacrifice and inconvenience	1	2	3	8	42
9	I would not disclose to others if I had diabetes	1	2	3	9	43
10	Being told you have diabetes is like being sentenced to a lifetime of illness	1	2	3	10	44
11	A diabetic diet does not really spoil a social life	1	2	3	11	45
12	In general, I need to be more sympathetic in the treatment of people with diabetes	1	2	3	12	46
13	Having diabetes over a long period changes the personality	1	2	3	13	47
14	Diabetic patients often have difficulty to decide whether they feel sick or well	1	2	3	14	48
15	Diabetes is not really a problem because it can be controlled	1	2	3	15	49
16	There is really nothing you can do if you have diabetes	1	2	3	16	50
17	Diabetes patients do not always have a good support system	1	2	3	17	51
18	I believe I could adjust well to having diabetes	1	2	3	18	52
19	I often think it is unfair that some patients should have diabetes when other people are so healthy	1	2	3	19	53

E REGARDING DIABETES

In the next few questions I would like to ask you about practices with regard to diabetes.

5.1 Which **asymptomatic** patients do you screen for diabetes?

1	None	54
2	All patients above 45 years old	55
3	Family history of diabetes (1st degree)	56
4	On request	57
5	Other specify	58
		59-60
	…….	61-62
	…….	

5.2 Which topics do you discuss with your Diabetic patient at diagnosis and annually?

1	None	63
2	Avoidance of alcohol use	64
3	Cessation of smoking	65
4	Community and family support	66
5	Complications of diabetes	67
6	Other specify	
		68-69
.....		70-71
.....		

5.3 What would you advise a patient to do if they need to loose weight?

1	Nothing	72
2	Moderate intensity physical activity	73
3	Low-fat diet	74
4	Low-carbohydrate diet	75
5	Refer to a dietitian	76
6	Other specify	77
.....		78-79
.....		80-81

PART VI: PRACTICE REGARDING DIABETES

6.1 Is there anything that you would like to discuss regarding diabetes?

.....	82-83
.....	84-85
.....	86-87
.....	88-89
.....	90-91
.....	992-93-92

6.2 How often do you do inspections at the clinic(s) you are responsible for?

1	Never	94
2	Once a week	
3	Once a month	
4	Less than once a month	
5	Ad hoc (Once or twice a year)	

ADDENDUM C1: PROFESSIONAL NURSES' GUIDELINE

Professional Nurse Working with Adult patients with Type 2 Diabetes-Guideline

Question-by question guide:

Instructions: Below in **boldface** type are the questions found in the Professional Nurse Questionnaire.

These instructions are not to be read to the professional nurse. Before interviewing be sure to be thoroughly familiar with this question-by-question guide, so that you understand what each question is asking.

1.1 Write the name of the CHC Centre or PHC clinic

1.2 Write the date questionnaire is completed

PART I:DEMOGRAPHIC INFORMATION

1.3 Note respondents gender: Make a tick in the block indicating MALE or FEMALE

1.4 What is your birth date? Ask the PROFESSIONAL NURSE what is his or her current age in years.

1.5 What is your home language? Ask the PROFESSIONAL NURSE which language they are speaking mostly at home. If they speak more than one language, tick both.

1.6 Are you currently employed as? Ask the PROFESSIONAL NURSE if he or she is employed as a professional nurse, senior professional nurse or a chief professional nurse. Make a tick in the appropriate block.

1.7 What is your highest level of education? Ask the PROFESSIONAL NURSE what his highest level of education is namely, diploma, Ba degree M degree or PhD.

1.8 Did you have any specific training on how to provide care and support to a Diabetic patient after completion of your basic nursing qualification? Here we would like to know if the PROFESSIONAL NURSE received specific training with regard to providing care and support to diabetic patients. Make a tick in the block yes or no.

1.9 If yes, list the type of training? Here we would like to know what training the PROFESSIONAL NURSE received regarding diabetes? Write everything the professional nurse says.

System Issues

1.10 Many of the professional nurses are frustrated in the work situation today, are you frustrated?

Here we would like to know if the Professional Nurse is frustrated in the work situation. Make a tick in the block yes or no.

1.11 If yes, name the one aspect that mostly cause frustration in your place of work. We would like to know if the Professional Nurse can identify any aspects that causes frustration in the workplace. Write everything the professional nurse says.

1.12 When providing care to diabetic patients, do you have the following available?

1. Dedicated professional nurse. Here we want to know if the nurse is specifically allocated to care for patients with diabetes. Tick yes or no.

2. Visiting doctors. We want to know if the clinic has doctors who can attend to patients with diabetes. Tick yes or no.

3. Adequate space for individual sessions. We would like to know if a room is available where consultations with the patient can be done privately. Tick yes or no.

4 Adequate space for group sessions. We would like to know if a room is available where consultations with groups of patients can be done. Tick yes or no.

5. Protocol for management of diabetic patients. Here we would like to know if there is a compiled list of treatment options which can be used as a guideline for treatment, when patients are diagnosed. Tick yes or no.

6. Protocol for management of hypertension. Here we would like to know if there is a compiled list of treatment options which can be used as a guideline for treatment, when patients are diagnosed with hypertension. Tick yes or no.

7. Protocol for the prevention and management of obesity. Here we would like to know if there is a compiled list of options which can be used as a guideline for the prevention and management of patients who are obese. Tick yes or no.

8. Protocol for the management of eye conditions. Here we would like to know if there is a compiled list of treatment options which can be used as a guideline, when patients are diagnosed with eye conditions. Tick yes or no.

9. Educational material for patients with diabetes. Here we would like to know if the clinic has pamphlets or booklets which can be handed to patients to read at home. Tick yes or no.

10. Tape measure to do waist circumference. We want know if the clinic has a tape measure to measure the waist circumference of the patient. Tick yes or no.

11. Scale. We want to know if the clinic has a scale which could weigh the patient. Tick yes or no.

12. Height measure. We want to know if the clinic has a height measure which could be used to measure the height of the patient. Tick yes or no.

13. Bp Apparatus with two cuffs. We want to know if the clinic has a Bp apparatus with two cuffs to measure the blood pressure of obese patients and patients with an average circumference around the arm. Tick yes or no.

14. Glucometer. We want to know if the clinic has a glucometer to measure the level of the blood glucose of the patients. Tick yes or no.

15. Urine strips. We want to know if the clinic has urine strips which are used to test urine in order to detect if any abnormalities are present in the patients urine. Tick yes or no.

16. Snellen charts. We want to know if the clinic has a snellen chart which is used to determine the eyesight ability of the patient. Tick yes or no.

17. Out of stock (past 1 month) of diabetic medication. We want to know if in the past month there were a time that the clinic could not provide the diabetic patient with treatment because they are out of stock. Tick yes or no.

18. Support groups for patients and families. We want to know if there is any support groups that diabetic patients can be referred to. Tick yes or no.

19. A fast lane for patients with chronic diseases. We want to know if the diabetic patients are seen in any form of preference above other patients when they arrive at the clinic. Tick yes or no.

20. Patient training in self – care and disease management. We want to know if the diabetic patient receives training with regard to self-management of his chronic condition. Tick yes or no.

21. Referral form. We want to know if referral forms are completed when patients are referred for further treatment. Tick yes or no.

22. Systems to follow up defaulters (non – attenders). We want to know if the clinic has a system where they can detect which chronic patients are not coming to the clinic for follow up treatment and to visit the patients at home in order to determine the problem. Tick yes or no.

23. Audits to evaluate patient care. We want to know if diabetic care is audited by management using a tool. Tick yes or no.

24. Complaint procedure for patients. We would like to know if there is a complaint box in the clinic where the patient can write all problems experienced at the clinic. Tick yes or no.

25. Plan to reduce waiting times. We want to know if there is a plan in place which prevents patients sitting for long hours in the clinic. Tick yes or no.

26. Register for diabetic patients. We want to know if there is a register at the clinic where all diabetic patients who visits the clinic is recorded daily. Tick yes or no

PART II: KNOWLEDGE REGARDING DIABETES

Read the introduction sentence to the patient: **In the next few questions I will be asking you about your knowledge about diabetes.**

2.1 Indicate whether the following statements are true, false or if you are unsure. 1-T, 2-F and 3-U. The Professional Nurse must indicate for each statement if he or she thinks this statement is true or false. If the patient is not sure about the answer, tick unsure. Ask one question at a time and allow the patient to make up his mind before proceeding to the next question.

- **Poor control of diabetes could result in a greater chance of complications:** Here we would like to know if the PROFESSIONAL NURSE is aware of the consequences of poor control of diabetes.
- **A substantial decrease in the BMI will lower a patient's risk profile.** Here we would like to know what the PROFESSIONAL NURSE's understanding is of losing weight.
- **Eating a diet high in sodium will assist with blood glucose control.** Here we would like to know what the PROFESSIONAL NURSE's understanding is of factors contributing to low blood sugar.

2.2 The following is a sign of hyperglycaemia. Here we would like to know if the PROFESSIONAL NURSE is aware of the signs and symptoms of hyperglycaemia.

- Chest pain
- Polydipsia
- Confusion

2.3 The following is a possible complication associated with diabetes? Here we would like to know if the PROFESSIONAL NURSE is aware of the complications associated with diabetes.

- **Retinopathy**
- **Chronic kidney disease**
- **Chronic obstructive pulmonary disease.**

2.4 Regular exercise will benefit the diabetic patient with… Here we would like to know if the professional nurse understands the importance of exercise for diabetics and the effects on the control of diabetes.

- **Glycaemic control**
- **Peripheral neuropathy**
- **Weight loss**

2.5 Metformin is contraindicated in... … Here we would like to know if the PROFESSIONAL NURSE understands the contraindications of metformin. Do not list all options only tick applicable answer given or write down in other what was said.

- Chronic kidney disease
- Patients on insulin
- Impaired lung function
- I don't know
- Other specify

2.6 Retinopathy is a possible complication associated with diabetes? Here we would like to know if the PROFESSIONAL NURSE understands the complications of diabetes.

2.7 What would give you a high index of suspect ability for diabetes? Here we would like to know if the PROFESSIONAL NURSE know what could be possible signs for a patients to suspect that he has diabetes.

2.8 Aggravating factors for diabetes are? Here we would like to know if the PROFESSIONAL NURSE know what the factors are that causes an increase in the blood glucose of the patient who suffers from diabetes.

- Hypertension

- Epilepsy
- Obesity

2.9 What is the blood glucose level of a patient with uncontrolled blood glucose level? Here we would like to know if the PROFESSIONAL NURSE knows what the blood glucose level is when diabetes is uncontrolled. Write everything the professional nurse says.

2.10 Should a diabetic patient exercise? Here would like to know if the PROFESSIONAL NURSE understands the importance of exercise. Tick yes or no.

2.11 If Yes how often? Here would like to know if the PROFESSIONAL NURSE understands that exercising often would be of benefit for the patient as well as how often should the patient exercise. Write everything the professional says

3.1 Do not list all options **choose the correct answer.**

The following is a sign of hyperglycaemia? Here would like to know if the PROFESSIONAL NURSE understands the signs and the symptoms of hyperglycaemia or raised blood glucose. Choose the correct answer from the following: the PROFESSIONAL NURSE can indicate that she/he does not know or give a brief explanation. Write everything the professional nurse says

- Chest pains
- Polydipsia
- Confusion
- I don't know
- Other specify

3.2 Do not list all options **Diabetes has many complications. Identify which of the following possible complications is usually not associated with diabetes**. Here we would like to know if the PROFESSIONAL NURSE understands the complications of diabetes. Choose the correct answer from the following: the PROFESSIONAL NURSE can indicate that she/he does not know or give a brief explanation. Write everything the professional nurse says

- retinopathy
- chronic kidney disease
- chronic obstructive pulmonary
- I don't know
- Other specify

3.3 Do not list all options **If you had to treat an unconscious patient with a glucose of <3.5 mm /l what would you do**. Here we would like to know if the PROFESSIONAL NURSE understands how to treat a patient with a low blood glucose level. Choose the correct answer from the following: the PROFESSIONAL NURSE can indicate that she/he does not know or give a brief explanation. Write everything the professional nurse says

- Immediately administer oral carbohydrate e.g. Sugar 1-3 teaspoons
- Immediately administer 50ml 50% dextrose IV
- Dextrose 10%, 5ml/per kilogram via nasogastric tube
- I don't know
- Other specify

3.4 Do not list all options **People with diabetes should take care of their feet because ……** Here we would like to know if the PROFESSIONAL NURSE understands why a diabetic patient should take of his feet. Choose the correct answer from the following: the PROFESSIONAL NURSE can indicate that she/he does not know or give a brief explanation. Write everything the professional nurse says

- Metformin causes oedema of the lower limbs
- Flat feet are common in people with diabetes
- People with diabetes may have poor peripheral circulation
- I don't know
- Other specify

PART III: ATTITUDE REGARDING DIABETES

4.1 This section consist of 19 statements to see how you feel about diabetes and its effect on a patient's life. There are only three possible answers. Give your first natural, answer There is no "right" or "wrong" answer because everyone has the right to their opinion The PROFESSIONAL NURSE must answer one of the following: I agree, I disagree, and I am Neutral.

1. **I think diabetes would change a person.** Here we would like to know how the PROFESSIONAL NURSE feels about diabetes as a chronic disease.
2. **I think you can refer to a patient as "A Diabetic"** Here we would like to know if the PROFESSIONAL NURSE feels a diabetic patient could be stigmatized
3. **Diabetes is the worst thing that can ever happen to you**. We would like to know if the PROFESSIONAL NURSE's experience of diabetes is positive or negative.

4. **Most people would find it difficult to adjust to having diabetes** Here we would like to know what the experience of the PROFESSIONAL NURSE is towards diabetes, not only of him or herself, but also in general.
5. **I would feel embarrassed about having diabetes.** Here we would like to find out if the PROFESSIONAL NURSE would have accepted the fact that he or she has diabetes, should he/she be diagnosed as such.
6. **There is not much one seem to be able to do to control diabetes.** Here we would like to know if the PROFESSIONAL NURSE is knowledgeable about the management of diabetes
7. **There is little hope of leading a normal life with diabetes** Here we would like to know if the PROFESSIONAL NURSE is positive about patients living with diabetes.
8. **The proper control of diabetes involves a lot of sacrifice and inconvenience.** Here we would like to find out if the PROFESSIONAL NURSE has knowledge regarding proper control of diabetes.
9. **I would not disclose to others if I had diabetes.** Here we would like to know if the PROFESSIONAL NURSE would have accepted his or her diagnosis with diabetes or will he/she feel ashamed of being a diabetic**.**
10. **Being told you have diabetes is like being sentenced to a lifetime of illness.** Here we would like to know if the PROFESSIONAL NURSE's perception about being diagnosed with diabetes or does he/she see it as a death sentence.
11. **A diabetic diet does not spoil a social life.** Here we would like to know if the PROFESSIONAL NURSE sees a diabetic diet as an adjustment
12. **In general, I need to be more sympathetic in the treatment of people with diabetes.** Here we would like to find out if the PROFESSIONAL NURSE sees it necessary to be more sympathetic in treating patients with diabetes.
13. **Having diabetes over a long period changes the personality.** Here we would like to find out if the PROFESSIONAL NURSE feels that the personality of the patient changes if he/she live with the condition for a long time.
14. **Diabetic patients often have difficulty to decide whether they feel sick or well** Here we would like to find out if the PROFESSIONAL NURSE experiences the patient as not knowing when he/she feels sick or well most of the time.
15. **Diabetes is not really a problem because it can be controlled.** Here we would like to find out if the PROFESSIONAL NURSE is confident that diabetes can be controlled.
16. **There is really nothing you can do if you have diabetes.** Here we would like to find out if the PROFESSIONAL NURSE is aware that diabetes can be managed and patients with diabetes can live a healthy life.

17. **Diabetes patients do not always have a good support system.** Here we would like to know if the PROFESSIONAL NURSE understands the importance of support of this condition.
18. **I believe I could adjust well to having diabetes.** Here we would like to know whether the PROFESSIONAL NURSE is positive about being diabetic .should she be diagnosed as such.
19. **I often think it is unfair that some patients should have diabetes when other people are so healthy.** Here we would like to find out if the PROFESSIONAL NURSE feels that patients diagnosed with diabetes are disadvantaged.

PART IV: PRACTICES REGARDING DIABETES

Read introduction sentence: In the next few questions, I would like to ask you about practices with regards to diabetes

5.1 Which asymptomatic patients do you screen for diabetes? Here we would like to know which patients you screen as a PROFESSIONAL NURSE that is not diagnosed as being a diabetic. Do not list all options choose the correct answer from the following. Write everything the patient says.

- None
- All patients above 45 years old
- Family history of diabetes (1st degree)
- On request
- Other specify

5.2 Which topics do you discuss with your Diabetic patient at diagnosis and annually. Here we would like to know what aspects relevant to diabetes mellitus you discuss with the patient when he is diagnosed and with his follow up visits. Do not list all options choose the correct answer from the following. Write everything the patient says.

- None
- Avoidance of alcohol
- Cessation of smoking
- Community and family support
- Complications of diabetes
- Other specify

5.3 What would you advise a patient to do if they need to lose weight? Do not list all options Here we would like to know what advice the PROFESSIONAL NURSE would give the patient regarding weight loss...

GENERAL

6.1 Is there anything else that you would like to discuss regarding diabetes? Here we would like to know if there is anything the PROFESSIONAL NURSE would like to discuss. Write everything the patient says.

THANK THE PROFESSIONAL NURSE FOR HIS OR HER TIME

Note the time the interview ended.

ADDENDUM C2: NURSE MANAGERS' GUIDELINE

Health Care Worker (Nurse Manager) Working With Adult Diabetes Type 2 Patient Guideline

Question-by question guide:

Instructions: Below in **boldface** type are the questions found in the Nurse Manager Questionnaire.

These instructions are not to be read to the patient. Before interviewing be sure to be thoroughly familiar with this question-by-question guide, so that you understand what each question is asking.

1.3 Write the name of the CHC Centre or PHC clinic

1.4 Write the date questionnaire is completed

PART I:DEMOGRAPHIC INFORMATION

1.3 Note patients gender: Make a tick in the block indicating MALE or FEMALE

1.4 What is your birth date? Ask the NURSE MANAGER what is his or her current age in years.

1.5 What is your home language? Ask the NURSE MANAGER which language they are speaking mostly at home. If they speak more than one language, tick both.

1.6 Are you currently employed as? Ask the NURSE MANAGER if he or she is employed as a professional nurse, senior professional nurse or a chief professional nurse. Make a tick in the appropriate block.

1.7 What is your highest level of education? Ask the NURSE MANAGER what his highest level of education is namely, diploma, Ba degree M degree or PhD.

1.8 Did you have any specific training on how to provide care and support to a Diabetic patient after completion of your basic nursing qualification? Here we would like to know if the NURSE MANAGER received specific training with regard to providing care and support to diabetic patients. Make a tick in the block yes or no.

1.9 If yes, list the type of training? Here we would like to know what training the NURSE MANAGER received regarding diabetes? Write everything the patient says.

System Issues

1.10 Many of the professional nurse are frustrated in the work situation today, are you frustrated?

Here we would like to know if the nurse manager is frustrated in the work situation. Make a tick in the block yes or no.

1.11 If yes, name the one aspect that mostly cause frustration in your place of work. We would like to know if the Nurse Manager can identify any aspects that causes frustration in the workplace. Write everything the patient says.

1.12 When providing care to diabetic patients, do you have the following available?

1. Dedicated professional nurse. Here we want to know if the nurse is committed to her work as a professional nurse. Tick yes or no.

2. Visiting doctors. We want to know if the clinic has doctors who only visits certain days and times. Tick yes or no.

3. Adequate space for individual sessions. We would like to know if a room is available where consultations with the patient can be done privately. Tick yes or no.

4 Adequate space for group sessions. We would like to know if a room is available where consultations with groups of patients can be done. Tick yes or no.

5. Protocol for management of diabetic patients. Here we would like to know if there is a compiled list of treatment options which can be used as a guideline for treatment, when patients are diagnosed. Tick yes or no.

6. Protocol for management of hypertension. Here we would like to know if there is a compiled list of treatment options which can be used as a guideline for treatment, when patients are diagnosed with hypertension. Tick yes or no.

7. Protocol for the prevention and management of obesity. Here we would like to know if there is a compiled list of options which can be used as a guideline for the prevention and management of patients who are obese. Tick yes or no.

8. Protocol for the management of eye conditions. Here we would like to know if there is a compiled list of treatment options which can be used as a guideline, when patients are diagnosed with eye conditions. Tick yes or no.

9. Educational material for patients with diabetes. Here we would like to know if the clinic has pamphlets or booklets which can be handed to patients to read at home. Tick yes or no.

10. Tape measure to do waist circumference. We want know if the clinic has a tape measure to measure the waist circumference of the patient. Tick yes or no.

11. Scale. We want to know if the clinic has a scale which could weigh the patient. Tick yes or no.

12. Height measure. We want to know if the clinic has a height measure which could be used to measure the height of the patient. Tick yes or no.

13. Bp Apparatus with two cuffs. We want to know if the clinic has a Bp apparatus with two cuffs to measure the blood pressure of obese patients and patients with an average circumference around the arm. Tick yes or no.

14. Glucometer. We want to know if the clinic has a glucometer to measure the level of the blood glucose of the patients. Tick yes or no.

15. Urine strips. We want to know if the clinic has urine strips which are used to test urine in order to detect if any abnormalities are present in the patients urine. Tick yes or no.

16. Snellen charts. We want to know if the clinic has a snellen chart which is used to determine the eyesight ability of the patient. Tick yes or no.

17. Out of stock (past 1 month) of diabetic medication. We want to know if there are times when the clinic cannot provide the diabetic patient with treatment for I month, because they are out of stock. Tick yes or no.

18. Support groups for patients and families. We want to know if there is any support groups that diabetic patients can be referred to. Tick yes or no.

19. A fast lane for patients with chronic diseases. We want to know if the chronic patients are seen immediately when they arrive at the clinic. Tick yes or no.

20. Patient training in self – care and disease management. We want to know if the diabetic patient receives training with regard to self-management of his chronic condition. Tick yes or no.

21. Referral form. We want to know if referral forms are completed when patients are referred for further treatment. Tick yes or no.

22. Systems to follow up defaulters (non – attenders). We want to know if the clinic has a system where they can detect which chronic patients are not coming to the clinic for follow up treatment and to visit the patients at home in order to determine the problem. Tick yes or no.

23. Audits to evaluate patient care. We want to know if the type of care rendered is assessed by NURSE MANAGER by using a tool. Tick yes or no.

24. Complaint procedure for patients. We would like to know if there is a complaint box in the clinic where the patient can write all problems experienced at the clinic. Tick yes or no.

25. Plan to reduce waiting times. We want to know if there is a plan in place which prevents patients sitting for long hours in the clinic. Tick yes or no.

26. Register for diabetic patients. We want to know if there is a register at the clinic where all diabetic patients who visits the clinic is recorded daily. Tick yes or no

PART II: KNOWLEDGE REGARDING DIABETES

Read the introduction sentence to the patient: **In the next few questions, I will be asking you about your knowledge about diabetes.**

2.1 Indicate whether the following statements are true, false or if you are unsure. 1-T, 2-F and 3-U. The Nurse Manager must indicate for each statement if he or she thinks this statement is true or false. If the patient is not sure about the answer, tick unsure. Ask one question at a time and allow the patient to make up his mind before proceeding to the next question.

- **Poor control of diabetes could result in a greater chance of complications:** Here we would like to know if the NURSE MANAGER is aware of the consequences of poor control of diabetes.
- **A substantial decrease in the BMI will lower a patient's risk profile.** Here we would like to know what the NURSE MANAGER's understanding is of losing weight.
- **Eating a diet high in sodium will assist with blood glucose control.** Here we would like to know what the NURSE MANAGER's understanding is of factors contributing to low blood sugar.

2.2 The following is a sign of hyperglycaemia. Here we would like to know if the NURSE MANAGER is aware of the signs and symptoms of hyperglycaemia.

- Chest pain
- Polydipsia

- Confusion

2.3 The following is a possible complication associated with diabetes? Here we would like to know if the NURSE MANAGER is aware of the complications associated with diabetes.

- **Retinopathy**
- **Chronic kidney disease**
- **Chronic obstructive pulmonary disease.**

2.4 Regular exercise will benefit the diabetic patient with… Here we would like to know if the patient understands the importance of exercise for diabetics and the effects on the control of diabetes.

- **Glycaemic control**
- **Peripheral neuropathy**
- **Weight loss**

2.5 Metformin is contraindicated in... … Here we would like to know if the NURSE MANAGER understands the contraindications of metformin.

- Chronic kidney disease
- Patients on insulin
- Impaired lung function
- I don't know
- Other specify

2.6 Retinopathy is a possible complication associated with diabetes? Here we would like to know if the NURSE MANAGER understands the complications of diabetes.

2.7 What would give you a high index of suspect ability for diabetes? Here we would like to know if the NURSE MANAGER know what could be possible signs for a patients to suspect that he has diabetes.

2.8 Aggravating factors for diabetes are? Here we would like to know if the NURSE MANAGER know what the factors are that causes an increase in the blood glucose of the patient who suffers from diabetes.

- Hypertension
- Epilepsy
- Obesity

2.9 What is the blood glucose level of a patient with uncontrolled blood glucose level? Here we would like to know if the NURSE MANAGER knows what the blood glucose level is when diabetes is uncontrolled. Write everything the patient says.

2.10 Should a diabetic patient exercise? Here would like to know if the NURSE MANAGER understands the importance to exercise. Tick yes or no.

2.11 If Yes how often? Here would like to know if the NURSE MANAGER understands that exercising often would be of benefit for the patient as well as how often should the patient exercise. Write everything the patient says

3.1 Choose the correct answer.

The following is a sign hyperglycaemia? Here would like to know if the NURSE MANAGER understands the signs and the symptoms of hyperglycaemia or raised blood glucose. Choose the correct answer from the following: the NURSE MANAGER can indicate that she/he does not know or give a brief explanation. Write everything the patient says

- Chest pains
- Polydipsia
- Confusion
- I don't know
- Other specify

3.2 Diabetes has many complications. Identify which of the following possible complications is usually not associated with diabetes. Here we would like to know if the NURSE MANAGER understands the complications of diabetes. Choose the correct answer from the following: the NURSE MANAGER can indicate that she/he does not know or give a brief explanation. Write everything the patient says

- retinopathy
- chronic kidney disease (CKD)
- chronic obstructive pulmonary (COPD)
- I don't know
- Other specify

3.3 If you had to treat an unconscious patient with a glucose of <3.5 mm /l what would you do. Here we would like to know if the NURSE MANAGER understands how to treat a patient with a low

blood glucose level. Choose the correct answer from the following: the NURSE MANAGER can indicate that she/he does not know or give a brief explanation. Write everything the patient says

- Immediately administer oral carbohydrate e.g. Sugar 1-3 teaspoons
- Immediately administer 50ml 50% dextrose IV
- Dextrose 10%, 5ml/per kilogram via nasogastric tube
- I don't know
- Other specify

3.4 People with diabetes should take care of their feet because …… Here we would like to know if the NURSE MANAGER understands why a diabetic patient should take of his feet. Choose the correct answer from the following: the NURSE MANAGER can indicate that she/he does not know or give a brief explanation. Write everything the patient says

- Metformin causes oedema of the lower limbs
- Flat feet are common in people with diabetes
- People with diabetes may have poor peripheral circulation
- I don't know
- Other specify

PART III: ATTITUDE REGARDING DIABETES

4.1 This section consists of 19 statements to see how you feel about diabetes and its effect on a patient's life. There are only three possible answers. Give your first natural, answer as it happen to you. There is no "right" or "wrong" answer because everyone has the right to his/her opinion. In the following 19 statements, the NURSE MANAGER must indicate how he or she feels about diabetes and how it is affecting a patient's life. It is important to stress to the NURSE MANAGER that there is no right or wrong answers. Every NURSE MANAGER's opinion is important. The NURSE MANAGER must answer one of the following: I agree, I disagree, and I am Neutral.

20. **I think diabetes would change a person.** Here we would like to know how the NURSE MANAGER feels about diabetes as a chronic disease.
21. **I think you can refer a patient as "A Diabetic"** Here we would like to know if the NURSE MANAGER feels a diabetic patient should be stigmatized
22. **Diabetes is the worst thing that can ever happen to you**. We would like to know if the NURSE MANAGER's experience of diabetes is positive or negative.
23. **Most people would find it difficult to adjust to having diabetes** Here we would like to know what the experience of the NURSE MANAGER is, not only of him or herself, but also in general.

24. **I would feel embarrassed about having diabetes.** Here we would like to find out if the NURSE MANAGER would have accepted the fact that he or she has diabetes, should he/she be diagnosed as such.
25. **There is not much one seem to be able to do to control diabetes.** Here we would like to know if the NURSE MANAGER is knowledgeable about the management of diabetes
26. **There is little hope of leading a normal life with diabetes** Here we would like to know if the NURSE MANAGER is positive about patients living with diabetes.
27. **The proper control of diabetes involves a lot of sacrifice and inconvenience.** Here we would like to find out if the NURSE MANAGER has knowledge regarding proper control of diabetes.
28. **I would not disclose to others if I had diabetes.** Here we would like to know if the NURSE MANAGER would have accepted his or her diagnosis with diabetes or will he/she feel ashamed of being a diabetic**.**
29. **Being told you have diabetes is like being sentenced to a lifetime of illness.** Here we would like to know the NURSE MANAGER's perception about being diagnosed with diabetes or does he/she see it as a death sentence.
30. **A diabetic diet does not spoil a social life.** Here we would like to know if the NURSE MANAGER sees a diabetic diet as adjustment
31. **In general, I need to be more sympathetic in the treatment of people with diabetes.** Here we would like to find out if the NURSE MANAGER sees it necessary to be more sympathetic in treating patients with diabetes.
32. **Having diabetes over a long period changes the personality.** Here we would like to find out if the NURSE MANAGER feels that the personality of the patient changes if she live with the condition for a long time.
33. **Diabetic patients often have difficulty to decide whether they feel sick or well** Here we would like to find out if the NURSE MANAGER experiences the patient as not knowing when he/she feels sick or well most of the time.
34. **Diabetes is not really a problem because it can be controlled.** Here we would like to find out if the NURSE MANAGER is confident that diabetes can be controlled.
35. **There is really nothing you can do if you have diabetes.** Here we would like to find out if the NURSE MANAGER is aware that diabetes can be managed and patients with diabetes can live a healthy life.
36. **Diabetes patients do not always have a good support system.** Here we would like to know if the NURSE MANAGER understands the importance of emotional support of this condition.

37. **I believe I could adjust well to having diabetes.** Here we would like to know whether the NURSE MANAGER is positive about being diabetic.
38. **I often think it is unfair that some patients should have diabetes when other people are so healthy.** Here we would like to find out if the NURSE MANAGER feels disadvantaged because of his o her diabetes.

PART IV PRACTICES REGARDING DIABETES

Read introduction sentence: In the next few questions, I would like to ask you about practices with regards to diabetes

5.1 Which asymptomatic patients do you screen for diabetes? Here we would like to know which patients you screen as a NURSE MANAGER that is not diagnosed as diabetics. Choose the correct answer from the following. Write everything the patient says.

- None
- All patients above 45 years old
- Family history of diabetes (1st degree)
- On request
- Other specify

5.2 Which topics do you discuss with your Diabetic patient at diagnosis and annually. Here we would like to know what aspects relevant to diabetes mellitus you discuss with the patient when he is diagnosed and with his follow up visits. Choose the correct answer from the following. Write everything the patient says.

- None
- Avoidance of alcohol
- Cessation of smoking
- Community and family support
- Complications of diabetes
- Other specify

5.3 What would you advise a patient to do if they need to lose weight? Here we would like to know what advice the NURSE MANAGER would give the patient regarding weight loss...

GENERAL

6.1 Is there anything else that you would like to discuss regarding diabetes? Here we would like to know if there is anything the NURSE MANAGER would like to discuss. Write everything the patient says.

6.2 How often do you do inspections at the clinics you are responsible for? Here we would like to know how often the Nurse Manager visits the CHC and PHC clinics. . Choose the correct answer from the following.

- Once a week
- Once a month
- Less than once a month
- AD HOC (once or twice a year)

THANK THE NURSE MANAGER FOR HIS OR HER TIME

Note the time the interview ended.

ADDENDUM C3: COMMUNITY HEALTH WORKERS' GUIDELINE

Community Health Worker working with Adult Diabetic Community Health workers Guideline

Question-by question guide:

Instructions: Below in **boldface** type are the questions found in the Community Health Worker's Questionnaire.

These instructions are not to be read to the Community Health worker. Before interviewing be sure to be thoroughly familiar with this question-by-question guide, so that you understand what each question is asking.

1.5 Write the name of the CHC Centre or PHC clinic

1.6 Write the date questionnaire is completed

PART I:DEMOGRAPHIC INFORMATION

2.1 Note Community Health workers gender: Make a tick in the block indicating MALE or FEMALE

2.2 How old are you in years? Ask the Community Health worker what is his or her current age in years.

2.3 What is your home language? Ask the Community Health worker which language they are speaking mostly at home. If they speak more than one language, tick both.

2.4 What is your job title? Ask the Community Health worker what his job title is. Write everything the community health worker says.

2.6 What is your highest level of education? Ask the Community Health worker which grade he / she completed at school. If he or she has completed high school ask whether he or she has any diplomas or degrees. Make a tick in the appropriate block.

2.7 Did you have any specific training on how to provide care and support to a diabetic patient? Here we would like to know if the community health worker received specific training with regard to providing care and support to diabetic patients. Make a tick in the block yes or no.

2.8 If yes, list the type of training. Here we would like to know what training the community health nurse received regarding diabetes? Write everything the patient says.

System Issues

2.9 Do you provide any type of care to diabetic patients? Here we would like to know if the community health nurse provides care to diabetic patients. Make a tick in the block yes or no.

2.10 If yes, list the type of care? Here we would like to know what care the community health nurse provides to diabetic patients. Write everything the patient says.

QUALITY OF LIFE

2.5 Do you consider yourself currently ill? We would like to know if the Community Health worker has any health problems that make him or her feel ill. If there is any problem that the Community Health worker mentions, tick YES. Only tick Yes or No. If YES proceed to 2.6, if NO continue to 2.7.

2.6 What is wrong with you? Here we would like to know what the Community Health worker think is wrong with him or her. Probe for more information from the Community Health worker about his illness and write everything the Community Health worker says.

2.7 Do you have any problems walking about? We would like to know if the Community Health worker could walk around without any problems, if he has some problems the answer is YES.

2.8 Do you have problems with self-care such as dressing and washing? Here we would like to know it the Community Health worker has any problems with dressing or washing himself or herself. If somebody needs to assist the Community Health worker, tick YES, if the Community Health worker does not need any support at all, tick NO.

2.9 Do you have problems with usual activities such as work, study, housework, family of leisure activities? We would like to know if the Community Health worker is still capable of doing these activities without any help from somebody else. If the Community Health workers cannot do these usual activities without any help, tick YES.

2.10 Do you have stress or anxiety? Determine here if the Community Health worker has any stress or if he or she feels anxious. If the answer is positive to stress or anxiety, tick YES.

2.11 Do you feel depressed? Determine whether the Community Health worker is depressed or is the Community Health worker just stressed. Tick YES if Community Health worker indicates that he or she is depressed.

PART II KNOWLEDGE REGARDING DIABETES

Read the introduction sentence to the Community Health worker: **In the next few questions I will be asking you about your knowledge about diabetes.**

3.1 Indicate whether the following statements are true, false or if you are unsure. The Community Health worker must indicate for each statement if he or she thinks this statement is true or false. If the Community Health worker is not sure about the answer, tick unsure. Ask one question at a time and allow the Community Health worker to make up his/her mind before proceeding to the next question.

- **Poor control of diabetes could result in a greater chance of complications:** Here we would like to know if the Community Health worker is aware of the consequences of poor control of diabetes.
- **It does not matter if I lose weight as long as I do not eat too much bread:** Here we would like to know what the Community Health worker's understanding is of losing weight.
- **It is better to eat salty food, as it would prevent my sugar levels from dropping:** Here we would like to know what the Community Health worker's understanding is of factors contributing to low blood sugar.

3.2 Many people do not know what the normal range of blood glucose is. Do you know? What is the normal range of blood glucose? Here we would like to know if the Community Health worker is knowledgeable about the normal range of blood glucose. If the Community Health worker gives an answer between 4 and 6 mmol/litre, tick YES. If the Community Health worker gives any other value, tick NO. If the Community Health worker does not know, tick unsure.

3.3 Many people find terminology like carbohydrate, protein and fat confusing. What about you? In which group would you place the following items? Name each of the food items and ask the Community Health worker if he or she will group them under carbohydrate, protein or fat. Make a tick in the appropriate block.

3.4 What do you think are the most common signs of high blood sugar? Mention as many signs as you want to. Here we would like to know from the Community Health worker if he or she knows the common signs of high blood sugar. Write down everything the Community Health worker says, whether it is right or wrong. If the Community Health worker does not know, write "do not know" in the available space.

3.5 What type of health complications are usually associated with diabetes? Here we would like to know from the Community Health worker if he or she knows what the health complications are that are usually associated with diabetes. Write everything the Community Health worker says, whether it is right or wrong. If the Community Health worker does not know, write “do not know” in the available space.

3.6 Is exercise (or activities that make you sweat) important for people with diabetes? Here we would like to know if the Community Health worker understands the importance of exercise for diabetics. If the Community Health worker thinks exercise or activities that make you sweat are important, tick YES, if not, NO and if he or she is not sure, UNSURE.

3.7 Indicate whether the following statements are true, false of if you are unsure. The Community Health worker must indicate for each statement if he or she thinks this statement is true or false. If the Community Health worker is not sure about the answer, tick unsure. In the following 3 statements we would like to know if the Community Health worker is knowledgeable about the use of medication.

- **Diabetic medication can cure diabetes.**
- **Diabetic medication should be taken for life.**
- **Diabetic medication should not be taken when you feel sick.**

3.8 What is the most important thing to do when you feel the beginning of hypoglycaemia (low blood sugar) Here we would like to know if the Community Health worker knows what to do when his or her blood sugar is low. Write down all the answers the Community Health worker gives. If the Community Health worker does not know, write “do not know” in the available space.

3.9 Indicate whether the following statements are true, false of if you are unsure. Here we would like to know if the Community Health worker is aware of the effect of blood sugar on his or her feet. The Community Health worker must indicate for each statement if he or she thinks this statement is true or false. If the Community Health worker is not sure about the answer, tick unsure. In the next 3 statements we would like to find out if the Community Health worker is knowledgeable about complications with regards to his or her feet.

- **Diabetic medication may cause swelling of the feet**
- **Sore feet are common in people with diabetes**
- **People with diabetes may have poor circulation of blood in the feet.**

3.10 What causes diabetes…? Here we would like to know if the Community Health worker is aware of the causes of diabetes. Ask the Community Health worker to give you the causes of diabetes

according to his knowledge. Write down everything he or she says. If the Community Health worker does not know, write “do not know” in the available space.

3.11 If you do physical work, exercise or activities that make you sweat regularly, it will help with: Here we would like to know if the Community Health worker knows what the benefits of physical exercise is. Indicate for each one of the statements whether the Community Health worker says YES or NO and tick in the appropriate block

Blood sugar control

3.12 Painful feet

3.13 Weight loss

3.14 The following factors can make diabetes worse: Here we would like to find out if the Community Health worker is aware of other conditions that worsen diabetes. Indicate for each one of the statements whether the Community Health worker says YES or NO and tick in the appropriate block

High blood pressure

3.15 Epilepsy

3.16 Overweight

PART III ATTITUDE REGARDING DIABETES

4.1 In the following 19 statements the Community Health worker must indicate how he or she feels about diabetes and how it is affecting his or her life. It is important to stress to the Community Health worker that there is no right or wrong answers. Every Community Health worker’s opinion is important. The Community Health worker must answer one of the following: I disagree, I am Neutral or I agree.

1. If I did not have diabetes I think I would be quite a different person: Here we would like to know how the Community Health worker feels about the diagnosis with diabetes.

2. I dislike being referred to a “DIABETIC”: Here we would like to know if the Community Health worker feels stigmatized by being a “DIABETIC”

3. Diabetes is the worst thing that has ever happened to me…: We would like to know if the Community Health worker’s experience of being a diabetic was positive or negative

4. Most people would find it difficult to adjust to having diabetes: Here we would like to know what the experience is of the Community Health worker, not only of him or herself, but also in general.

5. I often feel embarrassed about having diabetes: Here we would like to find out if the Community Health worker has accepted the fact that he or she has diabetes.

6. There is not much I seem to be able to do to control my diabetes: Here we would like to know if the Community Health worker is knowledgeable about the management of diabetes

7. There is little hope of leading a normal life with diabetes: Here we would like to know if the Community Health worker is positive about living with diabetes.

8. The proper control of diabetes involves a lot of sacrifice and inconvenience: Here we would like to find out if the Community Health worker is struggling with his or her diabetes control.

9. I avoid telling people I have diabetes: Here we would like to know if the Community Health worker has accepted his or her diagnosis and if he or she feels ashamed of being a diabetic.

10. Being told you have diabetes is like being sentenced to a lifetime of illness: Here we would like to find out how the Community Health worker feels about being a diabetic and if he or she struggles with the management.

11. My diabetic diet does not really spoil my social life: Here we would like to know if the Community Health worker enjoys his or her new lifestyle with a diabetic diet.

12. In general, nurses need to be more sympathetic in their treatment of people with diabetes: Here we would like to find out if the Community Health worker received the necessary attention from the health worker that he expected.

13. Having diabetes over a long period changes the personality: Here we would like to find out if the Community Health worker feels his or her personality would have changed after living with the condition for a long time.

14. I often find it difficult to decide whether I feel sick or well: Here we would like to find out if the Community Health worker feels sick or well most of the time.

15. Diabetes can be controlled: Here we would like to find out if the Community Health worker is confident that diabetes can be controlled.

16. There is really nothing you can do if you have diabetes: Here we would like to find out if the Community Health worker is aware that diabetes can be managed and patients with diabetes can live a healthy life.

17. There is really no-one I feel I can talk to openly about my diabetes: Here we would like to know if the Community Health worker feels that a diabetic patient can speak openly to someone about his condition.

18. I believe I have adjusted well to having diabetes: Here we would like to know whether the Community Health worker is positive about diabetes.

19. I often think it is unfair that I should have diabetes when other people are so healthy: Here we would like to find out if the Community Health worker would feel disadvantaged if he/her should be diagnosed with diabetes.

PART IV: PRACTICES REGARDING DIABETES

Read introduction sentence: In the next few questions, I would like to ask you about practices with regards to diabetes

5.1 Which asymptomatic patients do you advise to go for diabetes testing? Here we would like to know which patients you screen as a community health worker that is not diagnosed as a diabetic. Choose the correct answer from the following. Write everything the patient says.

- None
- All patients above 45 years old
- Family history of diabetes (1st degree)
- On request
- Other specify

5.2 Which topics do you discuss with your Diabetic patient at diagnosis and annually. Here we would like to know what aspects relevant to diabetes mellitus you discuss with the patient when he is diagnosed and with his follow up visits. Choose the correct answer from the following. Write everything the patient says.

- None
- Avoidance of alcohol
- Cessation of smoking

- Community and family support
- Complications of diabetes
- Other specify

5.3 What would you do if a patient with a hyperglycaemic (very high blood glucose) emergency comes to your clinic? Here we would like to know what care the community health nurse would give to a patient who presents with a high blood glucose. Write everything the patient says.

5.4 What would you advise a patient to do if they need to lose weight? Here we would like to know what advice the community health nurse would give the patient regarding weight loss

GENERAL

6.1 Is there anything else that you would like to discuss regarding diabetes? Here we would like to know if there are any questions that the community health nurse would like to ask. Write everything she/ he says.

This letter confirms that this project namely: knowledge, attitude and practices [KAP] survey of health care workers on type 2 adult diabetes patients in the Free State, South Africa, falls under the main study health dialogue with adult patients with chronic diseases in the Free State: towards a model for lower and middle income countries. Therefore, the letter received from the ethics committee as well as the letter from the Department of Health in the Free State is applicable to this project.

ADDENDUM D1: APPROVAL FROM ETHICS COMMITTEE

UNIVERSITY OF THE FREE STATE
UNIVERSITEIT VAN DIE VRYSTAAT
YUNIVESITHI YA FREISTATA
UFS UV

Research Division
Internal Post Box G40
☎(051) 4052812
Fax (051) 4444359

E-mail address: StraussHS@ufs.ac.za

Ms H Strauss/hv

2013-04-10

REC Reference nr 230408-011
IRB nr 00006240

DR M REID
SCHOOL OF NURSING
UFS

Dear Dr Reid

ECUFS NR 39/2013
DR M REID **SCHOOL OF NURSING**
PROJECT TITLE: HEALTH DIALOGUE WITH ADULT PATIENTS WITH CHRONIC DISEASES IN THE FREE STATE: TOWARDS A MODEL FOR LOWER AND MIDDLE INCOME COUNTRIES.

- You are hereby kindly informed that the Ethics Committee approved the above project at the meeting held on 9 April 2013.
- Committee guidance documents: Declaration of Helsinki, ICH, GCP and MRC Guidelines on Bio Medical Research. Clinical Trial Guidelines 2000 Department of Health RSA; Ethics in Health Research: Principles Structure and Processes Department of Health RSA 2004; Guidelines for Good Practice in the Conduct of Clinical Trials with Human Participants in South Africa, Second Edition (2006); the Constitution of the Ethics Committee of the Faculty of Health Sciences and the Guidelines of the SA Medicines Control Council as well as Laws and Regulations with regard to the Control of Medicines.
- Any amendment, extension or other modifications to the protocol must be submitted to the Ethics Committee for approval.
- The Committee must be informed of any serious adverse event and/or termination of the study.
- A progress report should be submitted within one year of approval of long term studies and a final report at completion of both short term and long term studies.
- Kindly refer to the ETOVS/ECUFS reference number in correspondence to the Ethics Committee secretariat.

Yours faithfully

.....
PROF WH KRUGER
CHAIR: ETHICS COMMITTEE

ADDENDUM D2: PERMISSION RECEIVED FROM FREE STATE DEPARTMENT OFHEALTH TO CONDUCT RESEARCH

health
Department of
Health
FREE STATE PROVINCE

25 April 2013

Doctor M Reid
Principal Investigator
University of Free State
BLOEMFONTEIN
9300

Dear Dr Reid

SUBJECT: APPROVAL TO CONDUCT RESEARCH ON HEALTH DIALOGUE WITH ADULT PATIENTS WITH CHRONIC DISEASES IN THE FRE STATE TOWARDS A MODEL FOR LOWER AND MIDDLE INCOME COUNTRIES

The above mentioned correspondence bears reference.

Permission is hereby granted for the above – mentioned research on the following conditions:

- Participation should be by informed consent.
- Ascertain that your data collection exercise neither interferes with the day to day running of the health facilities nor the performance of duties by the respondents.
- Confidentiality of information will be ensured and no names will be used.
- The results of the study should be communicated to Head: Health in writing.

Trust you find the above in order.

Kind Regards,

Dr TD MOJI
ACTING HEAD: HEALTH
Date: 26/4/2013

Head : Health
PO Box 227, Bloemfotein, 9300

ADDENDUM D3: DECLARATION BY TEXT EDITOR

CORRIE GELDENHUYS
POSBUS 28537
DANHOF 9310

✆ 083 2877088
☎ +27 51 4367975
corrieg@mweb.co.za

20 June 2016

TO WHOM IT MAY CONCERN

Herewith I, **Cornelia Geldenhuys (ID 521114 0083 088)** declare that I am a qualified, accredited language practitioner and I have edited the following master's dissertation by

Charmaine Elizabeth Hassan

Diabetes related Knowledge, Attitude(S) and Practices [Kap] survey of health care workers working with adult patients with Type 2 Diabetes in the Free State, South Africa

All changes were indicated by track changes and comments for the student to verify and finalise.

.....
C GELDENHUYS
MA (LIN – *cum laude*), MA (Mus), HED, Postgraduate Dipl, Library Science, UTLM

ACCREDITED MEMBER OF SATI – Membership number: 1001474 (APTrans)
GEAKKREDITEERDE LID VAN SAVI – Lidmaatskapnommer: 1001474 (APVert)
Member of/Lid van PEG (The Professional Editors Guild)