

**AWARENESS ABOUT DIABETIC RETINOPATHY AND RETINAL SCREENING  
AMONG FEMALE DIABETIC PATIENTS ATTENDING THE DIABETIC CLINIC IN A  
DAY HOSPITAL IN CAPE TOWN, SOUTH AFRICA**

by

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submitted in accordance with the requirements

for the degree of

**MASTER OF PUBLIC HEALTH**

at the

**UNIVERSITY OF SOUTH AFRICA**

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### **DECLARATION**

I declare that **AWARENESS ABOUT DIABETIC RETINOPATHY AND RETINAL SCREENING AMONG FEMALE DIABETIC PATIENTS ATTENDING THE DIABETIC CLINIC IN A DAY HOSPITAL IN CAPE TOWN, SOUTH AFRICA** is my own work and that all the sources that I have used or quoted have been indicated and acknowledged by means of complete references and that this work has not been submitted before for any other degree at any other institution.

08 February 2016

.....

**Nomfundo Fortunate Mkhombe**

.....

**Date**

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**ABSTRACT**

A non-experimental quantitative, descriptive and contextual study which sought to examine the level of awareness about Diabetic Retinopathy (DR), and how aware female diabetic patients were about retinal screening as a preventative measure to eye complications and blindness was conducted. The objective of the study was to explore and describe the variables related to the awareness level of female diabetic patients about Diabetic Retinopathy and diabetic retinal screening. A convenient sample of 149 respondents was obtained. A questionnaire was used to collect data. Data was analysed using the Statistical Package for Social Sciences (SPSS), 13.0 computer software program. Results evidenced a good level of awareness about DR. Recommendations based on the findings were made for consideration in clinical practice, education and research.

**KEY CONCEPTS**

Awareness; diabetes mellitus; diabetic retinopathy; female patients; retinal screening.

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## *Dedication*

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**LIST OF ABBREVIATIONS**

DM	Diabetes Mellitus
DR	Diabetic Retinopathy
HBM	Health Belief Model
PDR	Proliferative Diabetic Retinopathy
SA	South Africa
T2D	Type 2 Diabetes
WHO	World Health Organization

# CHAPTER 1

## ORIENTATION OF THE STUDY

*The only thing worse than being blind, is having sight but no vision.*

Helen Keller

### 1.1 INTRODUCTION

Almost 143 million people are affected by diabetes mellitus (DM) worldwide, and the numbers are projected to increase to approximately 300 million by the year 2025. This anticipated increase is due to the population growth, aging population and urbanisation (Benatar, Doherty, Heunis, MacIntyr & Ngwena 2004:246-247).

Clarke-Farr, Nell and Wilkinson (2006:134-135) consider that ocular changes that occur in a diabetic patient affect nearly the entire eye, and the most significant eye diseases caused by DM are refractive changes, cataracts, rubeosis iridis, ocular hypertension and Diabetic Retinopathy (DR). Due to this increase in people with DM, this will cause an increase in the number of people with DR. DR is identified as the most common eye complication that occurs in most diabetic patients leading to blindness (Read & Cook 2007:56-64).

According to Smith, Szetu and Bourne (2007:415), DM was not common in indigenous Pacific populations 30 years ago, when these populations maintained a traditional lifestyle. It was particularly rare amongst the Melanesian populations, but now there have been a notably high prevalence of type 2 diabetes in the urban areas, which inversely increased the prevalence of DR. Similarly, DR is now classified to be among the leading causes of why people go blind in Pacific Island nations.

In the Pacific, the growing problem of more prevalent cases of type 2 DM could be due to changes in lifestyle and diet. Due to the time that lags between the onset of diabetes and the time a person is diagnosed with diabetes, patients with type 2 DM have a significant DR at first diagnosis, as compared to patients with type 1 diabetes (Smith et al 2007:417). The pathogenesis of retinopathy in DM is still not fully understood, but

hypertension, poor glycaemic control and increasing duration of DM have been identified as risk factors for DR (Smith et al 2007:417).

DR is classified according to its severity which progresses from mild non proliferative abnormalities (NPDR) and is characterised by blood vessels becoming permeable. This is followed by non-proliferative moderated DR, then severe non-proliferative DR, which is characterised by vascular closure. There is also proliferative DR (PDR), which is characterised by formation of new blood vessels on the retinal surface and posterior surface of the vitreous. At all stages of DR, macula oedema, which is characterised by swelling of the retina, occurs due to the leaking of blood vessels of the retina. Some conditions such as pregnancy, puberty, blood glucose control or hypertension can cause DR to occur at a faster rate (Fong, Aiello, Gardner, King, Blakenship, Cavallerano, Ferris & Klein 2003:99-102).

Therefore, this study seeks to determine the level of awareness about DR, and how aware female diabetic patients are about retinal screening as a preventative measure to eye complications and blindness. This study will be conducted in phases as exhibited in figure 1.1.

### **1.1.1 Phases of the study**

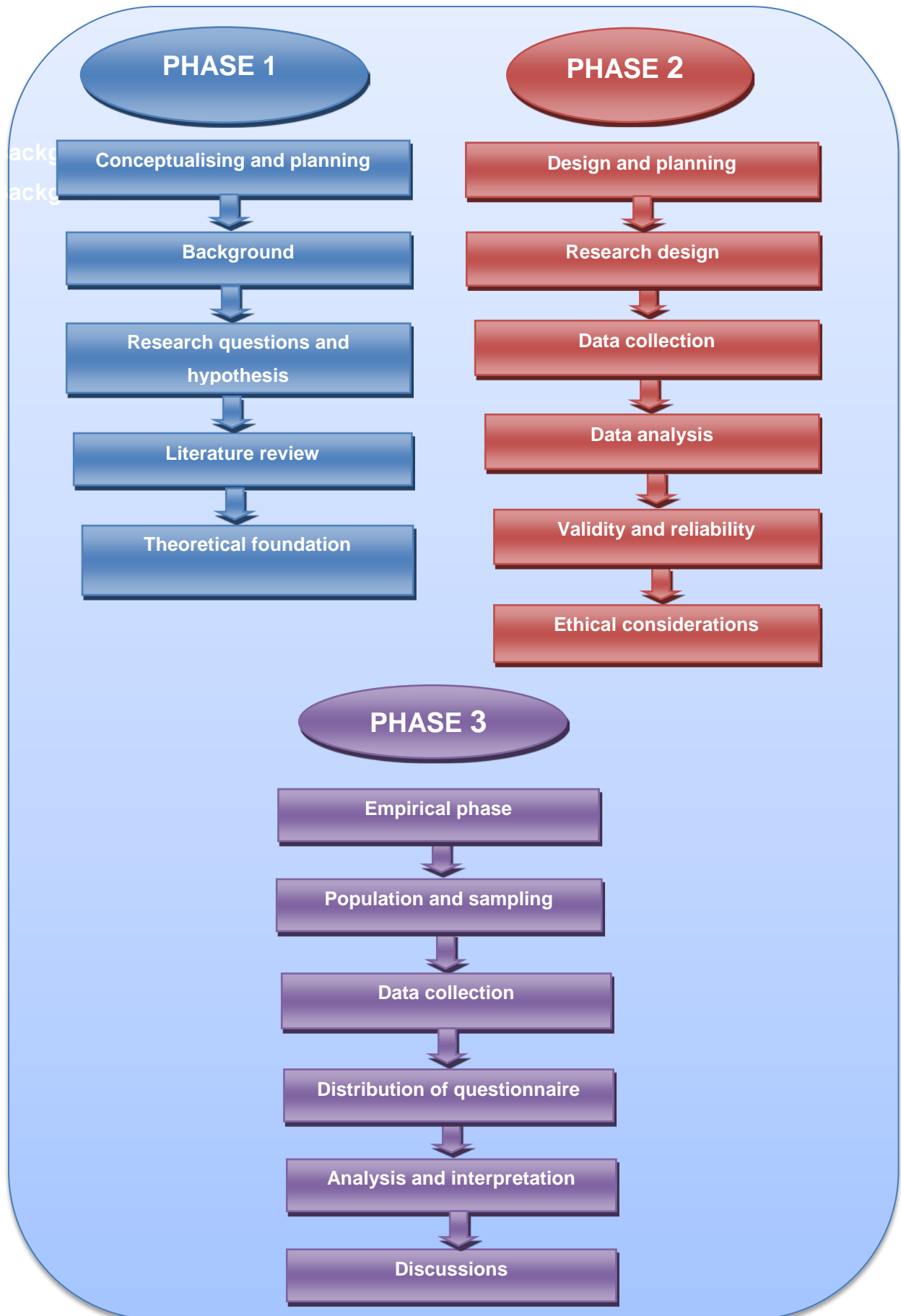
The study was conducted in three phases as exhibited in figure 1.1. These phases included firstly conceptualisation and planning through comprehensive literature review. The second phase involved design and planning and the third phase involved empirical implementation of the research process.

The *first phase* was a very brief phase of the study and it involved conceptualising and planning. A comprehensive review of the literature using sources such as journal articles from various data bases, research and discipline books, and the internet was undertaken for contextual understanding of DR and retinal screening. The literature review included studies that were conducted internationally, Sub-Saharan countries, Africa and South Africa.

The *second phase* involved constructing the research methodology, which focused on a quantitative non-experimental, contextual research design, theoretical framework and

the research methods that were used, which included study population and sampling, sampling technique, data collection and data analysis. In this phase, the researchers gained the privilege of entering the day clinic and establish a rapport with the facility management and staff. The researcher also met with a statistician, and familiarise themselves with the Provincial Research Department that granted permission to conduct the study (Polit & Beck 2012:67)

During the *third phase*, the researcher engaged in data collection, analysis and discussion of the results. Conclusions and recommendations were also made based on the study results. Details of the phases are presented in chapter 3.



**Figure 1.1 Phases of the study**



All three of these phases demonstrate the pathway in which the research followed from the beginning to the end of the study.

## **1.2 BACKGROUND INFORMATION ABOUT THE RESEARCH PROBLEM**

A research problem is defined by Burns and Grove (2009:68) as an area of concern where there is a gap in the knowledge base needed for any sort of practice. It is investigated to generate knowledge or new findings that address the practice that is of concern, which ultimately provides evidence-based health care. A research problem is identified within a broad topic of interest by researchers with the purpose to solve it or to bring about a contribution to its solution, by generating the relevant evidence (Polit & Beck 2012:73).

### **1.2.1 Source of the research problem**

The researcher is a qualified Optometrist who runs an eye care clinic where mostly female patients with eye problems consult daily with already advanced stages of DR. The researcher observed that most of the eye complications presented was preventable. The high occurrence of undiagnosed DR particularly was observed. Most of the patients were under the impression that having an eye test and receiving a pair of spectacles will sort their visual health care needs and usually demand to be prescribed spectacles. In most instances the, visual error is deeper and often requires intervention further than only a pair of spectacles. After the problem was identified, related literature search was done to acquire more information about the phenomena.

### **1.2.2 Background to the research problem**

Findings from a study conducted by Mwangi, Githinji and Githinji (2011:140) state that there is a successful program whose objective is to combat a particular disease in a certain community. The success of this program depended on the awareness of that disease by the general community. These researchers conducted their research in a Kenyan Hospital and they found that 83% of their participants had heard of DR (diabetic eye disease) and 60% of those who knew of diabetic eye disease knew about the association of diabetic eye disease and diabetes. The results suggested that there is a general awareness of DR amongst diabetic patients; however, there is a need for an

increase in awareness amongst female patients and about its risk factors and prevention because of the high statistics of the complication noted.

There is evidence that diabetic retinal screening were conducted in India with the objective of creating awareness among the rural population regarding DR. These screening's emphasis was on the early detection of this eye complication and to conduct DR screening camps in order to bring to the base hospital patients who had sight-threatening DR. The objective was for the benefit of Ophthalmologists and general physicians in order to develop an integrated DR model (Rani, Raman, Agarwal, Paul, Uthra, Margabandhu, Senthilkumar, Kumaramanickavel & Sharma 2005:1-11). This programme successfully covered three rural districts and the use of bumper stickers containing DR awareness messages and were displayed at public places. The program targeted about 2.5-3 million people, of whom 7770 were diabetic patients who underwent diabetic retinal screening. According to these results, the prevalence was 17.6%, of whom 5.9% had sight-threatening Retinopathy. With regards to the awareness about DR, the retinal screening before and after increased awareness of DR from 76% to 98% (Rani et al 2005:1-11).

Retinal screening is also described as not for only allowing for the detection of microvascular complication, but for the detection of other comorbidities. Recent advances in digital camera technology have improved screening for DR and many countries have established systems that screen all diabetics for DR annually (Cook 2013:449).

### **1.2.3 STATEMENT OF THE RESEARCH PROBLEM**

DR is the fifth leading cause of blindness globally, which includes developing and developed countries (Read & Cook 2007:56). The majority of patients do not know about the effects of diabetes to the eye and most of them only receive treatment after they have developed moderate DR. They already would have developed visual errors, which sometimes cannot be corrected with spectacles. Although blindness caused by this disease is preventable, a notable number of female patients report at the eye clinic already in advanced stages of diabetes with DR. Some of the diabetic female patients do have retinal screening performed on their eyes, but they are not given back their results or even explained the condition of their retinas, as a result they do not take note

of what was done. When requested to return for follow ups they do not return because they do not have sufficient knowledge and awareness about what DR is or why they should have the retinal screening done.

Education among diabetic patients regarding retinal screening is seemingly poor. As a result patients in the public sector are often not referred for screening. This may be due to the assumption of the primary caregiver that does not think of it, later leading to the lack of awareness to request for retinal screening. The public sector is generally swamped with established pathology, which sometimes even with unfortunate events where further retinal screening is discouraged in order to decrease back logs. Many diabetic patients in SA are therefore not screened for DR and often present to the Optometrist or Ophthalmologist for the first time with vision loss due to advanced stages of the eye complication. There however, continues to be an urgent need to turn this situation around and enable patients to have an increased awareness of DR and retinal screening and the severity of DR and provide them with necessary information to modify risk factors and change their health-seeking behaviour for the better (Cook 2013:1-6).

Therefore, the problem statement of this study is “What is the awareness level of female diabetic patients attending the diabetic clinic in a day Hospital about the occurrence of DR and diabetic retinal screening”?

### **1.3 AIM OF THE STUDY**

The aim of this research was to examine the awareness level about DR among female diabetic patients and how they can be made aware of the dangers of this eye disease which gradually progresses from a mild to a proliferative state if blood sugar levels are not controlled.

#### **1.3.1 Research purpose**

A research purpose is defined as a clear, concise statement of the specific goal or aim of a study, which is generated from a research problem (Burns & Grove 2013:74). Creswell (2014:123) defines a research purpose as a statement that establishes the intent of the entire study and it needs to be clear, specific and informative.

The purpose of this study was to determine the level of awareness about DR and retinal screening among female diabetic patients attending the diabetic clinic in a day hospital.

### **1.3.2 Research question**

A research question is a concise, interrogative statement that is worded in the present tense and includes one or more variables. It focuses on the descriptive variables, a determination of differences between two or more groups with regards to selected variables, an examination of relationships among those variables and the use of independent variables to predict a causal effect on dependent variables (Burns & Grove 2009:167). A research question with reference to this quantitative study inquires about the relationships among the dependent and the independent variables than a researcher would like to know (Creswell 2014:143).

The research question of this study was formulated based on the PICO approach. The acronym stands for the following:

P	–	Population
I	–	Intervention
C	–	Comparison
O	–	Outcome

The details of the application of this approach are discussed in chapter 3.

### **1.3.3 Hypothesis of the study**

A research hypothesis ( $H_1$  or  $H_a$ ) is the alternative to the null and is, according to Creswell (2014:143), the prediction that a researcher makes about the expected outcomes of the relationship among study variables. These hypotheses are numeric estimates of the values within populations which are based on the data collected from the given population samples. Testing of hypotheses employs statistical procedures in which the researcher draws inferences about the population which is used in the study sample (Creswell 2014:143).

The null hypothesis of this study was that there will be no association between the independent and dependent variables. There will be no increase utilisation of retinal services at the health facility even with increased awareness of DR and retinal screenings.

The research hypothesis of this study was that there is an association between the independent and dependent variables. There will be an increase in the utilisation of retinal screening services at the facility with increased awareness of DR and retinal screenings.

The hypothesis is further explicated in chapter 3.

#### **1.3.4 Research objectives**

An objective to a quantitative study as defined by Burns and Grove (2009:166) is described as a clear, declaring statement that is expressed in the present tense. The objectives of this study were to

- explore and describe the variables related to the awareness level of female diabetic patients about DR and diabetic retinal screening in female diabetic patients attending the diabetic clinic in a day hospital
- create awareness by developing an information brochure on the need and benefits of diabetic retinal screening and preventative behaviour against eye complications

#### **1.4 SIGNIFICANCE OF THE STUDY**

The results of this study will assist in creating awareness about DR as an eye complication caused by DM that can cause preventable blindness. The study findings will help clinicians, educators, policy makers, researchers in making policy related decisions to improve current, treatment protocols, policies and future referrals. Some viable recommendations will be made pertaining to the development of strategies that will be used to encourage diabetic patients to have diabetic retinal screening annually to address the disease early in the specific population, which will assist to decrease preventable eye disease complications and blindness. The results and information

brochure that will be developed will provide guidance on the need, importance and benefits of retinal screening for all diabetic patients and general eye care awareness.

## **1.5 DEFINITIONS OF TERMS**

The terms were defined conceptually and operationally as follows:

### **Awareness**

According to Freshwater and Maslin-Prothero (2005:65), awareness is defined as a state of consciousness, being awake, conscious and cognisant of one's self and one's surroundings.

Awareness is also described as having knowledge or cognisance, archaic vigilant. The synonyms of awareness are cognisant, conscious, sensible, awake, alert, watchful, and vigilant. A state of elementary or undifferentiated consciousness, clear, certain mental apprehension (Awareness 2003-2012); awareness is having knowledge of a situation or fact (*Oxford English Dictionary* 2012:43).

Awareness is defined by *Oxford Advanced Learner's Dictionary* (2010:88) as knowledge that something exists or understanding of a situation or subject at the present time based in information or experience. As a noun, awareness is defined by the as a state or condition of being aware or having knowledge and consciousness.

Awareness is further defined as knowing something, knowing that something exists and is important, being interested in something (*Oxford Advanced Learner's Dictionary* 2010:88).

In this study, awareness is described as the extent to which female diabetic patients who attend the diabetic clinic know or are familiar with DR as an eye complication and diabetic retinal screening which is available at their nearest day hospital to make early detection of eye complications.

## **Diabetic clinic**

A clinic refers to a building or part of a hospital where people can go for special medical treatment or advice, a period of time during which doctors give special medical advice, a private hospital or one that treats health problems of a particular kind, a building where visiting patients can get medical treatment; a building shared by a group of doctors and nurses who work together (*Oxford Advanced Learner's Dictionary* 2010:264).

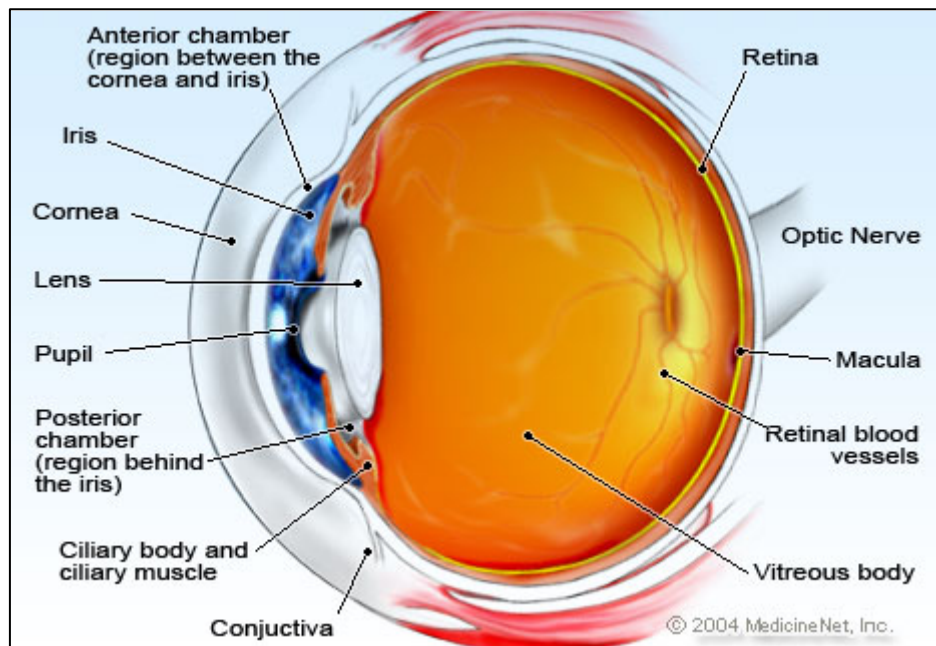
In this study, clinic refers to a health facility where people visit for any medical service that they require. Each facility comprises of different departments which all work together.

An eye is defined for better insight of the affected organ in the body of the respondents.

## **Eye**

An eye is one of a pair of organs of sight, contained in a bony orbit at the front of the skull, with retro bulbar fat and innervated by four cranial nerves. The bulb of the eye is composed of segments of two spheres with nearly parallel axes which constitute the outside tunic and one of the three fibrous layers enclosing two internal cavities, separated by the crystalline lens (*Mosby's Dictionary of Medicine, Nursing and Health Professions* 2009b:691).

An eye is an organ of vision or of light sensitivity, a pair of hollow structures located in bony sockets of the skull, functioning together or independently, each having a lens capable of focusing incident light on an internal photosensitive retina from which nerve impulses are sent to the brain, the vertebrate organ of vision (*The American Heritage Dictionary* 2009). Figure 1.3 gives some visual exposition of the different parts of the eye structures.



**Figure 1.2 Anatomy of the eye**

(Eye Anatomy 2014)

The term eye refers to a part of the body which is either of the two organs on the face that one sees with. It is the ability to see and also refers to a particular way of seeing something and is the ability to make intellectual or aesthetic judgements, watchful attention or supervision (Freshwater & Maslin-Prothero 2005:223).

Another definition of an eye, is the hole in the end of a needle that one puts the thread through and a small thin piece of metal curved round, that a small hook fits into, used for fastening clothes. As a verb, to eye somebody or something means to look at somebody or something carefully, especially because one wants something or is suspicious of something (*Oxford Advanced Learner's Dictionary* 2006:519). Freshwater and Maslin-Prothero (it is a dictionary) (2005:223) define eye as the organ of vision located in the eye socket of the skull as exhibited on figure 1.3.





**Figure 1.3 View of an eye body organ**

(Sculpting the Eyes 2016:1)

In this study, eye refers to an organ of the body which is responsible for ones' vision. In the eye a complication of DM called DR may occur due to uncontrolled blood sugar levels, causing negative health changes within the eye, both in the anterior and posterior pole.

### **Diabetes Mellitus (DM)**

Diabetes Mellitus also known as diabetes is the most common metabolic disorder, in which the person has high blood glucose, either because insulin production is inadequate, or because the body's cells do not respond properly to insulin or both. Signs of DM includes polyuria (frequent urination), increasingly thirsty (polydipsia) and hunger (polyphagia) (Bastaki 2005).

DM is defined as a group of disorders that have glucose intolerance as a common factor, characterised by hyperglycaemia and other disturbances of carbohydrates, protein and fat metabolism. The onset of symptoms in type 1 diabetes is acute, and symptoms are detected soon. These types of diabetes are when the body fails to produce its own insulin. People with type 2 diabetes are often asymptomatic in the early stages and this is the type of diabetes is a result of insulin resistance (Edelman & Mandle 2010:239).

In this study, DM is a disease which occurs due to uncontrolled blood sugar levels affecting mostly female patients who visit the eye clinic. The uncontrolled blood sugar levels may cause eye complications called DR to the eyes, which when left untreated may cause irreversible vision errors.

### **Diabetic retinopathy (DR)**

DR is defined as a vascular disease of the retina which affects patients with DM, and involves damage to the small blood vessels in the retina (see figure 1.4) and results from chronically high blood glucose levels in people with poorly controlled diabetes (Visliser & Oetting 2010:1).

DR is a vascular disease which gradually causes the vessels of the retina to rupture causing them to leak into the eye. This results in lack of colour differentiation and central vision changes (Edelman & Mandle 2010:603).

In this study, DR is described as an eye complication or disease of retinopathy, which causes damage to the back of the eye, which causes a gradual deterioration in a diabetic patients' vision with females in the majority.

### **Diabetic retinal screening**

Diabetic retinal screening is a once yearly appointment, eye checkup, which is carried out to identify early signs of eye complications and particularly DR. Such screening is vital to prevent visual loss due to diabetes because retinopathy is often asymptomatic early in the course of the disease. Annual eye screening for patients with diabetes is frequently proposed as a measure of quality of care (Smith et al 2007:421).

In this study, retinal screening refers to screening of the retina of a diabetic patient performed annually to ensure that no DR is present on the retina. If pathology is present, further referrals and interventions are undertaken to treat and manage it early.

## **Patient**

The term patient, according to Freshwater and Maslin-Prothero (2005:440), refers to a person who is physically or mentally ill and receiving medical treatment for physical or mental illness especially in a hospital, or a person who receives treatment from a particular doctor.

A patient is also defined as recipient of a health care service, a health care recipient who is ill or hospitalised (*Mosby's Dictionary of Medicine, Nursing and Health Professions* 2009a:1402).

In this study, patients refer to female diabetic patients who are attending at eye clinic, referred by the day Hospital and are receiving ocular medical treatment. They attend the diabetic clinic for check-ups and further treatment on weekly basis.

## **1.6 FOUNDATIONS OF THE STUDY**

Quantitative studies need a theoretical framework or model to guide the study for better clarity of concepts and for deductive reasoning from a general premise to specific situations. In this study, the Health Belief Model (HBM) was used. It is a psychological model that attempts to explain and predict health behaviour. The major components of this model are perceived susceptibility, perceived severity, perceived benefit, perceived barriers, cues to action and self-efficacy (Stanhope & Lancaster 2011:271-272). Detailed description of the model is given in chapter 2.

The meta-theoretical assumptions such as ontological, teleological, epistemological and methodological assumptions proposed by Mouton and Marais (1994:9-16) are utilised for further theoretical base.

### **1.6.1 Meta-theoretical assumptions**

Meta-theoretical assumptions, which are also known as metaphysical assumptions, are assumptions that underlie the use of theories or models or paradigms and are used to define the context of a study. With more effective scientific communication, in the long run, better research will be promoted by the explication of these meta-theoretical

assumptions underlying the use of a single theory to another and one methodological approach to the other based on the classical work of Mouton and Marais (1994:192).

Assumptions are statements about the nature of certain things that are not observable or testable and remain hidden or unstated (Neuman 2011:52-53). Sources of assumptions include universally accepted truths such as theories, previous research and clinical practice. In research studies, assumptions are embedded in the philosophical base, study design and interpretation of findings (Burns & Grove 2013:41). The recognition of assumptions by the researcher is their strength and not their weakness (Burns & Grove 2013:41). A positivist assumption says that there is a reality in every situation which exists with or without verification (Polit & Beck 2008:14). These assumptions also assume that for an example, with regards to DR, patients understand the disease in a way of how they experience it and what is not known is the actual description of the knowledge about DR - what it is, how far does it go in damaging eye structures, what does it cover and to what extent. Assumptions influence the logic of a study, and the recognition of assumptions leads to more rigorous study development. To this end ontological, teleological, epistemological and methodological assumptions were posited in this study.

### **1.6.2 Ontological assumptions**

According to Mouton and Marais (1994:11-12), ontology refers to the study of being or reality.

Ontological assumptions include assumptions about the human nature, society, the nature of history, the status of mental entities, observable and material phenomenon, and causality and intentionality in human action (Mouton 1996:124).

The ontological assumptions regarding reality underlying this study are that:

- People take health-related actions on the basis of what is real to them.
- Prescription and use of spectacles is regarded as a panacea for all eye diseases.
- Different people process data obtained through memory and senses and transform it into reality according to how they interpret their own world.

- Although it is difficult to ascertain when truth has been attained, it is, however, necessary to strive for reality as close as possible.

This assumption, according to Polit and Beck (2012:13), refers to the study of being or nature reality.

### **1.6.3 Teleological assumptions**

According to Mouton and Marais (1994:13-14), teleological assumptions refers to the fact that social science, in it being a typical human activity, is nonetheless goal driven. 'Telo' is a Greek word for goal or aim. These goals are classified by the traditional distinction between theoretical and practical goals or praxis. This assumption was initially was founded by Aristotle (Mouton & Marais 1994:13-14), who discovered that humans are naturally inclined to desire knowledge. This desire stems from a fascination with the obvious and the more obscure. Man's fascination gradually led to an increasing awareness of his ignorance and the concomitant necessity for systematic investigation. The goals included in these assumptions are both theory and practically based goals (Mouton & Marais 1994:18-19).

- The theoretical goal involves testing some of the concepts or elements of the model used in this study as most patients are under the misconception that spectacles will sort out every visual need, therefore they do not take much of an interest in having retinal screening done or even honouring their appointments (Mouton & Marais 1994:19).
- With regards to the practical goal, which involves therapy or healing of the human being and improving the quality of life, the female diabetic patients in this study will have an increase in awareness of the occurrence of DR and the importance of undergoing annual retinal screening (Mouton & Marais 1994:13-14).

### **1.6.4 Epistemological assumptions**

Epistemology in social science according to Mouton and Marais (1994:18-19), refers to quest for the truth during which the relationship between the inquirer and the respondents is unknown. The researcher will objectively ask each respondent questions

in the itemised form of a questionnaire, where each participant is expected to answer and elicit an understanding of their awareness of the eye complication of diabetes, which is DR and retinal screening (Polit & Beck 2012:13).

Epistemological assumptions are statements that embody the ideal of science, namely the quest for the truth (Mouton & Marais 1994:14-15). In this regard the epistemological assumptions were that:

- Adequate knowledge about a phenomena lowers anxiety about that phenomena.
- Determinants of Health Belief Model can form a basis for a conceptual framework through which the empirical data on the knowledge of DR and retinal screening can be organised in the processes of development of questionnaire, data collection and analysis methods.

#### **1.6.5 Methodological assumptions**

According to Mouton and Marais (1994:15-16), this concerns what may be called the how of research. In other words, how the research should be planned, structured and executed to comply with the criteria of science. It refers to the logic of implementing scientific methods in the study of reality. Methodological assumptions regarding this study were that:

- Quantitative research is often associated with precise measurement of phenomena and quantification, often involving a rigorous and controlled design (Polit & Beck 2012:793).
- Quantitative research supports the collection of structured data with close ended type of questions.
- Explorative and descriptive research designs aim at portraying and exploring people's views on a particular phenomenon accurately.
- Quantitative research studies support deductive reasoning as a strategy for making conclusions about a phenomenon, from a general to a particular situation.

Polit and Beck (2012:13) refers to the methodological assumption as to how the evidence for the study will be best obtained.

Burns and Grove (2009:39) conclude that assumptions are embedded (unrecognised) in thinking and behaviour, and uncovering these assumptions requires introspection and strong knowledge base in the particular field of study as it was purposed in the study.

## **1.7 RESEARCH DESIGN AND METHOD**

A research design according to Burns and Grove (2009:218), is the blue print or strategy of conducting the entire research. It allows maximum control over all the internal and external factors than can cause any form of interference with the internal validity of research results. A research design is a guide to the researcher in the planning and implementation of a study so that an intended research purpose, question and hypothesis or objectives is achieved. It is best described as the architectural backbone of a study (Burns & Grove 2013:195).

### **1.7.1 Research design**

The research design of this study is a quantitative, non-experimental, descriptive and contextual research design.

#### ***1.7.1.1 Quantitative research paradigm***

Quantitative research paradigm is a formal, objective, systematic process, where data is collected numerically to obtain information about the world of the respondents. Variables are described, relationships among variables are examined, and cause-and effect interactions between variables are determined where applicable (Burns & Grove 2009:225).

#### ***1.7.1.2 Non-experimental design***

Non-experimental design is used by researchers if they wish to construct a picture of a phenomenon, explore events, or people and situations as they occur in nature (LoBiondo-Wood & Haber 2010:195).

This type of designs can as well be used to test relationships or differences among variables. In non-experimental designs the independent variable is not manipulated, as the independent variables occur naturally, and the researcher cannot control them by manipulation. These designs require a clear, concise research question or hypothesis which is based on a theoretical framework. The evidence produced by these designs is not as strong as compared to experimental designs because of the difference in the degree of control in the designs due to the independent variable not being manipulated (LoBiondo-Wood & Haber 2010:195).

### ***1.7.1.3 Descriptive research design***

Descriptive research design serves a purpose to observe, describe and document the aspects of a certain situation, as it occurs in the natural. It also serves as a starting point to generate or test a hypothesis for future research possibilities on specific phenomena (Polit & Beck 2012:226).

Through the contextual approach one seeks insight into a given situation or the phenomenon as well as an understanding of the underlying causes (Polit & Beck 2010:23).

### **1.7.2 Setting**

A research setting is the specific place where the research will take place (Polit & Beck 2012:49). In this study, information will be gathered in one research site. The study will be conducted at a clinic in a day hospital in Cape Town, South Africa (SA) on the diabetic clinic days, or days when female diabetics are easily available at the clinic.

The setting where the hospital is situated was an African peri-urban community. Partial informal settlement, which is situated on the Cape flats between Table Bay and False Bay of the Western Cape Province. The setting is described as the fastest growing township in SA. According to Population Census (South African National Census 2011:1), it covers a total of 38, 71 Kms in area, and the total population is about 391 749 people living in the area. There are more females staying in this area, which is



approximately 200 187, and makes up 51.10% of the total population. The native language is isiXhosa, and 90.54% of the population is Xhosa speaking.

The clinic context is within the hospital and diabetic patients consult on Mondays.

### **1.7.3 Research method**

The research methods as described by Polit and Beck (2012:12), are techniques, processes or procedures that researchers use for the structure and implementation of a study. These procedures include the gathering and analysis of the data relevant to the research question, problem statement and the study objectives. The research methods in this study will cover aspects such as population, sample, sample selection method, sample size, data collection, data analysis and ensuring validity and reliability.

#### ***1.7.3.1 Population***

The universal or global population in the study was all female diabetic patients who could be at risk of developing DR in SA (Burns & Grove 2009:344).

The target population was all the female diabetic patients who meet the sampling criteria (Burns & Grove 2009:344). The accessible population was female diabetic patients who attended the diabetic clinic on the days when data was collected.

### **Inclusion and exclusion criteria**

Inclusion criteria are characteristics that persons must have in order to be allowed to participate in a study.

Exclusion criteria are characteristics that can cause a person to be excluded from a study (Burns & Grove 2009:345).

#### ***Inclusion criteria***

- Who attend the diabetic clinic at the day hospital
- Female diabetic patients

- Both who have undergone or not undergone diabetic retinal screening
- Irrespective of whether they have type 1 or type 2 DM
- Aged between 30-60 years of age
- Married or not

#### *Exclusion criteria*

- Younger than 30 years or over 60 years old
- Not members of the day clinic
- Male diabetic patients

#### **1.7.3.2 Sample and sampling technique**

From this population, a convenient sample (Grove, Burns & Gray 2013:363) of 150 participants was selected for the study and consisted of female diabetic patients because they were also conveniently happened to be at the right place at the right time.

#### **1.7.3.3 Sample size**

A sample is a smaller set of cases that a researcher selects from a larger pool and generalizes the results to that population. The population is the larger pool that has an important role in sampling (Neumann 2011:219-224).

#### **1.7.3.4 Data collection**

Data collection is defined by Polit and Beck (2012:293) as the gathering of information to address a certain research question. Quantitative researchers collect their data in a structured manner. There are constraints from the people who are collecting data and the people participating in the study during structured data collection. This often is due to a possible inconsistency in what is asked in the questions and the manner in which the respondents answer the questions, in an effort to enhance objectivity.

Data collection procedures in research should remain objective and systematic. The data is to be kept free from researchers biases and beliefs and values or attitudes , and

systematically collected uniformly, consistently and standardised, and should be identifiable, repeatable and yet confidential (Lo-Biondo-Wood & Haber 2010:269).

In this study, a structured questionnaire (Annexure E) was utilised to collect data in order to determine the level of awareness about DR and retinal screening. Two volunteers were trained to assist in the collection of data over a time period of 4-8 weeks as the diabetic clinic runs once a week on Mondays. Pre-testing the instrument was done to modify it for better and easier conceptualisation. The instrument was developed based on the comprehensive literature review on the phenomena and the elements of the determinants of health promotion behavior conceptual frame work.

#### **1.7.3.5 Data analysis**

In quantitative studies, the data is a complex field of knowledge especially in analysis. However, data analysis allows the researcher to organise, interpret, and communicate numerical information. Logical thinking ability is important with data analysis hence the use of charts, graphs and tables, which represent or gives a picture of the evidence collected by the researcher (Polit & Beck 2012:388).

Therefore, in this study, data was analysed through the use of a Statistical Package for the Social Sciences (SPSS) computer software program in consultation with a statistician. Inferential and descriptive statistics were discussed. Data was presented in frequency tables, percentages, mean and standard deviation at a confidence level of 95% and 1 degree of freedom.

#### **1.7.4 Validity and reliability**

Validity and reliability are the two most important appraisal of a measurement instrument, as they measure its accuracy as well as the extent to which it yields the same results on repeated measures (Grove, Burns & Gray 2013:393-394).

In this study face, content, external and internal validity were ensured ((Polit & Beck 2012:371).

Cronbach's alpha coefficient (Polit & Beck 2012:389) was used to test the reliability and the internal consistency of the instrument.

## **1.8 ETHICAL CONSIDERATIONS**

In this study, considerations were taken to ensure protection of the rights of the research institution, study respondents and ensuring scientific integrity.

The researcher endeavored to protect the rights of the institution by successfully obtaining official and approved ethical clearance (Annexure A) from the Research and Ethics Committee of the Department of Health studies at UNISA. The committee is legally mandated to objectively review research proposals on the merits and risks envisaged, and make recommendations. Moreover, this research took place under the authority of the management of the chosen day clinic therefore permission was request (Annexure B) and obtained from the facility management (Annexure C).

The researcher protected the rights of all the participants by considering: the right to obtain informed consent (Annexure D), right to voluntary participation, self-determination, privacy, anonymity and confidentiality, fair treatment and justice (Polit & Beck (2012:152). Respect for the respondents and their individual autonomy was realised by giving them the freedom to with draw from the study at any given time without experiencing prejudicial and victimisation treatment (Burns & Grove 2009:189-199).

The researcher adhered to the principles of scientific integrity by avoiding plagiarism. A plagiarism declaration is enclosed in the research report. These included: honesty in reporting and communication of the intensions to do the study, accuracy in referencing and communicating the findings, and credit for the scholarly work of others. A brief overview of the layout of this chapter has been plotted in chapters using a table format as evidenced in table 1.1.

## **1.9 STRUCTURE OF THE DISSERTATION**

This dissertation has been structured into the following chapters:

**Table 1.1      Structure of the dissertation**

<b>CHAPTER</b>	<b>TITLE</b>	<b>CONTENT DESCRIPTION</b>
1	Orientation of the study	The introduction of the study, overview of the research problem, the research purpose, research question and hypothesis, the study objective and the significance of the study. The theoretical foundation of the study, research design and study methods were briefly introduced.
2	Literature view	A comprehensive search for literature on the topic which was under investigation and information on what is published or discussed in the literature about the phenomenon.
3	Research design and methodology	The overall plan for addressing the research question and problem, objectives, including the setting, population, sampling and sampling technique, sampling size, data collection and data analysis, ensuring validity and reliability and ethical considerations.
4	Data representation, analysis and interpretation	Presentation, analysis and interpretation of the research results.
5	Research conclusions and recommendations	The discussions, conclusions, and recommendations based on the research results.

The literature review is discussed in depth in chapter 2.

## **1.10 CONCLUSION**

This chapter provided a comprehensive overview and serves as an introduction to the study. A brief discussion was used to describe the background information of the research problem with regards to the level of awareness about DR and diabetic screening studies from other countries and in the context of SA.

The meta-theoretical assumptions were noted respectively as epistemological, teleological, ontological and methodological and have been outlined. All key terms have been conceptually and operationally defined, the research design and methodology

have been briefly introduced. The research design that was discussed in this study was a quantitative, non-experimental, descriptive and contextual approach. Research methods were introduced which included the study population, sampling and sampling techniques, sample size, data collection and analysis, external and internal validity. Ethical considerations were also outlined and are discussed in more detail in chapter 2.

## CHAPTER 2

### LITERATURE REVIEW

*Even in literature and art, no man who bothers about originality will ever be original: whereas if you simply try to tell the truth (without caring two-pence how often it has been told before) you will, nine times out of ten, become original without ever having noticed it.*

CS Lewis

#### 2.1 INTRODUCTION

Literature review is defined by Grove, Burns and Gray (2013:708) as the analysis and use of research sources to develop a picture of what is known or unknown about a particular phenomenon or research problem. These are sources that are relevant or highly important in providing the in-depth knowledge needed to make changes in clinical, education or advanced research or to study a particular identified research problem is reviewed.

Researchers conduct studies within a context of specialised field of knowledge that is already known and is done by means of undertaking what is known as a literature review. A literature review provides the reader with the overview of pre-existing evidence and this evidence can contribute towards the forth coming study. The literature review of a study provides the context and confirms the need for more recent and new research to be done (Polit & Beck 2012:95).

The literature review in a quantitative study is responsible for directing the development and implementation of a study. The major literature review is conducted at the beginning of the research process and a limited literature review is conducted during the generalisation phase of the research report to integrate knowledge from the literature with new recent knowledge, for validation of the results (Burns & Grove 2009:90).

The literature review accomplishes several purposes. It shares with the reader other studies that are closely related to the phenomenon being undertaken. It also relates a

study to the larger, ongoing dialogue in the literature and is able to fill in gaps and extend prior studies. The literature review has a characteristic of providing a framework for establishing the importance of the study as well as a benchmark for comparing the results with other scholarly literature into a study for a more extensive discussion of purposes for compiling a literature review in research (Creswell 2014:27-28).

The literature review of this study was conducted to give insight to the researcher by means of available and already existing knowledge, which was used to assess the level of awareness of the occurrence of DR and benefits of retinal screening among female diabetic patients. For the purpose of this study, various resources were consulted such as international and national publications and sources from Google Scholar, a number of eBooks, internet and available relevant clinical data bases such as Medline, Scopus and clinical index together with the use of relevant research textbooks.

The major aspects of discussion focused mainly on the main study construct which is DR as the eye complication due to uncontrolled diabetes, lack of attendance of diabetic retinal screenings and the level of awareness among the females of the diabetic clinic in the day hospital.

The subsequent discussion focused on DM, general complications to the eye, DR and retinal screening.

## **2.2 DIABETES MELLITUS**

Diabetes is a chronic disease that is caused either when the pancreas does not produce enough insulin or when the body cannot effectively use its own insulin which it produces. Insulin is a hormone which regulates blood sugar. Diabetes prevalence is estimated to be 180 million people world wide, and this number is likely to double by the year 2030 if there is no urgent action to alleviate this pandemic. In 2005 , an estimated 1.1 million people died from diabetes and almost 80% of them occur in low and middle-income countries, and half of the people under 70 years, 55% of diabetes deaths are in women (WHO:2013:1).

The common signs of DM include polyuria (frequent urination),increasingly thirsty (polydipsia)and hungry (polyphagia) (Bastaki 2005:111-112).



Although diabetic retinal screening is advised as a preventative measure for all diabetic patients, however, some patients seem not to be well informed about its importance and as well where it can be done. Most researchers contend that a diabetic retinal screening is worthwhile and provides an opportunity to detect other eye complications such as glaucoma and age-related macular degeneration. The examination of the posterior pole of the eye detects a high proportion of patients with pathology that can be referred or treated timeously (Cook 2013:449).

### **2.2.1 Prevalence of diabetes mellitus**

The International Diabetes Federation (IDF) reported that between the ages of 27-79, the estimates for people who are diabetic are estimated to be approximately 151 million, and there is an anticipation that these figures are still likely to escalate. South Africa's prevalence of diabetes cases still continues to rise. In a study conducted by Javadi and Sarei-Ghanavati (2008:52-53), it was reported that the global prevalence of people with diabetes worldwide is projected to rise from 346 million in year 2012 and this number is likely to be increased more than double million in 2030 (Goa, Yang, Su, Jiang, You, Yang & Shang 2013:509).

The prevalence of DM is increasing due to population growth, the aging, urbanisation and the increasing of obesity and physical inactivity. The global prevalence of diabetes in the year 2000, as reported by the WHO Global-burden of disease, projected that the diabetes pandemic will continue to rise if levels of obesity remain constant. In all age groups this prevalence worldwide was estimated to be 2.8% in the year 2000 and 4.4% in 2030. The total number of people with diabetes is projected to rise from 171 million people in the year 2000 to 366 million in the year 2030. This prevalence is noted to be higher in men than in women (WHO:2014a:1).

There are two main types of diabetes, type I and type II diabetes mellitus. Type I diabetes mellitus (T1D) or insulin-dependent diabetes mellitus (IDDM) is due to the inability of the pancreas to secrete insulin (Skyler & Ricordi 2011:1).

## **Type 1 diabetes mellitus**

This type of diabetes is insulin-dependent diabetes mellitus, which commonly occurs in young adults, and the onset of this type is very sudden. In this type of diabetes there is a destruction of the  $\beta$ -islet cells, which then inversely causes depletion or absence of insulin in the body. There is a familial and genetic tendency linked to this type of DM (Clarke-Farr et al 2006:134-136).

## **Type 2 diabetes mellitus**

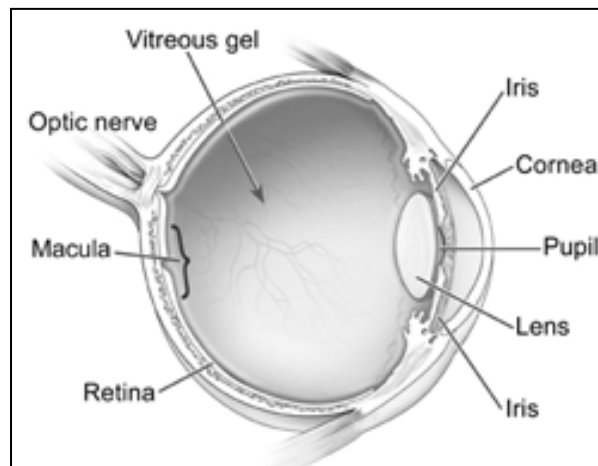
Type II diabetes mellitus (T2D) is a major cause of morbidity and mortality worldwide. Approximately 171 million individuals worldwide are affected by T2D. Predictions are that this figure is expected to rise to 366 million individuals by 2030 (Kumar & Singh 2010:665-669). The WHO classifies an individual with fasting plasma glucose levels of  $\geq 7.0$  mmol/l as diabetic. Type 2 diabetes is a multifactorial disease that occurs primarily in adults and is associated with insulin resistance, dyslipidaemia and obesity. However, T2D is becoming prevalent amongst children particularly in obese children. It is essentially a lifestyle disease that can be managed by exercise and diet (Seino, Nanjo, Tajima, Tajima, Kadowaki, Kashiwagi, Araki, Ito, Inagaki, Iwamoto, Kasuga, Hanafusa, Haneda & Ueki 2010:212).

Diabetes mellitus often leads to complications within the eye.

## **The eye**

An eye is one of a pair of organs of sight, contained in a bony orbit at the front of the skull, with retro bulbar fat and innervated by four cranial nerves. The bulb of the eye is composed of segments of two spheres with nearly parallel axes that constitute the outside tunic of the eye. There are three fibrous layers enclosing two internal cavities separated by the crystalline lens (*Mosby's Dictionary of Medicine, Nursing and Health Professions* 2009a:691).

The different structures of an eye are evidenced in figure 2.1



**Figure 2.1 Structures of the normal eye**

(Source: Eye anatomy 2014)

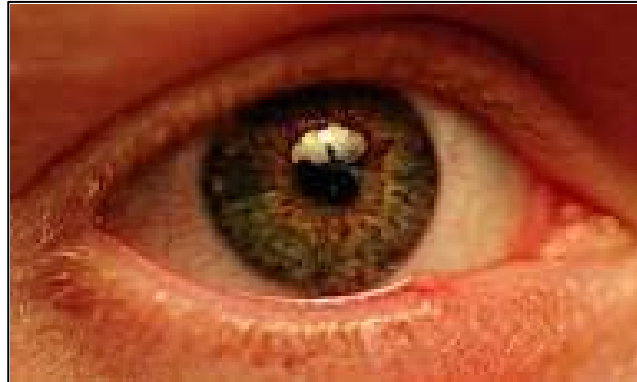
Freshwater and Maslin-Prothero (2005:223) define an eye is an organ of vision or of light sensitivity, a pair of hollow structures located in bony sockets of the skull, functioning together or independently. Each eye has a lens capable of focusing incident light on an internal photosensitive retina from which nerve impulses are sent to the brain and the vertebrate of vision. Another definition of eye is the ability to make an intellectual or aesthetic judgment, watchful attention or supervision (*The American Heritage Dictionary* 2009).

The term *eye*, according to *Oxford Advanced Learner's Dictionary* (2006:519) refers to a part of the body which is either of the two organs on the face that one uses to see. It is the ability to see and also refers to a particular way of seeing something. It is the hole in the end of a needle that one puts the thread through and a small thin piece of metal curved round, that a small hook fits into, used for fastening clothes. As a verb, to eye somebody or something means to look at somebody or something carefully, especially because one wants something or is suspicious of something (*Oxford Advanced Learner's Dictionary* 2006:519).

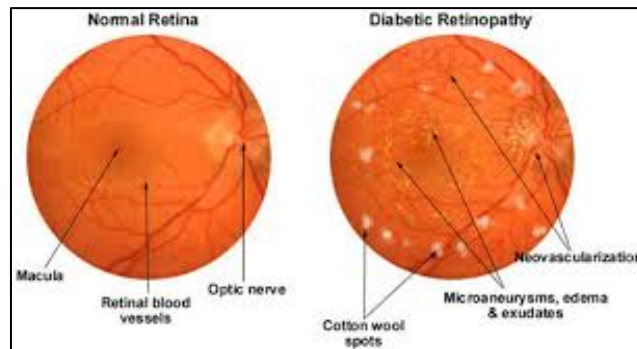
## **2.3 DIABETIC RETINOPATHY**

According to the University of Chicago (2013:1), DR is defined as the leading cause of blindness in American adults. The University states that DR occurs when there are changes on the surface of the retina of the eyes. DR may cause the retinal blood

vessels to swell and leak with fluid, and in some cases the retina may develop abnormal new blood vessels to occur on the outer surface of the retina as exhibited on figure 2.2.



**Figure 2.2a Eye with diabetic retinopathy**  
(DR Picture Image 2009)



**Figure 2.2b Eye with diabetic retinopathy**  
(DR Picture Image 2009)

When these changes occur, this may result in loss of vision and eventually blindness. In the early stages of DR a person may be completely asymptomatic, and experiences no pain, and their vision may not change until the progression of the disease. As the disease continues to progress a condition called macula oedema may occur, and the macula, which is the most sensitive part of the retina, swells due to the leaking fluid and causes the person to have blurred vision. When the formation of new abnormal vessels occurs on the retinal surface, those new vessels can bleed into the eye causing a persons' vision to be blocked (University of Chicago 2013:1).

Diabetic retinopathy will affect anybody who has DM, the longer a person has had diabetes the, higher the chances of them developing DR (Clarke-Farr et al 2006:134-135).

According to Smith, Szetu and Bourne (2007:415-419), DM was not common in indigenous pacific populations 30 years ago, when these populations maintained a traditional lifestyle and DM was rare in Melanesian populations. There has been a high prevalence of type 2 diabetes in the urban areas, which proportionally increased the prevalence of DR. Similarly DR is now classified to be among the leading causes of why people go blind in pacific Island nations. Due to the time that lags between the onset of DM and the time a person is diagnosed with DM, patients with type 2 diabetes mellitus have a significant DR at first diagnosis, as compared to patients with type 1 diabetes (Smith et al 2007:415-419). The pathogenesis of retinopathy in DM is still not fully understood, but hypertension, poor glyceamic control and increasing duration of DM have been identified as risk factors for development of DR (Smith et al 2007:415-419).

### **Stages of diabetic retinopathy**

The progression of DR can be classified into four stages, these stages are namely: mild non-proliferative retinopathy, moderate, severe non-proliferative retinopathy and lastly proliferative DR (Samuels 2012:1).

Diabetic retinopathy is classified according to its severity. It progresses from mild non-proliferative abnormalities (NPDR), which is characterised by blood vessels becoming permeable, followed by non-proliferative moderated DR, then severe non-proliferative DR, which is characterised by vascular closure, lastly there is proliferative DR (PDR), which is characterised by formation of new blood vessel on the retinal surface and posterior surface of the vitreous (Fong, Aiello, Gardner, King Blakenship, Cavallerano, Ferris & Klein 2003:99-102).

At all stages of DR, macula oedema, which is characterised by swelling of the retina occurs due to the leaking of blood vessels of the retina. Some conditions such as pregnancy, puberty, blood glucose control, and hypertension can cause DR to occur at a faster rate (Fong et al 2003:99-102).

Diabetic Retinopathy that threatens a persons' vision is not common in type 1 diabetes mellitus in the first 3-5 years after they have been diagnosed with diabetes or before

they reach puberty. Between 10-20 years of a patient having type1 diabetes, almost all type1diabetics will develop DR (Fong et al 2003:99-102).

### **Mild non-proliferative diabetic retinopathy**

This stage in retinopathy is the least serious of all the stages. This stage is characterised by micro-aneurysms, where there was swelling in the retinal vessels. (Samuels 2012:1).

### **Moderate non-proliferative diabetic retinopathy**

This is the second stage of DR is characterised by blockage of the blood vessels of the retina (Samuels 2012:1).

### **Severe non-proliferative diabetic retinopathy**

In this stage of DR, there is further blockage of more blood vessels. Certain areas of the retina will have a shortage of a blood supply, the brain will be signaled to form new blood vessels to supply blood to the retina for nourishment and this process is called neovascularisation (Samuels 2012:1). In severe NPDR, many more blood vessels are blocked, depriving several areas of the retina with their blood supply. These areas of the retina send signals to the body to grow new blood vessels for nourishment (Mayo clinic 2015:1).

### **Proliferative diabetic retinopathy**

It is in this stage that DR advances and becomes serious. The newly formed blood vessels are abnormal and fragile. These new blood vessels are fragile their walls are thin, so they leak and grow along the retina and the surface of the clear, vitreous gel that fills the inside of the eye. At this stage of DR the patients' vision is still normal, there is still no loss of vision but once these newly formed, yet fragile blood vessels begin to leak into the retina, this then causes a progressive loss of vision and eventual blindness (Samuels 2012:1).

Proliferative diabetic retinopathy (PDR) is the most severe type of DR. It's called proliferative because at this stage, new blood vessels begin to grow in the retina. These new blood vessels are abnormal. They may grow or leak into the clear, jelly-like substance that fills the center of the eye (vitreous). Eventually, scar tissue stimulated by the growth of new blood vessels may cause the retina to detach from the back of the eye. If the new blood vessels interfere with the normal flow of fluid out of the eye, pressure may build up in the eyeball, causing glaucoma. This can damage the optic nerve that carries images from the eye to the brain (Mayo clinic 2015:1).

### **Causes and risks factors of DR**

Although diabetes is a disease of the urban areas, there is an increase of prevalence in the rural areas as well. The socio economic burden that results from visual impairment or blindness caused by DR, is particularly in the working age group. The most common risk factor of DR is vision loss, and it occurs through the following:

Blood vessels damaged from DR can cause vision loss in two ways:

- Fragile, abnormal blood vessels can develop and leak blood into the center of the eye, blurring vision. This is **PDR** and is the fourth and most advanced stage of the disease.
- Fluid can leak into the center of the macula, the part of the eye where sharp, straight-ahead vision occurs. The fluid makes the macula swell, blurring vision. This condition is called **macular oedema**. It can occur at any stage of DR, although it is more likely to occur as the disease progresses. About half of the people with proliferative retinopathy also have macular oedema (National Eye Institute 2013:1).

### **Who is at risk of DR?**

All people with DM – both type 1 and type 2 – are at risk. It is recommended that all diabetic patients should get a comprehensive dilated eye exam at least once a year. The longer someone has diabetes, they are more likely to develop DR. Between 40 to 45 percent of Americans diagnosed with diabetes have some stage of DR. If one has

DR, a doctor may recommend treatment to help prevent its progression (National Eye Institute 2013:1).

During pregnancy, DR may be a problem for women with diabetes and this is referred to as gestational diabetes. To protect vision, every pregnant woman with diabetes should have a comprehensive dilated eye exam as soon as possible. A physician may recommend additional exams during pregnancy (National Eye Institute 2013:1).

### **What are the symptoms of DR?**

According to the National Eye Institute (2013:7-8), often there are no symptoms in the early stages of the disease, nor is there any pain. **A diabetic patient should never wait for symptoms.** A dilated fundus exam should be recommended annually. Blurred vision may occur when the macula — the part of the retina that provides sharp central vision — swells from leaking fluid. This condition is called macular oedema. If new blood vessels grow on the surface of the retina, they can bleed into the eye and block vision. In proliferative DR when bleeding occurs, at first, a patient will see a few specks of blood, or spots, “floating” in one’s vision. If spots occur, a patient should see their eye care professional immediately. Hemorrhages tend to happen more than once, often during sleep. Sometimes, without treatment, the spots clear, and the patient’s vision will improve. However, bleeding can reoccur and cause severely blurred vision. If left untreated, proliferative retinopathy can cause severe vision loss and even blindness. Also, the earlier one receives treatment, the more likely treatment will be effective (National Eye Institute 2013:7-8).

### **Detection of DR and macula oedema**

Diabetic retinopathy and macular oedema are detected during a comprehensive eye exam that includes:

- **Visual acuity test.** This eye chart test measures how well a person can see at various distances.
- **Dilated eye exam.** Mydriatic drops are administered in the eyes to widen, or dilate, the pupils. This allows the eye care professional to see more of the inside of one’s eyes to check for signs of the disease. An eye care professional uses a



special magnifying lens to examine the retina and optic nerve for signs of damage and other eye problems. After the exam, the close-up vision may remain blurred for several hours.

- **Tonometry.** An instrument which measures the pressure inside the eye. Anaesthetic drops may be administered to the eye for this test.

An eye care professional checks the retina for early signs of the disease, including:

- Leaking blood vessels
- Retinal swelling (macular oedema)
- Pale, fatty deposits on the retina – signs of leaking blood vessels
- Damaged nerve tissue
- Any changes to the blood vessels

Should an eye care professional believe that a diabetic patient needs treatment for macular oedema, may suggest a **fluorescein angiogram**. In this test, a special dye is injected intravenously through the arm. Pictures are taken as the dye passes through the blood vessels in your retina, this test is utilised for the identification of any leaking blood vessels and recommend treatment (National Eye Institute 2013).

## **Treatment of DR**

During the first three stages of DR, no treatment is needed, unless there is evidence of macular oedema. To prevent progression of DR, it is critical people who are that diabetic control their levels of blood sugar, blood pressure and blood cholesterol.

Proliferative retinopathy is treated with laser surgery. This procedure is called scatter laser treatment. Scatter laser treatment helps to shrink the abnormal blood vessels. An Ophthalmologist will place 1 000 to 2 000 laser burns in the areas of the retina away from the macula, causing the abnormal blood vessels to shrink. Because a high number of laser burns are necessary, two or more sessions usually are required to complete treatment. Although after the procedure it may be noticed that there is a significant loss of the peripheral vision. Scatter laser treatment may also slightly reduce colour and night vision in some instances (Skyler & Ricordi 2011:18).

Scatter laser treatment works better before the fragile, new blood vessels have started to bleed. Regular check-ups and comprehensive dilated eye exams are advised. Even when bleeding has started, scatter laser treatment may still be possible, depending on the amount of bleeding. Severe bleeding may require a surgical procedure called a vitrectomy. During a vitrectomy, blood is removed from the center of your eye.

With regards to treatment several laser and vitrectomy surgeries cause severe vision loss in patients with DR (Skyler & Ricordi 2011:19).

### **How is a macular oedema treated?**

Macular oedema is treated with laser surgery. This procedure is called focal laser treatment. The Ophthalmologist places several hundred small laser burns in the areas of retinal leakage surrounding the macula. These burns slow the leakage of fluid and reduce the amount of fluid in the retina. The surgery is usually completed in one session. Further treatment may be needed. A patient may need focal laser surgery more than once to control the leaking fluid. Macular oedema in both eyes may require laser surgery; generally only one eye will be treated at a time, usually several weeks apart. Focal laser treatment stabilises vision. In fact, focal laser treatment reduces the risk of vision loss by 50 percent. In a small number of cases, if vision is lost, it can be improved (National Eye Institute 2013).

National eye institute research found that prompt treatment of macular oedema with the drug Lucentis, with or without laser treatment, resulted in better vision than laser treatment alone or steroid injections. When injected into the eye, Lucentis, and two other similar drugs, Avastin or Aylea, reduce fluid leakage and interfere with the growth of new blood vessels in the retina (National Eye Institute 2013).

### **How is current research going to contribute to this study?**

The National Eye Institute (NEI) is conducting and supporting research that seeks better ways to detect, treat, and prevent vision loss in people with diabetes. This research is conducted through studies in the laboratory and with patients.

Researchers are currently studying drugs that may hinder the retina from sending signals to the body to grow new blood vessels. Someday, these drugs may help people control their DR and reduce the need for laser surgery.

This online resource guide provides information about diabetic eye disease. It answers questions about causes and symptoms, and discusses diagnosis and types of treatment (NIH Publication No. 04-3252:2014).

## **2.4 RETINAL SCREENING**

Diabetic retinal screenings is defined as a once yearly appointment, eye checkup, which is carried out to identify early signs of DR. Retinal camera technologies have improved over the years in many countries which allows for retinal screening to occur annually (Cook 2013:8).

### **2.4.1 Global perspective on diabetic retinopathy and retinal screening**

Diabetic retinopathy is the 5<sup>th</sup> leading cause of blindness worldwide and this eye complication affects approximately 1.8 billion people and is responsible for 4.8% causes of blindness (Read & Cook 2007:56-64). Germany is a country where retinal screening programmes provide opportunistic services to patients. These patients access them through their chosen healthcare provider and have a more individualised 'doctor-patient' relationship, and this service is funded by the individual (Cook 2013:1-3). A study conducted by Rani et al (2005:1-3) concluded that the prevalence of DR is increasing at an alarming rate worldwide.

In Malaysia a study was done which assessed the awareness of eye complications and the prevalence of DR. This was in the first visit to the eye clinic among type 2 diabetic patients attending a tertiary medical centre in Kuala Lumpur, Malaysia. Conclusions were made pertaining to this study, which were that 86% of the respondents were aware of the diabetic eye complications, especially patients who had achieved tertiary educational level. The majority, which was 78.8% of these patients' were referred by their physician and only 20.4% came on their own initiative, 43.8% did not know how frequent they should go for an eye test and 72.3% did not know what treatments were available. The barrier for most of the diabetic patients were that there was a lack of

understanding of the diabetic diseases, and this led to the delay of them coming for their eye tests earlier or come for retinal screening (Tajunisah, Wong, Tan, Rokiah & Reddy 2011:519-524).

## **2.5 SUB-SAHARAN COUNTRIES**

Findings from a study that was conducted in Nigeria by Nwosu (2003:115-120) confirmed that the effects of diabetes to the eye in people with type 1 and type 2 diabetes affected ocular tissue. The findings concluded that DR had an incidence of 33% of the accessible population, which accounted for 16.7% of retinal disease and led to bilateral blindness in 22% of diabetic patients. This incidence depended on both the duration of diabetes suffering and the level of glycaemic control. Findings from this study also pointed out that a diabetic patient who had strict and well controlled blood sugar delayed the onset of developing DR and retarded the progression of established diabetic complications to the entire body (Nwosu 2003:115-120).

In a study conducted in Kenya by Mwangi et al (2011:140), findings concluded that 83% of their respondents had heard of DR (diabetic eye disease) and 60% of those who knew about it, were not aware of the need for diabetic retinal screening. Although some diabetic patients in that study had a general awareness of DR, there still exists a great need for an increase in awareness amongst them and about its risk factors and prevention of blindness.

A launch of a major DR screening program was done in India, Mumbai by the eye institute in collaboration with the lions club international foundation and the RD trust, which was to create awareness among the rural population of DR with emphasis on early detection in order to conduct diabetes and retinopathy screening camps to bring to the base diabetic patients who had sight-threatening DR for fluorescein angiography, ultrasound and to perform laser photocoagulation or vitreous surgery (Rani et al 2005:1-11).

### **2.5.1 South African perspective**

In SA, DR is the 3<sup>rd</sup> leading cause of blindness, which is preceded by cataract and glaucoma which are responsible for 5% of blindness. Cataract and refractive error are

the first phase of vision 20/20 in SA that needs to be dealt with, while DR is the second phase (Read & Cook 2007:56-64).

South Africa has lagged behind due to the increased pressures in primary health care (PHC), which results in more and more diabetics not having enough opportunity to be screened. The Ophthalmology Society of Southern Africa has developed a low cost system for national retinal screenings (Cook 2013:1-6).

Diabetes causes microvascular complications of the retina which later manifest into DR, which is the current leading cause of blindness in the current worldwide diabetes pandemic. Screening for DR provides an opportunity to detect many other forms of pathology of the retina. Previously direct funduscopy has been the method of examining the fundus at PHC level, but there is a great demand for patients and less health care workers are equipped with this skill. Fewer patients are being screened for DR, which results in a decreased awareness of the diabetes eye complication and an importance of annual retinal screening. There is also a high default rate among those patients who were screened, thus reflecting a poor understanding of the necessity for retinal screening and ignorance (Cook 2013:1-6).

South African public sector tends to follow a more structural model, where there are pitfalls such as that there are no recommendations, no structured central register, no recall system or a common grading system inversely the private sector follows an opportunistic model. Another contributing factor to the pitfalls in the public sector is that diabetic patients needing retinal screenings may be referred away from their established eye caregivers for screening to other practitioners (Cook 2013:1-6).

A study conducted by Read and Cook (2007:56-64) in a day Hospital in Cape Town showed similar characteristics to those noted in this literature. This study consisted of two hundred and eighty-eight type 2 diabetic patients, whose objective was to evaluate the retinopathy status of the patients and to assess the adequacy of retinal screening programmes. This study uncovered that with regards to statistics, Cape Town was falling well short of the recommended retinal protocols for diabetics. It also found that there was a general lack of awareness among diabetic patients with regards to the existence of the diabetes eye complication and the importance of retinal screening. Only

10.4% of patients were aware that annual funduscopy was a requirement. This emphasised the importance of education as part of the visual screening process.

A similar study conducted by Clark-Farr et al (2006:134-143) in the Cape Town metropolitan district, also uncovered ocular complications of diabetes and how the disease could affect their eyes. The findings evidenced that a total of 89% of patients agreed or strongly agreed that diabetes might affect the way that they may see. When considering whether diabetes could affect the way their eyes healed if became injured, 37% agreed and 43% strongly agreed. A question regarding the formation of cataracts due to diabetes, 13% disagreed or strongly disagreed, 41% were not too sure. A total of 88% agreed strongly agreed that pressure changes in the eyes could lead to glaucoma. Most importantly the patients were asked about their knowledge about diabetes causing bleeding and damage inside their eyes 33% agreed and 43% strongly agreed with the statement, and 43% disagreed. This significant proportion of the study results indicated the need for further education to diabetic patients regarding the ocular complication of diabetes to the eye and how to take care of themselves.

## **2.6 THEORETICAL FRAMEWORK OF THE STUDY**

A theoretical framework is the abstract, logical structure of meaning that will guide the development of a study and enable a researcher to link the results to the body of knowledge. In quantitative studies, the framework is often a testable mid-range theory that has been developed in a discipline. A framework can also be developed inductively from findings in qualitative studies or developed deductively from previously published research or theories. Every quantitative study has a framework, although it is not explicitly expressed. Theories are also often used as theoretical frameworks for guidance in data collection and analysis (Burns & Grove 2009:126).

A theory is defined as an integrated set of defined concepts, which are existent statements and relational statements that present a view of a particular research phenomenon. It can be used to describe, explain, predict or control the phenomenon (Grove et al 2013:71). A theory is used as a systemic explanation to describe how phenomena are interrelated. A theory embodies at least two concepts that are related in a manner that the theory purports to explain. Traditional theories have explanation or prediction as their purpose. A theoretical framework is the overall underpinning of a

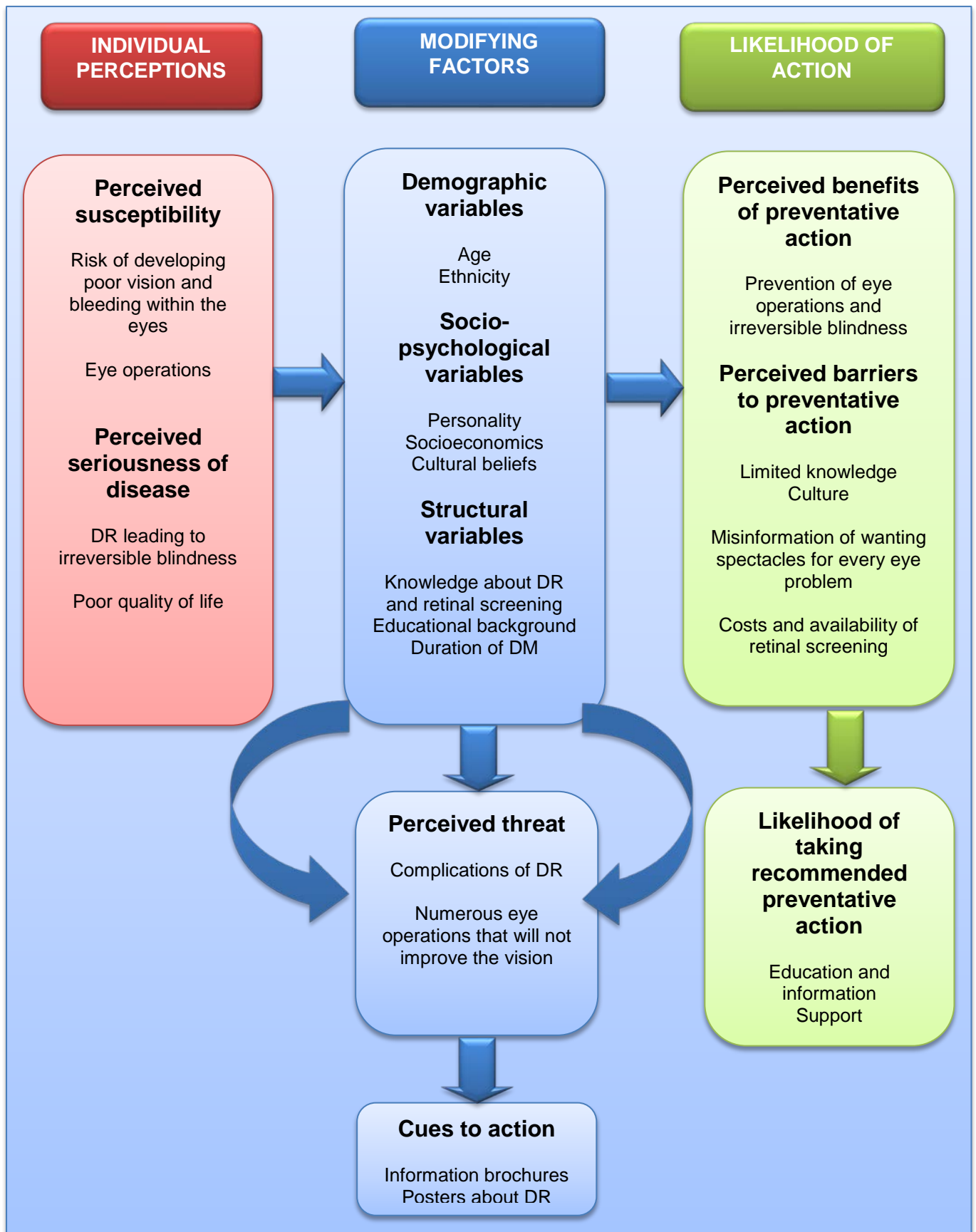
study. A study that has its roots in a specific conceptual model, that study's framework is referred to as a conceptual framework (Pilot & Beck 2012:127-128). The role of a framework is to guide the researcher during all the stages of the study, from the literature review to the collection and analysis of data and it is vitally important that the study findings relate to the framework. Although models are viewed as less formal means by which phenomena are organised (Parahoo 2006:161-162).

However, this study will be based on the interacting systems and schematic model called Determinants of the Health Belief Model (HBM) which suits well to the study purpose, research questions and objectives.

### **2.6.1 Determinants of the Health Belief Model (HBM)**

A HBM is described by Stanhope and Lancaster (2011:271-272) as a model which was developed to provide a framework for understanding why some people take particular actions to avoid illness and inversely why others fail to protect themselves. This model is beneficial in the assessment of health protection or disease prevention behaviours, the organising of information regarding clients' views of their state of health and the factors that influence them to make a change in their behaviour. It is also appropriately used in providing organised assessment of data regarding the clients' abilities and motivation to change their health status.

Conceptual models organise global ideas and simplify complete health systems of thought into succinct formats. These models provide meaningful descriptions to guide the thinking, observation and the practice of various clinicians. The HBM is similar to the PRECEDE-PROCEED model (Lancaster & Stanhope 2010:270). The components of the HBM are depicted in figure 2.3.



**Figure 2.3 Concepts of the Health Belief Model (HBM)**  
(Heath belief model 2010)



The model of this study represents theoretical concepts and how they are linked, which is done through the use of boxes, arrows and other symbols. The model is used to explain and predict the health belief components of lifestyle. This schematic figure was useful to clarify and succinctly communicate linkages among these concepts (Pilot & Beck 2012:128). The model also helps researchers to identify the background factors that influence behaviour. The central focus of the model comprises of three major constructs that are critical for any health intervention and these are: individual perceptions, modifying factors and variables affecting the likelihood of initiating action (Stanhope & Lancaster 2011:271). Use of the word patient in this section and rest of the study refers to a female diabetic patient.

### ***2.6.1.1 The Health Belief Model (HBM)***

The HBM includes four constructs which are to be combined to predict health-related beliefs as applied in the context of the study.

#### **Individual perceptions**

These perceptions refer to the way in which awareness about DR and retinal screenings among patients may reflect the valuing of the eyesight and eye health when compared to other aspects of life. These perceptions include the following variables:

- **Perceived susceptibility** to a disease is one of the most powerful perceptions in promoting healthier behaviour. If the risk of disease is greater, there will be a greater likelihood in the engaging of behaviours to decrease the risk (Glanz et al 2008:46). When patients perceive that the risk of blindness is higher, they will attend the diabetic clinic often, keep their blood sugar levels controlled and attend retinal screening as directed.
- **Perceived seriousness of the disease or disability** of contracting a specific disease, speaks to the individual's belief about the seriousness or the severity of the disease. This is based on medical information or knowledge, which may also come from beliefs that a person has pertaining to the difficulties diabetic eye complications such as DR may create or effects that it would have on their general life (Glanz et al 2008:47). This may be based on the knowledge, difficulties and complications that DR would create or effects that it would have on one's life

and family. Knowledge and beliefs of the consequences of irreversible blindness will influence diabetic patients to take eye care education seriously, by attending retinal screening.

- **Perceived threat** perceived susceptibility and severity combined is labelled as a perceived threat (Glanz, Rimmer & Viswanath 2008:47). Until one recognises personal susceptibility, action will not occur until the individual perceives a severity high enough to have serious organic or social implications (Polit & Beck 2012:135). Unless female diabetic patients perceive the ocular complications such as DR, cataracts and glaucoma to their vision, they may not understand the importance of retinal screening, and not only consider spectacles and eye drops to alleviate any visual problem.

### **Modifying factors**

The modifying factors of perception are modified by variables such as culture, educational level, past experiences, skills and motivation and these all influence personal perceptions and decision making (Glanz et al 2008:48). Other variables such as diverse demographic, socio-psychological, and structural variables have the ability to influence one's personal perception thus indirectly influencing health perceptions and taking of health related actions (Glanz et al 2008:50).

### **Demographic factors**

Age, ethnicity, marital status, educational background, past experiences and duration of DM may influence the awareness of DR and retinal screening among the patients. Younger patients with a better educational background in the results found it easier to understand what DR and retinal screening was about and this group of female patients had better motivation (Glanz et al 2008:48).

### **Socio-psychological factors**

These factors include, personality, socioeconomic, cultural and spiritual beliefs regarding DM treatment. If DM is not treated correctly the patient will develop high glycaemic levels. Intensive treatment of DM may delay the onset of microvascular eye complications, but patients find the prospect of treating the disease a daunting task.

Different female diabetic patients have different personalities on how they take care of themselves knowing that they are diabetic, some of them find it challenging, which causes some patients to go into depressed and panic modes of emotions which often leads to uncontrolled glycaemic levels.

Socioeconomic factors may be brought about by when the female diabetic patient does not eat a balanced diet. These diabetic patients may not be able to afford a balanced meal and may tend to have more of carbohydrates in their diet, which may increase their glycaemic levels. Cultural factors such as female responsibilities in society may play a role, where most of the elderly females are unemployed or retired and are forced to remain at home and look after their grandchildren. These elderly women may have poor attendance of their appointments and retinal screening referrals or collection of their medication from the day hospital. Since these elderly women are virtually on their own at home they forget to take their medication or those on insulin sometimes are unable to administer it themselves thus increasing glycaemic levels which increases the risk of developing DR further.

### **Cues to action**

The HBM suggests that behaviour is influenced by cues of action. There are events, people or things that move in order to change their behaviour, which are difficult to study in explanatory surveys (Brannon & Feist 2004:46; Glanz et al 2008:49). During a routine eye examination a patient may only realise and also be informed by the Optometrist that their vision is deteriorating due to possible DR. It will now be the responsibility of the patient to have frequent pre-booked appointments to the day hospital and follow all the health professionals' instructions and attend the retinal screenings as well.

Cues of action may come in the form of information brochures in the diabetic club room as well as outreach programs and campaigns to promote the awareness of DR and retinal screenings to decrease preventable blindness.

## Likelihood of action

The likelihood of action is influenced by a person's beliefs regarding the perceived benefits of the various available actions in order to reduce the disease threat.

- **Perceived benefits** can be defined as a patient's belief that a given treatment will cure their illness or help to prevent it (Polit & Beck 2012:136). With regards to eye care patients may be misguided by assuming that spectacles can alleviate all visual health care needs while there may have undiagnosed DR. But patients may perceive a personal susceptibility to DR which may be influenced by the awareness of DR and retinal screening, resulting in a behaviour change to eating habits, and attending the organised diabetic club often. There is a possibility of perceive barriers which may prevent the desirable action.
- **Perceived barriers** the negative aspects of a particular health action, which may act as impediments to undertaking the recommended behaviours such as having large backlogs of diabetic patients waiting for retinal screenings, those on the waiting list may consist of undiagnosed serious cases. While they wait for their appointments they may continue living with uncontrolled glycaemic levels, and many of them may lose their dates or forget and they eventually never return to have their retinal screenings performed.
- **Self-efficacy** is the conviction that a patient can successfully execute the behaviour required to produce the outcome or the confidence in a patient to take action (Glanz 2008:49). Patients need to be adequately educated about diabetic ocular complications such as DR, and well informed about the steps of how retinal screening can be booked and performed on their eyes, and explained on the various benefits.

According to the HBM, modifying factors and the likelihood of action which include individual behaviours and cues of action are influenced by the attitudes and perceptions of individuals towards concepts such as perceived susceptibility or severity, benefits and barriers together with threats.

Pender, Murgauth and Parsons (2011:1) state the strengths and weaknesses of the HBM :

### *Strengths*

- The model is simple to understand yet it is complex in structure.
- This theory gives much focus on health belief and disease prevention making it stand out from other theories.
- This model is highly acceptable in the community health setting
- The model promotes the independent practice of optometry by the source of health promoting interventions and education.

### *Weaknesses*

- The HBM was not able to define the four most important concepts of that a theory of Optometry should have which are: man, nursing, environment, and health.
- The conceptual framework contains multiple concepts which may invite confusion to the reader.
- The models applicability to an individual currently experiencing a disease was not given emphasis (Pender et al 2011:1).

## **2.7 CONCLUSION**

The literature review was conducted to collect information about the aspects of understanding firstly what diabetes mellitus is, which is the systemic disease that causes DR. Thereafter DR was described discussions included the awareness about DR and retinal screening globally, then the awareness in sub-saharan countries, followed by that in SA. The theoretical framework utilised in this study (Stanhope & Lancaster 2011:272-273) known as HBM was diagrammed, described and applied in context.

## **CHAPTER 3**

### **RESEARCH DESIGN AND METHOD**

#### **3.1 INTRODUCTION**

A research design is a path in which a researcher is to engage with the research respondents in order to achieve the outcomes necessary to address the research aims and objectives (Moule & Goodman 2014:463). Grove et al (2013:195) define a research design as the blueprint of conducting a study, which assists to maximise control over internal and external factors that may interfere with the internal validity of study results.

Research methods are techniques or procedures that researchers utilise to structure a study, gather and analyse data relevant to answer the research question, hypothesis and objectives. The research methods that were used in this study were: population, sample and sampling technique, sample criteria and sample size, data collection method, data processing and data analysis. Measures to ensure validity and reliability and ethical considerations were described too (Polit & Beck 2012:12).

This chapter pertains to the where, when, how the data collection and the analysis was conducted (Parahoo 2006:183). The research setting, study design and research method was discussed in depth. The foundation of the study, being the HBM was used to underpin the data collection and analysis processes (Stanhope & Lancaster 2011:172).

#### **3.2 RESEARCH PURPOSE**

The purpose of this study is to determine the awareness level of female diabetic patients attending the diabetic club in a day hospital about the occurrence of Diabetic Retinopathy and diabetic retinal screening.

### **3.3 RESEARCH OBJECTIVES**

An objective in a quantitative study is defined by Burns and Grove (2009:166) as a clear, declaring statement that is expressed in the present tense and provides a researcher with an opportunity to communicate what is to be achieved. The objectives of this study were to

- explore and describe the variables related to the awareness level of female diabetic patients about DR and diabetic retinal screening of those attending the diabetic clinic in a day hospital
- create awareness by developing an information brochure on the need and benefits of diabetic retinal screenings and preventative behaviour against eye complications

### **3.4 RESEARCH QUESTION**

A research question with reference to this quantitative study, inquiries about the relationship among variables that a researcher would like to know (Creswell 2014:143).

A research question is a concise, interrogative statement that is worded in the present tense and includes one or more variables. It focuses on the descriptive variables, a determination of differences between two or more groups with regards to selected variables, an examination of a relationship among those variables and the use of independent variables to predict a causal effect on dependent variables (Burns & Grove 2009:167).

The research question of this study was formulated based on the PICO approach. The acronym stands for the following (Grove et al 2013:703):

**P** – Population which in this study was female diabetic patients, who consult daily at the eye clinic for visual needs presenting with visual challenges. These diabetic patients also attend the diabetic clinic for monthly check-ups and collection of medications. They are also referred to the Ophthalmic clinic by the doctors as needed.

**I** – Intervention in this study refers to increasing the level of awareness about DR and annual retinal screenings for female diabetic patients. This will assist in decreasing the high prevalence of DR, and reduce eye complications and preventable blindness.

**C** – Comparison, this target population, which are specific female diabetic patients was compared with experiences of same population in the global community as identified in the literature.

**O** – Outcome of this study was to identify the level of awareness about DR and annual retinal screenings by female diabetic patients to reduce preventable eye complications, blindness and to promote eye care health.

### **Hypothesis of the study**

A research hypothesis ( $H_1$  or  $H_a$ ) is the alternative to the null hypothesis and is according to Creswell (2014:143), the prediction that a researcher makes about the expected outcomes of the relationship among study variables. These hypotheses are numeric estimates of the values within populations which are based on the data collected from the given samples. Testing of hypotheses employs statistical procedures in which the researcher draws inferences about the population which is used in the study sample (Creswell 2014:143).

LoBiondo-Wood and Haber (2010:39) define a hypothesis as a statement which involves the relationship between two or more variables that suggests an answer to the research question. The hypothesis is a declarative statement that predicts an expected outcome of a particular study. A hypothesis or hypotheses are formulated before a study is commenced as they provide the direction for the collection of data, analysis and the interpretation of data (LoBiondo-Wood & Haber 2010:39-41).

Hypotheses, which identify different types of relationships and the number of variables in a particular study, are divided into four categories namely:

- Associative versus causal hypothesis. An associative hypothesis identifies variables that occur and exist together in a study, as one variable changes so does the other. A causal hypothesis identifies a cause and effect interaction

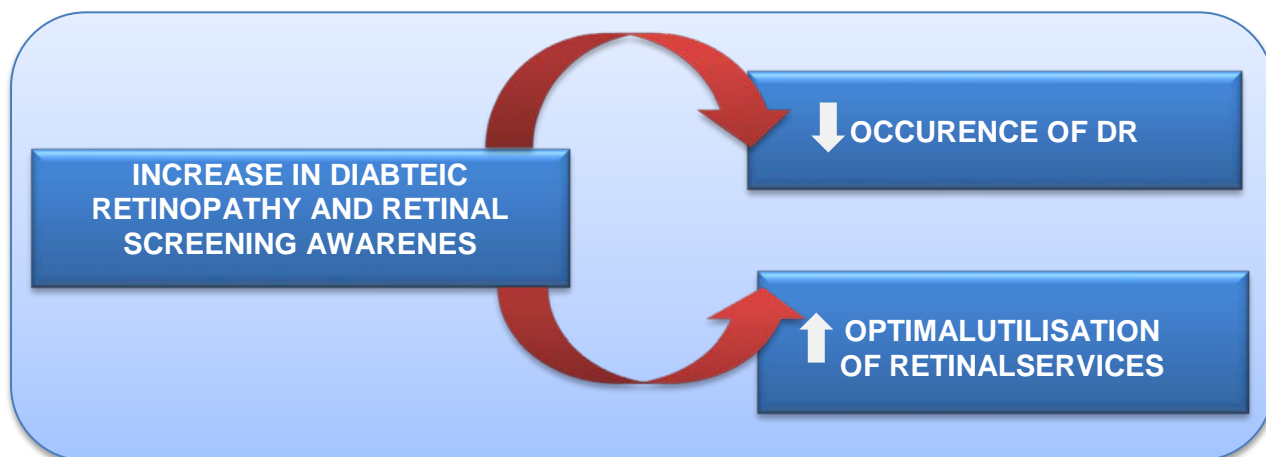


among two or more variables, called independent and dependent variables (Burns & Grove 2009:171). Simple versus complex hypothesis. A simple hypothesis predicts the type of relationship that will occur between two variables. Complex hypotheses predict the relationship between three or more variables (Burns & Grove 2009:172).

- Non-directional versus directional hypothesis. A null directional hypothesis states that there is an existence of a relationship between variables, but cannot predict the nature of that relationship. A directional hypothesis does state the nature of the relationship between two or more variables (Burns & Grove 2009:173).
- Null versus research hypothesis. The null hypothesis which was also called the statistical hypothesis is utilised for statistical testing and interpretation of statistical outcomes. The research hypothesis is an alternative to the null hypothesis and predicts a relationship between two or more variables. A null hypothesis can be simple or complex as well associative or causal. An associative null hypothesis states that there is no relationship between the variable of the study. A casual null hypothesis may be stated as there being no effect of the independent variable on the dependent variable (Burns & Grove 2009:173-174).

The independent variable with regards to this study was the level of awareness about DR and retinal screening among female diabetic patients. The dependent variable was the reduction of the occurrence of DR and optimal use of available retinal screening services (Creswell 2014:144). A hypothesis was therefore formulated:

The research hypotheses suggested in this study are exhibited in figure 3.1.



**Figure 3.1 Research hypothesis**

There was a simple causal relationship between the independent and dependent variable with regards to this study. If the level of awareness regarding DR and retinal screening is increased among diabetic female patients within the diabetic clinic, it will decrease the occurrence of DR, available retinal screening services will be utilised optimally.

There was also a directional hypothesis between the independent and dependent variable. The researcher was able to predict the direction of the relationship. The increase of awareness of DR and retinal screening evidenced a decrease in the occurrence of DR and increase in the utilisation of the available retinal services.

A null hypothesis of this study was that there will be no association between the independent and dependent variables. That there will be no increase utilisation of retinal services at the health facility even with increased awareness of DR and retinal screening which will be evidenced through the study results.

### **3.5 RESEARCH SETTING**

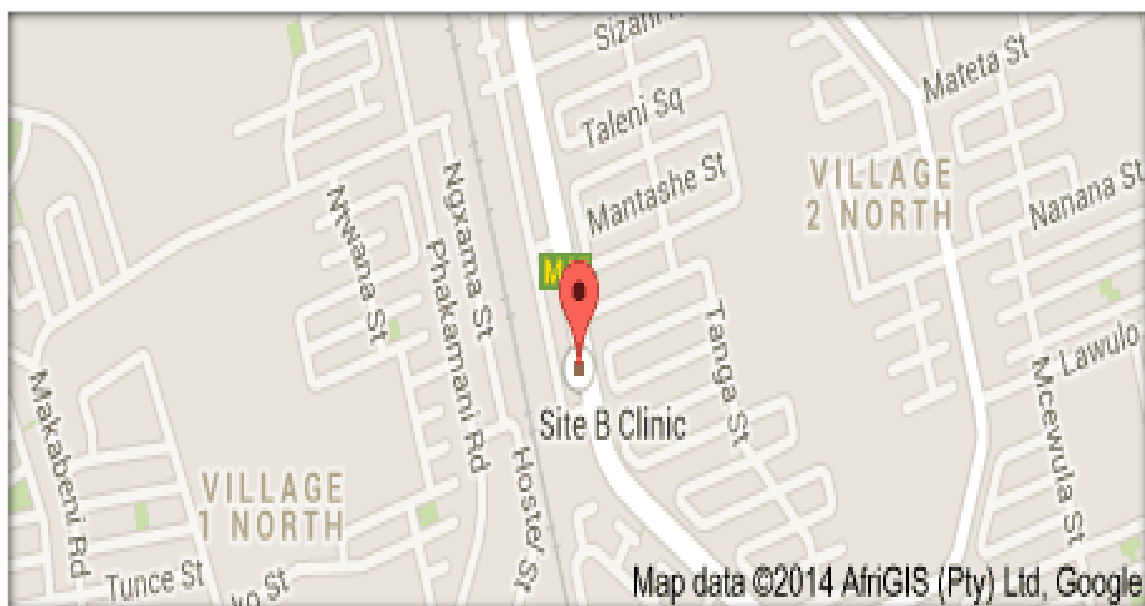
The context or setting of a research study is the location where the study is to be conducted. There are three commonly used settings in clinical research namely: a natural setting, which is conducted in an uncontrolled, real life situation or environment. A partially controlled setting occurs in an environment where the researcher may

manipulate or modify the environment. Lastly a highly controlled setting is an artificially constructed environment which is designed or created solemnly to conduct a research study (Grove et al 2013:373).

The research context refers to the broad spatial-temporal circumstances and the spatial-temporal setting under which the research is conducted which may be a particular year in a specific country which has a specific socio-political system (Polit & Beck 2012:56).

A research setting may also be a description of the organisation, agency or community in which the study will be conducted. It may highlight a number of salient characteristics of the study respondents and draw attention to any available relevant information with regards to the study at hand (Kumar 2011:230).

This study was conducted in Cape Town in SA, Khayelitsha Site B day clinic, which is presented in figure 3.2.



**Figure 3.2 Map of Khayelitsha Site B**  
(Main Place Khayelitsha 2011:1)

Figure 3.1 shows a detailed map of Khayelitsha Site B section, with its different plotted streets. The population of Khayelitsha is approximately 391 749, according to the population Main Place Khayelitsha (2011:1).

This study was conducted in a peri-urban community within Khayelitsha, which is a community situated in the Cape flats between Table Bay and False Bay. The hospital where the study was conducted is situated in a partial informal settlement in the Western Cape Province. Khayelitsha is described as the fastest growing township in SA. It covers a total of 38, 71 Kms in the area, and the total population is approximately 391 749 people living in the area (Main Place Khayelitsha 2011:1).

The site B day hospital is located towards the North of the township, nearby is a community health centre which has a number of services available.

The study was specifically conducted in a diabetic clinic, which is a service that is provided by the facility where patients with chronic diseases such as DM, are pre-booked attend on a weekly basis on Mondays to have check-ups with the doctors and collect their chronic medication as well.

The total number of diabetic patients that are usually scheduled for the diabetic clinic on Monday morning is approximately 150 patients, which includes male patients as well. However, for the purpose of this research, the diabetic female patients was conveniently sampled and included in the study.

The staff members that operate the diabetic clinic are two professional nurses, two staff nurses and 1 health promoter together with two medical doctors. The clinic room is located within the hospital premises and has a larger waiting area, with the doctors rooms situated close to the waiting room.

### **3.6 RESEARCH DESIGN AND METHODOLOGY**

A research design according to Burns and Grove (2009:218), is the blue print or strategy of conducting the entire research. It allows maximum control over all the factors than can cause any form of interference with the internal validity of the results. The research design is a guide to researchers in the planning and implementation of a study, so that an intended research purpose or objectives is achieved (Burns & Grove 2009:195). A research design, as defined by Creswell (2014:247), is a type of inquiry

within qualitative, quantitative and mixed research approaches which provide a specific direction for the procedures in research study particularly in clinical practice.

A research design is the overall plan followed to answer a research question or test a hypothesis and is best described as the architectural backbone of the study (Polit & Beck 2012:58). A research design, as defined by Moule and Goodman (2014:171) is the plan of how the research aims, objectives, hypothesis and research questions will be answered in the study. Literature may also inform the development of the study design, where the researcher is able to replicate a previous design or take elements of it into a new study. Research questions may also require the researcher to work with a design that incorporates both qualitative and quantitative research as a mixed method. The research design may guide the choice of the paradigm to be utilised which can be either qualitative or quantitative methods (Moule & Goodman 2014:171). A research design, as described by Mouton (1996:107), is defined as a set of guidelines and instructions to be followed in addressing a research problem.

The key function of the research design in this study was to enable the researcher to anticipate the appropriate research decisions in order to maximise the validity of the eventual results. The rationale for the research design chosen was to plan and structure this research project in such a way that the eventual validity of the research results were maximised by minimising, or where possible, eliminating potential error, such as errors in sampling, external and internal validity (Mouton 1996:107-108).

The research design of this study was a quantitative, non-experimental, descriptive and contextual research design using a questionnaire-based survey approach to collect data. These designs also influenced the choice of data collection and data analysis methods that were relevant to answer the research question (Polit & Beck 2012:58).

### **3.6.1 Quantitative paradigm**

A paradigm is defined as a way of looking at natural phenomenon which can also be looked at from a world view perspective and encompasses a set of philosophical assumptions and guides ones approach to empirical inquiry (Polit & Beck 2012:734).

A paradigm is also defined as a general perspective on the complexities of the world. Paradigms for human inquiry are often characterised in terms of the ways in which they respond to basic philosophical questions, such as “what is the nature of reality?”, and “what is the relationship between the inquirer and those being studied?” (Polit & Beck 2012:11).

The quantitative research method is closely allied with the positivist paradigm where much research activity is directed at understanding the underlying causes of a phenomenon. Positivists value objectivity and attempt to hold personal beliefs and biases at bay to avoid contamination the study (Polit & Beck 2012:12-13). Quantitative researchers hold onto the position that the truth is absolute and that there is a single reality that one could define by careful measurement. A quantitative researcher finds the truth by being completely objective and none of their values, feelings and personal perceptions can enter into the measurement of the reality under study (Grove et al 2013:24).

A quantitative research is a formal, objective, systematic process, where data is collected numerically to obtain information about the world of the respondents. Variables are described, relationships among variables are examined, and cause-and effect interactions between variables are determined where applicable (Burns & Grove 2009:225). It is implemented to obtain numerical data for understanding aspects of the world. Quantitative research seeks to generate numerical data that can be analysed using statistics. It emerged from a positivist position which later developed into a post-positivist approach.

This study was quantitative in nature and followed a positivist tradition. Positivism seeks to generate understanding from phenomenon that are observable and generates scientific knowledge through verified facts. The approach of positivism seeks to be formal, objective, rigorous and controlled. A systematic process was followed to generate knowledge and was used to describe the study phenomenon (Moule & Goodman 2014:179).

The quantitative paradigm in this study assisted the researcher to numerically describe the awareness of DR and retinal screening among female diabetic patients attending the diabetic clinic.

## Characteristics of quantitative approach

Quantitative studies utilise deductive reasoning since these studies are correlational and deterministic in nature. Researchers are able to test whether the variables are correlated or whether one variable causes a change on the other by means of analysing the relationship between the variables (Parahoo 2006:54). In this study the relationships between the independent and independent variables we statistically analysed.

Advantages of the quantitative approach were as follows:

- *Scientific method*, which refer to a set of orderly, disciplined procedures used to acquire information, through which the researcher progressed logically through a series of steps, utilising a specified plan of action (Polit & Beck 2012:13).
- *Strategies of Control* involved the imposition of conditions on the research respondents by using specific sampling eligibility criteria in order to minimise biases and maximise precision and validity (Polit & Beck 2012:13-14).
- *Empirical evidence* was objectively gathered by the use of sound scientific principles and processes (Polit & Beck 2012:14).
- *Quantitative information* was gathered, namely numeric information which was obtained through the use of a formal measurement instrument that was pre-tested and thereafter analysed statistically (Polit & Beck 2012:14).
- Deductive reasoning which moves from general principles to specific prediction was employed to make commendable recommendations and development of an information brochure from the results (Burns & Grove 2009:7; Polit & Beck 2012:11).

Disadvantages of the quantitative approach were as follows:

- Quantitative research is done outside the respondents' contexts, and the researcher did not get a closer feeling of the social responsibility of the respondents. Therefore the results did not necessarily represent the direct expressions of each respondent (Joubert & Ehrlich 2007:325).

- The results obtained were less accessible due to the study being a questionnaire survey based research of which responses from the respondents were of closed items and did not allow description of real life situations (Joubert & Ehrlich 2007:325).
- Quantitative research limits further exploration of new or accidental findings during the research process (Joubert & Ehrlich 2007:325).

However, the quantitative approach was suitable for this research as the researcher aimed the survey to come up with results that can be generalised and the study can be replicated in other settings.

### **3.6.2 Non-experimental design**

Non-experimental designs are used by researchers if they intend to construct a picture of a phenomenon, explore events, or people and situations as they occur in nature (LoBiondo-Wood & Haber 2010:195).

This type of designs can as well be used to test relationships or differences among variables. In non-experimental designs the dependent variable is not manipulated, as the independent variables occur naturally, and the researcher cannot control them by manipulation. These designs require a clear, concise research question or hypothesis which is based on a theoretical framework. The evidence produced by these designs is not as strong as compared to experimental designs because of the difference in the degree of control in the designs due to the independent variable not being manipulated (LoBiondo-Wood & Haber 2010:195).

The research problem was suitable for a non-experimental design because the study sought to find casual relationships among the variables (Polit & Beck 2012:223).

### **3.6.3 Descriptive research**

A descriptive study serves a purpose to observe, describe and document the aspects of a certain situation as it occurs in the natural, and also to serve as a starting point to generate or test a hypothesis for future research (Polit & Beck 2012:226).



Descriptive study designs are crafted to gain information about the characteristics within a particular field of study. The purpose is to provide a picture of situations as they naturally occur. This design may be used to identify problems with current practice (Burns & Grove 2009:237). According to Polit and Beck (2012:226), the purpose of a descriptive study is to observe and describe certain aspects of situations as they naturally occur, and also may occasionally serve as a starting point for the generation of a study hypothesis. A descriptive design was chosen for this study so that variables of interest such as the level of awareness of DR and retinal awareness among the patients were identified conceptually and operationally defined. Opinions, attitudes, needs or facts related to the study phenomenon are described to provide a complete picture of the phenomenon as they exist in reality.

#### **3.6.4 Contextual**

Contextual research is aimed at explaining systematic relationships between phenomena. Through explanatory research one seeks insight into a situation, or phenomenon. It frequently flows from exploratory and/or descriptive research and is aimed at why a specific event occurs in certain instances (Babbie 2010:97). Through the contextual approach one seeks insight into a given situation or the phenomenon as well as an understanding of the underlying causes (Polit & Beck 2010:23).

The design is contextual because this study seeks to understand the interaction between the increase in knowledge about DR and retinal screening and the decrease of eye complications and preventable blindness.

### **3.7 RESEARCH METHOD**

The research method as described by Polit and Beck (2012:12) are techniques, processes or procedures that researchers use for the structure and implementation of a study. These procedures include the gathering and analysis of the data relevant to the research question, problem statement and the study objectives. The research methods in this study covered aspects such as population, sample, sample selection method, sample size, data collection, data analysis and ensuring validity and reliability and ethical considerations.

### **3.7.1 Population**

The population according to Polit and Beck (2012:274) is the aggregate of cases which the researcher would like to generalise the results to. A population is defined by Polit and Beck (2012:274) as the elements (individuals, objects, events or substances) that meet the sampling criteria for inclusion in a study, which is sometimes referred to as the target population. There are three types of populations in research which are universal, target and accessible population. A population is the larger pool that has an important role in sampling (Neuman 2011:219-224).

A universal population is a certain group of people who share the same characteristics or elements, which is the focus of a research (Grove et al 2013:351). With regards to this study, the universal population of the study was all female diabetic patients in SA who could be at risk of developing DR (Burns & Grove 2009:344).

A target population according to Polit and Beck (2012:744), is the population as a whole in which a researcher takes an interest in and which possess all the inclusion criteria and the researcher would like to generalise the study results to them. The target population in this study was all the female diabetic patients who met the sampling criteria (Burns & Grove 2009:344). The accessible population were the female diabetic patients who attended the diabetic clinic on the days when data was collected.

### **3.7.2 Sample and sampling technique**

A sample is defined as a smaller set of cases that a researcher selects from a larger pool and generalises the results to that population (Neuman 2011:219-224).

Sampling techniques are employed into a research study, regardless of the research design in order to make it manageable. The process of the sample selection in a study is a crucial one because poor sampling techniques have a tendency to compromise the research findings (Moule & Goodman 2014:289). In this study, non-probability sampling was done to select respondents using non-random sampling methods or procedures, namely convenience sampling methods (Polit & Beck 2012:742).

Non-probability sampling is defined as the selection of sampling units from a population with the use of non-random procedures such as convenience, quota, consecutive or purposive sampling. Non probability sampling is less likely to produce representative samples than probability sampling (Polit & Beck 2012:735, 276). Non-probability sampling methods increase the likelihood of obtaining samples that are not representative of their target populations. However, convenience sampling is mostly used in clinical practice to select study samples (Burns & Grove 2009:353).

With regards to this study, a convenience sample was obtained from the accessible population. Not every member of a population could be included in the study therefore a sample was conveniently drawn from the population at large to be studied. This sample gave a reflection of the entire population of interest (Babbie & Mouton 2011:100).

- **Convenience sampling method**

Convenience sampling which is also known as accidental sampling, is a non-probability sampling technique where the respondents are included into the study because they happen to be at the right place at the right time. Available respondents were entered into the study until the researcher reached the desired sample size of 150 respondents (Burns & Grove 2009:353; Polit & Beck 2012:276).

### ***Advantages***

- Convenience samples are inexpensive and accessible because the respondents are accessible at the time they are needed (Burns & Grove 2009; LoBiondo-Wood & Haber 2010:226).
- Require less time to acquire as compared to other sampling techniques (Burns & Grove 2009:354).
- Provide means to conduct clinical studies on topics that could not be examined through the use of probability sampling techniques (Burns & Grove 2009:354).
- Enables researchers to acquire information in unexplored areas of clinical research (Burns & Grove 2009:354).

## ***Disadvantages***

- In health care studies, the recruitment of respondents is sometimes very difficult due to health challenges of the respondents, making them limited in number to participate in studies (Burns & Grove 2009:354).
- Respondents selected might have a probability to be atypical of the population with regards to critical variables of the study (Polit & Beck 2012:276).
- Due to the selection of respondents who are available to participate, convenience sampling techniques are prone to selection biases (Joubert & Elhrlich 2007:100).
- **Sampling criteria**

Sampling criteria, which is also known as eligibility criteria include the list of characteristics essential for eligibility in the target population (Polit & Beck 2012:274).

## ***Inclusion and exclusion criteria***

Inclusion criteria are characteristics that a person must have in order to be allowed to participate in a study. Exclusion criteria are characteristics that can cause a person to be excluded from a study (Burns & Grove 2009:345).

### ***Inclusion sampling criteria***

- Who attend the diabetic clinic at the day hospital
- Female diabetic patients
- Both who have undergone or not undergone diabetic retinal screening
- Irrespective of whether they have type 1 or type 2 DM
- Aged between 30-60 years of age
- Married or not

### ***Exclusion sampling criteria***

- Younger than 30 years or over 60 years old
- Not members of the day clinic

- Male diabetic patients

Respondents who had the required elements and were willing to participate were included in the study. However the sample size had to be determined.

### 3.7.3 Sample size

Quantitative studies require large population or sample size in order to generalise results.

#### *Sample size calculation*

A sample size is calculated by using determine formulae (Joubert & Ehrlich 2007:347).

In this study the following formula was used:

$$n = \frac{p(1-p)z^2}{d^2}$$

n=sample size

p=prevalence rate of DR in the context

d=precision required on either side of the proportion or margin of error+/-5%

s=score is the confidence interval at 95% (standard value of 1.96)

$$n = \frac{0.04(1-0.04)(1.96)^2}{(0.05)^2}$$

=36.8 ~37.

From the formula above, a minimum sample of 37 patients was needed to be included in the study. But 150 respondents participated in the study with a 100% return rate.

### 3.7.4 Data collection

Data collection is defined by Polit and Beck (2012:293) as the gathering of information to address a certain research problem. Quantitative researchers collect their data in a structured manner. There are constraints from the researcher, trained volunteers and the respondents participating in the study during structured data collection. This often is due to a possible inconsistency in how an instrument is administered, what is asked in the questions and the manner in which the respondents answer the questions.

The data collection procedures followed in this study remained objective and systematic. The data was kept free from the researchers' biases, beliefs and values or attitude. Data collection process followed can be identifiable, repeatable or replicable and yet was kept confidential (LoBiondo-Wood & Haber 2010:269).

### **Data collection approach and method**

A structured self-administered questionnaire (annexure E) was utilised to collect data in order to determine the level of awareness of DR and retinal screenings. Two volunteers were trained in confidentiality and other ethical issues, how to administer the instrument and to assist in the collection of data over a time period of 1 (one) month. Pre-testing the instrument was done to refine and modify it for better and easier conceptualisation.

Advantages of self-administered questionnaire are as follows:

- The use of a questionnaire is comparatively convenient and less costly, particularly if it is administered collectively to a study population.
- It offers greater anonymity: Due to there being no face-to-face interaction between the respondent and the researcher or volunteers. In cases where there are sensitive questions to be asked, this method helps to increase the likelihood of obtaining accurate information (Kumar 2011:148).

*Disadvantages of self-administered questionnaire are as follows:*

- The response rate is generally lower than that of other forms of self-reporting particularly if the questionnaires are mailed out (Burns & Grove 2009:409).
- Respondents may fail to respond to all the listed questions, which is very common in long questionnaires, which can threaten the validity of the instrument and many copies spoiled (Burns & Grove 2009:409).
- Respondents may ask to take the questionnaire home, to complete it themselves or ask family members to answer it. Sometimes a colleague may complete the questionnaire rather than the individuals' response that the researcher is seeking, which results in the biases of responses (Burns & Grove 2009:409).

The anticipated challenges in the data collected were prevented by the researcher by collecting data personally and the volunteers were well trained and supervised to deal with possible arising questions and challenges.

### **Development of the data collection instrument**

The data collecting instrument in this study was developed based on the comprehensive literature review on the phenomena and the elements of the determinants of the HBM.

When developing the questionnaire, there was an identification of the desired information. The researcher developed a blueprint or table of specifications in order to identify the essential content to be included in the questionnaire. The phrasing of each lead-in question was carefully designed and clearly expressed to avoid ambiguous or vague language, questions that influence a response, questions that assume a pre-existing state of affairs and double-barrel questions. The questionnaire had a response set that provided the parameters within which the respondent was able to answer, making the response rate narrow and direct. It included a list of alternatives that the respondent selected as closed ended questions were used (Burns & Grove 2009:409).

The Likert scale, which is the most utilised scaling technique which determined the opinion or attitude of DR and retinal screening, contained a number of declarative statements with a scale after each statement. The response addressed evaluation and frequency and were ranked in a continuum such as agree or strongly disagree (Burns & Grove 2009:411).

The language that was used in the questionnaire was English, which made it simpler for the respondents to answer, where they could not understand the trained volunteers were available to bring clarity to any question (Annexure E).

### **Characteristics of the data collection instrument**

The data collecting instrument was a questionnaire (Annexure E), which is an instrument in the form of a document containing questions and other types of items specifically designed to elicit information that will be useful and amenable to the data analysis methods and statistical tests.

The questionnaire was used with an intention to determine the extent to which the respondents hold a particular attitude or perspective towards the study phenomena (Babbie & Benasquito 2010:250).

The data collection instrument that was used was a self-administered structured questionnaire which comprised of closed- ended questions as well as a Likert scale.

*Closed-ended questions* offered a variety of response options and the study respondents must provide one answer which closely matches the appropriate answer, which ranged from a simple yes or no answer (Polit & Beck 2012:297-298).

*Likert scale* - consisted of several declarative items that expressed the view point of the study at hand, in which respondents were expected to indicate the degree to which they agree or disagree with the opinion expressed by the statement (Polit & Beck 2012:301).

The questionnaire comprised of different sections, which were:

- Section A Biographical data
- Section B Diabetes and your eyes
- Section C Factors related to the general knowledge of diabetes
- Section D Factors related to Diabetic Retinopathy
- Section E Factors related to Diabetic retinal screening
- Section F Awareness about risk factors related to diabetes mellitus and diabetic retinopathy

A self-administered questionnaire was distributed amongst 150 respondents. It was written only in simple English, however, the two trained volunteers were able to translate the questions in Xhosa where needed to avoid misinterpretation of the questions.



#### ***3.7.4.1 Pre-testing of the data collection instrument***

An instrument pre-test according to Burns and Grove (2009:713), is a smaller version of a proposed study conducted to refine the methodology, the instrument or data process which could be compared to the sample, but not included in the main study. Pre-testing occurs when the subjects are measured in terms of a dependent variable, after the subjects are exposed to a stimulus representing independent variable (Babbie & Benasquito 2010:245). The respondents who participated in the pre-testing were female diabetic patients who were not included in the main study. A new instrument was developed by the researcher which required rigorous pre-testing in order for it to be evaluated and refined (Polit & Beck 2012:296).

#### **Purposes of pre-testing**

The purpose of pre-testing was to determine how much time it would take to administer the entire instrument package. This was mainly to estimate how long it would take to administer a complete set.

Further purposes for pre-testing the instrument included to:

- Identify parts of the instrument package that may be difficult for participants to read or understand, or that may have been misinterpreted.
- Identify questions that the respondents may find objectionable or offensive.
- Assess whether the sequencing of questions made sense
- Identify a need for further training of the volunteers.
- Determine if the measures would yield data with sufficient variability (Polit & Beck 2012:296).

The instrument was pre-tested and aspects that were modified ensured the validity and the reliability of the measurement.

### **3.7.5 Data collection process**

The study focused more on the patients who visited the diabetic clinic on Mondays. Further training was given to the volunteers on the administration of a questionnaire by convenience sampling, in order to further improve internal validity and the return rate.

#### **Pre-arrangement phase**

Arrangements were made with the facility managers as gate keepers regarding the venue and the dates for data collection. There was a need for a quiet and secluded venue where the respondents could complete the questionnaire quietly without any external disturbances.

#### ***Process followed***

The researcher worked together with the two volunteers every Monday mornings on diabetic clinic days for four consecutive weeks to collect data over a period of one month. It was the responsibility of the researcher to check the completed questionnaires at the end of each date for omissions or spoiled questionnaires. One of the professional nurses acted as a gate keeper for us and explained the whole process to all the clinic attendees before we could talk to them. Once each patient had completed their check-up with the staff nurse and had been checked for sugar levels, then they could go for the collection of medication at the pharmacy. These female diabetic patients were then approached and asked if they would be willing to participate in the study.

A sample size of 30 diabetic patients was included in the study each week. The potential respondents were directed to a separate room, which was a free standing container which was situated behind the facility designated for the purpose of the study. The study was explained to them in terms of purpose, benefits and risks, need for an informed consent, voluntary participation and the right to withdraw from the study at any time they wish so with no victimisation. Inside the venue the respondents were provided with a table and a chair to sit and answer the questionnaire. To answer the questionnaire the respondents could ask for clarity. Once each respondent had completed a questionnaire they were free to leave. A 'no disturbance' sign was put at the door to control any disturbances.

During the data collection, fruit and refreshments were made available to all the participating respondents.

### **Leaving the field**

After all the respondents had completed answering the questionnaires, they were all checked to ensure that the respondents had answered all the questions. The respondents were given a healthy snack and were free to leave; all questionnaires were checked first after answering ensures that they don't leave with the questionnaires. All the questionnaires, even the unfilled ones were taken by the research team and were kept under lock and key in the researcher's office.

### **3.7.6 Data analysis**

Data analysis is defined as the systematic organisation and synthesis of research data to interpret and make inferences. (Polit & Beck 2012:724). Data analysis in quantitative studies is the process of quantification, which is the converting of data to numerical formats. This process allows data to be recorded on a computer or some other device for storing information that can be read by the computer and be statistically analysed. In quantitative studies, hypothesis is tested through the use of the data (Babbie & Benasquito 2010:409).

Often the data analysis process is a complex field of knowledge especially in analysis due to use of statistics and statistical tests that are a specialised field. However, data analysis allows the researcher to organise, interpret, and communicate numerical information. Logical thinking ability is important with data analysis hence the use of charts, graphs and tables which represent or give a picture of the evidence collected by the researcher (Polit & Beck 2012:388).

### **Data management**

Data management is a plan developed by the researcher on how to organise and store the data collected (Grove et al 2013:278). In this process the completed questionnaires were labelled and coded for each respondent. They were also scanned and saved onto

the researcher's computer for back up purposes. All the checked and completed forms were collected, kept safe and sent to the statistician.

### **3.7.7 Data analysis**

Data was analysed through the use of a Statistical Package for the Social Sciences (SPSS) version computer software program version 13.0 in consultation with a statistician. Analysis was done at the 95% confidence level and 1 degree of freedom. Data was therefore analysed by using descriptive and inferential statistics and the calculation of central tendencies such as the mean, median and the mode. Descriptive and inferential statistics were used to describe and summaries the data and results were presented in the form of percentages, frequency distributions, tables, histograms and pie charts. The researcher with the aid of a statistician calculated the frequency distribution and percentages.

### **3.7.8 Validity and reliability of the study**

Validity and reliability are the two most important appraisal methods of an instrument, as they measure it's accuracy as well as the extent to which it yields the same results on repeated measures.

#### **3.7.8.1 Validity**

Validity is described as the extent to which the measuring instrument is measuring what it purports to measure or measuring what is supposed to be measured. The measuring instrument becomes less valid if the characteristic in the same respondent or group is measured repeatedly higher or repeatedly lower than the real value (Joubert & Ehrlich 2007:117). Validity refers to the extent to which an empirical measure adequately reflects the real meaning of the concept under consideration. The ultimate validity of a measure can never be proved, but rather be agreed upon on the basis of use of approaches such as face validity, construct validity, content validity, interpretation validity, statistical validity, internal and external validation (Babbie 2011:132).

### *Face validity*

Grove et al (2013:694) define face validity as a way to verify that the instrument seemed to give an appearance of measuring the construct of the study. Face validity is where the measuring instrument is measuring the target construct (Polit & Beck 2012:336). Another description of face validity is that it is a form of content validity, which involves the giving of a questionnaire to anyone, and that individual is not necessarily an expert in that particular field. The person can browse through the questionnaire to assess whether the questions reflect the phenomenon being studied (Parahoo 2006:468). With regards to this study, face validity was insured by enlisting the assistance of three experienced colleagues who are involved in the eye clinic and conduct retinal screening in the clinic to read the questionnaire and make an input.

### *Content validity*

Content validity refers to how much the measuring tool covers the range of meanings included within the concept (Babbie & Mouton 2011:124). Content validity examines the extent to which the method of measurement, which in this study is a structured questionnaire including all the major elements of the construct being measured. Evidence was obtained through a comprehensive literature review, and through information given by construct experts who were the clinical supervisors at the clinic (Burns & Grove 2009:381).

### *Construct validity*

A construct according to Grove et al (2013:690) is a concept at very high levels of abstraction which possesses a general meaning. Polit and Beck (2012:722) further describe a construct as an abstraction or concept which is deliberately invented by researchers for a scientific purpose.

Construct validity examines the fit between conceptual and operational definitions of variables. It also determines whether the instrument actually measures the theoretical construct that it purports to measure (Burns & Grove 2009:693). Construct validity was the key criterion used for assessing the quality of this study (Polit & Beck 2012:339). It was the degree to which the measure related to other variables as expected within a

system of theoretical relationships (Babbie & Benasquito 2010:142). Furthermore, with regards to this study, construct validity was ensured by conducting an extensive literature review and conceptually and operationally defining the study key concepts. A statistician was also consulted to examine the construct validity of the study questionnaire questions.

### *Internal validity*

Internal design validity is concerned with the validity of inferences, which indicates that an empirical relation exists between an independent variable and the outcome, rather than any other unmeasured extraneous variables, such as inclusion and exclusion criteria. Internal validity is a form of a threat to validity in experimental research. These threats relates to experimental procedures, treatments or experiences of the study respondents that threaten the ability of the researcher to draw correct inferences from the data in an experiment (Creswell 2014:170). Environmental variables were also considered, since the research was conducted within the day clinic in an uncontrolled setting. Demographic variables, such as age, ethnicity, educational level, could also have affected the study since they were essential for the generalisation of the study results or rival hypothesis that caused the outcome. When the research was done, the researcher had a responsibility to develop strategies to rule out the plausibility that a certain influence rather than the independent variable accounts for the observed relationship (Polit & Beck 2012:236).

The carefully designed structured questionnaire was validated with the literature review, experts in the field of theory, practice and the statistician (Polit & Beck 2012:246).

### *External validity*

External validity refers to the extent to which the study results can be generalised beyond the sample and context used in the study (Burns & Grove 2009:700) or the extent to which results be applied to similar populations in different settings (Parahoo 2006:240). It concerns the extent to which it can be inferred that relationships observed in a study hold true over variations in people, conditions and settings, as well as over variations in treatments and outcomes (Polit & Beck 2012:250). In this study, external validity was ensured by recruiting a reasonable sample size as is required in

quantitative studies to enable the researcher to generalise the results to the study sample or target population.

### **3.7.8.2 Reliability**

Reliability is the degree of consistency or accuracy obtained by use of a measurement tool or dependability with which a measurement instrument measures an attribute (Polit & Beck 2012:741, 331). The less the variation an instrument produces in repeated measure elements, the higher its reliability.

Joubert and Ehrlich (2007:117) further describe reliability as the degree of similarity of the results obtained when a measurement is repeated on the same group. In other, words if the same value is arrived at every time the measurement is taken (Joubert & Ehrlich 2007:117, 284). In this study reliability was ensured by the use of Cronbach's alpha coefficient with the help of a statistician.

## **3.8 ETHICAL CONSIDERATIONS**

Burns and Grove (2009:61) define ethics as a branch of philosophy that is concerned with morality. It contains a set of propositions for the intellectual analysis of morality. The problems of ethics relate to obligation, rights, duty, right and wrong, conscience, justice, choice, intention as well as responsibility. Ethics is a system of moral values that are concerned with the degree to which research procedures adhere to professional, legal and social obligations to the study participants (Polit & Beck 2012:727). In this study considerations were taken to ensure protection of the rights of the institution, respondents and ensuring scientific integrity.

### **3.8.1 Protecting the rights of the institution**

The rights of the institution were protected by obtaining ethical clearance (Annexure A) from the Research and Ethics Committee of the Department of Health Studies at the University of South Africa (UNISA). Permission (Annexure B) was sought from the authority of the Khayelitsha Site B management through the Western Cape Research Department. Thereafter, a letter of permission to conduct this research was also obtained from the Western Cape Research Department (Annexure C).

### 3.8.2 Protecting the rights of the respondent

Polit and Beck (2012:157) describe the procedures to protect the rights of the respondents by the researcher as follows:

- **Beneficence**

Harm was minimised and benefits to the study respondents were maximised. The researcher had an obligation to avoid and prevent any harm that may have been imposed on any respondent. No respondents were exposed to any unnecessary harm or discomfort in the form of physical, emotional or financial harm. This study did not involve any physical contact with any of the respondents therefore there was a minimum risk of harm, physical invasion or discomfort expected. However, each respondent was expected to be psychologically prepared for the research. A psychologist resident at the hospital was briefed about the study and arranged to counsel the psychologically affected respondents that required it before they took part or affected during the study. There was no direct benefit to the respondents, only their participation would help come up with results that would be used to improve eye care services regarding DR and attendance of retinal screening in future (Polit & Beck 2012:152-153).

- **Respect of human dignity**

This ethical consideration included *self-determination* and the *right to full disclosure*. Each respondent was given the opportunity to voluntarily make a choice whether or not to participate in the study without the risk or prejudicial treatment, ask questions, refuse to disclose information and withdraw from the study with the freedom from coercion. The right to full disclosure meant that the researcher fully described the nature of the study, the respondent was given an opportunity to ask questions, refuse to participate, and risks that may arise in the study were all clarified to each respondent (Polit & Beck 2012:154). *Respect* was demonstrated by giving each respondent the full disclosure pertaining to the study, the purpose of the study, what they may benefit from it, provided them with a written informed consent to sign. The respondents were given an opportunity to take part in the study voluntarily where they were approached individually and asked, and had the right to refuse without being victimised or made to feel bad



about not participating. And anytime they felt that they didn't want to continue in the study they were allowed to withdraw.

- **Justice**

This ethical consideration included the *right to fair treatment* and the *right to privacy*. The right to *fair treatment* meant that the selection of respondents met the study requirement and not their vulnerability. All respondents were able to protect their own interests, without the risk of exploitation or victimisation, which was ensured through the use of the convenience sampling method. The researcher treated all the respondents who after agreeing later, withdrew from the study, in a non-prejudicial manner. All cultural beliefs, habits, lifestyles of each individual respondent were taken into consideration (Polit & Beck 2012:155-156).

- **Informed consent:**

This important procedure was to mainly safeguard the study respondents, which involved providing each one of them with a copy of the informed consent to sign. *Informed consent* provided each respondent with adequate information about the research, to empower them to consent or decline voluntary participation into the study. The two volunteers' responsibility was also to provide additional information as needed by each respondent. The issue of informed consent was adequately explained by the researcher or volunteers, thereafter was signed by each respondent to say that they are voluntary agreeing to participate in the study without coercion (Polit & Beck 2012:153).

- **Anonymity and confidentiality**

The research respondents have the right to anonymity and the right to assume that the collected data will be kept confidential (Burns & Grove 2009:196). Anonymity exists in order for the respondents' identity not to be linked with the individual responses. This information is even hidden from the researchers in some studies. In order for this information to be revealed authorisation must be given to the researcher by the respondent (Burns & Grove 2009:197; Polit & Beck 2012:720).

Anonymity and confidentiality was maintained throughout the entire study, where information was not to be shared with anybody who had no authorisation to access it and none of the respondents could be linked to their data. All identification of all the respondents was hidden and inaccessible to anybody else except authorised people. No names were written on the questionnaires as only codes were used.

- **Maintain privacy**

Privacy is the individuals' right to determine the time, extent and general circumstances under which their personal information can be shared with or withheld from other people. The information may consist of one's attitudes, beliefs, opinions and personal records (Burns & Grove 2009:194).

The research was not intrusive towards any of the respondents' personal information and privacy was maintained at all times. The respondents expected that their data and information be kept with the strictest of confidence and only to be shared between the researcher, statistician, study supervisor and those authorised to access (Polit & Beck 2012:156, 162).

### **3.8.3 Scientific integrity**

Scientific integrity refers to the sound ethical practice of science (Polit & Beck 2010:141)

The researcher adhered to the scientific integrity by adhering to the following principles:

- All the research methods and processes were reported with honesty and were without fabrication of data. Honesty was maintained in presenting goals, intentions, reporting research methods, procedures and in conveying interpretations.
- Objectivity was obtained by presenting facts capable of proof and transparency in the documentation of the empirical process that can be replicated.
- Fairness was maintained in providing references and giving credit for the scholarly work done by others.
- Sources of information were correctly cited and referenced.

By adhering to these principles of scientific integrity misconduct such as plagiarism, fabrication of results and falsification of data was avoided.

### **Dissemination of the results**

A completed examined report will be made available to the management of the study context and to the study respondents where needed. The results will be published with honesty through a written peer reviewed article and submitted to an accredited journal. The information brochure using current practice information and modification based on the results will be made available at the diabetic clinic and the eye clinic as free reading material.

### **3.9 SCOPE AND LIMITATIONS OF THE STUDY**

The scope of this study was limited because of the small sample size and it was not easy to generalise the results to a wider community, because quantitative studies involves large sample sizes. To assist with data collection, volunteer students were used who may not have been adequately trained in other finer aspects of science which could possibly compromise the quality of the data that was collected or make room for errors. Majority of the respondents were isiXhosa speaking and were required to answer the questionnaire only in English, some of the respondents might have battle with the language although it was kept simple. Use of the convenient sampling method makes representation of the sample to be limited. The participants were homogeneous as females only which excluded males who could have yielded reach information in answering the research question and research hypothesis. However, this was abated by strictly applying the inclusion criteria in order to get respondents who provided the needed information.

### **3.10 CONCLUSION**

This chapter described the research design and the methods which were used to conduct the study. A non-experimental, explorative, descriptive, contextual quantitative study design was used. The research method such as the population, sampling, sampling techniques, data collection, data analysis, validity and reliability of the measurement instrument and ethical considerations were also described. Scientific integrity, dissemination of results and scope and limitations were also briefly described.

Chapter 4 discusses the data analysis and interpretation of the research results.

## CHAPTER 4

### ANALYSIS, PRESENTATION AND DESCRIPTION OF THE RESEARCH RESULTS

#### 4.1 INTRODUCTION

The presentation of analysis results in this discussion is structured according to an argument that an analysis strategy for a study should be designed to answer the research problem, purpose, questions and objectives of the study. A quantitative, non-experimental, explorative, descriptive and contextual study was conducted using a questionnaire-based survey to determine the level of awareness amongst patients on DR and retinal screening.

The research question was:

*“What is the awareness level of female diabetic patients attending the diabetic clinic in a day Hospital about the occurrence of DR and diabetic retinal screening?”*

The objectives of the study were to:

- explore and describe the variables related to the awareness level of female diabetic patients about Diabetic Retinopathy and diabetic retinal screenings
- develop an information brochure on the need and benefits of retinal screenings and preventative behaviour against eye complications

A literature search on relevant sources was conducted to generate a picture of what was previously researched with regards to the subject as well as identifying key similar or differing findings in order to validate the results of this study.

## **4.2 DATA MANAGEMENT AND ANALYSIS**

The analysis was conducted on the collected data from 149 patients as one questionnaire was spoiled. The results of the analyses are presented in the sequence that the analysis strategy was set out in this section.

Data were coded and analysed using the SPSS version 13.0 statistical package in consultation with a statistician. Descriptive statistics such as frequency distributions, medians, contingency tables and percentages were obtained. For inferential statistics, bivariate analysis using Fisher's exact test were utilised for categorical data. A 95% confidence interval of proportions was constructed using the Binomial exact method and at the 1 degree of freedom.

## **4.3 SECTION A: SOCIO DEMOGRAPHIC CHARACTERISTICS**

Section A of the questionnaire consisted of eleven (11) items, comprising of the respondents' socio-demographic characteristics such as age groups, marital status, language or ethnic group, grade passed, employment status, family history of DM, period that respondent has been diabetic, general health status, eye operations, wearing of spectacles, satisfaction with eye information provided at the clinic.

The study results related to the socio-demographic characteristics that are summarised in table 4.1

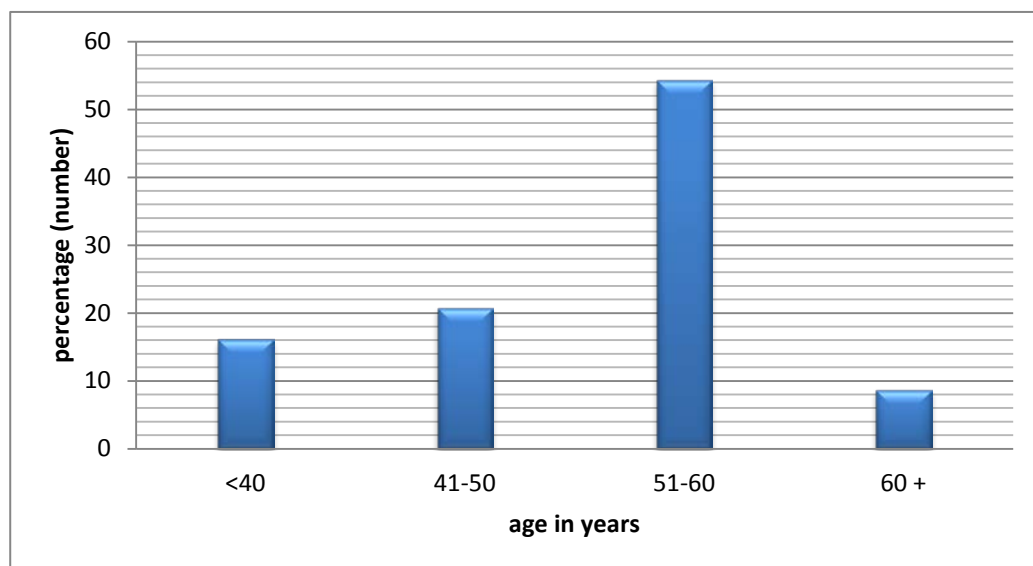
**Table 4.1      Socio-demographic characteristics of the respondents**

<b>Age groups</b>				
<b>Group</b>	<b>Frequency</b>	<b>Percent</b>	<b>Cumulative Frequency</b>	<b>Cumulative Percent</b>
<b>&lt;40</b>	24	16.11	24	16.11
<b>41-50</b>	31	20.81	55	36.91
<b>51-60</b>	81	54.36	136	91.28
<b>60+</b>	13	8.72	149	100.00
<b>Marital status</b> (co-habitation/ other excluded in further analyses)				
<b>Single/divorced/widowed</b>	84	56.38	84	56.38
<b>Married</b>	61	40.94	145	97.32
<b>Cohabiting</b>	1	0.67	146	97.99
<b>Other</b>	3	2.01	149	100.00
<b>Language group</b> (no Sepedi/ Tsonga reported, variable excluded in further analyses due to imbalance)				
<b>English</b>	1	0.67	1	0.67
<b>Xhosa</b>	136	91.28	137	91.95
<b>Afrikaans</b>	3	2.01	140	93.96
<b>Zulu</b>	1	0.67	141	94.63
<b>Other</b>	8	5.37	149	100.00
<b>Grade passed</b> (tertiary/ grade 11-12 combined in further analyses)				
<b>&lt;Grade 7</b>	45	30.20	45	30.20
<b>Grade 7-8</b>	45	30.20	90	60.40
<b>Grade 9-10</b>	23	15.44	113	75.84
<b>Grade 11-12</b>	32	21.48	145	97.32
<b>Tertiary</b>	4	2.68	149	100.00

<b>Employment status</b>				
(missing = 2, combine housewife/ pensioner is further analyses)				
	<b>Frequency</b>	<b>Percent</b>	<b>Cumulative Frequency</b>	<b>Cumulative Percent</b>
<b>Unemployed</b>	57	38.78	57	38.78
<b>Self/Employed</b>	34	23.13	91	61.90
<b>House wife</b>	12	8.16	103	70.07
<b>Pensioner</b>	44	29.93	147	100.00
<b>Family history of DM?</b>				
(missing = 11)				
<b>yes</b>	80	57.97	80	57.97
<b>no</b>	58	42.03	138	100.00
<b>Period that participant has been diabetic</b>				
<b>&lt;1 year</b>	12	8.16	12	8.16
<b>1-2 years</b>	26	17.69	38	25.85
<b>3-4 years</b>	26	17.69	64	43.54
<b>5-6 years</b>	31	21.09	95	64.63
<b>7-8 years</b>	16	10.88	111	75.51
<b>&gt; 8 years</b>	36	24.49	147	100.00
<b>General health status</b>				
(missing = 2)				
<b>Excellent</b>	14	9.52	14	9.52
<b>Good</b>	48	32.65	62	42.18
<b>Average</b>	42	28.57	104	70.75
<b>Not that good</b>	30	20.41	134	91.16
<b>Poor</b>	13	8.84	147	100.00
<b>&gt; 8 years</b>	36	24.49	147	100.00
<b>Eye operations?</b>				
(frequency missing = 2; exclude 'undecided' in further analyses))				
<b>yes</b>	28	18.79	28	18.79
<b>no</b>	114	76.51	142	95.30
<b>undecided/ cannot recall</b>	7	4.70	149	100.00
<b>Wear spectacles?</b>				
(missing = 3)				
<b>yes, when I read</b>	22	15.07	22	15.07
<b>yes, always</b>	58	39.73	80	54.79
<b>no</b>	66	45.21	146	100.00
<b>Satisfied with eye-information provided at day clinic?</b>				
(combine undecided and dissatisfied categories in further analyses)				
<b>Very satisfied</b>	48	32.21	48	32.21
<b>Satisfied</b>	79	53.02	127	85.23
<b>Undecided</b>	15	10.07	142	95.30
<b>Dissatisfied/++</b>	7	4.70	149	100.00

### 4.3.1 Age groups

Figure 4.1 depicts the age group distribution of the respondents.



**Figure 4.1 Age group distribution (n=149)**

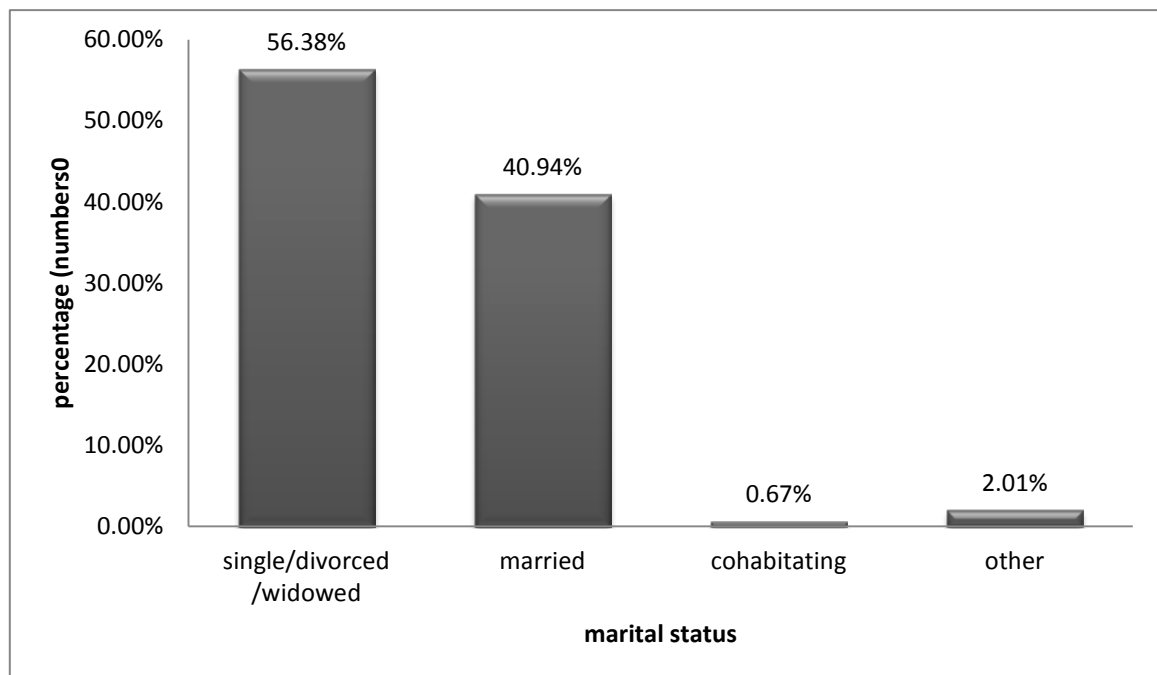
The youngest of the respondents were less than 40 years of age 16.11% (n=24). Majority of them 54.36% (n=81) were aged between 51-60 years, which was also the median age group. Fifty-four percent (n=81) of the respondents were between the ages 51-60 years of age. In a study conducted by Rheeda (2006:20), it was reported that the most important demographic change to DM prevalence across the world appears to increase in the proportion of older people including women older than 65 years of age. This result suggests that the women who were older in age probably have had DM for a long time. This statement was supported by the result that majority, 24.49% (n=36) of the respondents had DM for over 8 years.

This study's inclusion criteria were female diabetic patients within in the ages 18-60 years, however there were respondents within the age group of 60+, which were 8.72% (n=13) and were included in the data collection, and also included in the this study's data analysis, but will be excluded from further analysis. This accounted for the 8.16% (n=12) of respondents who were pensioners that fell in the 60+ category. The volunteers also might have forgotten and handed the questionnaires to respondents who were older than 60 and they were included in the study.



### 4.3.2 Marital status

Figure 4.2 illustrated the marital status of respondents who participated in the study.



**Figure 4.2 Marital status (n=149)**

The number of respondents that were single, divorced or widowed were the majority 56.48% (n=84). There were 40.94% (n=61) respondents that were married. Only one (n=1) 0.67% of the respondents was cohabitating and 2.01% (n=3) of them had other marital status, and both were excluded in further analysis. There was the highest percentage of respondents were either single, divorced or widowed which indicates that there were many single uncoupled women who head their own households. As expected in a peri-urban population, the majority of respondents were illiterate, and much older some of them had become widows, others had become housewives, with very little formal education with only 21.48% (n=2) and 2.68% (n=4) of the respondents having completed grade 11-12 and tertiary education. This indicated that there was an association between the respondents' marital status and their formal education. There was a high percentage of respondents that reported that they wore spectacles permanently 39.73% (n=58), which supported the result that majority of the respondents were between the ages of 51-60 were 54.36% (n=81).

This required them to be employed in order to support their families. However there were more respondents that were unemployed 38.78% (n=57), as compared to the employed or self-employed 23.13% (n=34). This indicates that there are homes head by single women who are unemployed in this township.

#### **4.3.3 Language or ethnic group (n=149)**

Of the 149 respondents who answered the questionnaire, majority of them belonged to the isiXhosa ethnic group 91.28% (n=136), 2.01% (n=3) were Afrikaners, 0, 67% (n=1) was English, 0.67% (n=1) was Zulu, and 5.37% (n=3) were from other ethnic groups, which included female respondents from other countries or ethnicities. The community in which the data was collected was in a peri-urban community within Khayelitsha, which is described as the fastest growing township in South Africa. This townships ethnic groups consists of approximately 90.5% Black African, 8.5% Coloured and 0.5% White, with Xhosa being the predominant language of the residents (Main Place Khayelitsha 2011:1).

#### **4.3.4 Grade passed (n=149)**

Of the 149 respondents who answered this item on the questionnaire, 30.2% (n=45) indicated that their educational level was less than grade 7.30.2% (n=45) of the respondents passed grade 7-8. Those that passed grade 9-10 were 15.44% (n=23), respondents who completed grade 11-12 were 21.48% (n=32) and respondents who completed tertiary were 24.16 (n=36). Education level seemed to have an impact on how patients understand information on health issues and seek help on time or take action that will protect their health.

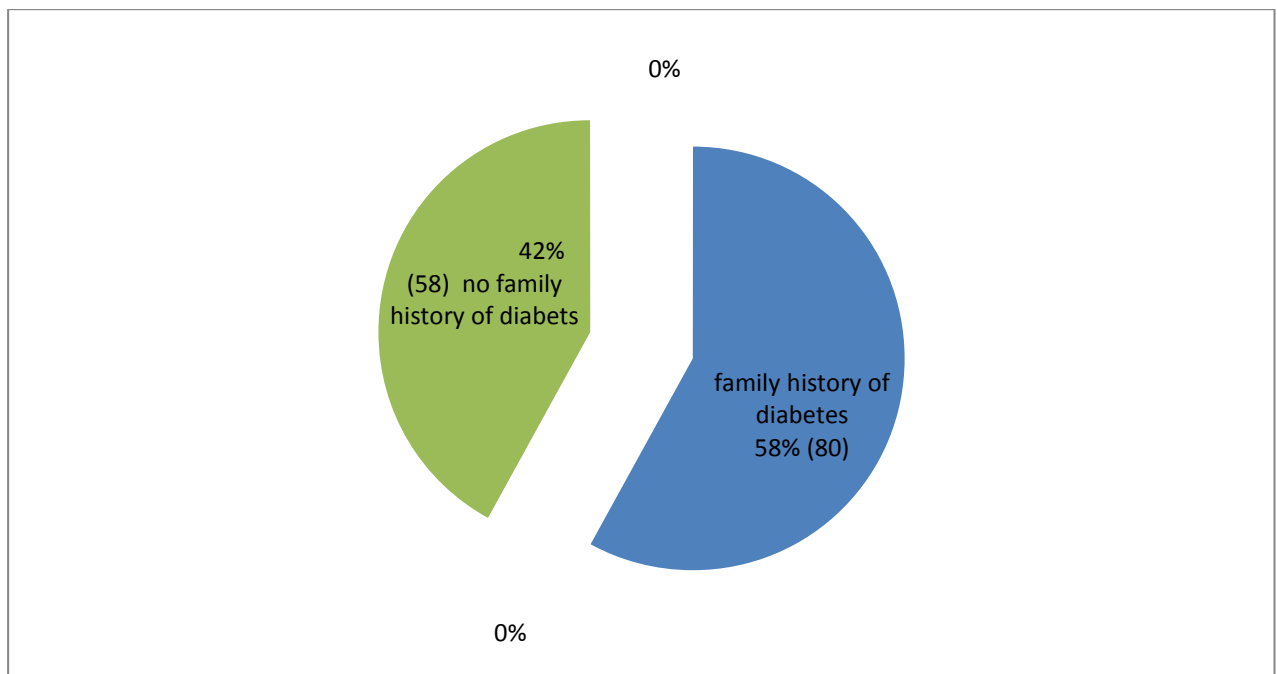
In Malaysia a study was done which assessed the awareness of eye complications and the prevalence of DR. Conclusions were made about the importance of education as in that study 86% of the respondents who had achieved tertiary education were aware of diabetic eye complications (Tajunisah et al 2011:519-524).

#### 4.3.5 Employment status (n=147)

Of the 147 respondents who answered this item, 38.78% (n=57) of them were unemployed. Respondents who were self-employed or employed were 23.13% (n=34). Those respondents who were either housewives or pensioners were 8.16% (n=12) and 29.93% (n=4) respectively. Because of the high percentage of female single-headed families, there was a high percentage of women who are unemployed, only 23.13% (n=34) of these women have an income, this could have led to high birth rates in these households increasing congestion of the townships and an easy spread of infectious diseases. With high birth rates there is an increase in demand of family support causing most young ladies to leave school to seek for employment, causing a decrease in formal education.

#### 4.3.6 Family history of diabetes mellitus (n=138)

Figure 4.3 illustrates the percentage of respondents who had a family history versus those who did not have a family history of DM.



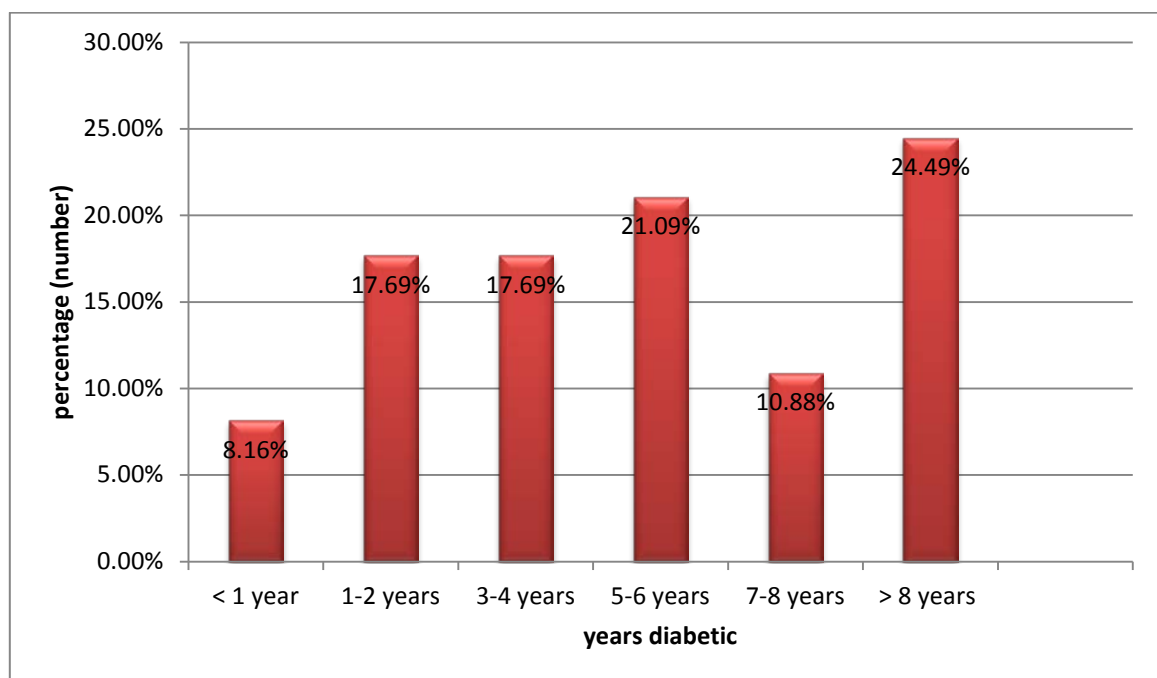
**Figure 4.3 Family history of diabetes mellitus (n=138)**

With regards to family diabetic history, 58% (n=80) reported to having a family history of DM and 42% (n=58) reported to having no known family history of DM.

Eleven (11) of the responses are missing from the data, these responses were either entered incorrectly on the questionnaire template by the researcher or the respondents did not know the answer to the question and therefore did not answer it.

#### 4.3.7 Period that respondents had diabetes

Figure 4.4 illustrates the period that respondents had diabetes mellitus



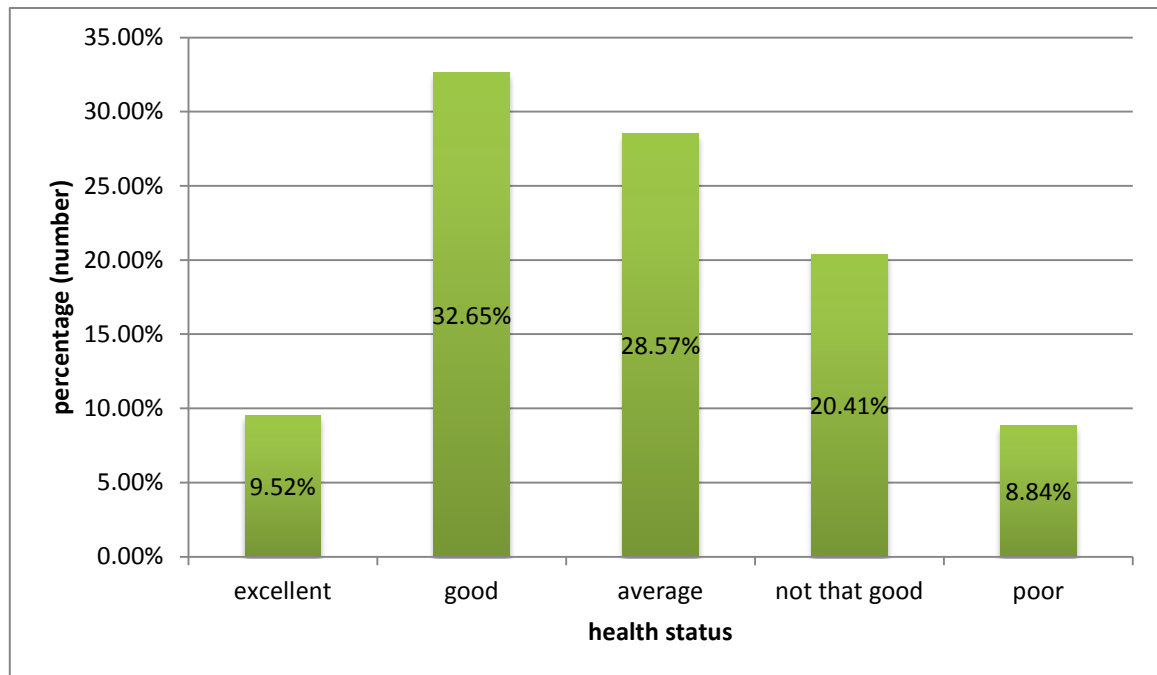
**Figure 4.4 Period that respondents had diabetes mellitus (n=147)**

Of the 147 respondents who answered this item, 8.16% (n=12), reported to having DM for less than one year. Those who were diabetic for 1-2 years were 17.69% (n=26). Respondents who were diabetic for 3-4 years were 17.69% (n=26), those who were diabetic for a duration of 5-6 years were 21.9% (n=31). And those who had DM for a duration of 7-8 years were 10.88% (n=16). Majority of the respondents were those who were diabetic for more than 8 years with 24.49% (n=36). Since majority of the respondents had known their diabetic status for over 8 years, these are the respondents that had the most knowledge and awareness about DM in general; these respondents were the ones who knew more about the eye complication of DM called Diabetic

Retinopathy. They knew most about retinal screening, and they made sure they attend that clinic. In question 13.5, 66.44% (n=99) of the respondents agreed that DR is common in people who have had DM for a long time.

#### 4.3.8 General health status

Figure 4.5 illustrates the general health status of the respondents.



**Figure 4.5 General health status (n=147)**

With regards to the general health status of the respondents, 9.52% (n=14) of them reported that they had excellent health, while 32.65% (n=48) reported their general health was good. Respondents that reported their health as average were 28.57% (n=42), those respondents that reported their general health being poor were 8.84% (n=13).

The 32.65% (n=48) of respondents who reported their general health as good, had the highest in percentage. These respondents were the ones who well informed about DM, they accounted for the respondents who agreed that eating a healthy diet contributes to the quality of life 95.97% (n=143), they agreed that doing regular exercise kept them healthy 91.94% (n=137). These respondents agreed that smoking 77.86% (n=116) and drinking 80.54% (n=120), can elevated ones blood sugars levels. With this high level of

knowledge these were the respondents who had some formal education the 24.16% (n=36) of respondents that had reached grade 11-12 and tertiary education. These respondents are those that are employed and therefore can afford to eat healthy nutritious meals, they take their medication as required and they are satisfied and apply the information given at the club very well.

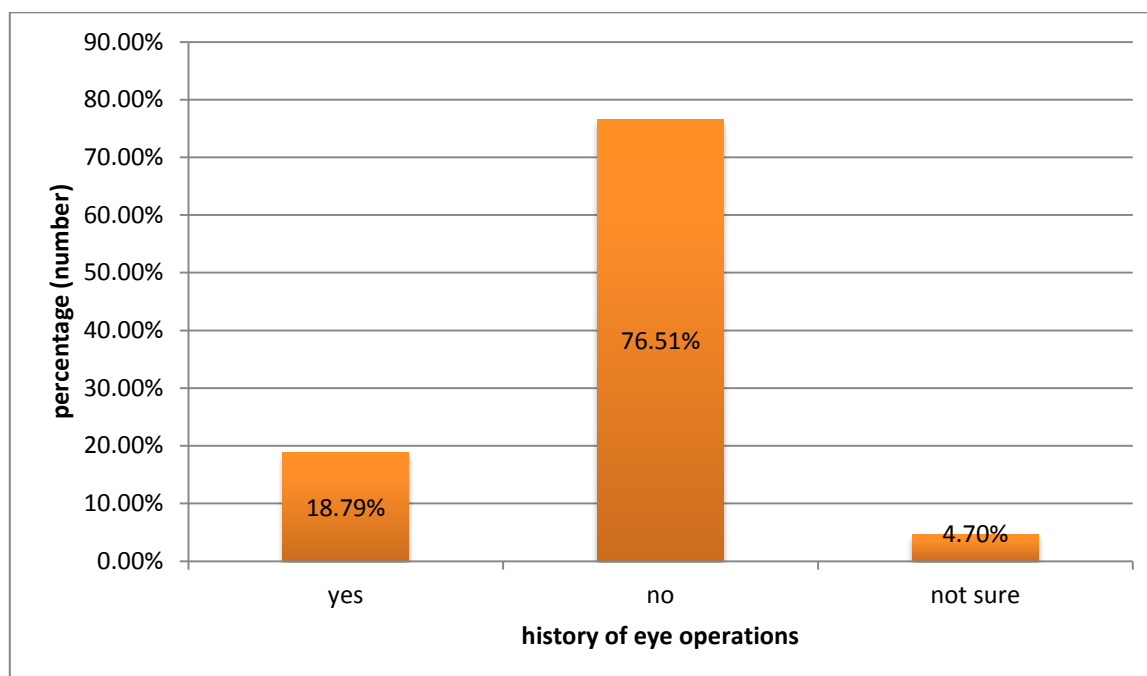
#### 4.3.9 Eye operations

Table 4.2 shows the number of respondents and previous eye operations.

**Table 4.2 Eye operations (n=149)**

Previous eye operations	Frequency	Percentage (%)
Yes	28	18.79
No	114	76.51
Cannot recall	7	4.70
Missing	2	
<b>Total</b>	<b>149</b>	<b>100</b>

Figure 4.6 Exhibits eye operations undergone by the respondents previously.



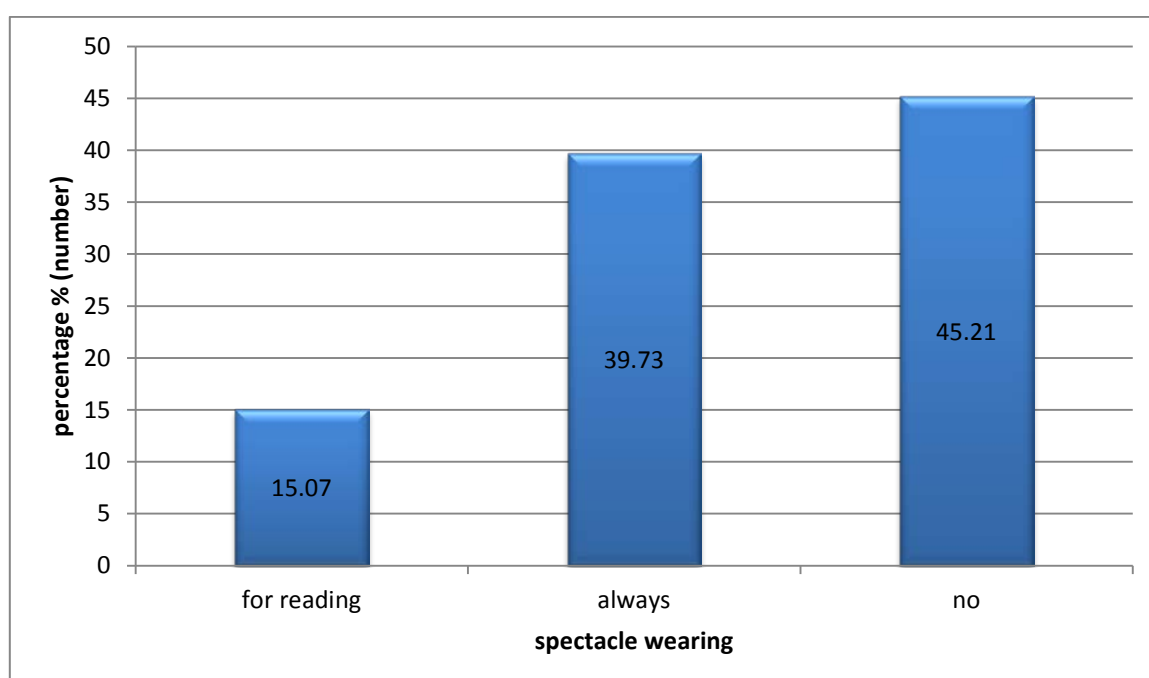
**Figure 4.6 Eye operations (n=149)**

Based on the results reported, 18.79% (n=28) of the respondents underwent eye operations or procedures previously, these patients are educated patients that were

aware of their procedures, they had full knowledge of their procedures done. The other 76.51% (n=114) did not have a history of eye operations and procedures. These were also those respondents who could not recall any history of eye operation or procedures 4.70% (n=7), these were the uneducated respondents who did not have the knowledge of what eye operations and procedures were. Another possibility was that these were the older patients the ones older than 60, 18.72% (n=13) years of age who could have forgotten about their history of eye procedures due to memory loss.

#### 4.3.10 Spectacles use

Figure 4.7 illustrated the percentage of the use of spectacles by the respondents.



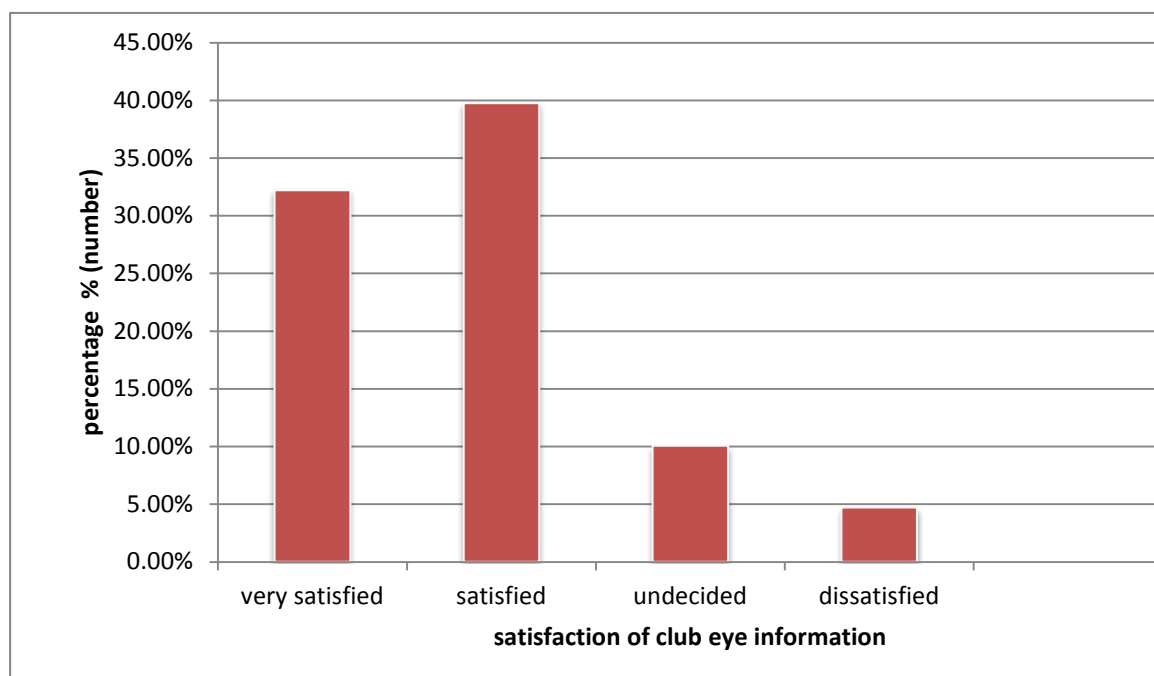
**Figure 4.7 Percentage of spectacle wear (n=146)**

With regards to use of spectacles, 15.07% (n=22) of the respondents reported to wearing spectacles only when they are reading, these were the older patients, which were over 40 years, which had entered the presbyopia (affects people older than 40 years where there is a decrease in the focusing ability for near) stage of their vision, so they used reading glasses only. The 39.73% (n=58) reported to constantly wearing spectacles, these were the respondents that had visual errors and used their spectacles all the time to correct their vision at the distance and near. Some of these respondents may have had visual errors due to DR. Majority of the respondents 45.21% (n=66)

reported that they do not wear spectacles at all. This day clinic has a department where spectacles can be done for patients. In the diabetic club they encourage diabetic patients to first have their retinal screening first and spectacles follow if the retinal photos shown no abnormalities on the retina. Most of these patients were probably waiting for appointments for spectacles or were not aware that patients are able to receive an eye test and spectacles at this facility. It was also possible that some of these patients had never been for eye testing.

#### 4.3.11 Satisfaction with eye information provided at the diabetic clinic

Figure 4.8 illustrates the satisfaction of the eye information provided by the clinic



**Figure 4.8 Satisfaction with eye-information provided at the clinic (n=149)**

With regards to eye information provided by the clinic staff to patients, 32.21% (n=48) of the respondents reported to being very satisfied with it, while 53.02% (n=79) of the respondents reported to being just satisfied, were 24.16% (n=36) these were the respondents that had a formal education and reached grade 11-12 and tertiary level 24.16% (n=36) .



There were some of the respondents who reported to being undecided about this information 10.07% (n=15), these were the respondents that did have much formal education those who were the minority of the respondents, 4.75% (n=7) reported to being dissatisfied with the eye information provided to them at the diabetic clinic, these were the patients who did not understand and follow the information given at the club.

The study that was conducted in Malaysia assessed the awareness of eye complications and the prevalence of DR. In the first visit to the eye clinic among type 2 diabetic patients attending the health facility, 43.8% did not know how frequent they should go for an eye test and 72.3% did not know what treatments were available.

The barrier for most of them was that there was a lack of understanding or knowledge of the diabetic disease, and this led to the delay of them coming for their eye tests earlier or come for retinal screening (Tajunisah et al 2011:519-524).

#### **4.4 SECTION B: GENERAL HEALTH AND DIABETES MELLITUS KNOWLEDGE**

This section dealt with the respondents' general health and DM knowledge. It comprised 5 items on a 5-point Likert scale ranging from strongly agree to strongly disagree. Table 4.3 depicts the respondents' general health and their knowledge of DM disease.

**Table 4.3 General health and diabetes mellitus knowledge (n=149)**

Frequency table of responses to subset of question on general health awareness				
Subset of questionnaire questions that describe general knowledge	Agreement levels			
Frequency Row Pct	agree	undecided	disagree	Total
12.1:DM is related to high sugar intake	119 79.87	10 6.71	20 13.43	149
12.2: DM disease can lead to blindness	118 79.20	10 6.71	21 14.09	149
12.3:When you feel better, you are allowed to stop the DM medication	36 24.16	19 12.75	94 63.08	149
12.4:DM is more common in obese(fat) people	73 49.33	23 15.54	52 35.13	148
12.5:DM is more common in women than in men	72 48.32	30 20.13	47 31.54	149
12.6:DM mellitus is common in adults than in children	80 53.69	16 10.74	53 35.57	149
12.7:Poor eye sight due to DM diseases affects the quality of life	106 71.14	15 10.07	28 8.79	149
<b>Total</b>	604	123	315	1042

With regards to the level of agreement of the statements, the following were concluded:

The majority of the respondents 79.87% (n=119), agreed that DM was related to high sugar intake, while 13.43% (n=20) disagreed that DM was related to high sugar intake, 6.71% (n=10). A study by American Diabetes Association (2015:1) contradicted this statement and confirmed that eating high sugar intake had nothing to do with developing type 1 diabetes. Type 1 is caused by genetics and other unknown factors that triggered the disease. One of the biggest risk factors for type 2 diabetes is being overweight, and a diet high in calories from any source contributes to weight gain. This response indicated a lack of knowledge among the respondents. The 13.43% (n=20) of respondents had a good knowledge about diabetes and high sugar intake.

According to their knowledge of DM and general health, 79.20% (n=118) of the respondents agreed that DM could cause blindness, these were the respondents that have DM for more than 8 years 24.49% (n=36) and they were very satisfied with the information that is given to them at the club pertaining to DM and their eyes. While 9.4%

(n=14) of the respondents disagreed with this statement these were the respondents that have had DM for less than 1 year 8.16% (n=12), and had been recently diagnosed and only began attending the club and the knowledge that they had pertaining to DM and their eyes was still limited.

The respondents that answered this item reported that they disagree 63.08% (n=94) that when a diabetic feels better they are allowed to stop their medication; this is good indication of compliance and adherence to treatment. The level of awareness about their general health is evidenced to be high. The 24.16% (n=36) of the respondents that agreed with the statement did not understand the question or indicated a lack of knowledge about DM. Once a patient has been diagnosed as diabetic they are to never stop their DM medication because it can lead to diabetic acidosis which can cause a coma and eventual death.

Majority of the respondents 49.33% (n=73), reported that they agreed that DM disease is more women compared to men, meanwhile 31.54% (n=47) reported that they were undecided.

With regards to the item of comparing DM prevalence in adults and children, 53.69% (n=80) of the respondents agreed, while 35.57% (n=53) disagreed with this statement. A study by Rheeda (2006:1) indicated that the prevalence of DM among all age groups worldwide was estimated to be 2.8% in 2000 and to be 4.4% by 2030 and the most important demographic change to DM prevalence across the world appears to be the increase in the proportion of people older than 65 years of age.

Regarding how poor eyesight due to DM affects the quality of life, 71.14% (n=106) of the respondents agreed with this statement which indicates that these respondents had an awareness of DR and how it can affect ones quality of life. These are the respondents who attend the retinal screening clinic and were aware of the effects of DM to the eyes. These were the respondents that were satisfied with the information about their eyes and DM which is given at diabetic clinic 85.23% (n=127).

In conclusion, the Chi-square test assumed a value of 179.02 under the null hypothesis that states that the response patterns to the seven questions do not differ statistically and are at a level of below 0.0001 (with df =24). This indicates a significance level of

0.1% which is highly significant. Therefore the null hypothesis is therefore rejected because some frequency response patterns differ statistically significantly from others. A majority of the respondents 24.49% (n=36) on table 4.1 had a period of 8 years being diabetic. On table 4.1 to cross reference the results the majority 32.65 (n=48) reported to be in good health. It is of a notable observation that 93.08% (n=94) of the respondents disagreed that when you feel better you should be allowed to stop treatment.

#### 4.5 SECTION C: KNOWLEDGE ABOUT DIABETIC RETINOPATHY

Table 4.4 illustrates the respondents' knowledge pertaining to Diabetic Retinopathy.

**Table 4.4 Knowledge about diabetic retinopathy**

Frequency table of responses to subset of question on knowledge of retinopathy				
Subset of questionnaire questions that describe/ probe retinopathy awareness	Agreement levels			
Frequency Row Pct	agree	Undecided	disagree	Total
13.1:Diabetic Retinopathy is well known in the community	106 71.14	18 12.08	20 16.78	149
13.2:Diabetic Retinopathy leads to permanent eye damage	119 80.4	18 12.16	11 7.43	148
13.3:Diabetic Retinopathy, common in people, DM for a long time	107 71.81	21 14.09	21 14.09	149
13.4:Diabetic diseases result in Diabetic Retinopathy	117 78.52	19 12.75	13 8.72	149
13.5:My eyes itch a lot which means that I have Diabetic Retinopathy?	99 66.44	31 20.81	19 13.38	149
13.6:Awareness regarding Retinopathy helps people seek timeous assistance	117 78.53	20 13.42	12 8.06	149
13.7:Cultural/spiritual beliefs reason people not attend retinal screening clinic	79 53.02	20 13.42	50 33.56	149
<b>Total</b>	<b>744</b>	<b>147</b>	<b>151</b>	<b>1042</b>

Regarding the level of awareness on the statements related to the awareness of DR, the following was concluded:

Majority of the respondents agreed with the statement that DR leads to permanent eye damage, 80.04% (n=119), while 12.16% (n=18) were undecided about this statement. The respondents who agreed with the statement indicated that they had knowledge regarding DR, which were those respondents who had a formal education, which were those that had completed grade 11-12 and tertiary education, 24.15% (n=36).

With regards to DR caused by DM, 78.52% (n=117), of the respondents agreed with statement. This statement is supported by a research done by Fong et al(2003:99-102), stating that between 10-20 years of a patient having type1 DM, almost all type1 diabetics will develop DR. The longer the duration of DM, most diabetic patients are at risk developing DR, if blood sugars are not controlled properly, those patients who had DM for over 8 years 24.49% (n=36), were more at risk of developing DR.

Regarding how awareness of DR helped people to seek timeous assistance, 78.53% (n=117) of the respondents agreed with the statement, 13.42% (n=20) of them were undecided about this statement, while 8.06% (n=12) of the respondents disagreed with the statement. This statement is supported by Cook (2013:449) which states that although diabetic retinal screening is advised as a preventative measure for all diabetic patients, however some patients seem to not be well informed about its importance and as well where, and how to have retinal screening done. Most researchers contend that diabetic retinal screening is worthwhile and provides an opportunity to detect other eye complications such as glaucoma and age- related macular degeneration. The examination of the posterior pole of the eye detects a high proportion of patients with pathology that can be referred or treated timeously.

Regarding the awareness of DR in the community, 71.1% (n=106) agreed with this statement. Majority of these respondents stayed within the community of Khayelitsha, and they had a common language, ethnicity and culture therefore this made it easier and better to communicate with one another, this allowed them to teach and make one another aware of DR or any other pandemic affecting their community.

When a diabetic patients eyes itch a lot, 66.44% (n=99), stated that they agree with this statement, while 20.81% (n=31) of the respondents reported that they were undecided regarding this statement. The itching of eyes is not a direct sign of DR, but is mostly a

secondary symptom of DR. Most Diabetics are symptomless therefore it is advised for every diabetic patient to have retinal screening annually.

Majority of the respondents, 71.81% (n=107) agreed that DR is common in people that have had DM for long durations of time. With a supporting study done by Clarke-Farr et al 2006:134-136), it states that DR will affect anybody who has DM, the longer a person has had DM the, higher the chances of them developing DR (Clarke-Farr et al 2006:134-135).

With regards to cultural or spiritual beliefs being a reason why people did not attend retinal screening, 53.06% (n=79) agreed with this statement, while 33.56% (n=50) of the respondents disagree. This demonstrated that in the African communities, spiritual and cultural beliefs still influenced their decision making, which applied to all ages, all educational backgrounds and all ethnicities. In this study the respondents that disagreed with the statement indicated that their beliefs did not influence them going for the retinal screening.

In conclusion, the Chi-square test assumed a value of 90.21 under the null hypothesis that states that the response patterns to the seven questions do not differ statistically and are at a level of below 0.0001 (with df =24). This indicates a significance level of 0.1% which is highly significant. Therefore, the null hypothesis is therefore rejected because some frequency response patterns differ statistically significantly from others, which is supported by the statements that, the respondents reported that diabetes disease results in DR, 78.52% (n=117) and 75.84% (n=117) agreed that all people should go for retinal screening, 73.83% (n=110) respondents also agreed that in their facility there are retinal screening services available.

#### **4.6 SECTION D: FACTORS RELATED TO DIABETIC RETINAL SCREENING**

Table 4.5 illustrates the respondents' level of awareness pertaining to diabetic retinal screening.

**Table 4.5 Factors related to diabetic retinal screening**

Frequency table of responses to subset of question on eye-screening procedures to prevent retinopathy				
Subset of questionnaire questions that describe screening for retinopathy	Agreement levels			
Frequency Row Pct	agree	undecided	disagree	Total
14.1:people in our community understand the importance of screening	94 63.08	32 21.48	23 15.44	149
14.2:Each health facility in this community has a Diabetic clinic	128 85.91	14 9.40	7 4.71	149
14.3:At clinic, consultation rooms that offer diabetic health services only	127 85.24	14 9.40	8 5.37	149
14.4:Our clinic has a retinal screening clinic	110 73.83	30 20.13	9 6.04	149
14.5:Retinal screening services are offered to all diabetic patients	107 71.81	29 19.46	13 8.72	149
14.6:Attending retinal screening sessions may delay need for spectacles	90 60.4	25 16.78	34 22.82	149
14.7:All people should go for retinal screening	113 75.84	22 14.77	14 9.40	149
14.8:Diabetic staff make referrals for retinal screening when consulting	114 76.51	24 16.11	11 7.39	149
<b>Total</b>	<b>883</b>	<b>190</b>	<b>119</b>	<b>1192</b>
The probability of a Chi-square statistic assuming the value of 83.25 under the null-hypothesis that the frequency response pattern of all seven questionnaire questions are the same, is < 0.001 (with df=28) . This indicates a significance level of 0.1% - which is highly significant, therefore some frequency response patterns differ statistically significantly from the others.				

Regarding the level of awareness of the statements related to the awareness of retinal screening, the following was concluded.

Regarding their knowledge of a diabetic clinic within the facility 85.91% (n=128) of the respondents agreed with this statements, 85.24% (n=127) agreed that their clinic had consultation rooms that catered for diabetic only, they agreed that diabetic staff make referrals for retinal screening during consultation 76.51% (n=114) and that all people should go for retinal screening 75.84% (n=113).The respondents agreed that their facility had a retinal screening clinic, 71.81% (n=107) agreed that retinal services are offered to all diabetics.

The respondents also agreed that people in their community understood the importance of retinal screening 63.08% (n=94). This high volume of agree responses indicated that the respondents had some knowledge about their facility's diabetic clinic and retinal screening.

Regarding retinal screening delaying their need for spectacles, 60.4% (n=90) of these respondents agreed with this statement, 22.82% (n=34) of the respondents were undecided about this indicated, this indicated a lack of knowledge in the importance of retinal screening because it is very important for every diabetic to have the retinal screening and wait for the retinal results and thereafter they can be sent to have spectacles.

In general, the knowledge about DR is positively reported in this result. This result is however contrary to the observation noted in practice that people report late to the eye clinical already in advanced stages of diabetes with DR. Some of the diabetic female patients do have retinal screenings done but they are not given back their results or even explained the condition of their retinas, as a result they do not take note of what was done. When requested to return for follow ups they do not return because they do not have sufficient knowledge and awareness about what DR or why they should have the retinal screenings done.

#### **4.7 SECTION E: AWARENESS OF THE RISKS ASSOCIATED WITH DM AND DIABETIC RETINOPATHY**

Table 4.6 illustrates the respondents perception towards the awareness of the risk factors associated with DM and DR.



**Table 4.6 Awareness of the risks associated with diabetes mellitus and diabetic retinopathy**

Frequency table of responses to subset of question on DM/retinopathy risk awareness				
Subset of questionnaire questions that describe/ probe DM/retinopathy risk awareness	Agreement levels			
Frequency Row Pct	agree	undecided	disagree	Total
15.1:Most Diabetic patients go for retinal screening	128 85.91	14 9.40	7 4.7	149
15.2:Eating a healthy diet contributes to quality of life	143 95.97	3 2.01	3 2.01	149
15.3:Doing regular exercises will keep me healthy	137 91.94	7 4.70	5 3.35	149
15.4:I keep doctors' appointments for my eyes	124 83.22	11 7.38	14 9.4	149
15.5:Smoking can elevate blood sugar levels	116 77.86	23 15.44	10 6.71	149
15.6:Drinking alcohol can elevate blood sugar levels	120 80.54	21 14.09	8 5.37	149
15.7:Overweight increases the risk of developing DM	129 86.57	12 8.05	8 5.36	149
<b>Total</b>	<b>897</b>	<b>91</b>	<b>55</b>	<b>1043</b>

Regarding the level of awareness on the statements related to the risk factors associated with DM and DR, the following was concluded:

With regards to eating habits, 95.97% (n=143) with the statement that eating a healthy diet contributes to the quality of life. This indicated that these respondents attended the club and were satisfied with the information given to them at the club, they attended and applied information from their dietician. These respondents had a good general knowledge of DM.

One hundred and thirty-seven respondents 91.94% agreed that doing regular exercises contributes to their quality of life. With regards to keeping their doctors' appointments for their eyes, 83.22% (n=124) respondents agreed with the statement. Regarding the consumption of alcohol, 80.54% (n=120) and smoking 77.86% (n=116) respondents agreed with the statement that consuming alcohol and smoking could elevate sugar levels.

With regards to the responses, 86% (n=879) of respondents responses were agreeing with the statements. The significance attached to Chi-square test in this instance can be interpreted that to question 15.2, 15.3 and 15.7 even stronger agreement was expressed than agreement to the other questions, it can therefore be deduced that respondents were aware of the risks associated with DM and DR.

#### **4.8 CONCLUSION**

This chapter discussed the data analysis and interpretation with the utilisation of composite frequency tables, graphs, descriptive and inferential statistics. The descriptive statistics were presented in the form of percentages, frequencies, tables, bar graphs and pie charts. The results of the study revealed that the respondents had satisfactory awareness of DR and retinal screening.

## **CHAPTER 5**

### **CONCLUSIONS, LIMITATIONS AND RECOMMENDATIONS**

#### **5.1 INTRODUCTION**

This chapter discusses the results, conclusions and limitations of the study and implications made to clinical practice of optometrists, education and research done by them. Feasible recommendations for practice and public health, policy makers and managers of programs for retinal screening were made.

#### **5.2 OBJECTIVES OF THE STUDY**

The objectives of the study were to

- explore and describe the variables related to the awareness level of female diabetic patients about Diabetic Retinopathy and diabetic retinal screenings
- develop an information brochure on the need and benefits of retinal screenings and preventative behaviour against eye complications

#### **5.3 DISCUSSION OF THE RESULTS**

##### **5.3.1 Biological data**

The respondents of this study were all female, and members of the diabetic clinic of the day hospital, this was part of the inclusion criteria of the study.

Majority of the respondents were single, divorced or widowed, 56.38% (n=84). Those that were married were 40.94% (n=61). There were 2.01% (n=3) women who had other forms of marital statuses. With only 21.48% (n=2) and 2.68% (n=4) of the respondents having completed grade 11-12 and tertiary education. There is an association between the respondents' marital status and their formal education. There is a high percentage of respondents that reported that they wore spectacles permanently 39.73% (n=58),

which supports the result that majority of the respondents were between the ages of 51-60 were 54.36% (n=81), which was their presbyopic stage in vision. There was a high percentage of respondents that were unemployed 38.78% (n=57). With regards to the respondents general health status, 32.65% (n=48) were in good health, yet 20.41% (n=30) had a general health status that was not too good.

### **5.3.2 General knowledge of diabetes disease**

The prevalence of DM is increasing due to population growth, the aging, urbanisation and the increasing of obesity and physical inactivity. The global prevalence of diabetes in the year 2000, as reported by the WHO Global-burden of disease, projected that the diabetes pandemic will continue to rise if levels of obesity remain constant. In all age groups this prevalence worldwide was estimated to be 2.8% in year 2000 and 4.4% in 2030. The total number of people with diabetes is projected to rise from 171 million people in the year 2000 to 366 million in the year 2030 (WHO 2014:1).

Respondents in this study had a fairly good general knowledge of DM, 79.20% (n=118) agreed that DM can lead to blindness, they agreed that DM is common in obese people 49.33% (n=73), and also agreed that poor eye sight due to DM affects ones quality of life 71.14% (n=106). However, the American Association of Diabetes (2015:1) states that DM is not entirely caused by high sugar intake and obesity, it can be caused by other contributing factors such as genetics, ethnicity and family history of DM. Read and Cook (2007:56) also reported in their study that DR is the 5<sup>th</sup> leading cause of blindness worldwide and this eye complication affects approximately 1.8 billion people and is responsible for 4.8% causes of blindness. (Read & Cook 2007:56-64). The results in this study showed a high level of awareness about DR. In line with the HBM, Stanhope and Lancaster (2011:273) concur with this finding that since these respondents have an awareness of DR that it can lead to permanent eye damage 79.20% (n=118) of the respondents agreed with the statement and 71.4% (n=106) respondents agreed that poor eye sight due to DM affects the quality of life, for this reason they attend the diabetic clinic from where they are referred to the retinal screening. An information brochure will be developed and it will be readily available around the health facilities in order to encourage, motivate and serve as a reminder to diabetic patients that a retinal screening needs to be done annually, in order to decrease preventable blindness.

### **5.3.3 Factors related to diabetic retinopathy**

There was also a general high level of awareness about DR among the respondents. Eighty percent (n=119) of the respondents agreed that DR leads to permanent eye damage, and DM results in DR 78.52% (n=117). The respondents that strongly agreed that DR is common in people who have had DM for a long time. There were 66.44% (n=99) in strong agreement that when their eyes itched a lot it meant they had DR, itchy eyes are not a direct symptom of DR, it is a secondary symptom.

There was a moderate percentage of the respondent who do not attend retinal screening due to cultural and spiritual beliefs 53.02% (n=79), which proves that these beliefs do play a role in how some of the respondents obey their cultures and beliefs and which influences how they care for their eyesight. There 33.56% (n=50) respondents that are aware of retinal screening and its importance and do not allow cultural and spiritual beliefs to influence their decisions to attend the retinal screening.

### **5.3.4 Factors related to diabetic retinal screening**

Respondents showed a general awareness of diabetic retinal screening. A total of 63.08% (n=94) agreed that the importance of retinal screening is understood by people in the community. Majority 85.24% (n=127) of the respondents agreed that each facility in the community has a diabetic clinic, while 73.83% (n=110) respondents agreed that there was a retinal screening clinic. Women are usually more concerned with their outward appearance and cosmesis, therefore the 60.4% (n=90) respondents who answered that attending retinal screening may delay the need for spectacles proves that some women prefer having spectacles rather than attending the retinal screening because they do not understand the importance and purpose of retinal screening.

According to 75.84% (n=113) of the respondents that agreed that all people should go for retinal screening. Not all people, but all diabetic should have a retinal screening done. A study conducted by the National Eye Institute (2013:1) suggested that all people with DM – both type 1 and type 2 – were at risk. It was recommended that all diabetic patients should get a comprehensive dilated eye exam at least once a year. The longer someone has diabetes, they are more likely to develop DR. Between 40 to 45 percent of Americans diagnosed with diabetes have some stage of DR. If one has

DR, a doctor may recommend treatment to help prevent its progression (National Eye Institute 2013:1).

### **5.3.5 Awareness of the risk factors associated with diabetes and diabetic retinopathy**

With regards to risk awareness of DM and retinopathy, 95.97% (n=143) respondents agreed with the statement that eating healthy contributes to the quality. A diabetic patient needs to always eat nutritious food in order to keep the sugar levels at the normal range. Doing regular exercise is important to everyone, but with diabetics it is more important in order to keep blood sugar levels at the normal range, 91.94% (n=137) respondent agree that doing regular exercise will keep them healthy. With regards to smoking elevating the blood sugar levels, 77.86% (n=116) respondents agree that smoking elevates blood sugar levels, smoking clogs up the blood vessels and can cause infections in the legs and feet. Drinking alcohol is dangerous to diabetics because alcohol can elevate the blood sugar levels, 80.54% (n=120) of the respondents agreed with this statement. The respondents agreed with the statement that being overweight increase the risk of developing DM, 86.57% (n=12).

The Health belief model is a model which was developed to provide a framework for understanding why some people take particular actions to avoid illness, and inversely why others fail to protect themselves. This model is beneficial in the assessment of health protection or disease prevention behaviors, the organising information regarding clients' views of their state of health and the factors that influence them to make a change in their behavior, and also appropriately used in providing organised assessment data regarding the clients' abilities and motivation to change their health status (Stanhope & Lancaster 2000:271). The study was developed and linked to the results of the questionnaire and objectives. This model was followed in that the respondents agreed that eating healthy contributed to their health, and regular exercising kept them healthy, these statements were taking action to prevent high sugar levels which could cause DR. Having knowledge and attending the retinal screening helped with the prevention of DR.

## **5.4 SCOPE AND LIMITATIONS OF THE STUDY**

Limitations can be described as those theoretical and methodological restrictions or weaknesses that may decrease the generalisability of the study results (Burns & Grove 2009:598).

All the data was collected from one day hospital , resulting in all other day hospitals being excluded. The study had a small sample and it was not easy to generalise these results to the community at large.

To assist with data collection two trained volunteers were used. Regardless of thorough training there was a possibility that they compromised the quality of the data that was collected. Majority of the respondents were isiXhosa speaking and they were required to answer the questionnaire only in English; some of the respondents might have battled with the language.

This study used a non-random selection method using convenience sampling. Due to the lack of randomisation processes, the population representation was limited, which could potentially make the results to be subjective than objective. There was a possibility that internal validity could have been compromised as well. This may have been caused during data collection by volunteers compromising the quality of the responses by explaining the questions too much in depth to the respondents. Eleven items from this section were missing which could have been that the respondents left the questions unanswered.

Although some concepts were as simplified as possible, during the instrument pre-testing, however, some of the respondents still had some aspects on which they needed clarification, which could have compromised the quality of the responses. Eleven items were missing on item.

## **5.5 RECOMMENDATIONS**

The results provided valuable and positive information on the awareness of DR and retinal screening among female diabetic patients, attending the diabetic clinic. The researcher identified knowledge gaps among the female diabetic patients with regards

to how DR knowledge can be improved. The following recommendations were made to the Ministry of Health and the Research division of the Cape Town Department of Public Health based on the results in terms of clinical and public health, educational and research implications.

### **Clinical and public health implications**

There are public health implications in order to decrease the number of people with irreversible blindness. It is therefore of importance that all diabetics be aware of the availability of retinal screening in all facilities as it was noted on the results that the respondents were in good health and were aware of retinal screening. There are however, currently very few facilities that are fully operational to conduct intensive retinal screening. There is still a need to reduce preventable blindness by considering the following suggestions based on the results:

- Awareness campaigns in the form of media are recommended in newspapers, radio broadcasting and television regarding the importance of retinal screening. It's fundamental that the public are made aware of its availability and places where one can have it done. The campaigns may be targeted to specific age groups of people such as the elderly and the illiterate as they were the most vulnerable group.
- During eye care awareness week, which are in October every year in the context of study, DR education and retinal screening campaigns can be done in communities, churches, old age homes and day hospitals.
- The early detection and treatment of DR is vital. Given that 71.14% of the respondents had an awareness of DR and 74.08% of the respondents aware of retinal screening, most patients would come forward for eye examination when experiencing visual problems.
- This study's results have implications for policy-makers, programs or strategic planners and practitioners and educators so as to serve as a knowledge base which can be used to improve the current strategies, especially those pertaining to the awareness of DR and retinal screening, with a main goal to reduce preventable blindness. The HBM as described by Stanhope and Lancaster (2000:271) helps to identify background factors that influence behaviour which are: individual perceptions, modifying factors and the variables affecting the



likelihood of initiating action. Effective health education about eye care may influence the behaviour of individuals to consider regular eye care.

## **Educational implications**

The results which are deductively generated from the study offer a deeper insight and enhance understanding and meaningful evidence towards improved training and educational content for diabetic patients and the communities as large. The aims of education do not only focus on the individual awareness of DR and retinal screening, but also provides the information on the prevention of irreversible blindness.

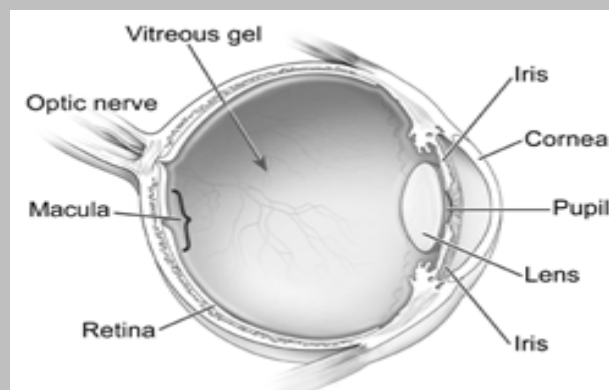
- Diabetic clinic staff and health promoters should hold workshops with Optometrists and Ophthalmologist regarding referrals and post-grading of retinal pictures to and from the retinal screening clinic. After retinal results have been graded, more effective and prompt post-diagnosis reminders as strategies to improve follow-up care or referral for retinal screening to be intensified.
- The diabetic staff should be able to immediately refer for spectacles or the patient needs to be sent to a tertiary institution in order for refer important or urgent cases promptly.
- More health professionals need to be trained to take retinal photos. There needs to be more programs where they can qualify to take retinal photos that help in diagnosing DR and not leave it to professionals that need to be outsourced, which can save most facilities financially.
- Since 66.44% (n=99) of the respondents agreed that if their eyes itch a lot it means that they had DR, and the 60.40% (n=90) respondents that agreed that attending the retinal screening delayed their need for spectacles, which is not entirely correct. Some patients in general still believe that spectacles help with any challenge that occurs in the eyes. Diabetic patient education can assist by educating them that retinal screening is the first route to go if they are diabetic, spectacles may follow later.

All eye care workers should receive in-service education and training on the diagnosis, treatment and prevention of DR related blindness. Further information is indicated in the information brochure. Although the brochure is initially written in English, it will be translated into the local common language for better understanding. A professional

translator will be sought for especially on the translation of complex medical ophthalmology concepts. Copies will be made freely available at the eye clinic and other surrounding clinics. It will complement information needed to give in-service education to the staff on regular basis.

The information brochure was suggested as follows:

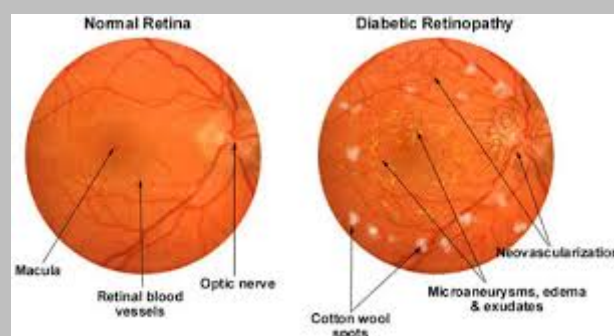
### INFORMATION BROCHURE ON DIABETIC RETINOPATHY



**Figure 1 Structures of a normal eye**

### WHAT IS DIABETIC RETINOPATHY?

Diabetic Retinopathy is an eye disease caused by Diabetes or sugar disease, where changes occur on the blood vessels and surface of the retina (back surface of the eye), which when left untreated may result in irreversible blindness. See picture of an eye with Diabetic Retinopathy.



**Figure 2 Eye with DIABETIC RETINOPATHY**

(DR picture image 2009)

## WHAT CAUSES DIABETIC RETINOPATHY?

Diabetes Mellitus cause Diabetic Retinopathy.

## ARE THERE DIFFERENT TYPES OF DIABETIC RETINOPATHY?

Yes diabetic retinopathy varies in severity from:

Mild non-proliferative

Moderate non-proliferative

Severe non-proliferative

Proliferative

## WHAT ARE THE COMMON SYMPTOMS OF DIABETIC RETINOPATHY?

There are usually no symptoms in the early stages of the disease, nor is there any pain.

**A diabetic patient should never wait for symptoms; a retinal screening should be done annually.** In proliferative DR when bleeding occurs, at first, a patient will see a few specks of blood, or spots, “floating” in your vision. If spots occur, a patient should see their eye care professional immediately. Hemorrhage tends to happen more than once, often during sleep. Sometimes, without treatment, the spots clear, and the patients vision will improve. However, bleeding can reoccur and cause severely blurred vision.

If left untreated, proliferative retinopathy can cause severe vision loss and even blindness. Also, the earlier one receives treatment, the more likely treatment will be effective.

## WHO IS AT RISK FOR DIABETIC RETINOPATHY?

ALL diabetic patients are at risk of Diabetic Retinopathy.

## HOW IS IT DIAGNOSED?

The following eye tests can be used to diagnose diabetic retinopathy:

- Viewing your fundus/retina by shining a light from a special electric torch into your eye (ophthalmoscopy).
- The more accurate and efficient way of diagnosing Diabetic Retinopathy is to have a **retinal screening** done every year.

## HOW AND WHERE CAN I GET A RETINAL SCREENING DONE?

This day hospital provides this service to ALL diabetic patients.

Make an enquiry with the clinic nurses or doctors and request that they book you for screening. It is painless and very important.

## WILL SPECTACLES HELP ME?

**NO.** Spectacles will not help your eyes to treat Diabetic Retinopathy. First have the retinal screening done and if your retina is normal, you can make use of spectacles.

## HOW IS IT TREATED?

During the first three stages of Diabetic Retinopathy, no treatment is needed, unless there is evidence of macular oedema (swelling of the sensitive part of the eye). To prevent progression of Diabetic Retinopathy, it is critical that diabetics control their levels of blood sugar, blood pressure, and blood cholesterol.

Proliferative retinopathy is treated with laser surgery.

## **LIFE STYLE ASPECTS**

Report early any eye health challenges such as becoming blind

Attend retinal screening once a year

Do blood sugar levels tests regularly as suggested

Take treatment as suggested

Attend information sessions at the clinic

Reduce sugar intake

Eat a healthy diet

Do regular exercises

Reduce alcohol consumption

Reduce or stop smoking

Lose weight

## **FURTHER INFORMATION**

If you have any queries or concerns about your eyes, please contact the diabetic clinic Staffon (021).

## **Research implications**

Implications on expanded research are as follows:

- A similar study may be conducted or replicated in other parts of Cape Town and beyond.
- A qualitative research involving both eye care workers and selected patients will help shed more light on various aspects of DR and retinal screening.
- The same study but using male diabetic patients or both genders in order to compare gender awareness as well.
- A population-based study to determine DR knowledge and its determinants in Cape Town would be useful to unveil misconceptions that need addressing.

Recommendations were made in the form of clinical, public, research and educational implications and will increase the level of awareness among health workers and patients at large and influence and guide day hospital facility managers and policy makers. An information brochure was developed in order to disseminate information on DR and retinal screening at various places such as at hospitals, day clinics and other health centres, in order to increase the awareness of DR, retinal screening to the public at large and possible life style changes.

## **5.5 CONCLUSION**

This chapter focused on making conclusions and recommendations based on the study results. The study in its entirety sought to answer the research question which was:

*“What is the awareness level of female diabetic patients attending the diabetic clinic in a clinic about the occurrence of Diabetic Retinopathy and diabetic retinal screening”?*

The research question was answered and the objectives of the study were reasonably achieved, presented and discussed. Factors that influence the increase in awareness of DR and retinal screening were discussed and validated with reference to previous supporting literature.

The scope and the limitations of the study were also indicated. Based on the results of the study described, the recommendations were outlined to be made to the Department of Health and management of the hospital and clinics involved in the study as well as to those involved more broadly in Public Health. These recommendations and implications were related to clinical and public health and educational implications as well as implications for further research.

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## **ANNEXURES**

ANNEXURE A

ETHICAL CLEARANCE CERTIFICATE:  
DEPARTMENT OF HEALTH STUDIES, UNISA

**ETHICAL CLEARANCE CERTIFICATE:**  
**DEPARTMENT OF HEALTH STUDIES, UNISA**



## ANNEXURE B

### LETTER OF REQUEST FOR PERMISSION TO CONDUCT THE STUDY

## **LETTER OF REQUEST FOR PERMISSION TO CONDUCT THE STUDY**

Dear Sir/ Madam

### **PERMISSION LETTER: APPLICATION TO CONDUCT A STUDY AT THE KHAYELITSHA DAY HOSPITAL IN CAPETOWN**

I am a female Master's student (student number: 46306129), at the Department of Health Studies, at the University of South Africa (UNISA). I intend to conduct a study at the Khayelitsha day Hospital in Site B, and my topic is about the awareness of Diabetic Retinopathy and retinal screenings targeted to specifically female diabetic patients, attending the diabetic clinic at day hospital in Khayelitsha. This study will assist in creating awareness about diabetic retinopathy as an eye complication of diabetes, and in itself as a condition that leads to blindness. This study will help in making future recommendations around diabetic health eye care, and to assist in the development of strategies that will be used to tackle late diagnosed diabetic retinopathy.

There will be no harm or risk whatsoever to any of the research respondents. Each respondent will be expected to respond to a questionnaire which will take about 20-30 minutes to answer. The participation to this study is simply voluntary and respondents will have the right to withdraw at any time they wish to do so, at any time during the process of data collection, for whatever reason. Their participation or otherwise will have no effect on their service delivery needs.

The ethical approval for this study has been sought and obtained from the Department of Health studies of UNISA, and is attached for your perusal.

I'm looking forward to receiving a positive, favourable response from you. Much appreciated

Kind regards

Nomfundo Mkhombe B-Optometry, U.J

Clinic Optometrist

## ANNEXURE C

### PERMISSION GRANTED TO CONDUCT THE STUDY

## **PERMISSION GRANTED TO CONDUCT THE STUDY**

ANNEXURED

INFORMED CONSENT FORM

## **INFORMED CONSENT FORM FOR STUDY RESPONDENTS**

**Research title:** Awareness about diabetic retinopathy and retinal screening among female diabetic patients attending the diabetic clinic in a day hospital in Cape Town, South Africa

**Name of institution:** University of South Africa (UNISA)

**Department of Health Studies**

**Name of supervisor:** Prof L.V. Monareng (University Of South Africa)

**Name of researcher:** Miss Nomfundo Fortunate Mkhombe

Dear Respondent

The purpose of this study is to assess the level of awareness about Diabetic Retinopathy and retinal screenings among female diabetic patients attending the diabetic clinic at this day Hospital. This study will assist in creating awareness about Diabetic Retinopathy as an eye complication caused by diabetes mellitus that can cause preventable blindness.

You are being requested for information about your awareness about diabetic retinopathy and retinal screening by completing a self-administered questionnaire comprising of 40 questions which will take approximately 20-30 minutes to complete. Your participation in this research is entirely voluntary. It is your choice whether to participate or not and you will not be penalised in any way if you do not participate.

You are assured that any information you share with the researcher will remain strictly confidential and will be used solely for the purpose of this study. Though the information will be published in the academic circles, it won't be shared with anybody on personal basis. All information collected from you will be kept in a secure place by the researcher. The data will be accessible only to the researcher and the supervisor.

There will be no direct benefit to you, but incentives in the form of light, healthy meals and water will be provided after the study. Indirect and long term benefits are that the results will contribute in improving the health of diabetic patients.

If you have any questions about this research study itself, please contact Nomfundo Mkhombe at 082-5764224 or 0825183426 or alternatively at work on (021)4470003. This study has been approved by the Research and Ethics Committee of the Department of Health Studies at UNISA. Should you wish to report any concerns you have related to the study, please contact. Professor LV Monareng, research supervisor of UNISA at [monarlv@unisa.ac.za](mailto:monarlv@unisa.ac.za).

I.....understand that I'm being asked to participate in the above mentioned study. I realise that I cannot participate in this study if I'm younger than 20 years of age.

I realise that my participation in this study is entirely voluntary and I may withdraw from this study at any time I wish to without penalty. Minimum risk is expected from my participation in this study and will be handled if necessary.

I have read the foregoing information, or it has been read to me and has had the opportunity to ask questions about the study. I am willing to answer all the questions to my satisfaction and therefore consent voluntarily to be a respondent in this study.

**Signature of respondent:-----**

**Date-----**

**Signature of witness:-----**

**Date-----**

**Signature of researcher-----**

**Date-----**

## ANNEXURE E

### STRUCTURED SELF-ADMINISTERED QUESTIONNAIRE



## **STRUCTURED SELF-ADMINISTERED QUESTIONNAIRE**

## ANNEXURE F

### LETTER AND ANALYSIS FROM THE STATISTICIAN

