

**DISASTER PREPAREDNESS OF PROFESSIONAL NURSES
IN A CENTRAL URBAN PUBLIC SECTOR TERTIARY
HOSPITAL IN JOHANNESBURG**

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A research report submitted to the
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of
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DECLARATION

I, Craig Vaughan, declare that this research report is my own work. It is being submitted for the degree of Master of Science (in Nursing) at the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination at this or any other university.

Signature

.....day of 2019

Protocol Number M130922

DEDICATION

“Let never day nor night unhallowed pass, but still remember what the Lord hath done.”

William Shakespeare 1564 – 1616

Thank you to Our Heavenly Father for the strength and ability to perform this monumental task. Praise unto the Lord. You provided everything needed to complete this assignment. May His Name be exalted.

A special dedication and tribute goes to my late mother, Theresa Dora Vaughan, who passed on in 2015. I know you would have been proud of me for obtaining this achievement. Rest in peace mom, may God Bless you and keep you.

ACKNOWLEDGEMENTS

I would like to extend special recognition to my supervisor, Professor Shelley Schmollgruber, for her knowledge, endurance, continuous support, motivation, encouragement and guidance. Without you, this would not have been possible. You were my beacon of light through the darkness. I wish you everything beautiful, and may prosperity follow you wherever you go and in whatever you may do. Many, many thanks.

A prominent figure in my life is my wife, Lanshire Vaughan, who has been with me from the beginning of this journey and never became tired of giving all she had in supporting me. I could not have asked for a better life partner. Thank you my Love; I love you, dearly.

Thank you to all my relatives and friends who given me additional support and added encouragement, it is highly appreciated. Thank you.

“EVERY ENDING HAS A NEW BEGINNING.” The French quotes

ABSTRACT

Background: Large scale disasters globally demonstrate that no one person nor country is immune from the threat of natural disasters or other tragedies. Although South Africa has been relatively free from large scale disasters, this does not override the need for a responsible society for disaster preparedness. According to Garbutt, Peltier and Fitzpatrick (2008), research is needed to assess nurses' familiarity with disaster preparedness as it is crucial to have a nursing workforce that would be prepared and willing to respond.

Aim: The aim of this study was to explore and describe disaster preparedness of professional nurses in a central urban public sector tertiary hospital in Johannesburg, with the intention of making recommendations for clinical practice and education of such nurses.

Setting: The setting for the study was the Emergency Departments and Intensive Care Units at a public sector tertiary hospital in Johannesburg.

Design and Methods: A quantitative, explorative, descriptive and cross sectional research design was utilised in this study. The total population for this study was 210 (N = 210). Eighty (n=80) respondents returned their completed questionnaires, which gave a 38.09% response rate. Data was collected using an adapted survey questionnaire developed by Fung, Loke and Lai (2008).

Results: The majority of nurses (92.5%; n = 74) in this study indicated they were not adequately prepared for disasters, while only 6.3% (n = 5) acknowledged they felt fully prepared. The nurses believed they could contribute to disaster preparedness through their roles as educators (73.8%; n = 59), coordinators (71.3%; n = 57) and caregivers (70.0%; n = 56). Most of the respondents were aware of existing protocols of disaster management at the hospital, but only 2.5% had read them. Courses taken in such areas as basic first aid (50.0%; n = 40), trauma life support (42.5%; n = 34) and disaster management (41.3%; n = 33) were cited as important in preparing for disasters.

Conclusion: Nurses in this study revealed they were not sufficiently prepared for disasters, nor had they read the disaster management protocols. Recommendations are made for clinical practice and education of professional nurses.

Keywords: disaster preparedness, professional nurses, South Africa

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LIST OF ABBREVIATIONS

CRED	Centre for Research on the Epidemiology of Disasters
DPET	Disaster Preparedness Evaluation Tool
DPQ	Disaster Preparedness Questionnaire
EM-DAT	Emergency Events Database
EPIQ	Emergency Preparedness Information Questionnaire
FEMA	Federal Emergency Management Agency
ICN	International Council of Nurses
ICU	Intensive Care Unit
IFRC	International Federation of Red Cross and Red Crescent Societies
RSA	Republic of South Africa
SANC	South African Nursing Council
SANDF	South African National Defence Force
SAPS	South African Police Services
SARS	Severe Acute Respiratory Syndrome
UN	United Nations
WADEM	World Association for Disaster and Emergency Medicine
WHO	World Health Organization

CHAPTER ONE

OVERVIEW OF THE STUDY

1.0 INTRODUCTION

This chapter provides an overview of the study, which comprises the background, problem statement, research questions, aim and objectives of the study and significance of the study. Included is also an overview of the research methods and design, validity and reliability of the study and ethical considerations.

This study sought to explore and describe the disaster preparedness of professional nurses working in the Emergency Departments and Intensive Care Units of a public sector tertiary hospital in Johannesburg. The findings of the study may facilitate the identification of strengths and weaknesses and help in the planning of future education and training experiences for professional nurses.

1.1 BACKGROUND OF THE STUDY

Globally, the number of disaster situations are increasing, resulting in significant numbers of reported deaths and an increase in the numbers of people affected by these disasters. In the last decade alone there has been an estimated 60% increase in disasters worldwide, in which an estimated 2 million people lost their lives, 4.2 million were injured, 3.3 million were left homeless, and three billion were otherwise affected (Achora & Kamanyire, 2016).

However, lessons learned from recent significant disasters demonstrate that no country has protection from the threat of natural disasters or other tragedies. Disasters not only have the potential to change the geographical landscape of an affected region, but also impact on the healthcare, social and economic infrastructure of that country. Nations with more resources may be able to move forward quickly and restore infrastructure and economy, but this may not be the same for developing nations with limited resources (Ibrahim, 2014). To circumvent these problems, international organisations, such as the United Nations (UN) and

World Health Organization (WHO) have developed disaster management guidelines for member countries to adopt that not only include response and recovery, but also a proactive risk management approach (WHO, 2017; UNISDR, 2015).

In the event of a disaster, nurses working in the hospital emergency units would be part of the first-line responders after emergency medical services to provide care for victims. Even though some of these nurses may have basic knowledge of natural disasters, most are not familiar with aspects of bioterrorism, large-scale disasters and mass casualties (O'Sullivan, Dow, Turner *et al.*, 2008; Oztekin, Larson, Akahoshi *et al.*, 2016; Whetzel, Walker-Clio, Chan *et al.*, 2013). All nurses, with their comprehensive education and training, should possess fundamental knowledge and skills regarding disaster preparedness (Loke & Fung, 2014; Ibrahim, 2014). This view is shared by the International Council of Nurses (ICN), which states "*nurses can assist in all stages of disaster programmes, as well as during disasters*" (ICN, 2006:13). However, "can" assist is not the same as "should" or "must" assist.

In a Chinese study, Fung, Lai and Yuen (2009) reported on individual nurses' perceptions of disasters. Findings in this study ranged from "major traffic accident to Severe Acute Respiratory Syndrome (SARS) outbreak, weather events, and with recent overcrowding stampeding at a nightclub." This study is limited in its findings because the authors seem to focus on nurses' opinions of disasters and not their actual preparedness. It does raise concern that nurses may not have a mutual understanding of disasters, being instead reliant on events from experiences of what could be considered small-scale events.

Another Chinese study by Fung, Loke and Lai (2008) aimed to investigate nurses' disaster preparedness. Ninety seven percent of the nurses in this study reported they did not feel adequately prepared to respond to a disaster; most (85%) were aware of the hospital disaster protocols but had not read them. These authors concluded that nurses might benefit from obtaining more education (Fung, Loke & Lai, 2008).

In a mixed methods study, Hammad, Arbon and Gebbie (2011) examined 194 Australian hospital emergency nurses' knowledge and perceptions of their roles in

disaster response. Most (85%) of the nurses failed the knowledge test with a score of less than 50%, even though 69% had completed hospital education/training related to disasters. Other forms of disaster education/training included postgraduate studies (33%), Major Incident Medical Management and support (13%), Emergo train (10%), Online education (7%), Military training (5%), and Emergency Management Australian Courses (5%). Two-thirds (70%) of the nurses had not experienced a disaster response. Three themes emerged from the data: a) nurses had minimal previous disaster experience (real or simulated), b) others had obtained disaster education, and c) nurses had minimal knowledge of disaster preparedness. It was concluded that nurses would benefit from more appropriate disaster education and training, and a need for further research into the appropriateness of education and training was identified (Hammad, Arbon & Gebbie, 2011).

In a Canadian study, O'Sullivan, Dow, Turner *et al.* (2008) surveyed a national sample of nurses (n=1543) practicing in different Emergency departments and Intensive Care Units to determine whether they felt prepared to respond to large scale disasters. Included was the ability to respond to chemical, biological, radiological and nuclear events (O'Sullivan, Dow, Turner *et al.*, 2008). In this study, approximately half the nurses (47%) agreed that their institutions had programmes and policies to manage disasters, however, 59.8% these nurses reported that institutions do not provide continuing education on disaster preparedness and that they were not prepared nor equipped to care (40%) for victims of a large-scale disaster event (O'Sullivan, Dow, Turner *et al.*, 2008).

It is evident in the literature that nurses' perceptions of disaster preparedness may vary by geographical location (Chapman & Arbon, 2008; Labrague, Yboa, McEnroe-Petitte *et al.*, 2016), the area of expertise (Al Thobaity, Plummer, Innes *et al.*, 2015; Hammad, Arbon, Gebbie *et al.*, 2012) and previous experience and training (Nilsson, Johansson, Carlsson *et al.*, 2016; Wenji, Turale, Stone *et al.*, 2015). Each nurse has a personal responsibility to be prepared for disaster situations (Arbon, Cusack, Ranse *et al.*, 2013). The government, local hospitals and academic institutions have a responsibility to ensure that healthcare professionals are better prepared to respond to real or simulated disasters (Laaser & Beluli, 2016; Mehta,

2007). Thus, knowledge gained from past disaster events that have occurred around the world should be taken note of when raising awareness amongst nurses of being personally and professionally prepared to respond when disaster strikes.

Nurses are also a vital source of information for the communities in which they serve (Loke & Fung, 2014), and therefore, their preparedness and involvement in disaster management, including mitigation and prevention, rapid responses, effective management and rehabilitation, is vital for the well-being of that community (ICN, 2009). However, investigation into disaster preparedness of healthcare professionals is limited in Africa, including South Africa. These developing nations are faced with increasing levels of disaster risk as they are inclined to natural and man-made disasters, such as earthquakes, floods, wildfires, droughts and public health events, such as cholera and rift valley fever (Guha-Sapir, Below & Hoyois, 2015; South Africa, Act No 57 of 2002, as amended). A study focused on this valuable aspect of public and professional interest would be valuable, particularly in South Africa, when assessing whether professional nurses are sufficiently prepared to respond to disasters. Disaster training and education courses with annual simulation is active in the hospital where the researcher conducted the study.

1.2 PROBLEM STATEMENT

Disasters are tending to happen more frequently (Labrague, Hammad, McEnroe-Petitte *et al.*, 2018), and as such, it is important to maintain preparedness among professional nurses (Fung, Loke & Lai, 2008). Lack of preparedness may include, but is not limited to, insufficient education and training, inability to recall existing or prior disaster management knowledge and also inexperience in this sense. The disaster preparedness of professional nurses needs to be addressed so that the hospital system can function cohesively by identifying areas that need to be improved upon in a disastrous event.

The study attempted to answer the following research questions:

- What is the disaster preparedness of professional nurses working in the Emergency department and Intensive Care Units?

- Will there be a difference in the level of disaster preparedness between novice and experienced professional nurses?
- What are the educational needs regarding the level of disaster preparedness of these professional nurses?

1.3 AIM AND OBJECTIVES

The study aimed to explore and describe the disaster preparedness of professional nurses working in a public sector tertiary hospital in Johannesburg, with the intention of making recommendations for clinical practice and education of such professional nurses.

The objectives of the study were:

- To assess professional nurses' disaster preparedness by completing a Disaster Preparedness Questionnaire (DPQ).
- To identify the relationships between demographic characteristics of professional nurse participants by making use of the Disaster Preparedness Questionnaire (DPQ).
- To describe the educational needs regarding disaster preparedness of professional nurses.

1.4 SIGNIFICANCE OF THE STUDY

This study intended to create an awareness of professional nurses' disaster preparedness in one public sector tertiary hospital in Johannesburg. The study is significant because the implementation of a hospital system response and disaster management plan is reliant on the expertise and training of its human resources. Nurses are by far the largest human resource in any hospital system, and insight and understanding of nurses' knowledge and skills deficits would assist in identifying strengths and weaknesses in the hospital disaster management plan and help with planning future education and training experiences for professional nurses.

1.5 OPERATIONAL DEFINITIONS

Definitions for the purpose of this study are as follows:

- Disaster

The WHO defines a disaster as an occurrence that causes damage, ecological disruption, loss of human life, deterioration of health and health services on a scale to warrant an extraordinary response from the outside community or area (WHO, 2017).

- Mass casualty incident

A mass casualty incident is considered a disaster when Emergency Medical Services, such as personnel and equipment, are overwhelmed by the number and severity of casualties (WHO, 2017).

- Disaster management

The range of activities designed to maintain control over disaster and emergency situations and to provide a framework for helping persons at risk or to recover from a disaster (Mehta, 2006).

- Disaster preparedness plan

A formal written and tested plan of action for co-ordinating the response of a hospital's staff members in the event of a disaster within the hospital or the community (Mehta, 2006; Moabi, 2008).

- Hospital preparedness

Hospital preparedness is a "process for assessing risks and capabilities for responding when disasters occur. It involves co-ordination and planning,

surveillance and forecasting, training and orientation, stocks and logistics, communication and consultation” (Moabi, 2008: 18).

- Disaster preparedness

Disaster preparedness is defined as the comprehensive knowledge, skills, abilities and actions needed to prepare for and respond to unexpected events. These events may be threatened, actual or suspected, chemical, biological, radiological, nuclear or explosive, and may be human-induced or natural in origin (Baack & Alfred, 2013; Slepiski, 2007).

- Emergency department

An Emergency department is a designated area in a hospital where acute care is rendered to patients with medical emergencies that are life threatening, where medical emergency specialists institute the first evaluation and management within the defined capabilities of that hospital or clinic (Arbon, Cusak, Ranse *et al.*, 2013; Wallis, Garach & Kropman, 2008).

- Intensive Care Units

An Intensive Care Unit is a specially staffed and equipped hospital unit where the management is dedicated to providing acute care of patients with life-threatening illness, injuries or complications thereof (Bersten & Soni, 2014).

- Professional nurse

A professional nurse is a person registered under Section 16 of the Nursing Act No 33 of 2005. This person is qualified and competent to practice comprehensive nursing in the manner and level prescribed by the South African Nursing Council (SANC), and who is capable of assuming responsibility and accountability for such practice (SANC, R2598 of 30 November 1984, and as amended).

- Knowledge

Knowledge is characterised as the objects, concepts and relationships that are assumed to exist in some area of interest. Knowledge differs from data or information in that the new knowledge may be created from existing knowledge using logical inference (Oxford Dictionary, 2007).

- Perceptions

A perception is an idea or belief that someone holds according to his or her understanding. In this study, the professional nurses' perceptions of disaster preparedness were assessed using the adapted version of the Disaster Preparedness Questionnaire (DPQ) by Fung, Loke and Lai (2008).

1.6 OVERVIEW OF THE RESEARCH METHODOLOGY

The research methodology refers to the “blueprint that guides the study to have control over the factor that could interfere with the desired outcomes” (Burns & Grove, 2009). An overview of the research methodology is provided in the next section, and will be discussed in detail in **Chapter Three**.

An explorative, descriptive and cross-sectional survey design was utilised in this study, with the use of a self-administered adapted questionnaire developed by Fung, Loke and Lai (2008). The study respondents were professional nurses affiliated to Casualty Departments and Intensive Care Units at a 1,088 bedded public sector tertiary hospital in Johannesburg. The two Emergency Departments included the Trauma Emergency and Medical Emergency, while the five Intensive Care Units included the General ICU, Trauma ICU, Cardiothoracic ICU, Neurosurgical ICU and Coronary Care ICU.

Ethical clearance and permission to conduct the study was obtained from the Human Ethics Research Committee (Medical) (HERC) of the University of the Witwatersrand, the hospital's Chief Executive Officer (CEO) and Director of Nursing

Services for the Gauteng Department of Health. Participation in this study was voluntary, and respondents were free to withdraw at any time.

After permission was obtained from the hospital and relevant unit nurse managers, consent was obtained from the professional nurses who agreed to participate in the study. Descriptive and inferential statistics were used to analyse the results of the study, with statistical software STATISTICA (version 13.2) used for analysis of the data. Categorical data (demographic and questionnaire schedule) were analysed using frequencies and percentages, and the relationship between respondent's demographic variables and level of disaster preparedness were analysed using univariate and logistical regressions and Chi-square tests. Testing was done on the 0.05 ($p < 0.05$) level of significance. In addition, content analysis was used for analysis of the open-ended questions, using the method of Hsieh and Shannon (2005).

Reliability of the study was maintained by ensuring the researcher adhered to the guidelines provided by the developers of the questionnaire. The researcher was the sole data collector.

The convenience sampling method was used to achieve the sample size. The data was verified by a biomedical statistician to ensure the accuracy of findings. Face and content validity of the questionnaire was achieved by ensuring the adapted questionnaire used for data collection was verified by a small group of local domain experts to fit into the South African context. Methods of trustworthiness were followed in the content analysis, an audit trail was conducted and findings were verified by an experienced nurse researcher.

1.8 OUTLINE OF THE STUDY

The study will be presented as follows:

Chapter One – Overview of the study

Chapter Two – Literature review

Chapter Three – Research methods

Chapter Four – Results of the study

Chapter Five – Discussion of findings, conclusions and recommendations

1.9 SUMMARY

This chapter gave an overview of the study. Firstly, the background was described followed by the problem statement, the research questions, aim and objectives of the study and operational definitions. An overview of the research methods, validity and reliability and ethical considerations have been outlined.

The next chapter will discuss the literature review.

CHAPTER TWO

LITERATURE REVIEW

2.1 INTRODUCTION

Chapter Two presents the literature reviewed for the study. A literature review is an organised written presentation of what has been published on the topic. De Vos, Strydom, Fouche *et al.* (2011) stated that a literature review helps to familiarise the researcher with the existing body of knowledge relating to the topic under study. To provide an understanding and comprehension of the subject field, the researcher sought to provide an in-depth discussion of an overview of disasters, types of disasters, phases of disaster management, management of disasters in South African hospitals, disaster nursing competencies, nurses' perceptions and knowledge of disaster preparedness, factors inhibiting nurses' disaster preparedness and factors promoting or inhibiting nurses willingness to work during a disaster.

A literature search was done using PubMed, Scopus and Google Scholar and search terms such as *disaster, hospital, preparedness, nurse, nursing* and *South Africa* were used. The inclusion criteria for relevant literature were publication and peer-reviewed journals, and the use of quantitative and qualitative methods and different settings and designs. The inclusion and exclusion criteria limited the sources to peer-reviewed journals, electronic books, websites that included studies conducted on nurses and disasters. Only articles that were written in English were included and those older than 10 years were excluded. Abstracts were scanned, and the full-text relevant article was identified and reviewed.

2.2 AN OVERVIEW OF DISASTERS

Fung, Lai and Yuen (2009) stated that disasters are defined in many ways, and it depends on who is describing them. There is however universal agreement among international organisations, such as the World Health Organization (WHO),

International Strategy for Disaster Risk Reduction (ISDR) and the Centre for Research on the Epidemiology of Disaster (CRED) that a disaster is defined as:

“An incident(s) which may involve a significant number of people either individual or groups including a community or even a country, where there is development of an event(s) that affect the health, economy or environment negatively.”

(ISDR, 2005; WHO, 2009).

The International Council of Nursing (ICN), as the global authority for the nursing profession, shares the same definition (ICN, 2009).

The CRED has been actively participating and reporting on research involving disasters and epidemiology for over 40 years (Guha-Sapir, Vos, Below *et al.*, 2017). Data from the CRED shows an increase in the frequencies of disasters and events over the years (Guha-Sapir, Vos, Below *et al.*, 2016; IFRC, 2001). For a disaster to be entered on the CRED database, at least one of the following criteria must be met:

- Ten (10) or more people reported killed.
- Hundred (100) or more people reportedly affected.
- Declaration of state of emergency.
- Call for international assistance.

Figure 2.1 provides a graphic representation of increasing frequencies in natural disasters.

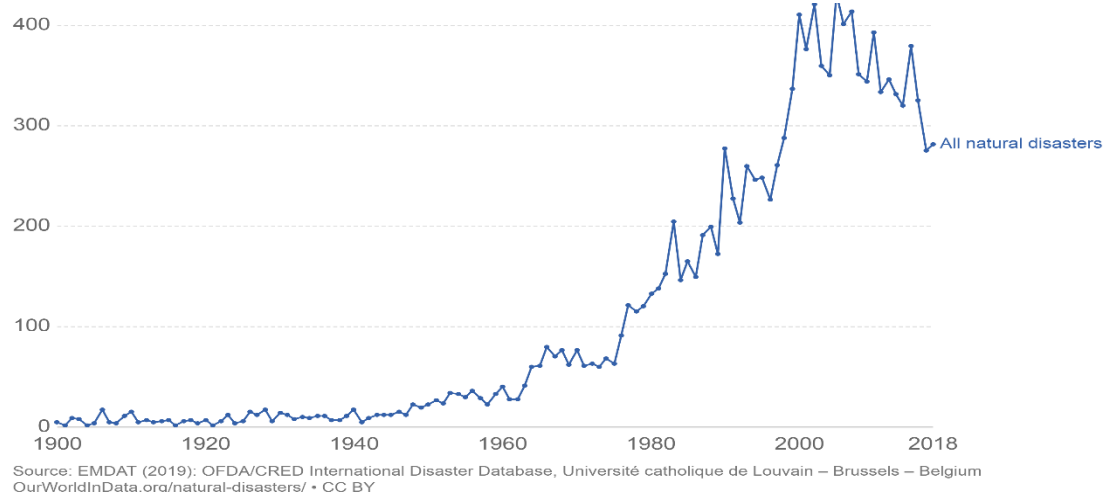


Figure 2.1: Number of recorded natural disaster events from 1900 to 2018

Source: CRED EMDAT (2017) International disaster database Université Catholique de Louvain – Brussels, Belgium.

Available at: <https://ourworldindata.org/natural-disasters>. Accessed 31.01.2019

In 2016, data indicated that 301 country-level disasters occurred, affecting 102 countries. This amounts to a total of 7,628 deaths, 411 million affected people and US\$ 97 billion in economic damage (Guha-Sapir, Vos, Below *et al.*, 2016).

Table 2.1 provides an overview of major disasters and events that have occurred worldwide from 2001 to 2016.

Table 2.1: Major Disasters and events that have occurred worldwide from 2001 to 2016

Year	Location	Disasters and events	Dead	Impact
2001	New York	World Trade Centre Terrorist Attack – 9/11	>3 000	Society change
2002	Bali	Bali Bombings	202	Air evacuation injured / Security Impact
2004	South Asia	Tsunami **	>230 000	1.6 million homeless
2005	London	Subway Bombings	52	Societal change
2007	New Orleans	Hurricane Katrina	>1 800	>\$80 billion USD
2008	Myanmar	Cyclone Nargis	>140 000	Political issue of aid
2008	China	Earthquake	>65 000	>\$140 billion USD
2009	Haiti	Earthquake **	>80 000	1.5 million homeless
2010	Pakistan	Floods	>1 000	20 million homeless
2011	New Zealand	Earthquake	181	>\$20 billion USD
2011	Japan	Earthquake & Tsunami – 3/11	>15 000	>\$300 billion USD
2012	New York	Hurricane Sandy	220	>\$70 billion USD
2013	Pakistan	Earthquake	>500	\$10 billion
2014	China	Earthquake	617	200 000 homeless
2015	Nepal	Earthquake	8,583	3.5 million homeless
2015	Chile	Earthquake	15	>1 million people evacuated
2016	Ecuador	Earthquake	272	2 527 sustained injuries

Key: ** = major disasters

These significant disasters have resulted in the loss of life and multiple injuries, but also have affected the broader society. The impact of terrorism, as witnessed in the New York World Trade Centre attack (9/11), has resulted in heightened security

during air travel and other aspects of 'homeland' protection (Benjamin, Bassily-Marcus, Babu *et al.*, 2011). The devastation caused by the South East Tsunami and the recent Earthquake disaster in Haiti have seen international efforts of mutual international assistance, whilst other large-scale disasters, such as the New Orleans Hurricane Katrina, China Earthquake and Japanese Tsunami and Nuclear incident (3/11), have not received international assistance but have been managed predominantly by the affected country (Noto, Kitamamiya, Itaki *et al.*, 2013; Slepiski, 2007; Wenji, Turale, Stone *et al.*, 2015).

In South Africa, one natural disaster (drought) occurred in 2015, which had an impact on 2.5 million people and resulted in 141 deaths. South African was ranked 12th in the listed countries sorted by number of reported damages (US\$ 1 billion) (Guha-Sapir, Below & Hoyois, 2015). South Africa faces increasing levels of disaster risk, being prone to natural and man-made disasters such as floods, landslides, windstorms, hail storms, bush and informal human settlement fires, rapid population movement and health disasters including Cholera, Rift Valley Fever and human pandemic (CRED, 2009; IFRC, 2011; South Africa Disaster Management, 2005).

2.3 TYPES OF DISASTERS

Birnbaum, Loretta, Daily *et al.* (2016) identified there are two primary classifications of disasters: natural disasters and manmade disasters. Mass casualty incidents and all hazard events are of importance in the identification of disasters.

Natural events are those that are considered unavoidable (Sundnes & Birnbaum, 2003), often related to weather conditions. These disasters refer to extreme events that may result in death and injuries, such as earthquakes, extreme heat or extreme cold, winter storms, floods, hurricanes, tornadoes, tsunamis, volcanoes and mudslides. *Manmade disasters* are caused by hazards that have been created by human activities (Sundnes & Birnbaum, 2003) and may be intentional or unintentional. Manmade disasters can be further broken down into five categories: *chemical, biological, radiological, nuclear, and explosive*, commonly referred to as CBRNE.

A *mass casualty incident* is a situation involving a large number of ill or injured people, and can contribute to a disaster or be the result of a disaster (Birnbaum, Loretto, Daily *et al.*, 2016). In addition to an association with a disaster event, a mass casualty incident can also be considered a disaster due to various types of accidents, such as multi-vehicle crashes (CRED, 2016). Although mass casualty incidents can be viewed as a predictor of an outcome of any disaster event, it was specifically defined as a mutually exclusive vehicular accident, whether air, bus, train or automobile.

An *all hazard event* refers to any, and all, types of disaster events, including simultaneous emergencies (Birnbaum, Loretto, Daily *et al.*, 2016). It provides a conceptual and management approach that uses the same set of management arrangements to deal with any and all types of natural or manmade disasters (Laaser & Beluli, 2016) and can promote the effective use of resources in the dual capacity of responding to manmade disasters, as well as enhancing emergency capabilities for addressing natural disasters (Birnbaum, Loretto, Daily *et al.*, 2016).

2.4 PHASES OF DISASTER MANAGEMENT

There are four time-related phases of disaster management, whether natural or manmade: mitigation, preparedness, response and recover (Laaser & Ulrich, 2016; Birnbaum, Loretto, Daily *et al.*, 2016).

- Mitigation

Mitigation refers to alterations that are conducted before potential disaster occurs in order to lessen or decrease vulnerability (Birnbaum, Loretto, Daily *et al.*, 2016). It begins by identifying potential hazards that may affect an organisation's operations or the demand for its services, followed by implementation of strategies to support the perceived weaknesses in the organisation (Mehta, 2006; Zhong, Hou, Zhang *et al.*, 2014).

- Preparedness

Preparedness, which represents the second phase of the disaster cycle, is defined as the process of turning awareness of risks into actions that improve the capability to respond, and recover from disasters (Birnbaum, Loretto, Daily *et al.*, 2016). Hospital preparedness activities include developing emergency response plans, training staff members on what to do in an emergency situation, acquiring needed equipment, supplies and materials, conducting disaster drills and exercises (Laaser & Beluli, 2016; Mehta, 2006; Zhong, Hou, Zhang *et al.*, 2014).

- Response

The third phase of the disaster cycle refers to the measures undertaken during and immediately after the disaster impact to address the situation to the degree possible, and includes activities such as search and rescue, medical care, taking action to contain ongoing threats, evacuating threatened populations and providing emergency food and shelter (Laaser & Beluli, 2016). Overall, this phase involves immediate actions to save lives, protect property and meet basic human needs (Mehta, 2006).

- Recovery

The final phase of the disaster cycle involves post-response measures undertaken to restore normality (Laaser & Beluli, 2016). Bringing all the components back to their pre-event functional status requires actions to repair, build, and reconstruct the damaged properties and to restore disrupted routines and activities (Zhong, Hou, Zhang *et al.*, 2014). Recovery actions can begin concurrently with response activities that require a large amount of resources and time to complete (Laaser & Beluli, 2016).

- Public Health Emergency Preparedness Plan

Public health emergencies, defined as an emergency for healthcare services to respond to a disaster, significant or catastrophic event, are economically costly. It is

worth noting that the outbreak of Severe Acute Respiratory Syndrome (SARS) in China and Canada raised global concern about effectiveness of hospital disaster management protocols to respond immediately to disasters (Fung, Lai & Loke, 2008; Laaser & Beluli, 2016). By the end of the outbreak a total of 251 cases and 43 deaths were reported in Canada, while the majority of cases were in China, Hong Kong, Taiwan and Singapore (7666 cases total, 718 deaths). An analysis of the outbreaks' impact on the Canadian economy shows that it is responsible for a projected 1% loss in GDP and \$5.2 billion net outflow of capital for imports and exports, not to mention the healthcare costs in dealing with the outbreak (Keong-Brown & Smith, 2008).

A study conducted in Toronto reported major identified gaps at the end of the outbreak, incomplete infection control, lack of system-wide communications and no effective coordination leading to isolated, inefficient responses (Lefebvue, Beswick, Crosby *et al.*, 2017). This is in contrast with another study conducted in Shandong Province, China, which indicated results regarding hospital safety, the greater majority of hospitals had syndromic surveillance for infectious diseases and more than half had evaluated their safety standards (Zhong, Hou, Zhang *et al.*, 2014). These authors reported that all hospitals had general plans, while only 20% had specific plans for individual hazards, 49% have a public communication protocol, 43.9% had attended the local coordination services and the majority had stockpiled emergency drugs (Zhong, Hou, Zhang *et al.*, 2014). It is imperative that all hospitals have well developed and tested disaster management plans or protocols to respond immediately to the consequences of disasters (Mehta, 2006; Laaser & Beluli, 2016).

2.5 MANAGEMENT OF DISASTERS IN SOUTH AFRICAN HOSPITALS

The South African Disaster Management Amendment Act (2015) calls for all health organisations to have a documented disaster management protocol in place indicating the potential disasters in the environment within which the institution is located, and state clearly the responsibilities of all health professionals when a disaster occurs. The hospital disaster protocol helps in defining the command structure and job card to avoid everyone being the commander when a disaster strikes (ISDR, 2009).

The hospital in which the research study was conducted has a disaster management protocol, which indicates what to do in case of disasters (bomb threats, floods, and biohazard cytotoxic spills). It also includes job cards, which are numbered from one to six, stating the responsibility of each healthcare worker during a disaster.

- Job card number one is the coordinator. The duty of the coordinator is to facilitate evacuation from the hospital, allocates second in charge, runner, communicator, person in charge of drugs and documentation. The coordinator triages patients and identifies the emergency exit.
- Job card number two is the second in charge, who helps with decision making, fetches the fire extinguishers in case of fire, ensures all patients have resuscitation bags and prepares to disconnect patients from ventilators. They also await evacuation instructions from the coordinator, and allocate nurses to bag and stay with patients.
- Job card number three is third in charge. The duty of the third in charge is to compile a list of all the staff and patients, do a visible head count and assemble patient files and records.
- Job card number four is the communicator, whose role is to receive incoming calls and disseminate information to coordinators.
- The fifth job card is the runner, whose purpose is to open fire escapes, monitor disabled patients and ensure that lifts are not used during evacuation.
- The last job card, number six, is the drug controller who collects the emergency box and ensures emergency drugs and fluids are in the box.

The hospital disaster protocol for the hospital of study also has codes that are used to indicate the severity of the disaster and that of patients.

Table 2.2 Disaster codes against disaster patients and disaster severity

Disaster Code	Disaster patients		Disaster severity
	Priorities	Type of Patient	
Code Red	Priority One	Resuscitation case, attended immediately	Severe disasters. Multiple casualties are brought in. A call out is made to bring in more healthcare workers.
Code Yellow	Priority Two	Direct admissions to high care areas.	Managed in casualty, no extra staffing from other wards is needed.
Code Green	Priority Three	Walking but wounded patients.	A minor disaster
Code Black	Priority Four	Dead patients	Last offices

Triage is a process that prioritises patients by their need, placing the right patients in the right place at the right time to receive the right level of care (ISDR, 2009). An effective triage protocol is based on the severity of the disaster together with available resources and is central to improving capacity during a disaster (Wenji, Turale, Stone *et al.*, 2015).

2.6 DISASTER NURSING COMPETENCIES

Competency is defined as a combination of abilities, knowledge, skills and behaviours to carry out a specific task (Loke & Fung, 2014). According to the WHO and ICN (2009), nurses must acquire certain core competencies to be able to deal with the scope and complexities of disasters. To support nurses in disaster preparedness, the International Council of Nurses (ICN) published the framework of Disaster Nursing Competencies, which outlines 10 competency domains for nurses responding to disasters (ICN, 2009); i

included are risk reduction, disease prevention and health promotion, policy development and planning, ethical practice, legal practice and accountability, communication and information sharing, education and preparedness, care of communities, care of individuals and families, psychological care and care of vulnerable populations (children and the elderly) (ICN, 2009).

Chan, Chan and Cheng *et al.* (2010) conducted a development and evaluation of an undergraduate training course for developing ICN disaster competencies in China. The training, entitled “Introduction to Disaster Nursing,” comprised 150 participants who went through pre-training and post-training assessments for participants’ self-rated disaster nursing competencies. The findings indicated that self-perceived disaster competencies for the pre-training and post-training proposed noticeable improvement by which slightly higher scores were achieved for policy development and planning, education and preparedness and psychological care domains (Chan, Chan, Cheng *et al.*, 2010). These results suggested that nurses’ perception of their competencies should be taken into account and educational training is important to develop better competencies.

Another study was done to investigate Hong Kong nurses’ perceptions on the ICN Framework of Disaster Nursing Competencies, which was used to categorise the disaster nursing competencies perceived by practicing nurses in this study (Loke & Fung, 2014). Findings revealed medical, surgical and critical care, and community nurses’ ability to recognise all the required competencies were manifestly inadequate. The authors concluded that a comprehensive curricular should be developed to improve nurses’ competencies for the improvement of disaster preparedness (Loke & Fung, 2014). Table 2.4 displays these domains and related nursing actions.

Table 2.3: Disaster competency domains and related nursing actions (ICN, 2009)

Domains	Nursing actions
Prevention and mitigation	• Risk reduction, disease prevention and health promotion. • Policy development and planning
Preparedness	• Ethical practice, legal practice and accountability • Communication and information sharing • Education and preparedness
Response	• Care of community • Care of individuals and families • Psychological care • Care of vulnerable populations
Recovery and rehabilitation	• Long term care individual, family and community recovery

Source: Adapted from the Framework of Disaster Nursing Competencies (ICN, 2009). Available at: http://www.wpro.who.int/hrh/documents/icn_framework.pdf. Accessed: 15.10.2017

2.7 NURSES' PERCEPTIONS AND KNOWLEDGE OF DISASTER PREPAREDNESS

Studies suggest there are gaps in literature about nurses' perceptions of disasters, perceived professional roles and responsibilities and educational needs (Baack & Alfred, 2013; Fung, Loke & Lai, 2009). According to Loke and Fung (2014), understanding nurses' perceptions could guide curricular content and potentially breakdown common barriers to active nursing involvement.

A study conducted by Fung, Lai and Loke (2009), which surveyed 164 practicing nurses in Hong Kong, revealed that 21% of nurses who responded chose to characterise disasters as "unpredictable, sudden, unexpected, and unpreventable," while 8.1% of the respondents chose "out of control, cannot manage and do not

know how to manage.” Other descriptive terms used were “urgent, quick, horrible happening, traumatic, crisis and danger” and “unknown disease with no treatment available for the time being.” The majority of nurses (61%) also considered disasters to be events with the most number of victims rather than events with the most number of deaths (Fung, Lai & Loke, 2009). The population of nurses in this study lived in a relatively disaster free-area, however the focus of disaster preparedness became more prominent following the nearby 8.0 earthquake in Wenchuan, China, in 2008 (Yang, Xiao, Cheng *et al.*, 2010).

One study, that surveyed 620 rural nurses working in various specialities in Texas, United States of America (USA), found similar results regarding nurses’ perceptions about disaster preparedness. Utilising an EPIQ summed score with a median of 82.5 and a mean of 90, the results revealed that nurses perceived a low level of competence with regard to disaster preparedness, and further stated they did not feel prepared to respond to large-scale disasters (Baack & Alfred, 2013). Other conclusions from this study were nurses needed to engage actively in volunteer organisations to gain experiences and feel more confident, and for all nurses to receive training in disaster preparedness (Baack & Alfred, 2013).

Labrague, Hammad, McEnroe-Pettite *et al.* (2018) conducted a systematic review of disaster preparedness among nurses, which included a combined analysis of 17 articles with 10 305 nurses. Different practice areas included medical, surgical, paediatric, psychiatric, operating room, Critical Care Units and Emergency departments. These authors reported that nurses are insufficiently prepared and do not feel confident responding to disasters (Labrague, Hammad, McEnroe-Pettite *et al.*, 2008).

Instrumentation used to measure disaster preparedness of nurses appears to be a driving force. Al Khalaileh, Bond and Beckstrand (2012) conducted a study to determine the validity of a Disaster Preparedness Evaluation Tool (DPET), which was a 68-item questionnaire that measures nurses’ perceptions of disaster management with seven dimensions of disaster management. The authors translated the tool in Arabic and administered it to 474 Jordanian professional nurses.

Garbutt, Peltier and Fitzpatrick (2008) examined an instrument in their study that measures familiarity with emergency procedures. This instrument was the Emergency Preparedness Information Questionnaire (EPIQ), a 44-item questionnaire that assesses nurses' self-report familiarity with eight dimensions of emergency preparedness. It also included a self-reported measure of overall preparedness for a large-scale emergency event. The authors administered it to 776 Wisconsin registered nurses.

Fung, Loke and Lai (2008) conducted a study to determine the validity of their developed Disaster Preparedness Questionnaire (DPQ), a 26-item questionnaire that asks about nurses' perceptions about disasters, preparedness to deal with disaster at the workplace and protocols related to data management, agencies and public services that should be involved in disasters and education and training needs of nurses. The authors administered the tool to 164 practicing nurses and master degree students in Hong Kong.

Ibrahim (2014) examined hospital nurses' knowledge, attitudes, practices and familiarity regarding disaster and emergency preparedness in Saudi Arabia. Findings revealed that the level of disaster knowledge in disaster scenarios was below average, with acceptable levels of attitudes regarding disaster preparedness. However, the nurses' level of awareness on emergency procedures was found to be moderate. The author recommended conducting hospital disaster preparedness with hospital-based employees (Ibrahim, 2014).

In the Australian study of Hammad, Arbon and Gebbie (2011), most (69%) of the 192 emergency nurses, from eight public hospitals who participated in the study, reported having completed disaster training; however, 85% failed the knowledge test which only required a pass mark of 50% (Hammad, Arbon & Gebbie, 2011). This study used a self-designed questionnaire with both quantitative and open-ended qualitative responses to assess nurses' disaster experience, education and perceptions of preparedness. The authors suggested the need for further research to decide what is appropriate and required for disaster training and education of emergency nurses.

Al Khalaileh, Bond and Alasad (2012) explored preparedness of nurses in Jordan and found that more than half (65%) of the nurses rated their state of preparedness as low to poor. These nurses rated themselves as inadequately prepared in areas of disaster response, such as conducting health assessments about chemical and biological agents, as well as organisational logistics and roles. Similar results have also been reported in studies emanating from the USA (Baack & Alfred, 2013; Jacobson, Soto Mas, Hsu *et al.*, 2010; Whetzel, Walker-Cilio, Chan *et al.*, 2013).

One large Asian Pacific study, conducted by Usher, Mills, Casella *et al.* (2015), assessed knowledge, attitudes and disaster preparedness of 757 hospital and community nurses in seven Asia-Pacific countries. Data were collected using the modified DPET. Participants were found to have low-to-moderate levels of disaster knowledge, skills and preparedness, wherein important gaps were identified. Nurses from Cambodia and Solomon Islands felt unprepared to perform assessments related to biological and chemical agents, whereas nurses from Bangladesh and Laos were unprepared to treat disaster victims without the presence of a medical doctor. Furthermore, multilevel random modelling identified disaster experience and education as a significant factor of positive perceptions of disaster knowledge, skills and preparedness (Usher, Mills, Casella *et al.*, 2015).

2.8 FACTORS INHIBITING NURSES' DISASTER PREPAREDNESS

Some studies have discussed nurses' awareness of hospital preparedness as a factor in their disaster preparedness. The majority of nurses in these studies reported an awareness of a disaster management protocol in their hospital but had not read it and did not know how to locate the plan (Al Khalaileh, Bond & Alasad, 2012; Duong, 2009; Fung, Loke & Lai, 2009; Ibrahim, 2014; Labrague, Yboa, McEnroe-Petitte *et al.*, 2016; Ozetekin, Larson, Akahoshi *et al.*, 2016; Tzeng Pei-Feng, Cheng *et al.*, 2016; Whetzel, Walker-Cillo, Chan *et al.*, 2013).

O'Sullivan, Dow, Turner *et al.* (2008) reported on Canadian Critical Care nurses' lack of preparedness both personally and institutionally. In this descriptive study, which utilised a self-developed online survey, personal preparedness for chemical, biological, radiological, nuclear and explosive was rated on a 4-point Likert scale,

where 1 = low and 4 = high. Out of 1 543 responses, the results ranged from 1.32 for a radiological attack to 2.35 for an infectious disease outbreak or natural disaster. These nurses expressed the need for additional disaster training.

In one USA study, Whetzel, Walker-Cillo, Chan *et al.* (2013) assessed nurses' perceptions of their role in a disaster as well as their perceived susceptibility to a disaster. Data were collected utilising a self-developed questionnaire, and the results revealed more than one third (39% out of 177) of nurses felt their institution was unprepared for disaster, while 60% had completed some form of emergency training in the previous year (Whetzel, Walker-Cillo, Chan *et al.*, 2013). Half (50%; n = 88) of the nurses did not have a personal disaster kit, whilst nearly all (98%) felt their community had the potential to experience a disastrous event (Whetzel, Walker-Cillo, Chan *et al.*, 2013).

In the Chinese study, Wenji, Turale, Stone *et al.* (2015) also found that measures of preparedness tended to be hospital focused and did not include preparedness of related systems such as water, power or communications systems. Of the nine hospitals investigated for adequate levels of commodities available for a disaster, eight consisted of medical supplies, with the last being water and food. A close three quarters (72%) of nurses felt their hospital had enough gloves, whilst a marginal (11%) percentage thought their hospital had enough food and water (Wenji, Turale, Stone *et al.*, 2015).

Two studies evaluated the response efforts during the 2003 SARS outbreak to demonstrate the ethical concerns, perceptions and experiences of nurses during a time of disaster. For example, one study from Canada surveyed 941 community nurses during the SARS outbreak; 61% of nurses stated they experienced increased working hours, more paperwork, and shortage of staff, which increased their anxiety levels, and 30% reported fears associated with working with a contagious disease and becoming infected, or infecting family members. Nurses reported being shunned by others who were afraid they would pass on the disease, given their work with contagious people. In addition, the study noted fears of patients about contracting the disease from nurses (Bergeron, Cameron, Armstrong *et al.*, 2006).

A similar study evaluating the SARS response in Hong Kong, surveyed 753 female nurses; 12% of the nurses felt they should not have to take care of SARS patients, 25% considered leaving their jobs due to threat of contracting the disease, and 7.6% agreed with both statements. In addition, approximately 50% of the nurses stated there was an increased workload and 32.4% reported being avoided by the general public because of their profession (Shiao, Koh, Lo *et al.*, 2007). Although no one can prevent the increased workload and probable stress with disaster responses, these studies indicate the need for nursing education that addresses the fears associated with working during a disaster.

2.9 FACTORS PROMOTING OR INHIBITING NURSES' WILLINGNESS TO WORK DURING A DISASTER

An understanding of the factors that influence nurses' ability and willingness to respond to disaster calls in the hospital is vital to ensuring an adequate workforce during a disaster (Arbon, Cusack, Ranse *et al.*, 2013). One study among Spanish nurses, reported that gender had no influence on nurses willingness to work during a disaster, while differences in age did, as older nurses were seen to be more willing to work than their younger colleagues (Ogedegbe, Nyireuda, DelMoro *et al.*, 2012). However, in a study amongst Australian nurses, it was reported that males are more willing to offer services when a disaster occurs than are females (Arbon, Cusack, Ranse *et al.*, 2013).

One study among Australian nurses found nurses were more willing to attend work where a building had collapsed or a plane crash, but were less willing in the case of a biohazard, chemical terrorism event or smallpox epidemic (Arbon, Cusack, Ranse *et al.*, 2013). Another study conducted among Israeli nurses found nurses regarded themselves as household caretakers, therefore reporting on duty during a disaster was a challenge to them, because of their responsibilities at home and the inability to contact family for a long time (Natan, Nigel, Yevdayev *et al.*, 2014).

In another Australian study, it was found that willingness to commit to work during a disaster increased when nurses were able to stay in touch with family members. These authors suggested that creating good communication channels would

enhance nurses willingness to work in disaster situations (Arbon, Cusack,, Ranse *et al.*, 2013).

Potential for safety risk placed on the nurse also reduced nurses' willingness to work in a disaster. In one study amongst Australian nurses, it was reported that nurses feared contracting commuicable diseases, being injured or worse, death (Arbon, Cusack, Ranse *et al.*, 2013). Other studies were found that indicated availabilty of protective clothing, prophylaxis, appropriate treatments and infection control measures greatly enhanced the nurses willingness to work during a disaster (Ogedegbe, Nyireuda, DelMoro *et al.*, 2012).

Another Australian study indicated that in most cases nurses reported for duty because of their professional responsibility (Hammad, Arbon, Gebbie *et al.*, 2012). The authors argued that a sense of professionalism increased nurses' willingness to work in a disaster because they felt obligated to work, stating they had no choice but to answer the call of duty.

One study conducted in China found that nurses with little knowledge were reluctant to attend disasters over those with previous knowledge and experience (Jiang, He, Zhou *et al.*, 2015). Other studies were found in literature that reported on the effectiveness of disaster training as a way of to improve nurses' disaster knowledge and skills. For example, one study (Al Thobaity, Plummer & Williams, 2015) indicated, in a sample of Saudi Arabian nurses, that most knowledge and skills for disaster management seemed to come from disaster drills and training. Similar findings were also reported in the study by Oztekin, Larson, Akahoshi *et al.*, (2016), where it was reported that regular disaster or emergency drills were found to be helpful in preparing Japanese nurses to respond to disaster situations.

2.10 SUMMARY

This chapter discussed the literature review conducted for the study. The literature review focused on the definition, types and phases of a disaster, nurses' disaster competencies, preparedness and knowledge, nurses' awareness of hospital

disaster management protocol, education and training, and ethical and professional concerns.

Chapter Three discusses the research methods used in the study.

CHAPTER THREE

RESEARCH METHODS

3.1 INTRODUCTION

Polit and Beck (2018) refer to research methods as “the techniques researchers use to structure a study, gather and analyse information relevant to the research question in a systematic way.”

This chapter gives a detailed account of the research methods and design used in the study to achieve the research objectives. The research methods consisted of research design, study setting, target population, sample, sampling method, and data collection process. The research instrument used in the data collection and methods of data analysis, pilot testing, ethical considerations and validity and reliability of the study are also described.

The study explored and described professional nurses’ disaster preparedness in the Emergency Departments and Intensive Care Units at a public sector and tertiary hospital in Johannesburg.

3.2 RESEARCH DESIGN

A research design is an overall plan for obtaining answers to the questions being studied, and for handling some of the difficulties during the research process (Polit & Beck, 2018). Research designs are developed to meet the unique requirements of a study. An explorative, descriptive and cross-sectional design, within a quantitative approach was used to meet the study objectives. The most appropriate means of collecting the data was a self-administered questionnaire. Each aspect the study design will be discussed in the next section.

Explorative research investigates the full nature of little understood phenomena, or a situation that is not clearly defined (Gray, Grove & Sutherland, 2017). It is done to

gain insight and familiarity into a situation, phenomenon and people in order to gain the identity of a problem, or develop a hypothesis (De Vos, Strydom, Fouche *et al.*, 2011). This approach was ideal to the study because it sought to understand disaster preparedness by using the viewpoints of professional nurses.

Descriptive research involves observing, describing and documenting aspects of a situation under study (Gray, Grove & Sutherland, 2017), and is done to obtain an accurate portrayal of people's characteristics and frequency with which a specific phenomenon occurs. This approach was ideal to the study because it aimed at disaster preparedness of professional nurses in a public sector and tertiary hospital in Johannesburg.

Quantitative research is a formal, objective systematic research process to describe and test relationships. The quantitative approach requires phenomena that can be measured through the collection of data in order to establish the strength of relationships between study variables. Polit and Beck (2017) point out that the approach focuses on systematic and controlled designs of collecting and analysing numerical data. A validated survey questionnaire developed by Fung, Lai and Loke (2008) was used in this study to collect numerical information for analysis and interpretation. Again, this approach was ideal because it was aimed at disaster preparedness of professional nurses in a public sector and tertiary hospital in Johannesburg.

The current study collected data at one point in time therefore it was also considered a cross-sectional study. According to Polit and Beck (2018), the purpose of a cross-sectional design is to describe the population to find the prevalence of the outcome of interest.

3.3 RESEARCH SETTING

As defined by Gray, Grove and Sutherland (2017), the research setting is the place where the study is conducted. This study was conducted in the adult Emergency Departments and Intensive Care Units of a public sector and tertiary hospital in

Johannesburg. This hospital also has a Paediatric Emergency Department and Paediatric Intensive Care Unit with different disease profiles.

This 1 088-bed accredited hospital serves patients from across Gauteng province and neighbouring provinces, and offers a full range of tertiary and secondary highly specialised services. The hospital is also the main teaching hospital for the Faculty of Health Sciences at the University of the Witwatersrand. The institution provides the service base for undergraduate and postgraduate training in all areas of health professions. The hospital has 4 000 staff members, and 1 500 patients are registered daily, including 280 casualties and 100 in-patients.

The hospital has a documented history of medical emergencies that have occurred around Johannesburg, for example, the Ellis Park Stadium Stampede on the 11th April in 2001, where 43 people were crushed to death and 250 were injured. Most people who were severely injured died on the scene and did not reach the hospital.

3.4 RESEARCH METHODS

The research methods refer to the steps, procedures and strategies used for gathering and analysing data. Each aspect of the research method will be discussed in the next section.

3.4.1 Population

The target population comprised all professional nurses employed in a full-time capacity at the study selected hospital's Emergency Departments ($n = 2$) and Intensive Care Units ($n = 5$). An accessible population is the portion of the targeted population to which the researcher has reasonable access (Gray, Grove & Sutherland, 2017), therefore the researcher targeted the accessible population of professional nurses to participate in the study.

A preliminary record review, undertaken in June 2013, indicated there were approximately 210 ($N = 210$) professional nurses on the nursing allocation lists in the respective study sites ($n = 7$). Table 3.1 presents these results.

Table 3.1: Total number of professional nurses working in the selected study sites

Study site	Number of professional nurses
Trauma Emergency	30
Medical Emergency	25
Trauma ICU	30
General ICU	38
Cardiothoracic ICU	29
Coronary Care Unit	22
Neurosurgical ICU	36
<i>Total</i>	<i>210</i>

3.4.2 Sample and Sampling

A sample is a subset of the population selected for a particular study, and sampling defines the process of selecting a group of people, events, behaviours, or elements with which to conduct a study (Gray, Grove & Sutherland, 2017).

All professional nurses working in the Casualty Departments and Intensive Care Units were invited to participate in the study to ensure a large a representative sample as possible. The total sample was applied and a convenience sampling method was used to achieve the study sample. This method was used to select the most extensive variety of participants typical of the population under study.

The inclusion criteria for prospective participants were:

- Registered by the South African Nursing Council (SANC) as a professional nurse.
- Working in one of the selected study site at the selected institution.
- Had a duration of more than six months experience in the selected unit.

Exclusion criterion for the study were enrolled and auxiliary nurses, as their sub-professional category of nursing personnel are required to practice under the supervision of a professional nurse.

3.4.3 Data Collection

Data collection is the precise, systematic gathering of information relevant to the research purpose or the specific objectives, questions, or hypotheses of the study.

3.4.3.1 Instrument

The questionnaire developed by Fung, Loke and Lai (2008), and identified in the literature and previously published studies (Labrague, Yboa, McEnroe-Petitte *et al.*, 2016; Oztekin, Larson, Yuksel *et al.*, 2015), was used to achieve the study objectives. The questionnaire was developed by a team of nurse academics, at the Hong Kong Polytechnic University, with expertise in emergency care, intensive care, and community health.

The self-reported questionnaire was developed to assess nurses' preparedness during disasters (refer **Appendix A**) and contained two parts: the demographic information and the Disaster Preparedness Questionnaire. The Disaster Preparedness Questionnaire contained four sections. The first section elicited information about the respondent's perceptions of disasters, the second section contained questions about the agencies or public services who would be involved in responding to disaster situations, the third section asked about disaster preparedness and the existence of protocols relating to disaster management, while section four asked respondents to identify their educational needs and the materials they thought would be useful to prepare them better for disasters.

- Adaptation of the Instrument to the South African context

Permission was obtained from the original developer to use and make minimal item modifications so that it would be appropriate for the South African context. After verification by a local domain expert in disaster medicine, some questions were edited (with permission from the original developer) so that the questionnaire would fit into the South African context.

- Three questions (items 3 to 5) were dropped from the demographic section of the questionnaire as they contained identifying information.

- Question 4 included an adaptation of qualifications known in South Africa
- Question 5 included an adaptation of positions in nursing known in South Africa
- Question 8 included an adaptation of local unfortunate events that happened in South Africa.
- Question 9 included a listing of additional disasters (sports stampedes, mining accidents and refugee migration) that may occur in South Africa.
- Question 10 included an adaptation of local South African organisations or agencies that would be involved when a disaster occurs.
- In question 11, the term “endangers life” was removed because there is a difference between “may endanger” and “actual endanger.”
- In question 12, the list of item adaptation included items relevant to less developed country logistics.
- Question 13 included localisation of courses known only in South Africa.
- Two negative worded repetitious questions (items 18 and 19) were dropped from the questionnaire.

After these adaptations were made, the questionnaire was language edited and proofread by a senior academic in the Department of Nursing. The final adapted self-reported disaster preparedness questionnaire had 21 items (refer to **Appendix A**).

3.4.3.2 Validity and reliability of instrument

The developers assessed face and content validity in the sample of the original study (Fung, Loke & Lai., 2008). Furthermore, it was tested on 164 practicing registered nurses studying in Master’s degree programmes at a Hong Kong University. One subsequent independent study (Labrague, Yboa, McEnroe-Petitte *et al.*, 2016) was found utilising this questionnaire on independent nurses.

Face and content validity were achieved using a panel of seven (n = 7) experienced nurses with expertise in emergency care, intensive care, community health and nursing education (Fung, Loke & Lai, 2008). The Content Validity Index (CVI) was 0.94, suggesting a high degree of validity (Fung, Loke & Lai, 2008; Chen, Chou,

Liao *et al.*, 2014). Similarly, in the study of Labrague and colleagues (2016), the CVI was 0.90, and its Cronbach's alpha coefficient reliability score was found to be 0.81.

Furthermore, the adapted questionnaire was validated by an independent panel of four (n=4) local domain experts, i.e. medical (n=1) and professional nurses (n=3), who were asked to comment on the appropriateness of the content of the questions for it to be applicable to the South African context. No further modifications were made, and the questionnaire was deemed suitable for use in the South African study.

3.4.3.3 Procedure

Permission was sought from the Chief Executive Officer (CEO) of the hospital being requested to participate in the study (refer to **Appendix D**). Once permission was obtained from the institution, permission from the Nursing Services Manager was sought, and after that, the unit managers were approached for permission.

The researcher visited the selected study sites and observed the respective nursing unit allocation lists for selection of participants. Those respondents who agreed to participate in the study were given an information letter outlining the study and its procedures (refer to **Annexure B**). As this was a survey study, an ethical waiver was applied, and the return of the questionnaire was accepted as informed consent. The study was anonymous, however the respondents were asked to provide information about their age, gender, qualification in nursing and duration of experience in the units. Data collection was conducted on the day and night shifts and weekends over a three months period from 3rd December 2013 to 1st March 2014.

The returned questionnaires were placed in a self-addressed envelope and posted into a sealed box by the participant. This box was only opened once the data collection period was completed. The researcher negotiated the finding of a secure area to place the sealed box with the respective Nurse Unit Managers. The researcher visited the study sites on a weekly basis to remind the participants to

complete the questionnaire, and a notice placed on the nurses' notice board in the respective unit to remind participants to complete the questionnaire.

3.4.4 Data Analysis

Data analysis is carried out to reduce, organise and give meaning to the data that has been collected (Burns & Grove, 2009). Descriptive statistics were used to present the interpretation of the data of nurses: gender, age, and years of nursing experience, current nursing position and area of clinical work representation. Measures of frequency distribution were used to summarise the disaster preparedness questionnaire. Frequency distributions and tables were used to provide an overall coherent presentation and description of the data.

When testing for the relationships between selected demographic variables (years of experience, unit and the highest level of qualification) and nurses' perceived "preparedness for disaster" (refer to Appendix A, item 17), univariate and multivariate ordinal logistic regression models were fitted. In this case, odds ratio (OR), p-values and confidence intervals (CI) were computed. When examining the presence and strength of relationships, the Chi-square test was employed to provide the statistic. To test the assumption of proportional odds, the Brant test was used (Brant, 1990). The null hypothesis for the Brant test is that the odds are proportionally, hence a p-value of >0.05 indicates that the assumption of proportionality of odds is met. The level of statistical testing was done at the level of $p < 0.05$. The data was analysed using the statistical package STATISTICA™ version 13.2. A biomedical statistician from the Faculty of Health Sciences research office verified the data and statistical tests once analysed.

The responses from open-ended questions (refer to Appendix A, item 7) were analysed using content analysis, one of the most common forms of analysis in qualitative research. The method of Hsieh and Shannon (2008) was followed, which emphasises extracting written words or brief statements, examining and recording patterns (or "categories") within data. Categories and subcategories are patterns across data sets that are important to the description of a phenomenon and are associated with a specific research question. A senior nurse researcher in the

Department of Nursing Education reviewed the written statements and verified this process.

3.5 PILOT TEST

A small pilot test was conducted before the commencement of the main study. The data collection tool was used on 10 ($n = 10$) respondents in another unit at the selected study site which was not included in the main study. A pilot test is a small-scale trial run on all aspects planned for the main study, with the intention of helping the researcher to fine tune the main study and to determine whether the methodology, sampling, instrument and analysis are adequate and appropriate (De Vos, Strydom, Fouche *et al.*, 2011:236).

The purpose of the pre-testing procedure was to identify any difficulties that may be encountered during the study, and to make changes to the data collection instrument if necessary. Participants indicated the language was understandable and no recommendations were made to change the instrument. Each participant took an average of 15 to 20 minutes to complete the questionnaire.

Results of the pre-testing procedure were not included in the main study, which followed the pre-test; this was done in consultation with the statistician.

3.6 ETHICAL CONSIDERATIONS

Burns and Grove (2009) stated that the conduct of research requires not only expertise and diligence, but also honesty and integrity to prevent public mistrust and researcher misconduct. According to Polit and Beck (2014:83), the Belmont report describes three principles of beneficence, respect for human dignity and justice as essential to conduct ethically acceptable studies, and the following ethical issues were taken into consideration.

3.6.1 Informed Consent

Informed consent means the respondents have adequate information about the study, comprehend the information, and have the power of free choice enabling them to consent to or decline participation voluntarily (Polit & Beck, 2018). Each respondent willingly agreed to participate in the study. Written consent was not obtained from each respondent because an ethical waiver had been applied and the return of the questionnaire was taken as informed consent. However, each respondent received an information letter outlining the study procedures (refer to **Appendix B**).

3.6.2 Permission to Conduct the Study

Permission to conduct research was obtained from the following relevant authorities: The Post-graduate Research Committee of the School of Therapeutics, Faculty of Health Sciences, and this permission was granted (refer to **Appendix E**), the Human Research Ethics Committee (Medical) of the University of the Witwatersrand, where the research proposal and instruments were submitted to, and ethical clearance was issued (refer to **Appendix C**), and the hospital management where the study was conducted (refer to **Appendix D**).

3.6.3 Anonymity and Confidentiality

Study respondents have a right to expect that the data they provide will be kept in strict confidence. Anonymity is the most secure means of protecting confidentiality and occurs when the researcher cannot link respondents to their data (Polit & Beck, 2018). In this study, the respondent's right to privacy was protected through confidentiality procedures, which included securing confidentiality assurances from anyone with access to research data, maintaining identifying information in locked files, substituting identification numbers of participant's names on records and files to prevent an accidental breach of confidentiality and reporting only aggregate data for groups of participants. No names were used in the final report. All the respondents were assured of their anonymity in their participation in this study.

3.7 VALIDITY AND RELIABILITY OF THE STUDY

The following were observed to ensure achievement of validity and reliability of the study.

Reliability of the study was maintained by the following:

- Maintaining consistency of data collection through compliance with data collection instrument.
- The data collection process was done entirely by one researcher.
- Data collection within the stipulated time frame, which was three months beginning on the 3rd December 2013.
- The statistician verified data for accuracy, and the total sample was utilised.

The validity of the study was maintained by the following:

- Four local domain experts (medical and nursing) assessed the adapted instrument for verification in the South African context.
- Total sampling was used to achieve a larger sample and prevent bias.
- A non-threatening environment was created by assuring respondents that participation was voluntary, anonymity would be ensured, and withdrawal from the study was applicable without any consequences.
- The instrument was handed to the participant alone, and when completed it was placed into a sealed box, which was only opened after the data collection process was finished for data analysis to take place.
- A pilot test was conducted on 10 (n = 10) respondents to enhance validity and reliability of the study.

3.8 SUMMARY

The chapter describes the research methodology. The research design was selected to meet the study's aim and objectives. An in-depth description was given of the instrument used for data collection. A small pilot test was conducted before the main study commenced using the data collection schedule, which met the study objectives.

The following chapter presents the data analysis and research results.

CHAPTER FOUR

RESULTS OF THE STUDY

4.1 INTRODUCTION

This chapter describes the results of the study describing professional nurses' perceived disaster preparedness; this was achieved through an explorative, descriptive and cross-sectional design. The population included all professional nurses working in the Emergency Departments and Intensive Care Units at a public sector tertiary hospital in Johannesburg. The population included the total sample (N = 210), and convenience sampling was used to achieve the study sample. Data were collected by means of a data collection instrument (refer to **Appendix A**) and analysed by means of descriptive and inferential statistics. The descriptive tests were used to synthesise the respondent's demographic data and questionnaire schedule. Statistical tests included the Brant test, univariable and multivariable logistic regressions and Chi-square tests. Testing was done on the 5% level of significance ($p < 0.05$).

In this chapter, the results of the data analysis are presented. Firstly, the demographic aspects of the respondents are described, the responses to the data collection questionnaire are presented on item level in tables and graphical formats, and lastly, significance of the relationships between level of disaster preparedness and demographic aspects are examined.

4.2 RESULTS AND FINDINGS

4.2.1 Response Rate

By the end of the data collection period of three months, 96 out of 210 surveys were returned. Sixteen surveys were unfilled leaving 80 surveys (response rate = 38.09%) available for analysis. This is considered a low response rate (Fincham, 2008), and the implications thereof will be addressed in the limitations of the study.

4.2.2 Section 1: Demographical Characteristics and Experiences

Table 4.1: Demographic characteristics of the respondents

Item	Characteristics	Frequencies	Percentage
Q1	Gender		
	- Male	19	23.7%
	- Female	61	76.3%
Q2	Age (in years)		
	- 18 to 25	1	1.2%
	- 26 to 35	26	32.5%
	- 36 to 45	15	18.8%
	- 46 to 60	38	47.5%
Q3	Years in nursing		
	- <i>No response</i>	1	1.2%
	- <1 year	-	-
	- 1 to 5 years	19	23.8%
	- 6 to 10 years	19	23.8%
	- 11 to 15 years	10	12.4%
	- >15 years	31	38.8%
Q4	Highest qualification		
	- <i>No response</i>	6	7.4%
	- Diploma	49	61.3%
	- Advanced diploma	7	8.8%
	- Bachelor degree	15	18.7%
	- Master's degree	3	3.8%
	- Doctorate	-	-
Q5	Current position in nursing		
	- <i>No response</i>	11	13.7%
	- Professional nurse	62	77.5%
	- Unit manager	3	3.8%
	- Area manager	-	-
	- Nursing services manager	-	-
	- Nursing educator	4	5.0%

	- Nursing researcher	-	-
	- Others (<i>please specify</i>)	-	-
Q6	Area of work		
	- Trauma Department	9	11.3%
	- Medical Department	-	-
	- Trauma ICU	12	15.0%
	- Cardiothoracic ICU	13	16.3%
	- Coronary Care Unit	-	-
	- General ICU	38	47.5%
	- Neurosurgical ICU	8	10.0%
	- Others (<i>please specify</i>)	-	-

Table 4.1 presented these results:

Females accounted for 76.3% (n = 61) and males 23.8% (n = 19) of the total sample (n = 80). The majority (66.3%; n = 53) were between the ages of 36 to 60 years and 33.8% (n = 27) were in the 18 to 35 age categories.

In this study, about one third (38.8%; n = 31) of the sample (n = 80) had more than 15 years of nursing experience, followed by 23.8% (n = 19) of nurses in the categories of 1 to 5 years and 6 to 10 years of experience in nursing, respectively.

The majority (61.3%; n = 49) had a diploma as their highest qualification, followed by 18.8% (n = 15), 8.8% (n = 7) and 3.8% (n = 3) indicated as a Bachelor's degree, Advanced diploma and Master's degree, respectively. The other 7.5% (n = 6) did not respond to this item.

The majority (77.5%; n = 62) of nurse respondents indicated their current clinical position as a professional nurse at the bedside, followed by 5.0% (n = 4) and 3.8% (n = 3) as nurse educators and nurse managers, respectively. The other 13.8% (n = 11) did not respond to this item.

A close majority (47.5%; n = 38) of nurses worked in the General ICU, followed by 16.3% (n = 13), 15.0% (n = 12) and 10.0% (n = 8) in the Cardiothoracic, Trauma

and Neurosurgical ICUs, respectively. However, only a small number of nurses (11.3%; n = 9) worked in the Trauma Emergency Department.

Table 4.2: Descriptions of disasters by the nurse respondents (n = 65)

Description	Statement	Frequencies	Percentage
Characteristics	Unpredictable, sudden, unexpected, unprepared, unplanned, unpreventable	29	43.0%
	Out of control, cannot manage, do not know how, catastrophic, disorganised	10	15.4%
	Urgent, rapid response, emergency	8	12.3%
	Horrific happenings, traumatic, crisis, dangerous	8	12.3%
Demanding medical attention	Emergency, immediate, medical attention needed	14	21.5%
	Need more nurses to cope	12	18.5%
	Challenging to services, exceeds normal work	7	10.8%
Impacts	Involves large numbers of victims, injury, death, fatalities, life-threatening	34	52.3%
	Damage to buildings/ destruction/ loss of property	15	23.1%
	Bad psychological effects/ anxious /sadness /stress/inability to cope	8	12.3%
	Severe consequences	2	3.1%
Types	Natural disasters, extreme weather change, floods	23	35.4%
	Serious accidents, extensive traffic accidents	11	16.9%

	Major fires	4	6.2%
	Food poisonings	2	3.1%
	Infectious diseases	1	1.5%
	Other man-made unfortunate events	1	1.5%

Table 4.2 presented these results:

Out of 80 respondents, only 65 (81.2%) answered the open-ended question, which stated, “*Describe in your words what you understand by a disaster*” (item 7). The responses from this question were analysed using a content analysis followed by the method described in Chapter Three. From this analysis, four categories emerged, which were described as: “*characteristics*,” “*demanding*,” “*impact*” and “*types of events*.”

Respondents described the “characteristics” mostly as “*unpredictable, sudden, unexpected, unprepared, unplanned, unpreventable*” (43.0%; n = 29), “*out of control, cannot manage, catastrophic, disorganised*” (15.4%; n = 10). Other descriptions of characteristics included “*urgent, rapid response, emergency*” and “*horrific happening, traumatic, crisis, dangerous*” (12.3%; n = 8), respectively.

Some respondents described their understanding of disasters as “*demanding*.” “*Emergency, immediate medical attention needed*” (21.5%; n = 14), followed by “*need more staff to cope*” (18.5%; n = 12) and “*challenging to services exceeds normal work*” (10.8%; n = 7).

The third most commonly used description was “*impact*”. The “*involvement of large numbers of victims, injury, death, fatalities, life threatening*” (35.4%; n = 24), followed by “*damage to buildings, destruction, loss of property*” (23.1%; n = 15), “*bad psychological effects, distress, sadness, stress, inability to cope*” (12.3%; n = 8) and “*severe consequences*” (3.1%; n = 2).

A small number of respondents used “*types of events*” to explain their understanding of a disaster, such as natural disasters, extreme weather changes, floods (35.4%;

n = 23), “serious accidents, extensive traffic accidents” (16.9%; n = 11), and “major fires” (6.2%; n = 4). Other examples included “food poisoning”, “infectious diseases” and “other man-made unfortunate events”, which were cited by a small number of respondents.

A list of unfortunate events that occurred in South Africa was then provided (item 8), and the respondents were asked to indicate whether they considered these events as disasters by answering “yes” or “no”. **Table 4.3** presents these results.

Table 4.3: Unfortunate events that happened in RSA and considered disasters

Item	Statements	Frequencies	Percentage
Q8a	Marikana miner’s strike, Rustenburg (10 to 20 September 2012, numerous miners involved, 44 deaths	48	60.0%
Q8b	Sharpeville massacre (21 March 1960, 5,000 to 7,000 protesters, 69 killed in shoot out)	59	73.8%
Q8c	Soweto uprising, Johannesburg (16 June 1976, 20,000 participants, 176 died with estimates up to 700 in shoot out)	63	78.8%
Q8d	Table Mountain fire (17 March 2009, 1 death and 7 injuries. Large amount of hectares were destroyed).	37	46.3%
Q8e	Westdene dam disaster, Johannesburg-Bus driver lost control and plunged into dam with schoolchildren (27 March 1985, 39 students died).	56	70.0%

Q8f	Bethlehem bus crash, Free State, coach drove into reservoir (1 May 2003, 80 killed).	47	58.8%
Q8g	Blackheath train accident, Cape Town (25 August 2010, train crashed into minibus, 10 school/children killed).	43	53.8%
Q8h	Hectorspruit level crossing accident, Mpumalanga (13 July 2012, Train collided with truck, 26 fatalities).	48	60.0%
Q8i	Ellis Park stadium stampede disaster, Johannesburg (11 April 2001, 120,000 attendees, 43 people were crushed to death).	69	86.3%

Table 4.3 presented these results.

The “*Ellis Park Stadium Stampede Disaster*” in Johannesburg, caused by overcrowding and stampede on the 11th April 2001, which crushed 43 people to death and injured 250, topped the list of disasters (86.3%; n = 69), followed by the “*Soweto uprising*” (78.8%; n = 63), “*Sharpeville massacre*” (73.8%; n = 59) and the “*Westdene dam disaster*” (70.0%; n = 56).

The respondents were given a list of possible unfortunate events that have happened around the world (item 9), and asked to indicate the likelihood of these events occurring in RSA. **Table 4.4** presents these results.

Table 4.4: Likelihood of unfortunate events happening in RSA

Statements	Most unlikely		Unlikely		Likely	
	n	%	n	%	n	%
Chemical spill	16	20.0%	23	28.8%	41	51.3%
Earthquakes	30	37.5%	24	30.0%	26	31.3%
Severe flooding	7	8.8%	10	12.5%	63	78.8%
Extensive landslides	30	37.5%	23	28.8%	27	33.8%
Major fire incidents	4	5.0%	11	13.8%	65	81.3%
Major transport incidents	5	6.3%	10	12.5%	65	81.3%
Nuclear incidents/radioactive substances	36	4.5%	25	31.3%	19	23.8%
Extreme weather	11	13.8%	18	22.5%	51	63.8%
Terrorist attacks	23	28.8%	33	41.3%	24	30.0%
Infectious diseases	9	11.3%	8	10.0%	63	78.8%
Widespread strike/demonstrations	11	13.8%	7	8.8%	62	77.5%
Mining accidents	6	7.5%	6	7.5%	68	85.0%
Refugee migration	15	18.8%	16	20.0%		
Overcrowding incidence, e.g. sport	7	8.8%	10	12.5%	63	78.8%

Table 4.4 presented these results:

The top five unfortunate events considered likely to happen in RSA were ‘mining accidents’ (85.0%; n = 68), followed by ‘*major fire incidents*’ (81.3%; n = 65), ‘*major traffic accidents*’ (81.3%; n = 65) and ‘*overcrowding incidences, e.g. sport*’ and ‘*infectious diseases*’ (78.8%; n = 63) respectively. Others are listed in Table 4.4.

The disastrous events that are considered not possible to happen in South Africa were ‘*extensive landslides*’ (37.5%; n = 30), ‘*earthquakes*’ (36.5%; n = 30) and ‘*terrorist attacks*’ (28.8%; n = 23). Others are listed in Table 4.4.

4.2.3 Section 2: Organisations and Agencies

Table 4.5 Frequencies obtained from the respondents for agencies and organisations involved in disaster situations

Item	Variable	Frequencies	Percentage
Q10	Organisations considered most involved in disastrous situations by nursing:		
	- Department of Health	73	91.3%
	- Department of Justice and Constitutional Development	11	13.8%
	- South African Weather Services	34	42.5%
	- South African National Defence Force (SANDF) and South African Police Services (SAPS)	67	83.6%
	- Department of Social Welfare and Population Development	38	47.5%
	- Department of Human Settlements	31	38.8%
	- Department of Education (lower and higher)	11	13.8%
	- Department of Public works	32	40.0%
	- Department of Home Affairs	28	35.0%
	- Department of Water Affairs	40	50.0%
	- South African Fire Services	63	78.8%
Q11	Nurses immediate action in the event of a disaster in the hospital:		
	- Escape as soon as possible	13	16.3%
	- Evacuate patients as soon as possible	18	22.5%
	- Follow instructions from supervisor	28	35.0%
	- Alarm others before escaping	23	28.7%
	- Follow hospital protocol to manage situation	56	70.0%

Q12	Minimum of a three-day supply of items at home:		
	- Water	43	53.8%
	- Food	63	78.8%
	- Shelter	35	43.8%
	- Warm blankets	45	56.3%
	- Light source	31	38.8%

Table 4.5 presented these results:

When asked to identify the agencies that would be involved in disaster management (item 10), almost all the nurses surveyed (91.3%; n = 73) agreed that the “*Department of Health*” is the body most involved in responding to disaster situations. The other agencies considered to be involved in disaster response included the “*South African National Defence Force (SANDF) and South African Police Services (SAPS)*” (83.6%; n = 67), and “*South African Fire Services*” (78.8%; n = 63). Others included “*Department of Water Affairs*” (50.0%; n = 40), “*Department of Social Welfare and Population Development*” (47.5%; n = 38) and “*South African Weather Services*” (42.5%; n = 34). Others are listed in Table 4.5.

If a disaster were to strike while they were at work (item 11), 70.0% (n = 56) of respondents reported they would follow the hospital protocol, while 35.0% (n = 28) would wait for instructions or directions from their supervisor. Others would alert people before escaping (28.7%; n = 23), would evacuate patients (22.5%; n = 18) and would escape as soon as possible (16.3%; n = 13).

When asked whether respondents had a minimum of a 3-day supply of selected items at home (item 12), most of the respondents surveyed (78.8%; n = 63) agreed they had “*at least a 3-day supply of food items at home.*” Other items considered important were “*warm blankets*” and “*water,*” as cited by 53.8% (n = 43) of the respondents respectively.

4.2.4 Section 3: Disaster Preparedness of Nurses

Table 4.6: Frequencies obtained from the respondents for preparedness for disaster
(n = 80)

Item	Variable	Frequencies	Percentage
Q13	Is there a protocol for disaster management in the workplace: - Yes - No - Don't know If yes, have you read it before	79 - - 2	98.8% - - 2.5%
Q14	Have you participated in any activity in accordance with disaster management at your workplace? - Yes - No	33 47	41.3% 58.7%
Q15	Nurses perceptions of their own preparedness for disasters: - No response - Totally unprepared (grade 1) - Somewhat unprepared (grade 2) - Somewhat prepared (grade 3) - Fully prepared (grade 4)	1 10 24 40 5	1.3% 12.5% 30.0% 50.0% 6.3%
Q16	Is there a need for the general public disaster preparedness? - Yes - No - No response	76 3 1	95.0% 3.8% 1.3%
Q17	Sources of obtaining information on disaster management: - By word of mouth - Hospital or school notice - Internet	29 60 41	36.3% 75.0% 51.2%

	- Newspapers	28	35.0%
	- Television	41	51.2%
	- Radio	43	53.8%
	- Electronic mail	9	11.3%
	- Telecommunication	38	47.5%
Q18	Role of nurses in disaster preparedness:		
	- Caregiver	56	70.0%
	- Educator	59	73.8%
	- Researcher	39	48.8%
	- Coordinator	57	71.3%
	- Manager	41	51.2%
	- Counsellor	49	61.3%
	- Others	2	2.5%

Table 4.7 presented these results:

Almost all of the nurses believed there was a protocol in their workplace for dealing with disastrous events (98.8%; n = 79) (item 13), but only 2.5% (n = 2) had read these protocols.

When respondents were asked, whether they attended any activity related to disaster management at the workplace (item 14), only 41.3% (n = 33) of nurses acknowledged they had, and most 58.7% (n = 56) had not

As many as 42.5% (n = 34) of the nurses acknowledged they were inadequately prepared for disasters (item 15).

When asked whether nurses believed the general public needed disaster preparedness (item 16), 95% (n = 76) of the respondents agreed.

Most of the respondents surveyed (75.0%; n = 60) believed that a “*hospital or school notice*” was used as a source for obtaining information on disaster management (item 17). Other sources used for obtaining information on disaster management, in

order of importance, were radio (53.6%; n = 43) and television and internet (51.2%; n = 41).

When respondents were asked about the perception of their roles during disaster preparedness (item 18), the majority of them believed their roles were as “*educator*” (73.8%; n = 59), “*coordinator*” (71.3%; n = 57) “*caregiver*” (70.0%; n = 57) and “*counsellor*” (61.3%; n = 49). Others are listed in Table 4.6.

4.2.5 Section 4: Education and Training Needs

Table 4.7: Frequencies obtained from the respondents for education and training needs

Item	Variable	Frequencies	Percentage
Q19a	Educational courses that should be undertaken in preparing for disaster:		
	- First aid level 3	40	50.0%
	- Basic life support	34	42.5%
	- Advanced cardiovascular life support	21	26.3%
	- Pre-trauma life support	22	27.5%
	- International trauma life support	30	37.5%
	- Infection control	19	23.8%
	- Peri-trauma counselling	20	25.0%
	- Post-traumatic psychological care	19	23.8%
	- Disaster management	33	41.3%
	- Others	1	1.3%
Q19b	Educational courses attended or attending in preparing for disaster:		
	- First aid level 3	14	17.5%
	- Basic life support	15	18.8%
	- Advanced cardiovascular life support	8	10.0%
	- Pre-trauma life support	10	12.5%
	- International trauma life support	4	5.0%

	- Infection control - Peri-trauma counselling - Post-traumatic psychological care - Disaster management - Others	13 5 8 9 1	16.3% 6.3% 10.0% 11.3% 1.3%
Q19c	Educational courses interested in attending in preparing for disaster: - First aid level 3 - Basic life support - Advanced cardiovascular life support - Pre-trauma life support - International trauma life support - Infection control - Peri-trauma counselling - Post traumatic psychological care - Disaster management - Others	48 50 38 36 28 36 36 43 47 12	60.0% 62.5% 47.5% 45.0% 35.0% 45.0% 45.0% 53.8% 58.8% 15.0%
Q20	Specific learning materials and activities; - Disaster drills - Disaster management course - Disaster management protocols - Information pamphlets - Information website about disaster management - Onsite visit - Equipment - Disaster management protocols	67 71 67 40 46 34 3 67	83.8% 88.8% 83.8% 50.0% 57.5% 42.5% 3.8% 83.8%

Table 4.7 presented these results:

All respondents agreed there were courses nurses should take in order to be prepared for disasters (item 19a). Some of these courses in order of importance

were “*First Aid (Level 3)*” (50.0%), “*Basic life support*” (42.5%), “*disaster management*” (41.3%), “*international trauma life support*” (37.5%), “*pre-trauma support*” (25.0%) and “*post-traumatic psychological care*” (23.8%). Others are listed in Table 4.7.

Only a few respondents identified courses that they had attended or participated in to be prepared for disasters (item 19b). Some of these courses, in order of importance, were “*Basic life support*” (18.8%; n = 15), “*Infection control*” (16.3%; n = 13), “*First aid level 3*” (17.5%; n = 14), “*Pre-trauma life support*” (12.5%; n = 10) and “*Disaster management*” (11.3%; n = 9). Others are listed in Table 4.6.

All respondents agreed there were courses they would be interested in attending to better prepare themselves for disasters (item 19c). The three top priority courses identified by the respondents were “*Basic life support*” (62.5%; n = 50), followed by “*First Aid (Level 3)*” (60.0%; n = 48) and “*Disaster management*” (58.8%; n = 47). Others are listed in table 4.7.

The majority of respondents considered that specific materials and activities related to disaster management should also be developed to enable nurses to prepare for disasters (item 20). A “*Disaster management course*” was deemed necessary by 88.8% (n = 71), followed by “*Disaster management protocol*” and “*Drills for disaster management*,” cited by 83.8% (n = 67), as helpful to prepare nurses for disasters. Others are listed in Table 4.7.

4.2.6 Open-ended Responses

The questionnaire made provision for one open-ended question at the end of the questionnaire (item 21) for open comments. Unfortunately, the study participants chose not to elaborate by providing additional information on the space provided on the questionnaire (refer to **Appendix A**) for open comments.

4.2.7 Relationships between Level of Disaster Preparedness and Demographic Aspects

To determine the relationship between the demographic aspects of nurses and disaster preparedness, univariable and multivariable ordinal logistic regression models were fitted. The following explanatory variables were fitted into the model: *years of experience*, *highest qualification* and *unit*. The ordinal outcome variable fitted was “*nurses’ preparedness for a disaster*,” with the following categories “*totally unprepared*,” “*somewhat unprepared*,” “*somewhat prepared*” and “*fully prepared*.”

The following assumptions for fitting an ordinal logistic regression were checked: dependent variable measured as at the ordinal level, no or little multicollinearity (highly correlated independent variables) and proportionality of odds (i.e. each independent variable has a similar effect at each split of the ordinal outcome variable) (Bender & Grouven, 1997). To test the assumption of multicollinearity, a variance inflation factor (VIF) statistic was used (VIF statistic is required to be ≤ 10 to indicate the absence of multicollinearity). There were no continuous dependent variables fitted into the model, hence this assumption was not checked. To test the assumption of proportional odds, the Brant test was used (Brant, 1990). The null hypothesis for the Brant test is that the odds are proportional, hence a p-value of >0.05 indicates the assumption of proportionality of odds is met. The results of the assumptions test are presented in Table 4.7.

Table 4.7: Ordinal logistic regression diagnostics

Variable	Brant test p-value
Years of experience	0.3040
Unit	0.3352
Highest qualification	0.1030

The univariable and multivariable ordinal regression analysis to assess the relationship between demographic factors and disaster preparedness are shown in **Table 4.8**.

Table 4.8: Univariable and multivariable ordinal regression analysis to assess the relationship between demographic factors and disaster preparedness

Outcome: As a nurse, please grade how prepared you are for a disaster				
	Univariable analysis		Multivariable analysis	
	Coef (95% confidence interval)	p-value	Coef (95% confidence interval)	p-value
Years of experience				
< 1 year	-3.27 (-6.70-0.16)	0.062	-3.12 (-6.71-0.47)	0.089
1-5 years	-3.90 (-5.40 - -2.39)	0.000*	-4.16 (-5.86 - -2.46)	0.000*
6-10 years	-1.66 (-3.00 - -0.32)	0.015*	-1.73 (-3.15 - -0.31)	0.017*
11-15 years	-3.27 (-4.89-1.66)	0.000*	-3.41 (-5.11 - -1.70)	0.000*
>15 years	Base			
Unit				
Emergency Department	-0.33 (-1.33-0.66)	0.514	0.09 (-1.13-1.31)	0.880
Intensive Care Unit	base			
Highest qualification				
Diploma	-1.24 (-2.61-0.12)	0.075	0.26 (-1.49-2.01)	0.771
Advanced diploma	Base			
Bachelor's	-0.85 (-2.50-0.80)	0.311	-1.08 (-2.71-0.56)	0.199
Master's	0.02 (-1.08-1.12)	0.970	-0.41 (-1.72-0.90)	0.539
Doctorate	1.12 (-1.52-3.77)	0.405	-0.37 (-3.52-2.78)	0.818

Key: * = statistical significance

The results presented in Table 4.8 show *there was an association between years of experience and disaster preparedness*. There was no significant association between hospital unit and disaster preparedness. There was also no significant association between highest qualification and disaster preparedness.

The results of the univariable analysis show that the lower the professional nurses' years of experience, the lower the likelihood of the nurses being '*totally unprepared*' as opposed to being '*somewhat unprepared*,' '*somewhat prepared*' or '*fully prepared*.' A similar trend is seen when adjusting for the unit and highest qualification in the multivariable analysis.

4.3 SUMMARY

The chapter presented the results of the study.

In the next chapter, the findings will be discussed in relation to relevant literature including the study limitations, recommendations for nursing practice, education, management and future research and conclusion of the study.

CHAPTER FIVE

DISCUSSION OF FINDINGS, LIMITATIONS AND RECOMMENDATIONS

5.1 INTRODUCTION

This chapter provides a discussion of the findings of the study, and presents the justifications together with the limitations. The chapter ends with recommendations for nursing practice, education, management and future research and a conclusion for the study.

5.2 DISCUSSION OF FINDINGS

Eighty respondents participated in this study and the demographic profile revealed that the majority of the professional nurses were women, aged between 26 to 45 years and having between one to 10 years of work experience in Nursing. In one similar study conducted in Hong Kong, it was reported that three-quarters of the nurses in their sample were aged between 18 to 36 years of age (Fung, Loke & Lai, 2008), whilst among Philippine nurses, 80.6% were in the 18 to 45 age categories (Labrague, Yboe, McEnroe-Petitte *et al.*, 2016).

In this study, the majority of the nurses had a Diploma as the highest nursing qualification and worked in the hospital as professional nurses, as opposed to being unit nurse managers or educators (3.8% and 5.0%), respectively. The South African healthcare system makes provision for employment of two bands of professional nurses in public hospitals, i.e. senior- and junior-professional nurses, and they provide direct patient care. In a similar study conducted in Saudi Arabia, only 31.8% of the sample of nurses were Diploma prepared (Al Thobaity Plummer & Williams, 2015), which contrasted with a study amongst Philippine nurses that reported 91.7% and 8.3% of respondents held a Bachelor's or Master's degree, respectively, and in Australia, where 77.7% of the nurses had a Bachelor's degree (Hammad, Arbon & Gebbie, 2011). In this current study only one quarter of the nurses had a Bachelor's or Master's degree (18.8% and 7.5%), respectively. It is noteworthy that the majority

of the respondents who participated in this study worked in Intensive Care Units, with almost half of the group of nurses being in a General ICU.

The *first objective* of the study was to assess the disaster preparedness of professional nurses by completing a Disaster Preparedness Questionnaire (DPQ).

Findings in this study revealed a close majority (52%) of the nurse respondents agreed that a large number of victims was a vital characteristic of a disaster. However, they did not choose the most unfortunate event in RSA with the largest number of deaths as the most disastrous event; instead of the Soweto Uprising with 176 deaths, more chose the Ellis Park Stadium Stampede with 43 deaths.

The majority of the nurses in this study considered the most likely disasters to occur in the RSA to be mining disasters (85%), major fires caused to informal human settlements or buildings and serious traffic accidents (81% respectively), as well as, extreme weather conditions (severe flooding and droughts) and overcrowding incidents such as sports (79% respectively). Natural disasters, such as extensive landslides, earthquakes and terrorist activities (38%, 37% and 29% respectively) were considered by the respondents in this study as least likely to happen in the RSA. When compared with other parts of the world, Asia was the region considered to be most hit by natural disasters, accounting for 90.13% of worldwide disaster victims (Guha-Sapir, Vos & Below, 2013). According to these authors, the Philippines and China have experienced the most earthquakes, flash floods, typhoons and volcanic eruptions. Conversely, the United States of America has suffered from nuclear and radioactive disasters and terrorist attacks, such as that of September 11, 2001 (Fung, Loke & Lai, 2008).

In this study, the greater majority of the respondents believed the Department of Health was the organisation mostly involved when a disaster occurs. Although these respondents were working in the hospital, they were employees of the Department of Health in the province. More than 70% of the nurses in this study agreed their immediate action in the hospital would be to follow the disaster management protocol, while others would wait for instructions from their immediate supervisor. In one study among Hong Kong nurses, it was reported that 36% of nurses would

follow the hospital disaster management protocol, while 34% would wait for instructions from their supervisors (Fung, Loke & Lai, 2008). In this current study, the majority of the respondents also recognised the need for a collaborative approach to disaster management, citing the SANDF, SAPS and Fire Services. In literature, these organisations and agencies are part of the first responders at the scene of the disaster (Mehta, 2006).

Arbon, Cusack, Ranse *et al.* (2013) and Duong (2009) noted that hospitals are among the first organisations to be affected after a disaster occurs, and nurses would be the first healthcare professionals to be affected. According to Zhong, Hou, Clark *et al.* (2014), hospitals should have the ability to manage usual work demands on its services at the time of a disaster. Therefore, it is imperative that hospitals have a well-developed and tested disaster management plan or protocol (Mehta, 2006).

It is evident from the findings of this study that the greater majority of the nurses were aware of the existence of a disaster management protocol in their hospital, but acknowledged having not read it. In one study among Hong Kong nurses, the majority of nurses knew of the existing protocol in their hospital, but only 61% had read it (Fung, Loke & Lai, 2008). In a study conducted in Canada, 40% of nurses were unsure whether their hospital had a disaster protocol (O'Sullivan, Dow, Turner *et al.*, 2008). In another study, 58% of Jordanian nurses familiar with disaster management plans reported no confidence in carrying them out (Al Khalaileh, Bond & Alasad, 2012), whilst in a study conducted in Australia, 87% of nurses knew a disaster management protocol existed in their hospital, but 42% had not read it (Duong, 2009). The questionnaire used in this current study did not make provision to explore further the reasons why nurses had not read the disaster management protocol used in their workplace, and this should be explored in further studies.

In the current study, nurses recognised the need for greater public awareness of disasters and disaster management. Additionally, the majority of the nurses identified hospital or school notice boards as being a good source for public information.

The majority of the nurses believed they had a “3-day supply of food at home,” followed by “warm blankets” and “water” (56% and 54% respectively). In a study conducted in America, nurses experiencing a disaster indicated they have concerns about competing demands, such as families’ welfare and worries about professional role responsibilities (Raveis, VanDevanter, Kovner *et al.*, 2017). These authors concluded that balancing personal and professional requirements could be arranged through anticipation (Raveis, VanDevanter, Kovner *et al.*, 2017).

This study explored nurses’ perceptions of their roles during a disaster situation, and they agreed their role as educator (74%) was seen as their primary role. Apart from this role, nurses believed they also had a role as caregivers and coordinators (>70% respectively). In a study among Chinese nurses, most reported that apart from giving direct care to victims, they performed other roles such as educating, solving problems and even coordinating activities (Yang, Xiao, Cheng *et al.*, 2010). In a study conducted in Australia, nurses reported performing various roles during a disaster, such as a clinician, commander, logistical coordinator and administrator (Ranse, Lenson & Aimers, 2010). In another Australian study, in addition to their clinical role nurses performed psychosocial support, coordinated care and resources, and were problem solvers (Ranse & Lenson, 2012).

It is worth noting that the majority of nurses (>90%) in this current study acknowledged they were not fully prepared for a disaster. In a study amongst Philippine nurses, 80% reported they were adequately prepared to handle a disaster (Labrague, Yboa, McEnroe-Petitte *et al.*, 2016), whilst a study conducted in Hong Kong indicated 97% of the nurses were not adequately prepared (Fung, Loke & Lai, 2008). In an Australian study, most nurses failed the knowledge test with a score of less than 50% (Hammad, Arbon & Gebbie, 2011). These authors suggested that nurses’ self-report of disaster preparedness may be similar to the results of knowledge tests (Hammad, Arbon & Gebbie, 2011).

The *second objective* of the study was to identify the relationships between demographic characteristics of professional nurse participants by making use of the Disaster Preparedness Questionnaire (DPQ).

In this study, the relationship between the demographic aspects of nurses and disaster preparedness was explored, using univariable and multivariable ordinal logistic regression models. The variables of interest were years of experience, highest qualification, workplace, nurse's preparedness for a disaster with the following categories "totally unprepared," "somewhat unprepared," "somewhat prepared" and "fully prepared."

The findings in this study have shown no significant ($p > 0.05$) association between hospital workplace and disaster preparedness. These findings are not consistent with those in studies conducted overseas, as one study (Hammad, Gebbie & Arbon, 2011) indicated that nurses working in Emergency departments coped better with disaster situations, whilst another USA study (Slepski, 2007) reported that additional clinical skills were not needed by nurses in their study sample. In this current study there was no association between the highest qualification and disaster preparedness ($p > 0.05$). Hammad, Gebbie and Arbon (2011) found nurses who held a Bachelor's degree scored higher in the knowledge test than their counterparts with a Diploma level qualification.

However, the findings in this study have revealed there was an association between the professional nurses' years of experience and disaster preparedness. The results have shown that **the lower the professional nurses' years of experience (OR - 3.27; 95% CI -6.70 – 0.16; $p = 0.062$), the lower the likelihood of the nurses being totally unprepared** as opposed to being somewhat unprepared, somewhat prepared, or fully prepared. Similarly, Hammad, Gebbie and Arbon (2011) found the more experienced nurses were more prepared in a disaster situation than were less experienced nurses. Another Australian study also reported that nurses with limited experience in disaster response had low confidence and demonstrated confusion during the response phase of a disaster (Duong, 2009).

The *third objective* of the study was to describe the educational needs regarding disaster preparedness of professional nurses.

In this study, the majority of the nurse respondents (>80%) identified the need for the development of a disaster management course, which included various issues relevant to disasters, such as drills on various aspects of response plans, and knowledge of equipment and supplies. According to Noto, Kitmamiya, Itaki *et al.* (2014) and Mehta (2006), this should include collaborative activities with national and local hospitals, emergency medical services and fire departments.

In addition to disaster management courses, all nurses agreed there were courses that nurses should take in order to be prepared for disasters. Examples cited included First Aid (Level 3), Basic Life Support and International Trauma Life Support TM. In one study conducted in China, nurses reported that First Aid, Basic Life Support and Advanced Cardiac Life Support TM knowledge would help a nurse to improve patient's chances of survival (Yan, Turale, Stone *et al.*, 2015). It is noteworthy that many nurses in this current study had not attended courses necessary for disaster preparedness. In a study conducted in the USA, the majority of nurses had never attended training or educational courses on disaster management (Baack & Alfred, 2013). These authors concluded that it is important to engage nurses in activities to provide them with insights into disaster response and preparedness (Baack & Alfred, 2013).

In this study, the majority of nurses believed specific learning material and activities related to disaster management (89%) should be developed to enable nurses to prepare for disasters. Hospitals have a responsibility to ensure a well-developed and tested disaster management protocol and provide opportunities for nurses to attend mock drills to prepare them for disasters (84% respectively). It is noteworthy that the disaster management protocol used in this study stipulates the hospital should make two disaster drills each year however, the last one was done in 2013, which suggests nurses working in the hospital for the past three years have not been exposed to disaster drills.

5.3 SUMMARY OF THE STUDY

This study intended to explore and describe the disaster preparedness of professional nurses working in a public sector tertiary hospital in Johannesburg. The main objectives were to assess the disaster preparedness of professional nurses by completing a disaster preparedness questionnaire to identify the relationship between demographic characteristics of professional nurses by making use of the disaster preparedness questionnaire, and to describe the educational needs regarding disaster preparedness of such nurses. Before commencement of the study, ethical approval was granted by the Human Research Ethics Committee (Medical) of the University of the Witwatersrand and approval was granted from the Postgraduate Research Committee of the School of Therapeutics, Faculty of Health Sciences, and the Chief Executive Officer and Director of Nursing Services in the hospital.

The Emergency Departments and Intensive Care Units at the public sector tertiary hospital in Johannesburg were used to conduct the study. Professional nurses were sampled using the total sample of 210 professional nurses affiliated to the selected study sites at the hospital. A self-administered adapted disaster preparedness questionnaire, developed by Fung, Loke and Lai (2008), was used to collect the data.

To achieve the study objectives, a quantitative, explorative, descriptive and cross-sectional research design was used. Data was collected from 96 respondents over a period of 12 weeks (3 months). Sixteen surveys were unfilled leaving 80 surveys available for data analysis. Results were discussed using descriptive and inferential statistics.

It was demonstrated that professional nurses in this current study acknowledged they were not adequately prepared for disaster. To ensure effective functioning of the hospital disaster management protocol, the training of professional nurses was recognised as a key strategy. Through collaboration with the hospital authorities and educational institutions, specific courses could be undertaken to help professional nurses be better prepared for disasters, such as basic first aid (up to a level three),

trauma life support and psychological counselling for victims. It also emerged that nurses in this study believed they could contribute to disaster preparedness through their nursing roles as educators, coordinators, caregivers and counsellors. Furthermore, the professional nurses recommended that specific materials and activities related to disaster management, protocols and drills should be developed in the hospital to enable nurses to prepare for disasters.

5.4 LIMITATIONS

The researcher acknowledges the following limitations to the study.

- The findings of the study cannot be generalised to other populations as the study was conducted in one public sector tertiary hospital in one province.
- The study yielded a response rate of only 38.09%, which was after a three-month period of data collection.
- The study sample was not balanced as there were more professional nurses working in the Intensive Care Units.
- The findings of the study are limited, as they did not measure professional nurses' practices related to disaster preparedness, but tended to focus on a sample of nurses self-reported perceived disaster preparedness.

In consideration of these limitations, the findings of this study cannot be generalised unless replication of the study is carried out on a larger scale in other public hospitals and other provinces.

5.5 RECOMMENDATIONS

The findings of this study provide an insight into the perceived disaster preparedness of professional nurses working in the Emergency Departments and Intensive Care Units. These findings have significant implications for disaster preparedness regarding nursing practice, education and further nursing research.

5.5.1 Nursing Practice

The findings of this study indicate that professional nurses believed there was a disaster management protocol in the hospital, however, only a few have read the hospital protocol. These findings therefore serve as empirical evidence to inform the responsibility of all professional nurses to read the disaster protocols to become familiar with their role expectations. Consequently, disaster drills and training are highly recommended. Training strategies, such as mock disasters or simulated disasters, can assist professional nurses in becoming better prepared in disaster management; this will not only empower professional nurses in effective caring for victims, but also facilitate confidence in their multidisciplinary role.

5.5.3 Nursing Education

The implications for nursing education are based on the findings that reveal there are specific courses that could help nurses to be better prepared for disasters, such as basic first aid (up to level three), trauma life support, and psychological counselling for victims. This serves as empirical evidence for educational institutions to engage with the hospital authorities in the development of such courses; this can be achieved through the implementation of an in-service education programme to encourage participation of as many professional nurses as possible. However, the nursing curriculum should be revisited to incorporate essential skills required for disaster preparedness, as well as scaling up the training of professional nurses. This would help prepare nurses for disasters in the hospital and make their practice safe and easy.

5.5.4 Further Research

Although research has been done on the disaster preparedness of professional nurses, findings in this study established nurses are not adequately prepared. There is a need to explore the disaster preparedness of professional nurses further. The current study can be replicated in other Emergency Departments and Intensive Care settings within the region so that the findings can be supported or refuted with those of other similar studies.

It is imperative to the development of professional nurses to determine if a disaster preparedness educational intervention would engage professional nurses in personal disaster preparedness and enhance their willingness to respond during a hospital disaster. This could be achieved through a pre-and post- survey to describe the effects of the educational intervention.

Furthermore, the collaborative structure that is unique to hospital disaster management was not addressed in this study. Therefore, the recommendations are to conduct a multidisciplinary study and possibly include doctors in further research.

5.6 CONCLUSION

In conclusion, this research report described professional nurses' disaster preparedness and found such nurses working in acute care areas (Emergency Departments and ICUs) were not adequately prepared for effective disaster management. To ensure effective functioning of the disaster management protocol, training of professional nurses is recognised as a key strategy. Through collaborative partnerships with hospital authorities and educational institutions, specific courses could be undertaken to assist professional nurses to be better prepared for disasters. These findings will be of use to inform the public sector tertiary hospital management in the delivery of effective nursing care, in determining necessary curricula components in professional nursing education in-line with the realities of clinical practice, and development of nursing personnel in these units.

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DISASTER PREPAREDNESS OF PROFESSIONAL NURSES IN A CENTRAL URBAN PUBLIC SECTOR HOSPITAL IN JOHANNESBURG

DATA COLLECTION INSTRUMENT

1. Your gender
 - ☐ Male
 - ☐ Female

 2. What is your age?
 - ☐ 18-25
 - ☐ 26-35
 - ☐ 36-45
 - ☐ 46-60

 3. How long have you been nursing?
 - ☐ <1year
 - ☐ 1-5years
 - ☐ 6-10years
 - ☐ 11-15years
 - ☐ >15years

 4. What is your highest qualification in nursing?
 - ☐ Diploma
 - ☐ Advanced Diploma
 - ☐ Bachelor Degree
 - ☐ Master's Degree
 - ☐ Doctoral Degree

 5. Currently what position/title do you hold?
 - ☐ Professional Nurse
 - ☐ Unit manager
 - ☐ Area manager
 - ☐ Nursing Services Manager
 - ☐ Nurse Educator
 - ☐ Nurse Researcher
 - ☐ Others (Please specify _____)

 6. In which area do you currently work?
 - ☐ Trauma Casualty
 - ☐ Medical Casualty
 - ☐ Trauma ICU
 - ☐ Cardiothoracic ICU
 - ☐ Coronary Care Unit
 - ☐ General ICU
 - ☐ Neurosurgical ICU
 - ☐ Others (Please specify _____)
- How long have you worked in this area? _____

7. Describe in your own words what you understand by a “disaster”

8. Which of the following South African events would you identify as a disaster? (You can tick more than one option)

- ☐ Marikana miners' strike, Rustenburg (10-20 September 2012, numerous miners involved, 44 deaths)
- ☐ Sharpeville massacre (21 March 1960, 5000-7000 protesters, 69 killed in shoot out)
- ☐ Soweto uprising, Johannesburg (16 June 1976, 20000 participants, 176 died with estimates up to 700 in shout out)
- ☐ Table Mountain Fire (17 March 2009, 1 death and 7 injuries. Large amount of hectare were destroyed)
- ☐ Westdene dam disaster, Johannesburg-Bus driver lost control and plunged in to dam with school children (27 March 1985, 39 students died)
- ☐ Bethlehem bus crash, Freestate, coach drove into reservoir (1 May 2003, 80 killed)
- ☐ Blackheath train accident, Cape Town (25 august 2010, Train crashed into minibus, 10 school children killed)
- ☐ Hectorspruit level crossing accident, Mpumalanga (13 July 2012, Train collided with truck, 26 fatalities)
- ☐ Ellis Park stadium Stampede Disaster, Johannesburg (11 April 2001, 120000 attendees, 43 people were crushed to death)

9. What is the likelihood of the following disaster occurring in South Africa?

* Please tick the box you choose and indicate you chosen rating.

DISASTERS THAT MAY OCCUR IN RSA	Most unlikely	Unlikely	Likely
Chemical Spills			
Earthquakes			
Severe flooding			
Extensive landslides			
Major Fire Incidents			
Major Transport Accidents			
Nuclear Incidents/Radioactive substances			
Extreme weather			
Terrorist attacks			
Infectious Disease(s)			
Widespread strike/Demonstrations			
Mining accidents			
Refuge Migration			
Overcrowding incidences (e.g. sport)			

10. Which of the following agencies are involved during a disaster in South Africa?

- ☐ National Department of Health
- ☐ Department of Justice and Constitutional Development
- ☐ The South African Weather Services
- ☐ The South African Defence Force (SANDF) and South African Police Services (SAPS)
- ☐ Department of Social Welfare and Population Development
- ☐ Department of Human Settlements
- ☐ Department of Education (lower and higher)
- ☐ Department of Public Works
- ☐ Department of Home Affairs
- ☐ Department of Water Affairs
- ☐ South African Fire Services

11. What will be your **IMMEDIATE ACTION** be in the event of a disaster at your workplace?

- ☐ Escape as soon as possible
- ☐ Evacuate patients as soon as possible
- ☐ Follow instructions from immediate supervisor at scene
- ☐ Alarm others before escape
- ☐ Follow hospital protocol to manage the situation

12. Which of the following items below do you have a 3-day supply of?

- ☐ Water
- ☐ Food
- ☐ Shelter
- ☐ Warm blankets
- ☐ Light source

13. Please indicate by ticking which sources are used in obtaining information on disaster management.

- ☐ By word of mouth
- ☐ Hospital/School Policy
- ☐ Internet
- ☐ Newspapers
- ☐ Television
- ☐ Radio
- ☐ Electronic mail
- ☐ Telecommunication

14. Is there any protocol for disaster management at your workplace?

- ☐ Yes
- ☐ No
- ☐ Don't know

a) If yes, have you read it?

- ☐ Yes
- ☐ No

15. Have you participated in any activity in accordance with disaster management at your workplace?

- ☐ Yes
☐ No

a) If yes, when and what? _____

16. Please grade how prepared you are for a disaster.

- ☐ 1 (Totally unprepared)
☐ 2 (somewhat unprepared)
☐ 3 (Somewhat prepared)
☐ 4 (Fully prepared)

17. Do you think there is a need for general public disaster preparedness?

- ☐ Yes
☐ No

18. Which of the following is/are the role(s) of nurses in disaster preparedness? (You may tick more than one option)

- ☐ Caregiver
☐ Educator
☐ Researcher
☐ Coordinator
☐ Manager
☐ Counsellor
☐ Others (Please specify _____)

19. Which of the following course(s) do you think is/are necessary for you to be prepared in the event of a disaster (in your workplace)? *Please tick and indicate whether you have attended or are intending to attend a course(s), and if not, whether you are interested in-attending.

Courses	Necessary for disaster preparedness	Attended or are attending	Interested to attend
First Aid level 3 (III)			
Basic Life Support			
Advanced Cardiovascular Life Support			
Pre-Trauma Trauma Life Support			
International Trauma Life support			
Infection Control			
Peri-Trauma Counseling			
Post traumatic Psychological care			
Disaster Management			
Others, please specify			

20. Which of the following will be useful in preparing you to deal with disaster? (You may tick more than one option)

- ☐ Disaster Drills
- ☐ Disaster management course
- ☐ Disaster management protocols
- ☐ Information pamphlets
- ☐ Information web sites about disasters management
- ☐ Onsite visit
- ☐ Others (please specify

21. Do you have any other comments?

Thank you for completing the questionnaire

**DISASTER PREPAREDNESS OF PROFESSIONAL NURSES IN A CENTRAL
URBAN PUBLIC SECTOR TERTIARY HOSPITAL IN JOHANNESBURG**

INFORMATION LETTER

Dear Colleague,

My name is Craig Vaughan. I am currently registered as a student at the University of the Witwatersrand, in the Department of Nursing Education, for the degree of Master of Science in Nursing (Critical Care Nursing). I am hoping to conduct a research project to determine nurses' familiarity with disaster preparedness because it is crucial to have a nursing workforce that is prepared to respond to disasters.

Large-scale disasters around the world demonstrate that no one person and no country is immune from the threat of natural disasters or other tragedies. Although South Africa has been relatively free of disasters, this does not override the need for a responsible society for disaster preparedness. It is of importance to conduct research, which is needed to assess critical care nurses familiarisation with disaster preparedness to be able to be equipped to deal with disasters if it should occur.

Participation in the study is voluntary; you may wish to choose to participate or withdraw from the study at any time. I undertake to ensure that no identification of your personal information will be given in reporting your opinions to ensure your confidentiality. If you consent to being part of my study, please complete the attached consent form and return it to me in the stamped addressed envelope enclosed.

I appreciate you will not derive any benefit from participation in this study. An understanding of staff knowledge deficit would help assist in identifying weaknesses and strengths in emergency preparedness in the critical care units and help with planning future education experiences for nurses.

The appropriate people and research committees of the University of the Witwatersrand, Gauteng Department of Health and Johannesburg Hospital have approved the study and its procedures.

Thank you for taking the time to read this information letter. Should you require any further information regarding the study or your rights as a study participant, you are free to contact me in the Department of Nursing Education or on the following telephone number, 072 232 2564, or email me using the following address, chcvaughan@gmail.com.

Yours faithfully

Craig Vaughan

Date _____

Ethical Clearance Certificate



HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)

CLEARANCE CERTIFICATE NO. M130922

NAME: Mr Craig Hosain Vaughan
(Principal Investigator)

DEPARTMENT: Nursing Education
 Charlotte Maxeke Johannesburg Academic

PROJECT TITLE: Disaster Preparedness of Professional Nurses
 in a Central Urban Public Sector Tertiary
 Hospital in Johannesburg

DATE CONSIDERED: 27/09/2013

DECISION: Approved unconditionally

CONDITIONS:

SUPERVISOR: Shelley Schmollgruber

APPROVED BY: 
 Professor PE Cleaton-Jones, Chairperson, HREC (Medical)

DATE OF APPROVAL: 30/10/2013

This clearance certificate is valid for 5 years from date of approval. Extension may be applied for.

DECLARATION OF INVESTIGATORS

To be completed in duplicate and **ONE COPY** returned to the Secretary in Room 10004, 10th floor, Senate House, University.

I/we fully understand the conditions under which I am/we are authorized to carry out the above-mentioned research and I/we undertake to ensure compliance with these conditions. Should any departure be contemplated, from the research protocol as approved, I/we undertake to resubmit the application to the Committee. **I agree to submit a yearly progress report**

Principal Investigator Signature

M130922Date

PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES

Hospital Permission to Conduct the Study



GAUTENG PROVINCE

HEALTH
REPUBLIC OF SOUTH AFRICA

CHARLOTTE MAXEKE JOHANNESBURG ACADEMIC HOSPITAL

Enquiries:

Ms. L. Mngomezulu

Tell: (011): 488-3793

Fax: (011): 488-3753

03rd December 2013

Mr. Craig Hosain Vaughan
MSc Nursing student
University of the Witwatersrand

Dear Mr. Vaughan

RE: "Disaster preparedness of professional nurses in a central urban public sector tertiary hospital in Johannesburg"

Permission is granted for you to conduct the above research as described in your request provided:

1. Charlotte Maxeke Johannesburg Academic hospital will not in anyway incur or inherit costs as a result of the said study.
2. Your study shall not disrupt services at the study sites.
3. Strict confidentiality shall be observed at all times.
4. Informed consent shall be solicited from patients participating in your study.

Please liaise with the Head of Department and Unit Manager or Sister in Charge to agree on the dates and time that would suit all parties.

Kindly forward this office with the results of your study on completion of the research.

Approved / ~~not approved~~

Ms. M.M. Pule
Acting Chief Executive Officer

Postgraduate Approval of study title



Faculty of Health Sciences
Private Bag 3 Wits, 2050
Fax: 027117172119
Tel: 02711 7172040

Reference: Ms Mpumi Mnqapu
E-mail: mpumi.mnqapu@wits.ac.za

05 November 2013
Person No: 690364
PAG

Mr CHC Vaughan
PO BOX 800
Northriding
2162
South Africa

Dear Mr Vaughan

Master of Science in Nursing: Approval of Title

We have pleasure in advising that your proposal entitled *Disaster preparedness of critical care nurses in a central urban public sector tertiary hospital in Johannesburg* has been approved. Please note that any amendments to this title have to be endorsed by the Faculty's higher degrees committee and formally approved.

Yours sincerely

Mrs Sandra Benn
Faculty Registrar
Faculty of Health Sciences

APPENDIX F

From: Yuen LOKE, Alice [SN] [<mailto:alice.yuen.loke@polyu.edu.hk>]
Sent: 03 April 2013 05:09
To: Shelley Schmollgruber
Cc: Olivia Fung
Subject: RE: request for permission to conduct research

Dear Shelley,

Thank you for showing your interest in our study.

I hereby attach the questionnaire that the research team used for our study. However, you will find that you need to modify the items in the questionnaire to suit your local context, since we have included the scenarios that are only applicable to the Hong Kong context.

On behalf of Dr. Fung and myself, you have our permission to modify our questionnaire for your research use.

Alice yuen Loke

From: Shelley Schmollgruber [<mailto:schmoll@iafrica.com>]
Sent: Wednesday, April 03, 2013 1:01 AM
To: Yuen LOKE, Alice [SN]
Subject: FW: request for permission to conduct research
Importance: High

Dear Professor Loke ,

My name is Shelley Schmollgruber. I am the postgraduate coordinator in the Department of Nursing Education of the University of the Witwatersrand in Johannesburg, South Africa. I am currently supervising a research study and my MSc student has expressed particular interest in your work entitled Fung, Loke & Lai "Disaster preparedness among Hong Kong Nurses Journal of Advanced Nursing, vol 62, issue 6, pp. 698-703.

On behalf of my student, I would like to request your permission to use the instrument as we are conducting a similar study in our South African context. Would it be possible to send us a copy of the instrument along with your permission to use it in our study? If you are in agreement, we can forward a copy of the proposal to you once our ethics committee has approved the study. We anticipate that the study will be completed by early 2014.

I am looking forward to your response.

Kind regards

Shelley Schmollgruber
Senior Lecturer Intensive and Critical Care Nursing
Department of Nursing Education
Faculty of Health Sciences
University of the Witwatersrand

Language Editing and Proofing

Gill Smithies
Proofreading & Language Editing Services
 59, Lewis Drive, Amanzimtoti, 4126, Kwazulu Natal
 Cell: 071 352 5410 E-mail: moramist@vodamail.co.za

Work Certificate

To	Dr. Shelley Schmollgruber
Address	Wits Dept of Nursing Education
Date	20/05/2019
Subject	DISASTER PREPAREDNESS OF PROFESSIONAL NURSES IN A CENTRAL URBAN PUBLIC SECTOR TERTIARY HOSPITAL IN JOHANNESBURG, by C Vaughan
Ref	SS/GS/30

I, Gill Smithies, certify that I have proofed the following for language, grammar and style:

Disaster preparedness of professional nurses in a central public sector tertiary hospital in Johannesburg: Forward, Chapters 1 to 5 and Appendices, by C. Vaughan,

to the standard as required by Wits Dept. of Nursing Education.

Gill Smithies