UNIVERSITY OF THE WESTERN CAPE

FACULTY OF COMMUNITY AND HEALTH SCIENCE

HEALTH LITERACY KNOWLEDGE AND EXPERIENCE OF BACHELOR NURSING STUDENTS AT A UNIVERSITY IN THE WESTERN CAPE

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A mini thesis submitted in partial fulfilment of the requirement for the degree of Magister Curationis (Nursing Education) in the School of Nursing,

Faculty of Community and Health Sciences,

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JANUARY 2016

KEYWORDS

Bachelor Nursing

Descriptive research

Experience

Health literacy

Knowledge

Nursing students

Western Cape

ABSTRACT

Background: Health literacy is defined as the degree to which an individual has the capacity of obtaining, processing, and understanding basic health information and services needed for one to make appropriate decisions with relation to health. Health literacy is currentl emerging as a major determinant of health outcomes yet it is not receiving enough attention, especially among health professionals. It is now considered a stronger predictor of health outcomes than social and economic status, education, and gender.

Since nurses play a major role in providing healthcare information to patients and clients, it is imperative that nurses be prepared to face the challenges presented by individuals with poor health literacy skills. The nursing discipline is the largest segment of the health-oriented workforce and therefore, nurses have the largest responsibility of providing patient education, however, there are no education efforts targeting health professionals with regard to health literacy in South Africa. It is, therefore, imperative to establish the knowledge and experience of nurses in training in order to forge a way forward in nursing education.

Aim: The overall aim of the study was to establish the health literacy knowledge and experiences of bachelor nursing students at a University in the Western Cape.

Methodology: A quantitative, descriptive survey design was applied and data collection was carried out using a self-administered questionnaire. Total population sampling technique was done, the final sample was (n=82) of the fourth-year nursing students. Data was analyzed using SPSS version 23, descriptive and inferential statistics were employed.

Ethics: Ethical approval was granted by the ethics research committee, thereafter permission to conduct the study at the University was obtained from the Registrar and the Director of The School of Nursing. The researcher maintained the principles of anonymity and confidentiality throughout the study. Participation was voluntary and informed consent was signed by the respondents.

Results: The study found that bachelor of nursing students in Western Cape exhibited satisfactory health literacy knowledge as measured by the questionnaire, the score was 73%, with a cut-off of 70%. Knowledge gaps however existed in some areas - for example with regards to the impact of low health literacy on patient health outcomes and identification of patients with low health literacy. Their health literacy experience was, however, lacking, with students only reporting some experience in the use of written materials in providing patient education.

There was a weak negative, but statistically significant relationship between health literacy knowledge and experience.

Conclusion: Exposure to health literacy within the nursing curriculum needs to be more comprehensive, since the results portray that the emphasis of health literacy in the curriculum failed to have an effect on the health literacy knowledge scores, deeming it insufficient.

DECLARATION

I declare that “Health literacy knowledge and experience of Bachelor Nursing students at a University in the Western Cape” is my own work, and it has not been submitted for any degree or examination in any other university and that all the sources I have used or quoted have been indicated and acknowledged by complete references.

Full name: Francesca Mibei Date:

Signed.....

ACKNOWLEDGEMENTS

I sincerely thank God for sustaining me throughout this process. I give special thanks to my Supervisor, Prof Felicity Daniels, for without you this research would not have been successfully completed. Your support, guidance, patience, and expertise are highly appreciated. It also gives me great pleasure to thank my mentor Prof J. Chipps, I am indebted to you and will always remember your encouragement, enthusiasm, and unyielding support. Thank you for your wise counsel and support and for providing statistical consultation, you have the gift of making the complex seem simple. Lots of thanks to Nicolette Johaness, for her support and assistance as the post graduate administrator. To Ms Lorraine Fakude, a mentor and a friend thanks for your guidance and support throughout the whole process. I also thank my precious angels, Christian and Kristina for understanding that at some point mummy would spend more time with them. Finally, I am extremely grateful to my husband, Paul Muganda. Thank you for the continuous love and support and encouragement, without you this would not have been possible.

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LIST OF ABBREVIATIONS

AMA	American Medical Association
ANOVA	Analysis of variance
CINAHL	Cumulative Index to Nursing and Allied Health Literature
EHLC	European Health Literacy Consortium
MEDLINE	Medical Literature Analysis and Retrieval System Online
NAAL	National Assessment of Adult literacy
RN	Registered nurse
SPSS	Statistical Package for Social Sciences
U.S.	United States
USA	United States of America
WHO	World health organization

CHAPTER ONE

ORIENTATION TO THE STUDY

1.1 Introduction

This chapter introduces the concept being studied. It provides a background into health literacy, the problem statement and outlines the aim and objectives along with the hypotheses. The significance of the study is discussed, the operational definition of terms is given and finally, an outline of the entire thesis is provided.

1.2 Background

> "A two-year-old diagnosed with an inner ear infection is prescribed an antibiotic. The mother understands that her daughter is required to take the prescribed antibiotic twice a day. She studies the label on the bottle carefully and decides that it doesn't tell how the medicine is to be taken, she then fills a spoon with the medicine and then pours it into her daughter's painful ear" (Parker, Ratzan, & Lurie, 2003).

The above is an excerpt from Parker et al. (2003) describing a case where a mother was given an antibiotic syrup and administered it into her toddler's ear rather than orally as per the prescription. In this case, it is highly likely that the healthcare professional neglected to give the mother clear directions about how to administer the medication. Such omissions are possibly due to physicians overestimating patients' literacy levels (Kelly & Haidet, 2007), by assuming that a patient can read and understand instructions. Another possible cause could be that the mother

was probably not literate, therefore, unable to read, process and comprehend the written instructions on the bottle (Richard S. Safeer & Keenan, 2005, Schillinger, Bindman, Wang, Stewart, & Piette, 2004). This case presents a common problem that can be described as low or limited health literacy, in this case, the mother is said to have low health literacy.

Health literacy is about communicating health information and understanding it correctly, it is relevant at all points along the healthcare continuum (Osborne, 2012). The United States Healthy People (2010) define health literacy as the capacity of an individual to obtain, interpret and comprehend basic health information and health services and the competence to use such information and services to enhance health. Similarly, DeWalt and Pignone (2005), Kindig, Panzer, and Nielsen-Bohlman (2004) describe health literacy as the degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions. It has also been referred to as the currency through which health care consumers negotiate access to quality healthcare (United States Department of Health and Human Services, 2010). Individuals lacking sufficient health literacy are said to have low health literacy.

The problems associated with having low health literacy include: poor overall health status, impaired comprehension of medical information, failure to use preventive services, lack of knowledge about health conditions, failure to comply with treatment regimes, increased healthcare costs, increased risk of hospitalization, higher rates of chronic diseases, and cultural beliefs that interfere with health care (McCray, 2005, Pawlak, 2005).

It is estimated that almost half of all Europeans have been found to have inadequate health literacy skills (WHO, 2013). A survey conducted by the National Assessment of Adult Literacy in the United States of America (USA) estimated that only 12% of adults have proficient health

literacy, meaning that almost all (88%) of the USA population has inadequate health literacy. The survey also found that more than a third of U.S. adults (approximately 77 million people) would be unable to perform routine health tasks, such as reading and adhere to instructions on a prescription drug label or comply with standard immunization schedules (U.S. Department of Health and Human Services, 2008).

The health literacy rate of South Africans is unknown as there are no studies published to date in this regard. Based on the above staggering figures in the USA can we assume that the health literacy rate in South Africa is probably lower as a developing country compared to countries in Europe and the United States which are more developed?

According to French and Larrabee (1999), as cited in Cormier (2006), there is plenty of research indicating that health literacy is a major problem and instigating the need for further research is to investigate why health literacy is not emphasized in healthcare settings.

The nursing profession is the largest segment of the health-oriented workforce and therefore, nurses have the largest responsibility to provide patient education (Barrett-Marshall, 2008). Nurses' role in providing health care information in a variety of health settings is imperative as they constantly face the challenges presented by persons with low health literacy. Pleasant (2012), however, states that there are no education efforts targeting health professionals with regard to health literacy in South Africa. In this regard, registered nurses may actually be the best solution to the health literacy crisis because they are already in an excellent position to promote effective communication between providers and patients (Singleton & Krause, 2009).

1.3 Problem statement

Health literacy is currently emerging as a major determinant of health outcomes yet it is not receiving enough attention especially among health professionals. It is imperative that nurses and other healthcare providers are knowledgeable and skilled in the detection of patients with limited or low health literacy to improve patient health outcomes. There is a scarcity of health literacy research within nursing literature (Mancuso, 2009). It is unknown the extent to which student nurses in the Western Cape are knowledgeable and skilled with regards to health literacy, therefore, the need to establish their knowledge and experiences in order to improve their educational preparation in this regard.

1.4 Aim of the study

The purpose of the study is to investigate the knowledge and experiences of patient health literacy by Bachelor Nursing students at a University in the Western Cape.

1.4.1 Research objectives

1. To describe nursing students' knowledge of the effects of low patient health literacy.
2. To describe nursing students' knowledge of the signs and symptoms of low patient health literacy.
3. To describe the knowledge of nursing students' regarding patient health literacy during patient interaction with the health environment and resources.
4. To assess nursing students' knowledge of factors and strategies that promotes patient health literacy.
5. To describe the health literacy experiences of Bachelor Nursing students at a University in the Western Cape.

1.4.2 Hypotheses

The following were the hypotheses that guided the study:

1. The health literacy knowledge scores are the same in all the five age groups.
2. There is no difference in the knowledge scores between the students with prior post-matric education and those without.
3. Students who reported high emphasis of health literacy in the curriculum had higher knowledge scores than the students with little or no emphasis of health literacy in the curriculum.

1.5 Significance of the study

Safe and efficient patient care requires nurses to be skilled in assessing and addressing limited patient health literacy and to clearly and effectively communicate health information to patients from a diverse range of cultural and socioeconomic backgrounds. Consequently, nurses must incorporate health literacy skills into practice to aid patients and family members have more understanding of medical conditions and eventually make better health care decisions. Through research and advocacy, we, as health care providers, can break down the barriers caused by low health literacy for individuals who currently lack the understanding needed to benefit from the advances in health care. In this way patients' health outcomes are improved. This study is therefore significant in that it describes the knowledge and experiences of nursing students with regards to health literacy in order to establish a way forward in the education of nurses. Furthermore it addresses the dearth of knowledge around this topic, as no studies have been conducted to determine the health literacy knowledge and experience of student nurses in Africa.

1.6 Operational definition of terms

Experience: In this study experience refers to the experience nursing students had during their clinical rotations and class teaching with regard to health literacy, the main focus is on their interaction with patients and patient teaching materials.

Health outcomes: The effects of healthcare services and practices on people, their symptoms, their ability to do their will, and ultimately life and death. They include whether a given disease improves or worsens, the cost of care, and patient satisfaction with the care they receive (Coulter, Parsons, & Askham, 2008).

Knowledge: For this study, knowledge refers to knowledge of patient health literacy as measured by the questionnaire. A score of 70% will be regarded as knowledgeable.

Low health literacy: An individual's inability to, understand health information, follow through with treatment, or make informed health care choices (Cormier & Kotrlik, 2009).

Patient health literacy: The capacity of patients to obtain, interpret and comprehend basic health information and services and the competence to use such information and services to enhance health (United States Department of Health and Human Services, 2010).

1.7 Outline of the thesis

Chapter 1: Presents an introduction to the thesis. It gives the background to the study, outlining the aim and objectives, rationale of the study and the assumptions.

Chapter 2: Presents a review of the literature on Health literacy and its relationship with literacy, the impact, and identification of low health literacy, and health literacy in relation to nursing education.

Chapter 3: Describes the methodology of the study. This includes the design, the study setting, the population as well as the data collection procedures. Validity and reliability along with the ethical considerations are also discussed.

Chapter 4: Presents the study findings.

Chapter 5: Highlights the key findings of the study in relation to the literature. A discussion of the study, the recommendations specific to the study. The study limitations are also presented.

1.8 Summary

This chapter briefly outlines the major issues that are addressed by the study with an introduction to the problem and rationale for the study. The section brings forth the concept of health literacy and its effect on the health and health outcomes of patients. A brief thesis outline is also given to act as a preview of what will be presented in each chapter. The next chapter will provide an extensive literature review.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

According to Blaxter (2010), a literature review is defined as an organized, explicit, and consistent method of identifying, evaluating and synthesizing the existing body of completed and recorded work produced by researchers, scholars, and practitioners. This review's intention is to provide current information about aspects related to: the concept of health literacy, factors associated with good or poor health literacy, including, the relationship between literacy and health literacy, health literacy during patient interaction with the health environment and resources and low health literacy, and its identification and impact on patients and the healthcare system. Strategies that promote health literacy are discussed as well.

A thorough Literature search was conducted and the following databases were searched: Academic search complete, global health, the Cochrane library, Soc Index, Cumulative Index to Nursing and Allied Health Literature (CINAHL), Google scholar, Health Source: Nursing/Academic Edition, MEDLINE, Psych Articles, Scopus and Science direct.

2.2 Literacy

In the American 1991 National Literacy Act, literacy is described as the ability to speak, read, write, compute and solve problems at proficiency levels necessary to function in society, and on the job (Lonigan & Shanahan, 2009).

Literacy is now used describe knowledge of a particular subject or field and not only to refer to reading, writing and comprehension examples include, nutritional literacy (Diamond, 2007) and cultural literacy, scientific literacy, computer literacy, media literacy and health literacy (Keleher & Hagger, 2007).

People with limited or low literacy are not illiterate (WHO, 2013). However, high literacy rates in a population benefit the society this is because literate individuals participate more actively in economic prosperity, are likely to be employed and have higher earnings. They are also likely to be more educated, informed and actively contribute to the community. They also enjoy better health and well-being. On the contrary limited health literacy -as measured by reading skills, significantly affects health and is associated with less participation in health-promoting and disease detection activities, riskier health choices -such as higher smoking rates,, more work accidents, diminished management of chronic diseases -such as diabetes, HIV infection, asthma and poor adherence to medication (WHO, 2013).

2.2.1 Literacy and health literacy

The relationship between health status and poor literacy skills is now well recognized and better understood. This relationship sparked a huge interest which led to health literacy emerging as a concept (Nutbeam, 2008).

Health literacy has been used for 30 years to reflect the intersection between the field of health and that of literacy (Green, Bianco, & Wyn, 2007). The use of the concept "health literacy" was initially limited to constructs involving reading ability, and the ability to act on both oral and written information in the health care environment (Ishikawa & Yano, 2008).

2.3 What is health literacy?

Health literacy has over the years emerged as a powerful determinant of health status and mortality (World Health Organization, 2013). It is a more powerful predictor of health status than education attainment, social and economic status, gender or age (Parker, Wolf, & Kirsch, 2008).

Health literacy is a broad concept as it encompasses literacy skills, health knowledge, linguistics, culture, and the demands of the healthcare system (United States Department of Health and Human Services, 2010), therefore, when assessing health literacy, the above characteristics should be considered.

Health literacy is a critical factor in managing health status (Paasche-Orlow & Wolf, 2007), it, however, means different things to different groups (Baker, 2006) and is therefore defined differently by various organizations (Speros, 2011).

2.3.1 Defining health literacy

Health literacy as a term was first introduced in 1974 in a paper calling for minimum health education standards for all grade-school levels in the United States (US) (Ratzan, 2001). However, widespread attention to the concept only emerged in a 1992 publication of the National Assessment of Adult literacy in the US (NAAL). This seminal study led to the subsequent health literacy studies that contributed to health literacy concept development (Speros, 2005). Despite the tremendous increase in attention to this concept, researchers are yet to reach a consensus as to a definition of the term, thus many definitions for health literacy have been developed, with each providing a slightly different perspective.

Some of the most widely accepted definitions of health literacy have been developed by the American Medical Association (AMA), World Health Organization, the Institute of Medicine (IOM) and more recently, the European Health Literacy Consortium.

The WHO has defined health literacy as "the social and cognitive skills which determine one's motivation and ability to gain access to, understand, and use information in ways that promote and maintain good health" (WHO, 1998). The Institute of Medicine has defined it as "the degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions" (Kindig et al., 2004). The American Medical Association's Ad Hoc Committee on Health Literacy for the Council on Scientific Affairs, health literacy is "a constellation of skills, including the ability to perform basic reading and numerical tasks required to function in the health care environment" (American Medical Association, 1999). The WHO and the Institute of Medicine have somewhat similar definitions where health literacy is tied to an individual's capacities to access, acquire and use information to influence their health outcomes while the AMA's definition is tied to literacy (ability to read and write).

The European Health Literacy Consortium (2012) (EHLC) has more recently developed a broader, more inclusive definition, where it links health literacy to literacy and postulates that health literacy entails people's knowledge, motivation and competence to access, understand, appraise and apply health information in order to make judgments and take decisions concerning health care, disease prevention and health promotion to maintain or improve quality of life during the course of life.

Health literacy is not simply the ability to read (Glassman, 2013), as per the definitions above, it also comprises mental ability, communications skills, culture and socioeconomic status.

Health literacy is a complex group of reading, listening, analytical, and decision-making skills, and the ability to apply them to health situations (Coleman et al., 2008). For example, it includes the ability to understand instructions on prescription drug bottles, appointment slips, medical education brochures, doctor's directions and consent forms, and the ability to negotiate complex health care systems (Nutbeam, 2008).

2.3.2 Global status of health literacy

A study conducted in Australia by Patrick et al. (2009) to determine the risks associated with low health literacy in Australia, concluded that majority of Australians are likely to have low or limited health literacy, and this is a risk to effective health care delivery and health improvement across the community. This study followed a national Canadian survey conducted in 2007 to report on the distribution of health literacy among the Canadian adult population which had revealed that the overall average level of health literacy in Canada is low. The results of the survey indicated that 60% of adult Canadians, aged 16 and older, lack the capacity to obtain, understand and act upon health information and services and to make appropriate health decisions on their own (Murray, Rudd, Kirsch, Yamamoto, & Grenier, 2007). These studies indicate a high prevalence of low health literacy, in developed countries. This is also the case in India, a developing country, where a small-scale study of 200 patients attending a tertiary care hospital in Southern India revealed that the health literacy status was below the adequate level in more than 50% of the patients (Rathnakar et al., 2013).

Following a thorough literature search, no studies were found documenting the state of health literacy in Africa. Considering that developed countries and India (a third world country) are reporting high cases of low health literacy it is also highly likely that African countries have the same if not a higher prevalence of low health literacy more so due to lack of resources and poor

infrastructure and or high levels of economic inequality in most African countries, which are related to poorer health status, notwithstanding low health literacy. These studies reveal that low health literacy is prevalent worldwide and needs to be addressed in order to improve health literacy and mitigate the effects of low health literacy on the health of individuals. Furthermore, Osborne (2012) believes that addressing low health literacy is among the last few ways for reducing healthcare costs, by having families take care of themselves, for which adequate health literacy is required.

2.3.3 Health literacy capacity and skills

The United States Department of Health and Human Services (2010) has established that health literacy affects people's ability to navigate the healthcare system, including filling out complex forms and locating providers and services. It also affects people's ability to share personal information, such as health history, with health care providers, engage in self-care and chronic disease management and understand mathematical concepts such as probability and risk. Kindig et al. (2004) postulate that health literacy skills are needed for dialogue and discussion, reading health information, interpreting charts, making decisions about participating in research studies, using medical tools for personal or familial health care, such as a thermometer, calculating timing or dosage of medicine, or voting on health or environmental issues.

This indicates that health literacy skills are important when it comes to the health and wellbeing of every individual. However, health literacy includes the word "literacy" many people assume that it is only a concern for those who cannot read, but that is an incorrect assumption. People have difficulty understanding health literacy for a range of reasons that may include: literacy, age, culture, disability, language or emotion (Osborne, 2012). Hence the need to develop or

acquire health literacy capacity and skills, where capacity is referred to as the potential a person has to do or accomplish something (Merriam-Webster, 2015).

Health literacy skills are those that people use to reap maximum health. These skills are applied either to provide health information and services to others as in the case of health care workers, or to make sense of health information and services for their own use (Centers for Disease Control, 2015).

In order for one to be said to have sufficient health literacy skills the following factors on which health literacy is dependent are to be considered: communication skills, knowledge of health topics, culture, and demands of the healthcare (United States Department of Health and Human Services, 2010).

Any individual in need of health information and services requires health literacy skills to locate information and services, be able to communicate needs and preferences and to respond to information and services. These skills also enable an individual to process the meaning and usefulness of the information and services, understand the choices, consequences, and context of the information and services and finally, decide which information and services match their needs and preferences so they can act (Centers for Disease Control, 2015).

According to the Centers for Disease Control (2015), all health care workers also need health literacy skills to, help patients find reliable health information and services, communicate about health and healthcare, process what people are explicitly and implicitly asking for, understand how to provide useful information and services and finally to decide which information and services suit different situations and people to enable them to act.

2.4 Low or limited health literacy

Research has shown that low health literacy is prevalent, and affects all segments of society (Kripalani & Weiss, 2006, Speros, 2005).

A systematic review of U.S. studies examining the prevalence of low health literacy was conducted. They reviewed 85 studies which included data on 31,129 subjects, with a report of low health literacy prevalence between 0% and 68%. Pooled analyses of these data revealed a weighted low health literacy prevalence of 26%. They concluded that the pooled analysis of the data on health literacy did not provide a nationally representative prevalence estimate, it, however, exhibited that limited health literacy is prevalent and consistently associated with education, ethnicity, and age (Paasche-Orlow, Parker, Gazmararian, Nielsen-Bohlman, & Rudd, 2005).

Patients with inadequate health literacy face many obstacles when accessing and using the health care system. Conceptually, health literacy can be understood as one of the essential determinants of whether individuals can use healthcare achieve good health. "Good health" is what individuals expect will be the result of healthcare (Vernon, Trujillo, Rosenbaum, & DeBuono, 2007). However, low health literacy acts as a hindrance in the quest for "good health." It has been found that individuals with low health literacy are likely to have poorer health regardless of the illness in question (Safeer & Keenan, 2005).

Wolf, Gazmararian, and Baker (2005) conducted a cross-sectional survey of 2923 older adults newly enrolled in Medicare, managed-care in three U. S. states (Ohio, Texas, Florida). The aim of the study was to determine the health literacy and functional health status among older adults. Health literacy was measured using the short form of the Test of Functional Health Literacy in Adults. The outcome measures included scores on the physical and mental health functioning

subscales of the Medical Outcomes, difficulties with instrumental activities of daily living and activities of daily living, and limitations because of physical health and pain. They then adjusted for the prevalence of chronic conditions, health risk behaviours, and socio-demographic characteristics. The results revealed that individuals with inadequate health literacy exhibit worse physical function and mental health than individuals with adequate health literacy. It also revealed that individuals with inadequate health literacy were more likely to report difficulties with instrumental activities of daily living and activities of daily living limitations in activity because of physical health, fewer accomplishments because of physical health, and pain that interferes with normal work activities. This study shows that low health literacy affects people of ages, however it is believed to be worse among the elderly and in this study it was independently associated with poorer. Inadequate health literacy among older adults has the effect of lowering the quality of life in addition to a poorer physical and mental health.

Another systematic review conducted by Berkman, Sheridan, Donahue, Halpern, and Crotty (2011), to determine the correlation between low health literacy and health outcomes, they found that low health literacy is associated with poorer health outcomes and poorer use of health care services.

Kripalani and Weiss (2006), found that low health literacy contributes to the creation of a gap in communication between patients and health care providers, this leads to patients with limited health literacy - being less knowledgeable about their health condition and treatment options. Safeer and Keenan (2005)further argue that patients' comprehension of health information is impaired and they are reluctant to ask their physician questions for fear of being exposed, embarrassed, or criticized. To make matters worse, healthcare practitioners often use technical terms and medical jargon without adequately explaining them to the patient (Kripalani & Weiss,

2006). Another important effect of low health literacy is that it places a restriction on patients as they attempt to navigate the healthcare system as mentioned earlier (Berkman et al., 2011). The ability to provide informed consent, determine where and when to go for appointments, understand how to properly prepare for appointments, select the most desirable treatment option, or select the most desirable healthcare plan are all highly dependent on proficient health literacy skills (United States Department of Health and Human Services, 2010). Given the complexity of the healthcare system, it is not surprising that limited health literacy is associated with poor health (Cormier, 2006). The health care system has a complex design that is too advanced for the general population, in other words, it is not user-friendly. Health care workers often use medical jargon, which is complex for many individuals especially those not in the health sector. These individuals may be too embarrassed to ask for clarification of information or instructions leaving them at a disadvantage and even at the risk of jeopardizing their health, which ends up being counterproductive.

2.4.1 Signs of low health literacy

Asking staff for help, bringing along someone who can read, inability to keep appointments, making excuses (“I forgot my glasses.”), noncompliance with medication, poor adherence to recommended interventions e.g., changes to decrease acid reflux, such as elevating the head of the bed, postponing decision making (“May I take the instructions home?” or “I’ll read through this when I get home”) and watching others (mimicking behavior), are among the behaviours suggestive of inadequate health literacy skills (Sicat & Hill, 2005, Vastag, 2004, Vernon et al., 2007, Villaire & Mayer, 2007, Young, 2004).

2.4.2 Effect/impact of low patient health literacy

Low health literacy is an underlying cause of disparities, also a source of extensive disempowerment and it also perpetuates preventable disease (Carmona, 2006), these disparities could be in health or even socio-economic status. People with low health literacy may suffer from preventable diseases, lack of adherence to basic hygiene and sanitation, poor nutrition or even inability to follow prescription, these lead to health conditions which subsequently lead to poor job performance or loss. This could have been easily prevented if the individual was health literate. Carmona (2006) also indicates that health literacy is an obstacle that affects people of all ages, races, income, and education levels. In addition, low health literacy is a problem that is intricately related with health disparities and prevention. One of the major disparities in health is related to advancement in technology, where active, health-literate consumers can go online and get the latest information on sophisticated technological innovations, and demand the latest technology. Whereas patients with low literacy are unable to function as "informed" consumers due to their lack access to this information (Bryan, 2008). Technological progress in health care will exacerbate disparities over time and these disparities will be larger for sicker, older, and more vulnerable groups compared to more health literate population as suggested by recent work on understanding health disparities across education groups (McLeod-Sordjan, 2011).

Jensen, King, Davis, and Guntzviller (2010) firmly established this fact when the results from their study indicated that individuals with low health literacy skills were less likely to use Internet technology (e.g., email, search engines, and online health information seeking), and those with low health numeracy skills were less likely to have access to Internet technology (e.g.,

computers and cell phones). They had set out to examine whether low-income adults' utilization of Internet technology is predicted or mediated by health literacy, health numeracy, and computer assistance. The sample consisted of low-income adults (N = 131) from the U.S., who were surveyed about their technology access and use. The study only included low-income individuals making it a biased assessment, because the results seem to imply that individuals with low health literacy are also likely to earn a low income, this may not give a true picture since it unfairly portrays individuals with low income as having low health literacy and consequently individuals with higher income are automatically presumed more health literate without any evidence. The results also showed that males, older respondents, and those with less education were less likely to search for health information online. Similarly, the Agency for Health Care Research and Quality (2011) found that older adults with low health literacy have a poorer overall health status and a higher risk of mortality than the rest of the population.

Furthermore, older adults with low health literacy have been reported to have a poorer overall health status and a higher risk of mortality than the rest of the population. This instigates that low health literacy affects the entire population both young and old, however, older adults are at a higher risk of having poor health due to low health literacy than does the younger population.

Lower health literacy is associated with increased emergency department and hospital use, less utilization of preventive health care services such as screening for cervical cancer (through a Pap test) and breast cancer (mammography), and lower influenza immunization (Agency for Health Care Research and Quality, 2011, Blackwell, 2005). There are also claims that people with low health literacy have poorer physical and mental health function (Hibbard, Mahoney, Stock, & Tusler, 2007).

Lower health literacy is also associated with poorer self-reported health, inappropriate medication use and non-compliance with physician orders, poorer glycaemic control and increased prevalence of self-reported complications that resulted from poor control, less health knowledge, less sharing in decision-making about treatment, less expression of health concerns and worse communication with practitioners (Peters, Hibbard, Slovic, & Dieckmann, 2007, Rootman, 2006).

To examine the impact of low health literacy on medical care use and costs, Howard, Gazmararian, and Parker (2005), studied a sample of 3260 non-institutionalized elderly persons enrolling in a Medicare managed care plan in several states in the U.S. The study examined the association between health literacy and medical costs, while adjusting for age, sex, race/ethnicity, education, income, alcohol and tobacco consumption, and comorbid conditions. The results revealed that emergency room costs were significantly higher among those with inadequate health literacy when compared to those with adequate. Blackwell (2005) has a similar view, people with low literacy skills actually incur annual health costs four times greater than those with adequate literacy skills.

The WHO, (2013) also released a report confirming that limited health literacy is associated with high health system costs, in the U. S. limited health literacy has been found to cost more than US$ 8 billion a year, while in Canada it estimates that up to 3–5% of the total health care budget in Canada in 2009 was lost due to limited health literacy. In 1998, the United States National Academy on an Aging Society estimated that the additional health care costs caused by limited health literacy were about US$ 73 billion.

2.5 Health literacy during patient interaction with the health environment and resources

At virtually every point along the healthcare continuum, the healthcare system behaves in a way that requires patients to read and understand important healthcare information (Vernon et al., 2007). Filling out registration forms, health histories, and consent forms are particularly difficult for those with low health literacy skills. Notwithstanding, people with good literacy skills may find that understanding healthcare information is a challenge (Wolf, Gazmararian, & Baker, 2007). This information is technical, dense and has jargon-filled language (Vernon et al., 2007), yet they often don't understand medical vocabulary and the basic concepts in health and medicine. Examples include reading signs in hospitals and clinics about where to go, where to sign and following written and oral instructions in brochures and pamphlets, as well as prescription medication directions completing health insurance applications. The healthcare system itself can pose a serious barrier to appropriate care due to a non-user-friendly environment, which perpetuates feelings of fear and embarrassment among health care seekers (Weiss, 2007), who are likely to be inhibited from seeking clarification regarding what is meant by treatment instructions or medical advice. Cultural and language barriers, as well as low general literacy levels, can further exacerbate the problem of effective communication between patients and the health care system (DeWalt & Pignone, 2005). Stress and anxiety limit their ability to listen, learn, and remember (Egbert & Nanna, 2009). Creating an environment that promotes health literacy requires helping patients navigate the healthcare system, preparing them to interact productively with their healthcare provider, and providing a respectful and caring environment (Kripalani & Weiss, 2006). These necessary activities to promote patient health literacy are discussed below.

2.6 Factors and strategies that promote patient health literacy

Increasing health literacy is predicated to the elimination of health disparities and advancing effective primary and secondary prevention (Carmona, 2006). One of the ways of eliminating health disparities is through formal education in order to improve literacy. Health literacy clearly depends on fundamental literacy and the associated cognitive development (Ferguson & Pawlak, 2011). This implies that people who have undeveloped reading and writing skills are not only likely to have less exposure to health education, but also less developed skills to act upon the received information. Strategies to promote health literacy, therefore, remain intricately tied to strategies that promote literacy. One of these strategies of responding to low literacy levels in a community involves improving access to formal education, and providing education for adults who missed out (Nutbeam, 2008). Health literacy inextricably remains tied to literacy, therefore, promotion of literacy through the classroom is recommended.

2.6.1 Improving communication with patients

Patients with low health literacy can feel intimidated and fear being judged therefore health care workers are tasked with the responsibility of creating a shame-free and safe environment where patients feel comfortable talking (Blackwell, 2005). Some suggested guidelines on communication with patients to promote health literacy include: While giving a patient information the main focus on 3 to 5 main points and a “need to know” rather than a “nice to know” basis. Keep sentences short and use active verbs. Communicate in plain language rather than medical jargon when speaking to patients. Words used by clinicians in their day-to-day conversations with their colleagues are likely to be unfamiliar to the majority of non-medically trained individuals, for example, use “pill” instead of medication, or “ear ache” instead of otitis

media, and “heart attack” instead of myocardial infarction (Blackwell, 2005, Kripalani & Weiss, 2006).

It is necessary to explain the reasons for a particular intervention and emphasize the benefits, e.g., “Following these directions will help you get enough medicine from the inhaler so you breathe better” (Blackwell, 2005).

It is important to be very clear and specific when providing medication instructions, such as “Take with food and water,” not just “Take with food”. Do this to avoid patient speculation and confusion. As a healthcare provider, it is essential to recognize that a nod or a “yes”, might mean your patient is simply being polite, and that asking the question, “Do you understand?” almost always elicits a “yes” response (Blackwell, 2005). Use the teach-back technique. Tell your patients you want to make sure you understand each other and ask them to repeat your instructions. Example: “Just so I can be sure I’ve been clear in my explanation, could you briefly summarize the information we’ve just discussed?” or “How are you to take your medicine?” or “What foods should you stay away from?” (Blackwell, 2005).

2.7 Health literacy and nursing education

Nurses comprise the largest group of health care providers (Sanders, Thompson, & Wilkinson, 2007), and they interact with more patients in various settings, this places them in the optimum position to promote health literacy. It is, therefore, imperative that nurses are knowledgeable and have experience in assessing and addressing health literacy. Nurses’ understanding of health literacy is vital to enhancing patient involvement in their own care, improvement of health outcomes and provision of safe health care. If health workers, including nurses, do not understand and address the importance of health literacy, all health inequities will widen, health

care provided will be of poor quality, which will impact negatively on health outcomes and lead to a continual increase of healthcare costs (Johnson, 2014). A number of studies have been carried out to determine the knowledge and experiences of health literacy among nursing students and professional nurses, they are highlighted in this section.

A study carried out assess undergraduate nursing students' integration of health literacy in clinical settings, conducted in a Canadian University (Egbert & Nanna, 2009), and another conducted in the US among medical students (Ross, Lukela, Agbakwuru, & Lypson, 2013), revealed that students possessed extraordinary competencies in addressing health literacy. They, however, recommend inclusion of instructional strategies that deepen students' existing knowledge and skills in health literacy before students graduate from nursing programmes. The Centers for Disease Control (2015), compiled a list of strategies that are required by health care workers when providing health information and services to others. These strategies include helping people find information and services, communicating about health and healthcare, processing what people are explicitly and implicitly asking for, understand how to provide useful information and services and finally deciding which information and services work best for different situations and people so they can act (Centers for Disease Control, 2015).

A survey conducted by Cormier (2006) to assess health literacy knowledge and experience, 361 nursing students enrolled at Louisiana state universities, showed that respondents were able to identify low socioeconomic groups as high risk for low health literacy skills and were strongly aware of the consequences associated with low health literacy skills. Knowledge gaps were, however, evident in the following areas: identifying the older adult as a high-risk group, health literacy screening, and guidelines for written healthcare information. These studies have demonstrated that students have some knowledge of health literacy although gaps are still

evident. It is a point of concern that these gaps in knowledge of health literacy also exist among registered nurses currently in practice as evidenced by the following studies.

Another U.S. study conducted amongst 460 registered nurses to determine nurse practitioners' knowledge, experience, and intention to use health literacy strategies in practice, concluded that: the knowledge of health literacy and health literacy strategies was found to be low (overall score= 69%). Screening patients for low health literacy and evaluating patient education materials were found to be areas with a knowledge deficit. These studies conclude that the respondents had some knowledge on health literacy which however was deemed insufficient (Cafiero, 2013).

Macabasco-O'Connell and Fry-Bowers (2011), also conducted a study to investigate the knowledge and perceptions of health literacy among nursing professionals. It was a descriptive, cross-sectional web-based survey among registered nurses licensed by the State of California, who were randomly selected and invited to participate in the study. The results of the study revealed that nursing professionals' had limited knowledge of health literacy and little understanding of the role health literacy plays on patient health outcomes. The study also revealed that health literacy was of low priority among providers and organizations. These results are shocking as they reveal that knowledge of health literacy is low not only amongst student nurses but also registered nurses in practice.

The studies mentioned so far on health literacy knowledge were mainly cross-sectional descriptive studies, giving a description of the health literacy knowledge and experience of both nursing students and registered nurses without any intervention. The next study is a comparative one where nursing students' health literacy knowledge is pre-tested, then the students are given an online health literacy course, after which a post-test is done. This comparative study was

conducted to assess the knowledge of health literacy of bachelor nursing students before and after implementation of an online educational module. A significant difference between the pre-test and post-test scores was reported (McCleary-Jones, 2012). This finding indicates the nursing curriculum does not adequately cover health literacy if at all. It is an indicator that incorporating health literacy into the curriculum would likely ensure that nursing students are knowledgeable in health literacy and consequently enter the workforce prepared to manage patients with low health literacy.

The results of these studies indicate that a lot more needs to be done to raise awareness of health literacy among both student and registered nurses, it is essential that nurses are well acquainted with the effects of low health literacy on patients in order to improve health outcomes. The authors are thus in agreement that significant efforts have to be made towards improving health literacy knowledge among nurses more so before students graduate into the workforce.

2.8 Summary

This chapter presented the a review of literature in the field, arguments were made on the importance of health literacy to individual health and the contributions that health care providers especially nurses can make to improve health literacy. It also highlights the global status of health literacy. The next chapter presents the methodology which will describe in detail the methods used in data collection, analysis, and presentation.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter acts as the blueprint for the study, it provides a description of the research methods used to conduct this study. First, the chapter describes the research approach and design that was used to guide the study. The study population and the sample selected for participation in the study are defined. The data collection procedures are discussed and the instrument utilized in this study will also be presented and explained. Data management and analysis carried out is also described. Lastly, the ethical principles and procedures used to protect the respondents are explained.

3.2 Research approach and design

A quantitative approach was selected for this study as it is useful in quantifying data and measuring the various views and opinions in a chosen sample (Houser, 2012) which are the aims of this research. A descriptive cross-sectional survey design was utilized in order to gain more information about nursing students' knowledge and experiences about health literacy. Surveys are used to collect comprehensive descriptions of existing variables, which can be useful data in justifying and or assessing current conditions and practices or for making plans to improve health care practices (Haber, 2010).

A descriptive study is useful in acquiring knowledge in an area in which little or no research is available or where little is known about the area of study (Houser, 2012), which was the case in this study.

3.3 Research setting and population

The study was conducted at a university situated in the Western Cape which offers a nursing undergraduate programme. It has approximately 1000 undergraduate students.

Burns and Grove (2011) describe the research population as a group of individuals or elements who are the focus of the research study. The Population comprised fourth-year undergraduate nursing students enrolled at a university in the Western Cape.

3.4 Sample and sampling procedure

A sample as defined by Fawcett and Garity (2009) is a subset or a portion of the study population. Polit and Beck (2010) define sampling as the process where a portion of the population is selected to represent the entire population. Total population sampling, which is a type of convenience sampling, was carried out due to a small population size and in order to ensure an adequate response rate. Thus, all (164) fourth-year undergraduate nursing students were included in the study out of which 82 students agreed to participate.

3.5 Data collection

3.5.1 Data collection method

Data collection is a process where empirical data is obtained for use in answering research questions (Burns & Grove, 2009).

Questionnaires are common survey data collection tools (Houser, 2012). They are structured surveys that are self-administered by subjects (Houser, 2012). They collect data on attributes, attitudes, beliefs, experience, behavior and activities (Watson, McKenna, Cowman, & Keady, 2008). The data required by questionnaires are mostly quantifiable (Watson et al., 2008), which is appropriate for the quantitative approach. Another advantage is that questionnaires are quicker and offer anonymity (Mouton, 2007), and were utilized based on the benefits they held for this study.

3.5.2 Data collection tool

A self-administered questionnaire was developed by the researcher because the researcher was unable to secure permission to use an existing reliable and validated instrument. The knowledge section of the questionnaire is based on the work of Cornett (2009) on assessing and addressing health literacy. The six questions in the experiences section were adapted from Cormier (2006). The questionnaire has 3 sections: the first section focuses on participant's demographics, the second section is on knowledge while the third section is on experiences. The questionnaire has Likert scale type questions. The questionnaire is attached as appendix A.

3.5.3 Pre-test

A pre-test is a procedure that precedes a treatment or experience that helps to refine the instrument of the proposed study (McMillan & Schumacher, 2006).

A pretest was carried out on a sample of 10 fourth year undergraduate nursing students who were excluded from the study as several changes were made to the questionnaire. The respondents were asked to fill in the questionnaire and give feedback if they identified ambiguities, difficult

questions, glitches in the wording of questions, and lack of clarity of instructions. The feedback given by the students included:

- Duplicated question 6 and 20, one was deleted.
- Ambiguous question 4 was discarded.
- The scale for experiences was inappropriate, the agreement scale (strongly agree, agree, unsure, disagree, strongly disagree) was replaced with a frequencies scale (always, very often, sometimes, rarely, never).

The researcher also looked for places where they hesitated or made mistakes, one negative question was reversed as it was confusing.

3.5.4 Validity and reliability

Validity is the accuracy and faithfulness of scientific findings while reliability refers to the consistency of results (Brink, Van der Walt, & Van Rensburg, 2006). To ensure face validity, five nursing lecturers at the university were consulted to assist in the evaluation and rating of the questionnaire to ascertain that it measures the targeted construct.

Content validity of an instrument refers to how well it reflects the construct being measured (Burns & Grove, 2009). The content of this questionnaire was aligned to the literature review and the framework based on the work done by Cornett (2009), on assessing and addressing health literacy (Table 1). Cornett is an expert in the field of health literacy and has developed and implemented numerous patient education programmes and health literacy training programmes. The tool was statistically tested following the pre-test, the Cronbach's alpha was calculated for the two sections of the questionnaire to test for the internal consistency (reliability) of the tool. The results of the reliability analysis are presented in the next chapter.

Table 1: Content validity table

Objective	Variables	Questions in the questionnaire
1	Impact of low patient literacy	5 – 11
2	Identification of low health literacy	12 – 16
3	Health Literacy environment and resources	17 – 23
4	Strategies to improve health literacy - communication & structural	24 – 37
5	Health literacy experience	4, 38 – 43

3.5.5 Data collection process

Data was collected after students were briefed about the study and consent was obtained. The researcher obtained class timetables from the fourth year coordinator and organized with the lecturers for a time that would be convenient for them and all the students. Because of the large number, the fourth-year students were divided into two groups and attended class sessions in two different venues but during the same period on the timetable. The lecturers were briefed and informed the students about the study a week prior to data collection. Data was collected on the 29th of September 2015, for both groups following the lecture session. A thorough explanation of the study was given to the respondents, with more information on the information sheet (appendix B). Consent forms were duly filled (appendix C), and a copy of the questionnaire issued to each participant. The survey took approximately 30 minutes to complete. Of the 164 students, 82 agreed to participate in the study.

3.6 Data analysis

Data analysis is defined as the process of inspecting, cleaning, transforming, and modelling data with the goal of discovering useful information, supporting decision-making and suggesting conclusions (Hair, Wolfinbarger, Ortinau, & Bush, 2008).

A total of 82 questionnaires were completed. Data collected from the respondents were captured on SPSS version 23 following receipt of the questionnaires. Each questionnaire was coded then entered into SPSS. The data analysis began with data cleaning - cleaning was carried out to look for incorrect values in the data set. Frequencies were run to check for and remove erroneous data. A few missing data in the knowledge section were replaced with substituted values using the multiple imputation methods in SPSS. Multiple imputation was done because missing data can create problems during data analysis and also in order to avoid introducing bias (van Ginkel & van der Ark, 2005). Descriptive and inferential statistics were employed.

3.6.1 Descriptive statistics

Descriptive statistics was employed to summarize and describe data in an organized and condensed manner with a visual representation (Brink et al., 2006). Data were described using measures of central tendency (mean, mode and median) and measures of dispersion (range, standard deviation, and variance). The findings were presented in frequency tables, bar charts, histograms a crosstabs graph.

The questions in Likert scale format were coded as, strongly disagree = 1, disagree = 2, not sure = 3, Agree = 4 and strongly agree = 5. Reverse coding was then carried out in the negative statements. Then the Likert scale questions were recoded into different variables. Agree and strongly agree were recoded as agree which was given a score of 1. While strongly disagree, disagree, and not sure were recoded as disagree for which the score was zero. The scores were

then added up in the knowledge section and a score 70% and above were considered knowledgeable. This is because only basic health literacy knowledge, which is observed in day to day interactions with patients was being assessed and students are expected to have a good grasp of this.

In the experiences section, the Likert scale was coded as never = 0, sometimes = 1, frequently = 2 and always = 3. The health literacy experience was then summarized across the different types of experiences using frequencies and percentages, then presented in bar graphs.

To summarize the relationship between age and gender a cross-tabulation was used. A cross-tabulation is a table that depicts the number of times each of the possible category combinations occurred in the sample data (Miller & Acton, 2009).

3.6.2 Inferential statistics

Inferential statistics was employed to examine relationships or associations between two or more variables (McMillan & Schumacher, 2006).

The first test carried out was a nonparametric, independent Kruskal-Wallis test. A Kruskal-Wallis test is used to determine whether the medians of two or more groups differ when you have data that are not symmetric, such as skewed data (Samuel & Neil, 2010). Non-parametric tests hypothesize about the median instead of the mean (Mehotcheva, 2010).

The test was run to compare the medians of the knowledge scores against the age groups to determine whether there were any differences between them.

An independent samples t-test was run to examine the relationship between education and level of knowledge. An independent samples t-test is normally used to examine categories of respondents or numerical variables between two groups for significant differences (Morgan, Leech, Gloeckner, & Barrett, 2004). An independent samples t-test was utilized to compare the

means between two unrelated groups on the same continuous, dependent variable (Samuel & Neil, 2010).

To examine the relationship between the students' experience of emphasis of health literacy in the curriculum and their knowledge scores a one-way Analysis of Variance (ANOVA) test was conducted. The one-way analysis of variance (ANOVA) is used to determine whether there are any significant differences between the means of two or more independent variables (Lund & Lund, 2012). In this study, the one-way ANOVA was used to examine the differences within the four categories of responses in relation to the knowledge scores. Thereafter it was determined which groups differed significantly using multiple comparison tests. Two tests of homogeneity variance to examine equal variances were selected The Scheffe was chosen as a multiple comparison test based on whether equal variances are assumed, and the Games-Howell based on whether equal variances are not assumed.

The data was reported and summarized by the framework (as in Table 1).

3.7 Ethics statement

Approval of the proposal and ethics clearance were first sought from the University's Senate Higher Degrees and Research and Ethics committees respectively.(Appendix D)Permission to conduct the study was then sought and obtained from the Registrar of the University and the Director of the School of Nursing (see appendix E and F respectively).

In order to ensure *confidentiality*, all the data gathered from the respondents is available only to the researcher, and the supervisor. The response questionnaires will be kept in a locked cabinet for five years after the results are published.

The identities of the respondents were kept confidential as the questionnaires were returned without filling in participant's names. This was to ensure *anonymity*.

Participation was *voluntary*, no one was coerced to participate in the study. Respondents were allowed to withdraw from participation in the study at any time without any implications.

Written informed *consent* was obtained from the respondents. This was after they had been given detailed information pertaining to the study, including its value and the benefits to the population. Thereafter the researcher ascertained that they had understood it. A copy of the information sheet and the consent form are attached to this mini-thesis (appendix B and C respectively).

It is acknowledged that every participant has a right to *protection from discomfort and harm*. Care was therefore taken to minimize the risk of harm to the respondents in this study.

3.8 Summary

The aim of this chapter was to provide the reader with a description of the research methods and data collection. This included a description of the research approach and design, the setting, sample and sampling method, data collection, data analysis and the ethical principles adhered to in the study. The next chapter will provide the results from the data collection and will include the statistical analysis along with the discussion.

CHAPTER FOUR

RESULTS

4.1 Introduction

This chapter reports the findings of the study. It presents empirical data to address the research objectives and provides an analysis and discussion of findings for each research question. In this chapter, all the findings of the study are presented using frequency tables, bar charts, and histograms. Each table is accompanied with a brief description and an interpretation of the results.

This chapter first introduces the reliability analysis. Secondly, a description of the sample, including the response rate and demographic characteristics are provided. The demographics comprise age, gender, and prior post-matric education of the respondents. The SPSS version 23 statistical software was used to analyze the data.

Knowledge was measured in section 2 of the questionnaire, it comprised thirty-three questions divided into four sections: Section one measured the knowledge of the impact of low patient health literacy, section two dealt with the knowledge on how to identify patients with symptoms of low health literacy, section three focused on knowledge on health literacy issues during patient interaction with the health environment and resources, while section four measured students' knowledge on the factors and strategies that promote patient health literacy.

The experiences section, whose aim was to extract information on the students' experience of health literacy both in the clinical areas and in the classroom, was composed of seven questions.

4.2 Results of reliability analysis

Given that the investigator used a Likert scale, internal consistency reliability analysis through Cronbach's alpha was calculated to determine how closely related the questions in the questionnaire are as a measure of internal consistency. It was computed in SPSS following the pre-test. The Cronbach's alpha calculated for knowledge section was .825 while for the experience section score it was .766.

4.3 Section 1: Description of sample

4.3.1. Response rate

Response rate refers to the number of people who answered the survey divided by the number of people in the expected sample size, usually expressed as a percentage (Sivo, Saunders, Chang, & Jiang, 2006).

The population of the study was all the fourth year bachelor of nursing students at a university in the Western Cape, N= 164. The 10 students who participated in the pre-test of the instrument were excluded from the study due to changes made to the instrument and in order to avoid bias. A total of 154 students were thus eligible to participate in the study. Out of 154 students, 82 students participated in the study by filling out the questionnaire. The response rate for this study was 53.25%.

4.3.2 Demographic data

The demographic data provided the researcher with a description of the sample population. The researcher examined the following items: gender, age, and prior education. Figure 1 below presents the cross-tabulation of age and gender.

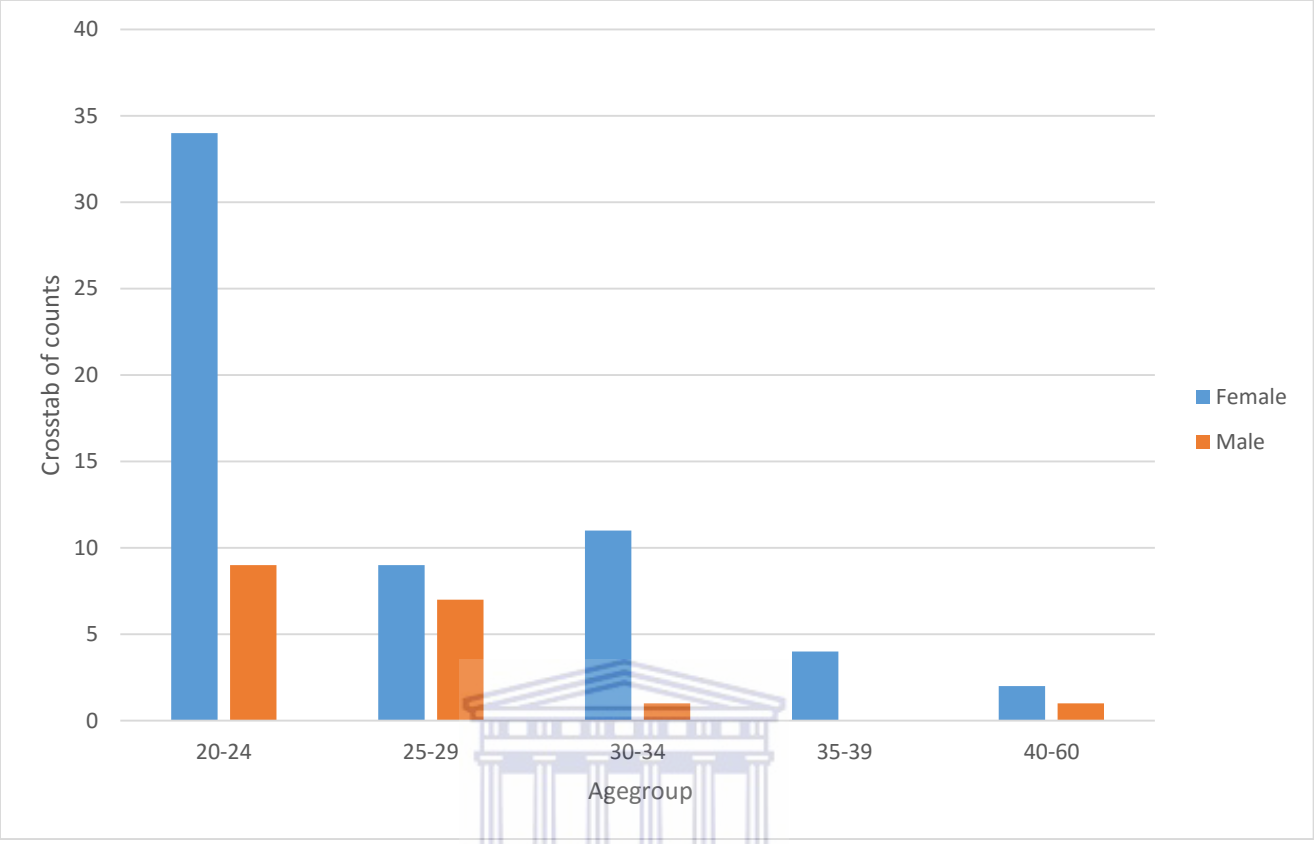

Figure1: Age and Gender Distribution

A cross tabulation (fig.1) of age against gender revealed that the largest demographic among the respondents were females aged between twenty and twenty-four years who comprised 44.3% (n=35) of the entire sample population.

According to the results, there were 62 females who accounted for 75.6% of the study sample and 20 males (24.4% of the study sample). The results indicated that the difference between the male and female gender was considerably high, there were three times the number of females as there were males, among the respondents in the study sample.

The mean age of the respondent was 26.4 years (standard deviation = 6.263), the median was 24, and the mode 22 years. The respondents' ages were between 20 and 57 years, thus, the range was 37. The results indicate that over half of the respondents (57.3%) were in the age group of 20-24

years followed by 25-29 years (19.5%). Respondents aged 30-34 years represent 14.6% of the sample population while the last two age groups, 35-39 and 40-60 had the lowest number of respondents 4.9% and 3.7% respectively (Figure 1).

4.3.2.1 Kruskal-Wallis Test

An independent Samples Kruskal-Wallis test was carried out to compare the medians of knowledge scores against the age groups. This test was selected because the distribution of age groups were positively skewed with most of the respondents being aged between 20 and 24 years. The hypothesis being tested were:

H_0: The distribution of percent score is the same across the five age groups.

H_1: The distribution of percent score is not the same across the five age groups. Table 2 below presents the results of an independent Kruskall-Wallis Test ran to compare the distribution of knowledge scores across age groups to determine whether there was a statistically significant difference between the median knowledge scores for the five age groups.

Table 2 shows a significance level of .136 which is greater than the P value (.05), which means that there is no significant difference knowledge across the age groups, thus, the null hypothesis is retained.

Table 2: Independent Kruskal-Wallis Test

Null hypothesis	Test	Significance	Decision
The distribution of percent score is same across categories of age group.	Independent sample Kruskal-Wallis test. Kruskal-Wallis chi-squared = 6.9994	P value = .136	Retain the null hypothesis

4.3.2.2 Prior education

The Bar Graph below (fig.2) presents data on post-matric education undertaken by the respondents prior to their current bachelor of nursing degree at the university. Results indicate that majority, 64 (78.1%) have no prior education while 6 (7.3 %) possess an undergraduate degree and 12 (14.6%) obtained certificates or diplomas prior to the bachelor's degree. The categories were then recoded into two categories, those with prior education and those without prior education as shown in figure 2 below.

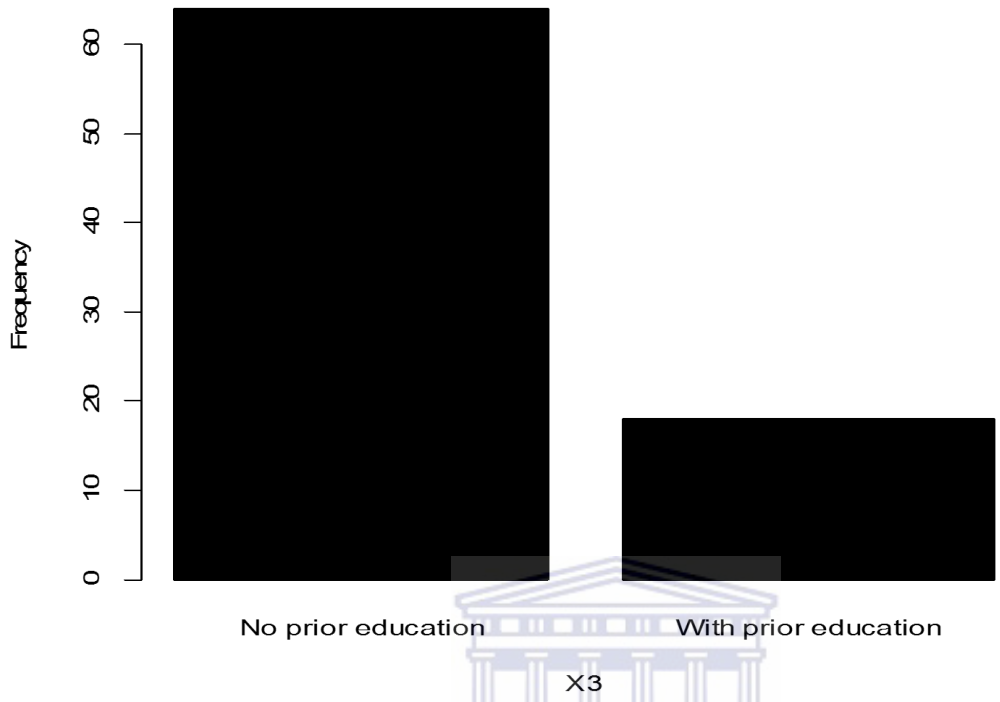

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Figure 1: Prior education post-matric

The population of the category without prior education post-matric was (n = 64), which was approximately three times more than the prior education post matric category whose population was (n = 18). The average knowledge score for the category with prior education was 73.43, whereas for no prior education was 73.37.

4.4 Section 2: Health literacy knowledge

This section presents the results of the health literacy knowledge of undergraduate nursing students in a University in the Western Cape. It is divided into five sub-sections, four of which represent each sub-section similar to the ones in the questionnaire, while the fifth section presents results on knowledge scores.

4.4.1 Objectives

This section answers the following research objectives:

- To describe nursing students' knowledge of the effects of low patient health literacy.
- To measure nursing students' knowledge of the signs and symptoms of low patient health literacy.
- To describe the nursing students' knowledge of patient health literacy during patient interaction with the health environment and resources.
- To assess nursing students' knowledge of factors and strategies that promotes patient health literacy.

4.4.2 Knowledge of nursing students' regarding the effects of low patient health literacy

Table 3 below presents the sum of correct responses to the corresponding questions in ascending order. This sub-section consisted of questions regarding nursing students' knowledge of the impact of low patient literacy, it was composed of seven questions in total. It yielded an average knowledge score of 63%, with an average of 51.6 respondents selecting the correct responses for each question. This is slightly above average although some questions were answered poorly with several unsure responses.

Table 3: Knowledge of the impact of low patient health literacy

Statement	Sum	Percent
Low health literacy is associated with poorer overall health status.	44	54%
Low health literacy is associated with increased emergency department and hospital use.	44	54%
Patients with low health literacy understand medical vocabulary and the basic concepts in health.	51	62%
Low health literacy is associated with poor ability to take medications properly.	53	65%
Low health literacy is associated with poor ability to interpret labels and health messages.	54	66%
Patients with low health literacy often miss appointments and/or make errors regarding their medication.	56	68%
Low health literacy is associated with inability to utilize health services e.g. vaccines.	59	72%
Average (N=82)	51.6	63%

The question with the lowest score was “Low health literacy is associated with poorer overall health status” with only 45% percent of the respondents’ answering correctly.

“Low health literacy is associated with inability to utilize health services e.g. vaccines”, was the question with the highest number of correct responses in this section at 72%.

4.4.3 Knowledge of nursing students' regarding symptoms of low patient health literacy

This sub-section consisted of five questions designed to elicit responses regarding nursing students' knowledge of symptoms of low patient health literacy (Table 4). The average knowledge score was 64.6% with an average of 53 respondents selecting the correct responses for each question.

Table 4: Knowledge of symptoms of health literacy

Knowledge of Symptoms of Low Health literacy	Sum	Percent
People with low literacy skills are good at concealing their deficit and are often quite articulate in speaking, so it is difficult to realize that a problem exists.	27	33%
Patients often make excuses when asked to read or fill out forms.	52	63%
Patients provide an incomplete medical history or check items as "no" to avoid follow-up questions.	54	66%
A patient's poor communication skills indicates a lack of intelligence.	61	74%
Patients with poor literacy skills may feel intimidated and avoid asking questions, this behaviour may be misinterpreted to mean that they understand the instructions when in fact they do not.	71	87%
Average (n=52)	53	64.6%

4.4.4 Knowledge of nursing students' regarding patient health literacy during patient interaction with the health environment and resources

Table 5: Patient interaction with health environment

Statement N= 82	Sum	Percent
A patient's literacy level is a concern in healthcare settings because some patients are not aware that they have low literacy skills.	46	56%
Patients with low health literacy are often considered noncompliant.	49	60%
Patients with low literacy skills are often ashamed of this problem and rarely tell anyone.	56	68%
People with poor literacy skills find that understanding healthcare information is a challenge.	65	79%
Patients with low health literacy skills understand medical jargon	66	81%
Filling out registration forms, health histories, and consent forms is difficult for those with low health literacy skills.	67	82%
Stress and anxiety limit the ability to listen, learn, and remember.	75	91%
Average (N=82)	59.7	72.7%

Subsection three of the questionnaire consisted of questions regarding patient health literacy during patient interaction with the health environment and resources. It was composed of seven questions in total. It yielded an average knowledge score of 72.7%, with an average of 59.7 respondents selecting the correct responses for each question as per table 5 above. This subsection demonstrated sufficient health literacy knowledge. The average knowledge score for this group was considerably higher than the previous sections at about seventy-three percent since the knowledge scores for all questions in this scored higher than 55%.

4.4.5 Knowledge of nursing students' of factors and strategies that promote patient health literacy

This sub-section consisted of fourteen questions designed to elicit responses regarding factors and strategies that promote patient health literacy. Table 6 below presents these results. The average knowledge score was 83.8% with an average of 68.6 respondents selecting the correct responses for each question. The average score in this sub-section is the highest compared to the other three sections and ranges between 43% and 98%.

The respondents did extremely well in answering the rest of the questions with average scores ranging 88-98% which is commendable.

Almost all (98%) respondents correctly agreed that written instructions should be made clear and simple, using language that is easy to read and understand, (98%) also agreed correctly that one should ask patients to clarify what the doctor told them before they leave, this is referred to as the teach-back technique (Blackwell, 2005). It is essential that nursing students and registered professional nurses are aware of these techniques and put them into practice in order to promote health literacy of patients. The students exhibited excellent knowledge when it came to strategies that promote health literacy.

Table 6: Factors and strategies that promote health literacy

Knowledge of factors and strategies that promote patient health literacy		
N = 82	Sum	Percent
Provide this help preferably in an area where they can be overheard by others.	35	43%
Reinforcing information is not necessary for retention	44	54%
Patients with low literacy skills are not likely to benefit from seeing pictures.	57	70%
To increase retention, speak slowly and limit the amount of advice given to patients	60	73%
To increase retention organize the information logically, focusing on the three to five most important 'need to know' points.	72	88%
Offer all patients help in completing forms.	72	88%
Ask for all necessary information at registration or during admission to a facility	74	90%
Verbal instruction should be reinforced with printed instructional materials that are easy-to-read and visual materials	75	91%
Break down complex instructions into small units of information to help the patient grasp and understand the information increase retention	76	93%
Use plain language as opposed to medical jargon	78	95%
Review the instructions with patients and check to be sure they understand the information.	79	96%
Simplify all forms using clear language, non-medical terms when possible, and easy-to-read formats	79	96%
Make written instructions clear and simple, using language that is easy to read and understand	80	98%
Ask patients to clarify what the doctor told them before they leave	80	98%
Average (N=82)	68.6	83.8%

4.4.6 Distribution of knowledge scores

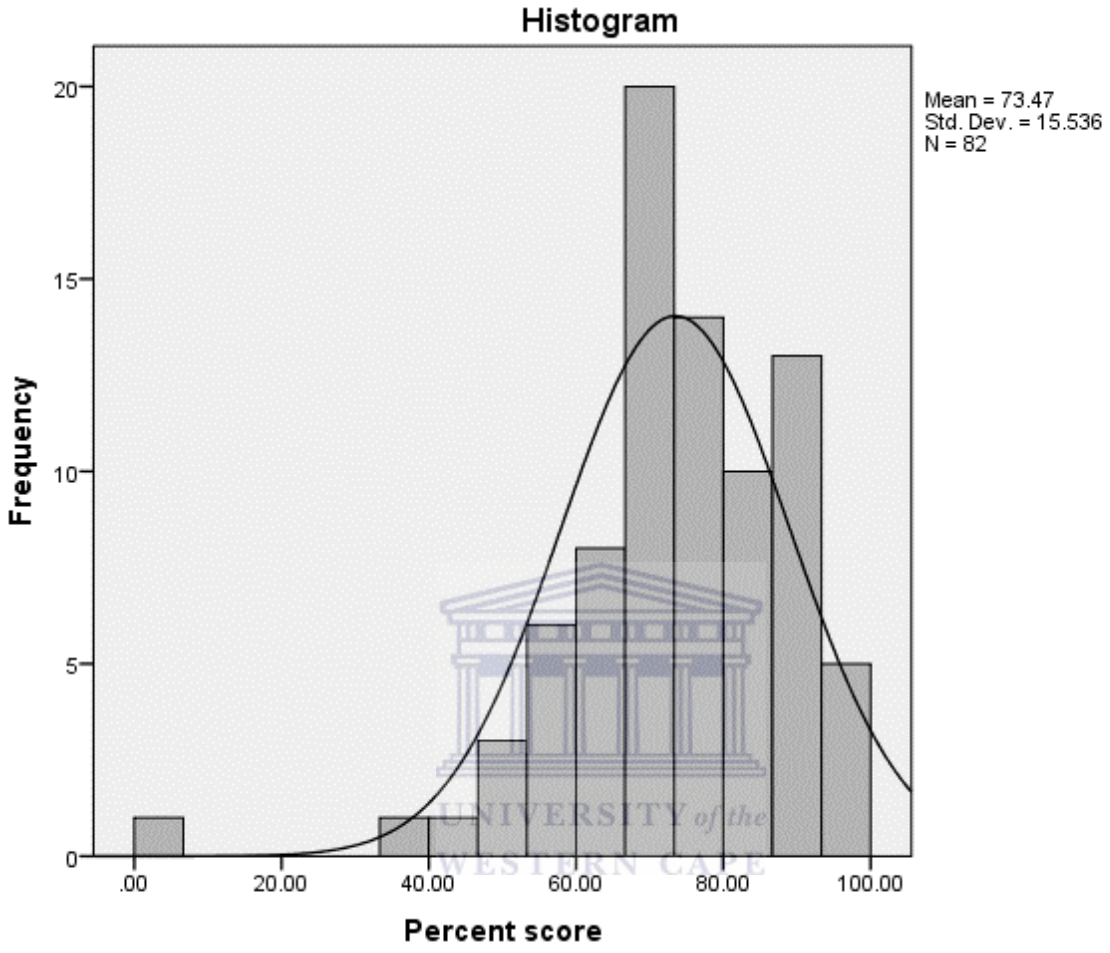

Figure 3: Knowledge scores

25th percentile = 66.66667, 50th percentile = 75.75758 and 75th percentile = 84.84848.

The histogram (figure 3) presents the distribution of knowledge of health literacy scores of respondents. After reviewing the responses to each of the 33 items in the knowledge section of the questionnaire, 5 point Likert scale responses were recorded in SPSS, a score of 0 for an incorrect response (either agree or disagree depending on the direction of the question), a "not sure" response was also recoded as a 0, while a correct response scored 1. These scores were then summed up and calculated as percentages.

Upon completion of these procedure measures of central tendency were calculated. The health literacy knowledge scores of respondents ranged from 0% to 96. 97%, with a mean score of 73.47. The standard deviation of scores was 15.54 while the range of scores was 96.97. This histogram is unimodal and skewed to the left. The distribution of health literacy scores was negatively skewed (-1.516), indicating a higher frequency of health literacy scores around the mean (73.47). The distribution is also said to be negatively skewed because the median (75.76) score is higher than that of the mean (73.47). The mode of the distribution is 78.79.

The lowest score possible was 0 and the highest score possible was 33. The health literacy knowledge scores of respondents ranged from 0 to 32 (0%-96.97%). Results of the interquartile range (IQR = 18.94) indicate that the health literacy knowledge scores of the middle half of respondents ranged from 21.75 to 28 (65.9-84.9).

4.5 Section 3: Health literacy experiences

This section describes the health literacy of fourth year bachelor nursing students at a University in the Western Cape. The respondents were expected to rate their experiences of health literacy by responding to six likert-type questions. The first question would rate their experience with health literacy in the nursing curriculum (Classroom), it asked how frequently health literacy was emphasized in the nursing curriculum, students responded by selecting one of the following responses: Never, at least once, in one subject, and in most subjects. The other six questions were designed to rate the respondents' health literacy experience with patients or in the clinical areas. They were asked to rate their clinical experiences by selecting one of four options in the Likert scale, very often, sometimes, always and rarely.

Results for each section will be displayed in graphs while statistical tests will be will be presented in tables each with an interpretation and discussion.

4.5.1 Emphasis of Health literacy in the nursing curriculum

The graph below (figure 4) presents results of the question, how frequently health literacy was emphasized in the nursing curriculum. Less than half (n=42, 51.2%) of respondents reported having health literacy emphasized in most subjects in their curriculum, about a quarter (n=23, 28.0%), reported having had health literacy emphasized in one subject, 9.8% (n=8) reported at least once, while 11.0% (n=9) report to have never had health literacy emphasised in their curriculum.

A one-way analysis of variance (ANOVA) was conducted in order to determine whether the variance in the emphasis on health literacy in the curriculum is in any way a reflection to the health literacy knowledge scores, i.e. did the students who reported that health literacy was emphasized in every subject in the curriculum score higher than those who reported to having

little or no health literacy emphasis in the curriculum. The ANOVA was to examine the differences in knowledge scores between the four Likert scale categories with relation to the health literacy emphasis in the curriculum.

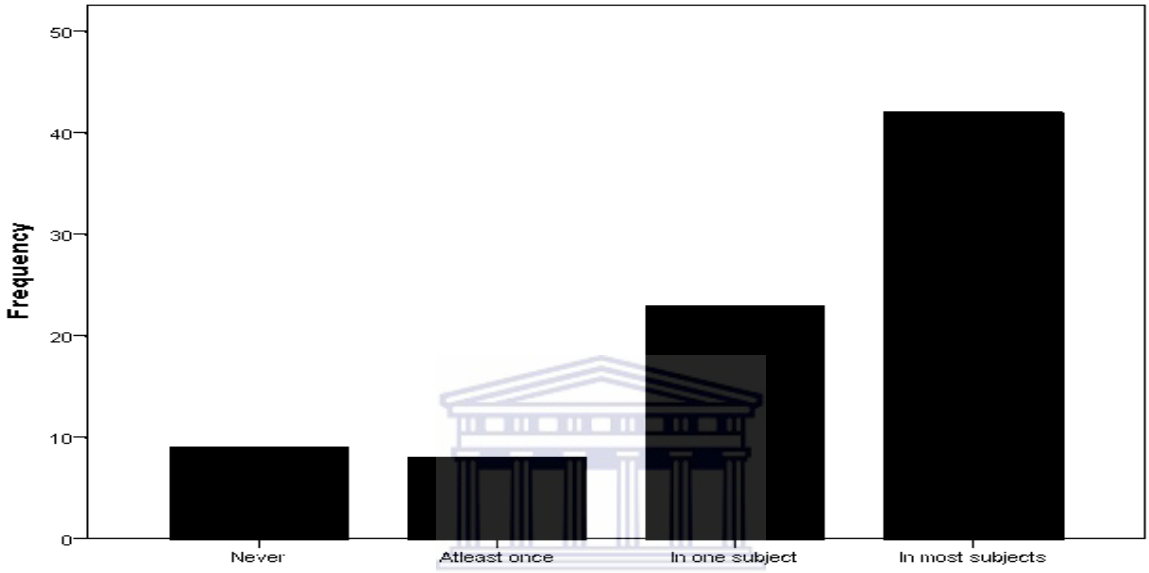

Figure 4: Frequency of health literacy emphasis in curriculum

The hypothesis being tested: Students who reported high emphasis of health literacy in the curriculum had higher knowledge scores than the students with little or no emphasis of health literacy in the curriculum.

Table 7: Analysis of Variance (ANOVA)

Means and standard deviations between and within groups. Percent score					
	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	1513.607	3	504.536	2.182	.097
Within Groups	18036.728	78	231.240		
Total	19550.335	81			

The emphasis of health literacy in the curriculum categories is based on a four-point scale ranging from 1 (Never) to 4 (In most subjects). Table 7 above shows the sig. or p-value was .097, which is above the cut-off point of .05. The result indicates that equal variances assumption is met, therefore, further tests were carried out to examine the variance in all the four categories each against the other, about sixteen different combinations. The multiple comparisons tests (Scheffe and Games-Howell) however revealed no significant difference between the knowledge scores with relation to the students reports regarding emphasis of health literacy in the curriculum (see appendix G). Therefore, the null hypothesis was rejected as there was no difference between the knowledge scores.

4.5.2 Health literacy experience

The experience questions were all focused on the respondents' experience when it came to patient education, which comprised the frequency of use of materials (written materials, videotapes, audio tapes and computer software) and evaluation of those teaching materials for cultural appropriateness before teaching.

Table 8 below presents the frequencies of health literacy experiences of students. Most responses show that in all the six questions the respondents selected the "sometimes" option except for how often computer software is used to provide healthcare information to an individual or a community group, for which they selected "rarely" as the most popular question, the other question for which there are more responses than the "sometimes" is how often written materials are used to provide healthcare information to an individual or a community group, for which the most popular answer was "very often".

Table 8: Frequencies of health literacy experience responses

Question n= 82	Never	Rarely	Some times	Very often	Always
38. How often do you evaluate the cultural appropriateness of health care materials including different handouts, videos & audiotapes before using them for teaching?	9	21	33	14	5
39. How often do you evaluate the use of illustrations to in written health care materials before using them for teaching?	5	17	32	18	10
40. How often do you use written materials to provide healthcare information to an individual or a community group?	1	10	27	29	15
41. How often do you use audiotapes to provide healthcare information to an individual or a community group?	21	25	22	13	1
42. How often do you use videotapes to provide healthcare information to an individual or a community group?	21	28	22	8	3
43. How often do you use computer software to provide healthcare information to an individual or a community group?	16	29	15	18	4

Many of the students (40.2%) reported to have evaluated materials used in patient education for cultural appropriateness “sometimes”, 39% of the students reported to have evaluated the use of illustrations in written health care materials for patient education also “sometimes”, 35.4% reported to have used written materials in patient education “very often”. 34.1% of the students reported to have “rarely” used videotapes and computer software in patient education while

approximately 30.5% of the students said they “rarely” used audiotapes to provide healthcare information to an individual or a community group.

On the other hand, 25.6% of respondents reported having “never” used audiotapes or videotapes to provide healthcare information, 19.5% reported having “never” used computer software for patient education, 11% reported that they never evaluated materials for cultural effectiveness, 6.1% reported that they never evaluated the use of illustrations in written health care materials, and 1.2% reported that they never used written materials to provide health care to an individual or a community.

4.6 Summary

This chapter presented the findings of the study. The next, and final chapter of the thesis will present a summary of the results, the discussion, recommendations based on the ensuing findings and the study limitations. In addition, study limitations and finally, the study conclusion.

CHAPTER 5

DISCUSSION, RECOMMENDATIONS AND LIMITATIONS

5.1 Introduction

This chapter presents a summary of the results, the discussion, recommendations, the limitations of the study and a conclusion. The discussion will be presented in the same order as the results in chapter four. The recommendations will be presented in three sections, recommendations for nursing education, nursing practice, and further research.

5.2 Summary of results

Out of 154 students, 82 students participated in the study. The response rate was 53.25%. Out of which 62 (75.6%) were female and 20 (24.4%) were male. The Cronbach's alpha calculated for knowledge section was .825 while for the experience section score it was .766.

An independent Kruskall-Wallis test was run to compare the distribution of knowledge scores across age groups yielded a P value of .136 which is greater than (.05), which means that there is no significant difference knowledge across the age groups.

The study found that 64 (78.1%) have no prior education while 6 (7.3 %) possess an undergraduate degree and 12 (14.6%) obtained certificates or diplomas prior to the bachelor's degree.

The average knowledge scores for the respondents with prior education was 73.43, whereas for no prior education was 73.37.

Section two of the questionnaire comprised thirty three likert type questions, the answers were then converted to yes or no in order to give a score to the question. Majority of the respondents answered the question “People with low literacy skills are good at concealing their deficit and are often quite articulate in speaking, so it is difficult to realize that a problem exists” poorly with only 33% of the respondents giving the correct response.

Almost all the respondents (98%) gave the correct response to these two questions: “Make written instructions clear and simple, using language that is easy to read and understand” and

“Ask patients to clarify what the doctor told them before they leave”.

The experiences section of the questionnaire measured the emphasis of health literacy in the curriculum and in the clinical area. The responses regarding health literacy in the curriculum varied widely, while, the health literacy experiences were relatively few on average.

5.3 Discussion

5.3.1 Demographics

5.3.1.1 Reliability analysis

The Cronbach’s alpha calculated for knowledge section was .825 while for the experience section score it was .766. According to Nunnaly and Bernstein (1994) as cited in (Lance, Butts, & Michels, 2006) .70 may be an acceptable minimum for a scale that is newly developed, however Lance et al. (2006) emphasize that basic research should rely upon scales that yields scores with a minimum reliability of .80. These results reveal that the instrument demonstrates internal consistency or reliability since both results were above the .70 cut-off point (.825 and .766), above which study instruments are deemed reliable

5.3.1.2 Response rate

The response rate for this study was 53.25%. Baruch and Holtom (2008) carried out a study to examine response rates for surveys used in organizational research. Following analysis of 1607 studies published between the year 2000 and 2005, 490 studies utilized surveys and were thus examined. The average response rate for studies that utilized data collected from individuals was 52.7% with a standard deviation of 20.4. The high standard deviation indicates that the range of response rates varied and there really is no set limit for response rates in research. In this study, the response rate was found to be 53.25% which is almost the same as the average in Baruch's study. Just because 52.7% is the average response rate in several surveys doesn't make it acceptable as a cut-off point since other factors have to be put into consideration, for instance, the sample and population sizes, which also affect the power of a study. However, in this case, a response rate of 53.25% was deemed sufficient since it represents approximately half the study population (N= 164). The use of total population sampling, a non-probability sample is justified since, probability sampling would have yielded a far lower response rate. Although going with students that were available and willing to participate in the study may have introduced a bias into the study, it was a risk worth taking. It was done to ensure that the power of the study isn't affected by an extremely low response rate attributed to the unavailability of the students, who are often busy in the clinical areas.

5.3.1.3 Age

In this study the mean age of the respondents was 26.4 years, which is consistent with the average in Cormier and Kotrlik (2009) who found an average age of 25years. This is an indication that majority of students entered the Bachelor nursing programme immediately after their matric education, between the ages of 18-20, however, some students were as young as

sixteen years when they joined the programme. This result is expected since most undergraduate students in University are between the ages of 20-25 years, the slight difference could be attributed to an outlier age of 57.

Figure 1 presents the age and gender distribution which shows that there were three times the number of females than males among the respondents in the study. This indicates that the nursing field is still dominated by females; this is consistent with the history of the nursing profession. Males constitute approximately 10% of all nurses in Western countries (Solbrække, Solvoll, & Heggen, 2013), however males represent 24.4% of the respondents in this study. This may be an indication that the numbers of males in the nursing profession may be on the rise; however further studies need to be carried out to verify that assumption.

An Independent sample Kruskal-Wallis test (refer to table 2) compared the distribution of knowledge scores across age groups to determine whether there was a statistically significant difference between the median knowledge scores for the five age groups. Table 2 shows a significance level of .136 which is greater than the P value (.05), which means that there is no significant difference in knowledge across the age groups, thus, the null hypothesis is retained. This result is contrary to what was expected. The expectation was that the older students would display higher scores, based on experience related to their more advanced age and the likelihood of having post-matric education, since it is likely that they were enrolled in other programmes before they got into the current degree. This result is likely due to a very small number of older students as compared to the younger students.

5.3.1.4 Prior education post matric

According to the results as shown in figure 2, only 18 students had prior education while 64 students had no prior education post matric. The average knowledge score for the category with

prior education was 73.43, whereas for no prior education was 73.37. The result demonstrates a difference in mean of .06 in the knowledge scores of the students with prior post-matric education and those without. This difference is quite small, almost insignificant and contrary to the expectations. Students with prior education were expected to perform better than students without prior education.

This result may be due to a very small number (n=12%) of students with prior post-matric education as compared to the ones without who comprised 78%. Another possible reason would be that the fields of study for prior education may not be health related therefore making the prior education irrelevant when it comes to knowledge of health literacy. However data on the fields of study was not collected thus this remains a speculation and further study is needed to determine whether this claim is valid. The null hypothesis (there is no difference in the knowledge scores between the students with prior post-matric education and those without prior post-matric education), was thus retained.

5.3.2 Health literacy knowledge

5.3.2.1 Knowledge of nursing students' regarding the effects of low patient health literacy

As seen in table 3, almost half the students (46%) were unable to identify low health literacy as being associated with poorer health status and increased emergency department use. It is alarming that such a high number of the respondents were unable to identify poor health status and increased emergency use as an effect of health literacy, since these two are among the major effects of low health literacy on a patient. This result points to a possible lack of understanding of the meaning of health literacy.

About two-thirds (62%) were able to correctly point out that patients with low health literacy do not understand medical vocabulary and the basic concepts in health. Despite the question was negatively worded ('trick' question) they scored well in this section, this shows that the respondents had a firm grip of the basics of health literacy. In a study conducted by Macabasco-O'Connell and Fry-Bowers (2011), reported lower results, albeit among nurse professionals who comprised: registered staff nurses, nurse practitioners, and clinical nurse specialists. Only 48% of registered nurses in web-based survey were able to identify health literacy as a barrier to understanding health information. It is very alarming that more than half of the nurses were uninformed. However it is a positive sign that students in the current study are informed, signifying that some health literacy knowledge is available in the curriculum. Around three-quarters (72%) of the students correctly identified that low health literacy is associated with the inability to utilize health services. There is a stark contrast with the Macabasco-O'Connell and Fry-Bowers (2011) study when it comes to this question since only 38% of the respondents were aware that low health literacy is associated with the inability to utilize health services. This result was expected since the inability to utilise health services is one of the main characteristics seen in patients with low health literacy and it can even be termed as an obvious or common sense occurrence thus should not be a problem for nurses to identify. The author suggests that something must have gone wrong in the Macabasco-O'Connell and Fry-Bowers (2011) study when it came to this particular question as the responses are way off. Perhaps the wording of the question confused the nurses or there might have been a problem with coding.

5.3.2.2 Knowledge of nursing students' regarding symptoms of low patient health literacy

The results as seen in table 4, show that only a third (33%) of the students were able to identify that people with low literacy skills are good at concealing their deficit and that it is difficult to

realize that a problem exists. This indicates that 67% percent of the students were unable to identify that people with low literacy skills are good at concealing their deficit and that it is difficult for nurses to realize that a problem exists. This alarming result indicates a gap in knowledge when it comes to the lengths that patients can go through to avoid being exposed as health illiterate, the researcher feels that majority of the respondents chose to oppose the statement since they generally do not expect patients to be deceitful when divulging information regarding their health, rather they expect honesty. The wording of the question may have also contributed to this result as it may have portrayed the patient as a villain, which is not what is implied, however it is possible that the respondents may have perceived it that way. However, respondents demonstrated sufficient knowledge in the rest of the questions.

Despite being a negatively worded question, three-quarters (74%) of respondents correctly pointed out that a patient's poor communication skills do not indicate a lack of intelligence, this is a good indication that students interact respectfully with patients and are likely to create a shame-free environment to avoid embarrassing patients. In this environment, patients will feel comfortable disclosing personal information to the nurses, without fear of embarrassment. This is the first step in the walk to a more health literate population. From this shame-free environment, a nurse is able to detect the patient's health literacy status and implement strategies to improve their health literacy and health outcomes simultaneously.

Almost two-thirds (63%) of the respondents were aware that patients often make excuses when asked to read or fill out forms, however a study carried out to examine health literacy knowledge and experience of nurses in the State of Georgia, reported that (92%) of respondents displayed the knowledge that when patients are provided health information and they express a desire to take the information home to read, it may be an indication that the patient has difficulty reading

the materials (Knight, 2011). The difference in scores (92% and 63%) could be attributed to the fact that the respondents in the Georgia study were registered nurses', therefore likely to be more knowledgeable and experienced than the student nurses in this study.

Majority of respondents (87%) correctly identified that patients with poor literacy skills may feel intimidated and avoid asking questions, which may be misinterpreted to mean that they understand the instructions when in fact they do not. This is a good result, it is important that nurses are cognisant that patients may be unable to ask for clarification for instructions or even ask questions about their health. Being aware of this should prompt nurses to encourage patients to open up by providing a judgment free environment. Nurses should make it their goal to ensure that patients are able to utilize and reap maximum benefits from the health care that they provide.

5.3.2.3 Knowledge of nursing students' regarding patient health literacy during patient interaction with the health environment and resources

The average knowledge score for this subsection as seen in table 5 was considerably higher than the previous sections at about 73% since the knowledge scores for all questions in this section scored higher than 55%. The lowest score in this section was 56%, where slightly more than half of the respondents recognized that patient's literacy level is a concern in healthcare settings because some patients are not aware that they have low literacy skills. A large number (44%) of the respondents reported not knowing that some patients are unaware of their lack of health literacy capabilities, which is a point of concern. The implication is that almost half of the respondents would be unable to identify a patient with low health literacy, let alone apply any strategies to enhance their health literacy. This indicates a knowledge gap which can only be

filled by educating nursing students about health literacy, more so on how to recognize low health literacy.

About 68% percent of the respondents were able to identify that patients with low literacy are often ashamed of this problem and rarely tell anyone, the score for this question is considerably lower than the 89% score on a study conducted in the United States (Cormier & Kotrlik, 2009). This lower score could be attributed to the notion that health literacy is a relatively new concept in Africa as compared to the United States, where it has been in existence since 1974.

It is high time that health literacy training is introduced in all health learning institutions as a widespread measure which will lead to enhanced health literacy amongst not only health care workers but patients as well. Unfortunately third world countries have been left behind when it comes to recognizing low health literacy and the implementation of measures to curb this deficiency. Africa and other third world countries are tasked with catching up with the rest of the world (the developed countries), who have put measures in place to identify low health literacy and other measures to mitigate its effect on the health outcomes of individuals. Low health literacy is fast threatening to turn into an epidemic that will serve to erode the significant efforts made so far, such as eradicating polio and the fight against malaria etc.

The first step in combating this threat is in educating nurses, who comprise the majority of health care workers and have the longest interaction with patients.

5.3.2.4 Knowledge of nursing students' of factors and strategies that promote patient health literacy

The average score in this sub-section (as seen in table 6) is the highest compared to the other three sections and ranges between 43% and 98%. It is reassuring that the respondents

demonstrated adequate knowledge, especially with regard to strategies that promote health literacy. The question now is whether they practice these strategies. Unfortunately, data on this was not collected, and the researcher recommends this for future research.

The results showed that 57% of respondents failed to disagree with the statement that health care providers should provide help to patients preferably in an area where they can be overheard by others. This was a reverse question and the respondents were expected to disagree with the statement because patient information should be kept confidential. Furthermore, a patient with low health literacy is likely to feel ashamed and unlikely to disclose any information that may embarrass them. The respondents may, however, have been confused or misread or misinterpreted the question, which may appear straight forward. However, it may be possible that the students may have perceived that disagreeing with the statement would imply having to deal with a patient alone in private, which could be easily misunderstood or taken the wrong way (it may even have brought the idea of sexual harassment or other malpractice into their minds). Another possible explanation could be that the question was negatively worded which may have led to acquiescence bias, where the respondents agree with statements as presented in order to "please" the experimenter (Schriesheim & Hill, 1981). This is only speculation, however in future it would be unwise to make this a negative question in order to avoid this misunderstanding.

Approximately half the students (54%) disagreed with the statement "reinforcing information is not necessary for retention of information". This means that 46% were not able to answer correctly. This was also a negative or reversed question, which may have a lot to do with the poor performance due acquiescence bias as mentioned above. Another plausible explanation would be that students skimmed through the question possibly misreading it or they answered the

question in a hurry. However, if either one of this explanations is not the case then it is a point of concern that about half the respondents do not know or agree that reinforcing information while communicating with patients is necessary. It is also recommended that the question should not be reversed in future to avoid misinterpretation and bias.

5.3.2.5 Knowledge scores

Figure 3 presents the distribution of knowledge scores. As much as 25% of respondents had health literacy knowledge scores below 21.75 (65.9%), and 25% of respondents had health literacy knowledge scores above 28 (84.9%).

The respondents scored higher than the 70% cut off that was set with an average of 73.47%, this score is higher compared with the results from Cormier (2006), where the average score was 61.24%. The slight difference could be attributed to having different questions in the questionnaire. The histogram displays a normal distribution though skewed to the left - this is because the median score is higher than the mean, possibly related to one outlier where one respondent who gave "unsure" responses for all the questions and scored 0%. The students, however, displayed sufficient knowledge which is commendable.

The results of the health literacy scores were satisfactory, however considerable knowledge gaps were evident in three sections: the effects of low patient health literacy, the signs and symptoms of low patient health literacy and patient health literacy during patient interaction with the health environment and resources. This signifies that a lot needs to be done to increase the students' knowledge of health literacy.

5.3.3 Health literacy experiences

The results as shown in figure 4, show that less than half of respondents reported having health literacy emphasized in most subjects in their curriculum. About a quarter reported having had health literacy emphasized in one subject, another quarter reported at least once, while 11.0% reported to have never had health literacy emphasised in their curriculum. These perceived differences on the emphasis of health literacy in the curriculum could be attributed to their division into different groups during training. The students are placed in different classes with different lecturers whose emphasis of health literacy may vary. It could also be attributed to the students' class attendance which may vary - some students may have lower attendance than others. The results of the respondents' experiences reveal that the students had little or no experience with the use of computer software, videotapes or audio tapes for patient education. However, they demonstrate adequate experience when it comes to written health care information and some experience with regards to the use of illustrations for patient teaching. Cormier (2006) and Knight (2011) also reported the similar results.

The ANOVA (See table 7) revealed no significant difference between the knowledge scores with relation to the students' reports regarding emphasis of health literacy in the curriculum. This led to rejection of the null hypothesis as there was no difference between the knowledge scores. This result demonstrates that students who reported that health literacy was emphasized in every subject in the curriculum did not score differently from those who reported to having little or no health literacy emphasis in the curriculum. This could perhaps indicate that even though most of the respondents reported having health literacy emphasized in most subjects in the curriculum, the level of emphasis may not have been sufficient to influence the scores.

According to the results as shown in table 8, the strongest health literacy experience was in using written healthcare materials to provide health information to patients and community groups, followed by evaluating the reading level of healthcare materials before using them for patient teaching.

While the areas of least health literacy experience were in the use audio tapes, videotapes and computer software in patient education. These results reflect the current practice in the field since written materials are the most popular material utilised for patient teaching than audio tapes, videotapes and computer software, this probably due to the high cost of these materials compared to printed materials.

These results suggest that participants could benefit from increased health literacy experience. However, the focus of the health literacy experience was narrow as it only captured patient education. Regrettably, crucial areas of health literacy experiences such as nurse and patient interaction and communication were left out. The researcher suggests further research in the topic with the inclusion of experience in patient interaction.

5.4 Recommendations

5.4.1 Recommendations for nursing education

The results indicated that the experiences of bachelor nursing students were satisfactory but, with huge knowledge gaps in many of the sections. The study, therefore, recommends that respondents are likely to benefit from increased and more comprehensive exposure to health literacy within the nursing curriculum.

The results also portray that the emphasis of health literacy in the curriculum failed to effect the health literacy knowledge scores, deeming it insufficient.

It has been shown that low health literacy is a major public health problem in the U.S. and European countries and more so in developing countries which are burdened with a poverty, widespread illiteracy, wide array of diseases, lack of clean water and sanitation, and HIV/AIDS. It is essential that our current and next generation of nurses both learn about the burdens that low health literacy places on individuals, on the healthcare system, and on society as a whole, and recognize how nursing can take a leadership role in decreasing low health literacy. Hence, all nursing education programmes should incorporate health literacy content throughout curricula. Nursing students should be astute in identifying individuals who have low health literacy. They must also be able to adapt patient education interventions to assure patient understanding of vital health information.

It is also necessary to incorporate evidence-based strategies that promote patient health literacy for example:

1. Recognition of patient cues suggestive of low health literacy.
2. Starting with the most important pieces of information in patient teaching.
3. Focusing on 3 to 5 main points and a "need to know" basis.
4. Clearly communicating instructions to patients.
5. Asking patients to repeat information to ensure they have understood.
6. Using simple language and avoiding medical jargon.

The above examples point out some of the strategies that nurses should integrate into practice for the purpose of improving communication with patients and subsequently, health literacy.

In light of the results, nursing schools also need to actively facilitate more health literacy experiences for nursing students. The students reported having very little health literacy experience, e.g. when it came to checking the reading level and cultural effectiveness of

healthcare materials, and the use of technology in patient education. This can be rectified by introducing clinical training specifically targeting health literacy of patients in the clinical areas.

5.4.2 Recommendations for nursing practice

It is of critical importance that nurses have a good grasp of health literacy. Sufficient knowledge in this field will enable them identify patients with low health literacy skills and implement effective teaching strategies, which would lead to improved patient outcomes and at the very least enable patients to make informed decisions about their healthcare.

Several studies have reported low health literacy knowledge and experience amongst registered nurses, which presents a big problem when it comes to enhancing patient health literacy. It is likely that this problem (low health literacy knowledge among RN's) could be exacerbating the effects of low health literacy among patients. If RN's are oblivious to a patient's low health literacy status then they are unlikely to do anything to enhance it.

Practicing nurses must be competent in identifying patients with low health literacy and communicating health information to patients in ways that will lead to improved health literacy since the ultimate goal of patient interactions is to empower the patient by enhancing their capacity to obtain, comprehend, and act on information needed for optimising health outcomes. Based on this observation, the researcher recommends continuing education programmes focusing on health literacy for RN's. Outcome measures for such an education programme should include for example, measurement of patient understanding of health information, patient health outcomes.

In the meantime, nurses could incorporate the evidence-based strategies (mentioned in the recommendations for nursing education above) to improve communication and interaction with

patients that would lead to maximization of their health outcomes, before education and training programmes are implemented.

5.4.3 Recommendations for further research

The health literacy levels of patients go hand in hand with the knowledge of health literacy of health care workers, however there is little or no research addressing the status of health literacy in Africa and indeed many other low-resource settings. This study has reviewed the relevance of health literacy when it comes to health outcomes and it, therefore, raises a concern that up until now no efforts have been made to neither improve nor determine the health literacy levels of Africans. This researcher, therefore, calls for more research in this area, as the first but critical step in promoting health and wellbeing and addressing poor health outcomes.

Another recommendation, mentioned earlier, is a call for further research to evaluate health literacy knowledge and experience of nursing students with regard to prior education and whether it makes a difference in knowledge scores.

5.5 Limitations of the study

Information obtained in a survey tends to be superficial. The breadth rather than the depth of the information is emphasized (Haber, 2010).

It may not be possible to generalize the results of this study since a representative sample is not assured because a non-probability sampling technique (convenience sampling) was employed. There is no way of knowing whether the respondents in the study are a true representative of the population without using a random sample.

The use of Likert Scale questions as the source of data may have introduced several biases to the study for instance, central tendency bias where respondents may avoid extreme response

categories (Lee, Jones, Mineyama, & Zhang, 2002) especially in the experiences section of the questionnaire which gives the wrong picture of the situation. It would have been more appropriate to ask the respondents for the number of times they performed a certain task. For instance, how many times did you use videotapes for patient education? Rather than rating the response on a Likert scale. A Likert scale in a way limits the number of responses one can give and the information is difficult to quantify.

The researcher included some reverse Likert scale questions in the questionnaire to items to control acquiescence response bias, these questions may have actually impaired response accuracy since a considerable number of respondents answered the reversed questions wrongly, despite some being "common sense". Acquiescence bias where the respondents agree with statements as presented in order to "please" the experimenter (Schriesheim & Hill, 1981).

5.6 Conclusion

The results indicated that knowledge gaps exist in some areas, for instance, when it comes to the impact of low health literacy on patient health outcomes, and identification of patients with low health literacy. The experiences section also demonstrated a low level of experience, this may suggest that respondents may not have had access to audiotapes, videotapes, and computer software needed to provide health care instruction in the clinical areas.

Without nursing understanding the widespread problem of low health literacy and its implications, they will not be able to facilitate understanding for patients with low health literacy skills (Sorrell, 2006), this goes for registered nurses as well, as studies have also revealed that there are gaps in their knowledge. It is, therefore, imperative that nurses have sufficient

knowledge of health literacy encompassing all areas in this field, since they undertake a major role in patient education it is critical that they.

Nurses play a major role in providing leadership that meets the challenge of low health literacy in our society. As health care providers it is important to know the strategies that enhance health literacy for example, creating a patient-centred, and shame-free environment that enhances for all patients. Knowing how to assess patients' ability to read and understand health information is essential if we are to identify the most vulnerable patients who most need help addressing their low health literacy. It, therefore, goes without saying that we should start to teach future generations of nurses' effective communication strategies to enable patients with low health literacy reap the benefits of health care and maintain good health and well-being. Teaching students and practicing nurses how to utilize practices that address low health literacy in patients will not only benefit individual patients but will also help reduce health disparities in the twenty-first century and beyond (Cornett, 2009).

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APPENDIX A: HEALTH LITERACY SURVEY

HEALTH LITERACY KNOWLEDGE AND EXPERIENCE SURVEY

Health literacy is the ability to read understand and make decisions about health care. The purpose of this study is to assess the health literacy knowledge and experiences of undergraduate nursing students enrolled at the University of the Western Cape.

Your participation in the study will contribute to the body of knowledge on health literacy and will provide valuable information to nursing faculty responsible for developing a nursing curriculum that prepares nursing students with the skills needed to provide health care to individuals with low health literacy skills.

Your responses will be kept anonymous and in no way affect your grade in any nursing course. I encourage your participation in this study, however it is optional.

PART 1: DEMOGRAPHIC DATA

Please tick the appropriate response.

1. Gender

Male		Female	

2. What is your age in years? ……

3. Do you have any prior post school educational experience?

☐ No prior degrees

☐ At least one undergraduate degree before entering nursing school

☐ At least a master's degree before entering nursing

☐ Other (Diploma, certificate) (Tick appropriate)

4. How frequently was health literacy emphasized in your nursing curriculum?

☐ Never

☐ At least once during my training

☐ In some subjects during my training

☐ In most subjects during my training (Tick appropriate)

PART 2: HEALTH LITERACY KNOWLEDGE

The following statements are pertaining to patients' health literacy and the health literacy skills employed by health care professionals when engaging with patients. To what extent do you agree or disagree with the following statements?

Please make tick (√) in the appropriate block alongside each statement.

Statement	Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree
EFFECTS OF LOW PATIENT HEALTH LITERACY					
5. Patients with low health literacy understand medical vocabulary and the basic concepts in health					
6. Patients with low health literacy often miss appointments and/or make errors regarding their medication.					
7. Low health literacy is associated with poorer overall health status					
8. Low health literacy is associated with poor ability to take medications properly					
9. Low health literacy is associated with increased emergency department and hospital use					
10. Low health literacy is associated with poor ability to interpret labels and health messages.					
11. Low health literacy is associated with inability to utilize health services e.g. vaccines.					
IDENTIFICATION OF LOW HEALTH LITERACY					
12. Patients with poor literacy skills may feel intimidated and avoid asking questions, this behaviour may be misinterpreted to mean that they understand the instructions when really they do not understand them.					

13. A patient's poor communication skills indicates a lack of intelligence					
14. People with low literacy skills are masters at concealing their deficit and are often quite articulate in speaking, so it is difficult to realize that a problem exists.					
15. Patients provide an incomplete medical history or check items as "no" to avoid follow-up questions.					
16. Patients often make excuses when asked to read or fill out forms.					
HEALTH LITERACY ENVIRONMENT AND RESOURCES	**Strongly Disagree**	**Disagree**	**Not Sure**	**Agree**	**Strongly Agree**
17. Stress and anxiety limit the ability to listen, learn, and remember.					
18. Filling out registration forms, health histories, and consent forms is difficult for those with low health literacy skills					
19. Patients with low health literacy skills understand medical jargon					
20. A patient's literacy level is a concern in healthcare settings because some patients are not aware that they have low literacy skills					
21. Patients with low health literacy are often considered noncompliant					
22. People with poor literacy skills find that understanding healthcare information is a challenge					
23. Patients with low literacy skills are often ashamed of this problem and rarely tell anyone					

STRATEGIES TO IMPROVE HEALTH LITERACY	Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree
24. To increase retention, speak slowly and limit the amount of advice given to patients					
25. To increase retention organize the information logically, focusing on the three to five most important 'need to know' points.					
26. Break down complex instructions into small units of information to help the patient grasp and understand the information increase retention					
27. Use plain language as opposed to medical jargon					
28. Reinforcing information is not necessary for retention					
29. Verbal instruction should be reinforced with printed instructional materials that are easy-to-read and visual materials					
30. Patients with low literacy skills are not likely to benefit from seeing pictures.					
31. Offer all patients help in completing forms.					
32. Provide this help preferably in an area where they can be overheard by others.					
33. Simplify all forms using clear language, non-medical terms when possible, and easy-to-read formats					
34. Ask for all necessary information at registration or during admission to a facility					
35. Make written instructions clear and simple, using language that is easy to read and understand					
36. Not review the instructions with patients and check to be sure they understand the information.					
37. Ask patients to clarify what the doctor told them before they leave					

PART 3: HEALTH LITERACY EXPERIENCE

The following statements are pertaining to your experience with regard to health literacy during your clinical training.
Please use the following scale to rate your health literacy experiences.
Please make tick (√) in the appropriate block alongside each statement.

HEALTH LITERACY EXPERIENCES	Always	Very Often	Some times	Rarely	Never
38. How often do you evaluate the cultural appropriateness of health care materials including different handouts, videos & audiotapes before using them for teaching?					
39. How often do you evaluate the use of illustrations to in written health care materials before using them for teaching?					
40. How often do you use written materials to provide healthcare information to an individual or a community group?					
41. How often do you use audiotapes to provide healthcare information to an individual or a community group?					
42. How often do you use videotapes to provide healthcare information to an individual or a community group?					
43. How often do you use computer software to provide healthcare information to an individual or a community group?					

APPENDIX B: INFORMATION SHEET

UNIVERSITY *of the* WESTERN CAPE

DEPARTMENT OF RESEARCH DEVELOPMENT

Private Bag X17, Bellville 7535, South Africa

Tel: +2798688239

Email: 3410307@myuwc.ac.za

Project Title: Health literacy knowledge and experience of bachelor nursing students at a University in the Western Cape

What is this study about?

This is a research project being conducted by Francisca Mibei at the University of the Western Cape. We are inviting you to participate in this research project because you are a senior nursing student at the Western Cape. The purpose of this research project is to establish the health literacy knowledge and experiences of Bachelor Nursing students.

What will I be asked to do if I agree to participate?

You will be asked to complete a consent form then fill out a questionnaire which will take approximately 20 minutes.

Would my participation in this study be kept confidential?

The researcher undertakes to protect your identity and the nature of your contribution. To ensure your anonymity, the survey is anonymous and will not contain information that may personally identify you and your name will not be included on the surveys and other collected data.

To ensure your confidentiality, your questionnaire will be available only to the researcher, statistician and the supervisor. The response questionnaires will be kept in a locked cabinet for five years after the results are published.

If we write a report or article about this research project, your identity will be protected.

What are the risks of this research?

There are no risks associated with participating in this research study.

What are the benefits of this research?

This research is not designed to help you personally, but the results may help the investigator learn more about student's knowledge and experience in health literacy. We hope that, in the future, other people might benefit from this study through improved understanding of health literacy in order to improve the educational preparation of nurses.

Do I have to be in this research and may I stop participating at any time?

Your participation in this research is completely voluntary. You may choose not to take part at all. If you decide to participate in this research, you may stop participating at any time. If you decide not to participate in this study or if you stop participating at any time, you will not be penalized or lose any benefits to which you otherwise qualify.

What if I have questions?

This research is being conducted by Francisca Mibei, at the nursing department, University of the Western Cape. If you have any questions about the research study itself, please contact her at: Cell phone: +27798688239

Email: 3410307@myuwc.ac.za.

Should you have any questions regarding this study and your rights as a research participant or if you wish to report any problems you have experienced related to the study, please contact:

Prof. Karien Jooste

Head of Department

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Private Bag X17

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Prof José Frantz

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This research has been approved by the University of the Western Cape's Senate Research Committee.

APPENDIX C: CONSENT FORM

UNIVERSITY *of the* WESTERN CAPE

DEPARTMENT OF RESEARCH DEVELOPMENT

Private Bag X17, Bellville 7535, South Africa

Tel: +2798688239

Email: 3410307@myuwc.ac.za

Title of Research Project: Health literacy knowledge and experience of Bachelor Nursing students at a University in the Western Cape.

The study has been described to me in language that I understand. My questions about the study have been answered. I understand what my participation will involve and I agree to participate of my own choice and free will. I understand that my identity will not be disclosed to anyone. I understand that I may withdraw from the study at any time without giving a reason and without fear of negative consequences or loss of benefits.

Participant's name……..

Participant's signature…….

Date……

APPENDIX D: ETHICS CLEARANCE CERTIFICATE (UWC)

UNIVERSITY of the
WESTERN CAPE

OFFICE OF THE DEAN
DEPARTMENT OF RESEARCH DEVELOPMENT

08 September 2015

To Whom It May Concern

I hereby certify that the Senate Research Committee of the University of the Western Cape approved the methodology and ethics of the following research project by:
Ms FC Mibei (School of Nursing)

Research Project:	Health literacy knowledge and experience of Bachelor Nursing students at a University in the Western Cape.
Registration no:	15/6/16

Any amendments, extension or other modifications to the protocol must be submitted to the Ethics Committee for approval.

The Committee must be informed of any serious adverse event and/or termination of the study.

Ms Patricia Josias
Research Ethics Committee Officer
University of the Western Cape

Private Bag X17, Bellville 7535, South Africa
T: +27 21 959 2988/2948 . F: +27 21 959 3170
E: pjosias@uwc.ac.za
www.uwc.ac.za

APPENDIX E: CONSENT FROM THE REGISTRAR'S OFFICE

UNIVERSITY of the
WESTERN CAPE

8 January 2016

Dear Ms FC Mibei

RE: PERMISSION TO CONDUCT RESEARCH AT THE UNIVERSITY OF THE WESTERN CAPE

As per you request, we acknowledge that you have obtained all the necessary permissions and ethics clearances and are welcome to conduct your research as outlined in your proposal and communication with us.

Please note, that while we give permission to conduct such research (i.e. interviews and surveys) staff and students at this University are not compelled to participate and may decline to participate should they wish to.

Should you require any assistance in conducting your research in regards to access to student contact information please do let us know so that we can facilitate where possible.

Yours sincerely

DR AHMED SHAIKJEE
MANAGER: STUDENT ADMINISTRATION
OFFICE OF THE REGISTRAR

APPENDIX F: PERMISSION FROM HEAD OF SCHOOL OF NURSING

UNIVERSITY OF THE WESTERN CAPE
SCHOOL OF NURSING

Private Bag X 17, Bellville 7535, South Africa

Tel: +27 21-9592274, Fax: 27 21-9592271
E-mail: kjooste@uwc.ac.za

PERMISSION LETTER

14 September 2015

Francisca Mibei

Title of Research Project: Health literacy knowledge and experience of Bachelor Nursing students at a University in the Western Cape

You are granted permission to conduct your study at the School of Nursing.

You have to arrange the data collection with the appropriate level coordinator(s) for a convenient time. During this phase you have to adhere to the ethical principles outlined in your study.

I wish you success with your studies.

Prof K Jooste
Director
School of Nursing

APPENDIX G: ANOVA, MULTIPLE COMPARISON'S TABLE

Multiple Comparisons

Dependent Variable: Total

	(I) Age group	(J) Age group	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Scheffe	1.00	2.00	-1.547	1.463	.890	-6.17	3.07
		3.00	1.890	1.632	.853	-3.27	7.05
		4.00	3.140	2.617	.836	-5.13	11.41
		5.00	7.307	2.990	.213	-2.14	16.75
	2.00	1.00	1.547	1.463	.890	-3.07	6.17
		3.00	3.438	1.914	.525	-2.61	9.48
		4.00	4.688	2.801	.594	-4.16	13.54
		5.00	8.854	3.153	.108	-1.11	18.82
	3.00	1.00	-1.890	1.632	.853	-7.05	3.27
		2.00	-3.438	1.914	.525	-9.48	2.61
		4.00	1.250	2.893	.996	-7.89	10.39
		5.00	5.417	3.235	.594	-4.80	15.64
	4.00	1.00	-3.140	2.617	.836	-11.41	5.13
		2.00	-4.688	2.801	.594	-13.54	4.16
		3.00	-1.250	2.893	.996	-10.39	7.89
		5.00	4.167	3.827	.879	-7.93	16.26
	5.00	1.00	-7.307	2.990	.213	-16.75	2.14
		2.00	-8.854	3.153	.108	-18.82	1.11
		3.00	-5.417	3.235	.594	-15.64	4.80
		4.00	-4.167	3.827	.879	-16.26	7.93
Games-Howell	1.00	2.00	-1.547	1.226	.715	-5.09	2.00
		3.00	1.890	1.191	.519	-1.61	5.39
		4.00	3.140	2.502	.730	-8.74	15.02
		5.00	7.307	8.867	.903	-59.91	74.53
	2.00	1.00	1.547	1.226	.715	-2.00	5.09
		3.00	3.438	1.380	.124	-.61	7.48
		4.00	4.688	2.597	.473	-6.71	16.08
		5.00	8.854	8.894	.843	-57.65	75.36
	3.00	1.00	-1.890	1.191	.519	-5.39	1.61
		2.00	-3.438	1.380	.124	-7.48	.61
		4.00	1.250	2.581	.985	-10.23	12.73
		5.00	5.417	8.889	.961	-61.21	72.04
	4.00	1.00	-3.140	2.502	.730	-15.02	8.74
		2.00	-4.688	2.597	.473	-16.08	6.71
		3.00	-1.250	2.581	.985	-12.73	10.23
		5.00	4.167	9.158	.986	-56.66	64.99
	5.00	1.00	-7.307	8.867	.903	-74.53	59.91
		2.00	-8.854	8.894	.843	-75.36	57.65
		3.00	-5.417	8.889	.961	-72.04	61.21
		4.00	-4.167	9.158	.986	-64.99	56.66