HUMAN RESOURCE GAP ANALYSIS FOR DISASTER MANAGEMENT QUALIFICATIONS IN THE FREE STATE PROVINCIAL GOVERNMENT EMERGENCY MEDICAL SERVICE (FS EMS)

By

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DECLARATION

I, Kevin Douglas Rowe–Rowe, hereby present for consideration by the Disaster Risk Management Training and Education Centre for Africa (DiMTEC), within the faculty of Natural and Agricultural Science at the University of the Free State (UFS), my dissertation in partial fulfilment of the requirements for the degree Master's in Disaster Management.

I sincerely declare that this dissertation is the product of my own efforts. No other person has published a similar study from which I might have copied, and at no stage will this work be published without my consent, as well as that of DiMTEC.

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Signature

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Name

DEDICATION

I dedicate this work to all the Emergency Medical Care personnel in South Africa, who daily place their lives at risk for the rendering of emergency medical care to the South African community and worldwide.

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LIST OF ACRONYMS

AEA	Ambulance emergency assistants
ALS	Advanced life support
BAA	Basic ambulance assistants
BLS	Basic life support
ECA	Emergency care assistants
EMS	Emergency Medical Service
EMC	Emergency Medical Care
DiMTEC	Disaster Risk Management Training and Education Centre for Africa
FS CoEC	Free State College of Emergency Care
DMAT	Disaster Medical Assistance Team
DMA	South African Disaster Management Act (Act 57 of 2002)
DMF	South African National Disaster Management Framework of 2005.
FS	Free State Province
HAZMAT	Hazardous materials
ICS	Incident Command System
MIMMS	Major Incident Medical Management and Support
NDMF	National Disaster Management Framework
NDMS	National Disaster Medical System
KPA	Key performance area
ODP	Office of Domestic Preparedness

OECO	Operational emergency care orderlies
PBECP	Professional Board for Emergency Care Personnel
PPE	Personal protective equipment
PTSD	Post-traumatic stress disorder
UCS	Unified Command system
WMD	Weapons of Mass Destruction

CHAPTER 1
METHODOLOGICAL ORIENTATION

1.1. INTRODUCTION

There is a lack of education and training of the different parties involved in the medical management of disasters (Hubloue & Debacker, 2010:129-130). Wang and Chang (2006:60) state that Emergency Medical Service (EMS) professionals lack training in disaster response, and Bradt and Drummond (2007: 364-368) state that there are currently no explicit interagency standards for the education and training or evaluation of health personnel who respond to disasters. The South African Disaster Management Act (South Africa, 2002) encourages a broad-based culture of risk avoidance and the promotion of disaster management education and training throughout South Africa (South Africa, 2002:19).

The study investigated the human resource gap amongst the EMS supervisors and managers with reference to disaster management qualifications and training in the Free State Provincial Government Emergency Medical Service (FS EMS), South Africa. The choice of the topic is guided by literature related to the lack of disaster management education and training, as well as the required knowledge and skills of the FS EMS managers and supervisors to fulfil their core role in disaster response in the Free State Province. The focus on the EMS managers and supervisors are due to the strategic level of decision-making they need to fulfil during the disaster response.

Currently in the Free State EMS, there are no specific training and education requirements that are recommended specifically towards a disaster management qualification. This study determines whether the FS EMS managers and supervisors comply with the South African legislature's requirements pertaining to disaster management education and training. The study also investigates the FS EMS managers and supervisors' disaster management qualifications and training against the requirements and guidelines that pursue national and international norms and standards of best practice.

The focus of this chapter is to give an overview of the topic and indicate its relevance to academic investigation, especially the research problem and research questions of this investigation. The aims, goals, research methods and procedures used in the study will be discussed in detail. The description of the study area and the explanation of terms used in this study are also included.

1.2. DESCRIPTION OF THE STUDY AREA

The Free State Province (FS) where this study was focused is one of nine provinces that make up the Republic of South Africa as seen in Figure 1.1. The Free State, domestically, shares borders with six of the nine provinces, namely KwaZulu-Natal in the east, Eastern Cape in the south-east, Northern Cape in the south and west, North West in the north western part, Gauteng in the north, and Mpumalanga in the north east. The FS also shares a border with Lesotho in the south-eastern part of the province.

The FS is the third largest province in surface area (approximately 129,852 km2) and the eighth in terms of population estimated at 2,824,500 (Statistics SA, 2010). The Free State Province consists of five districts, namely Xhariep, Motheo, Thabo Mofutsanyana, Fezile Dabi and Lejweleputswa. The capital city of the province is Bloemfontein that is situated in the Motheo district.The FS is situated on flat boundless plains in the heart of South Africa. The province is high-lying, with most of the area at and above 1,000 meters above sea level.

A continental climate is experienced in the FS that is characterized by warm to hot summers and cool to cold winters. The eastern part of the province, especially the higher areas are known for snowfalls in winter and temperatures can drop as low as -9, 5°C, whereas the western parts of the province can be extremely hot in summer with lower precipitation and aridity increasing from east towards the west. The annual rainfall ranges between 500-700 mm, with most of the rainfall in the summer months as a brief afternoon thunderstorm.

The dominant economic activity in the Free State is agriculture, and the FS province is known as the granary or the “grain basket” of South Africa. Agriculture is central to its economy, while the province is also rich in mineral wealth and mining on the rich goldfields reef, which is the FS’s largest employer.

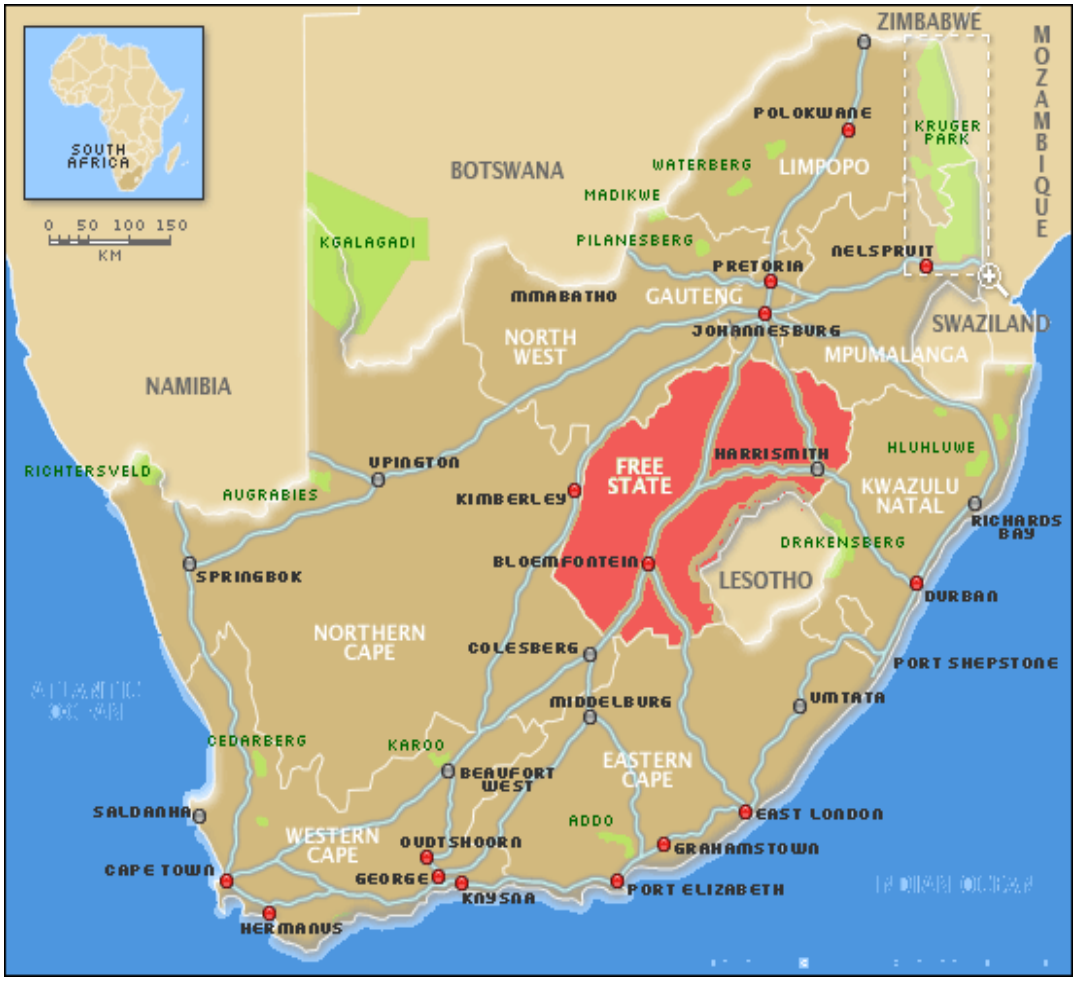

Figure 1.1: Map of the Republic of South Africa showing the Free State Province.

Source: (Cyber Cape Town, 2011: online).

In spite of all the wealth and resources the Free State population is relatively poor. In 2001, 64.5% of households earned less than R30 000 per year. Approximately 22, 254 million people in South Africa lived in absolute poverty during 2001. In the Free State alone, approximately 1,544 million (63.6% of the FS population) people live in poverty, the majority (97% or 1 503 million) of them are Africans (Statistics South Africa, 2004).

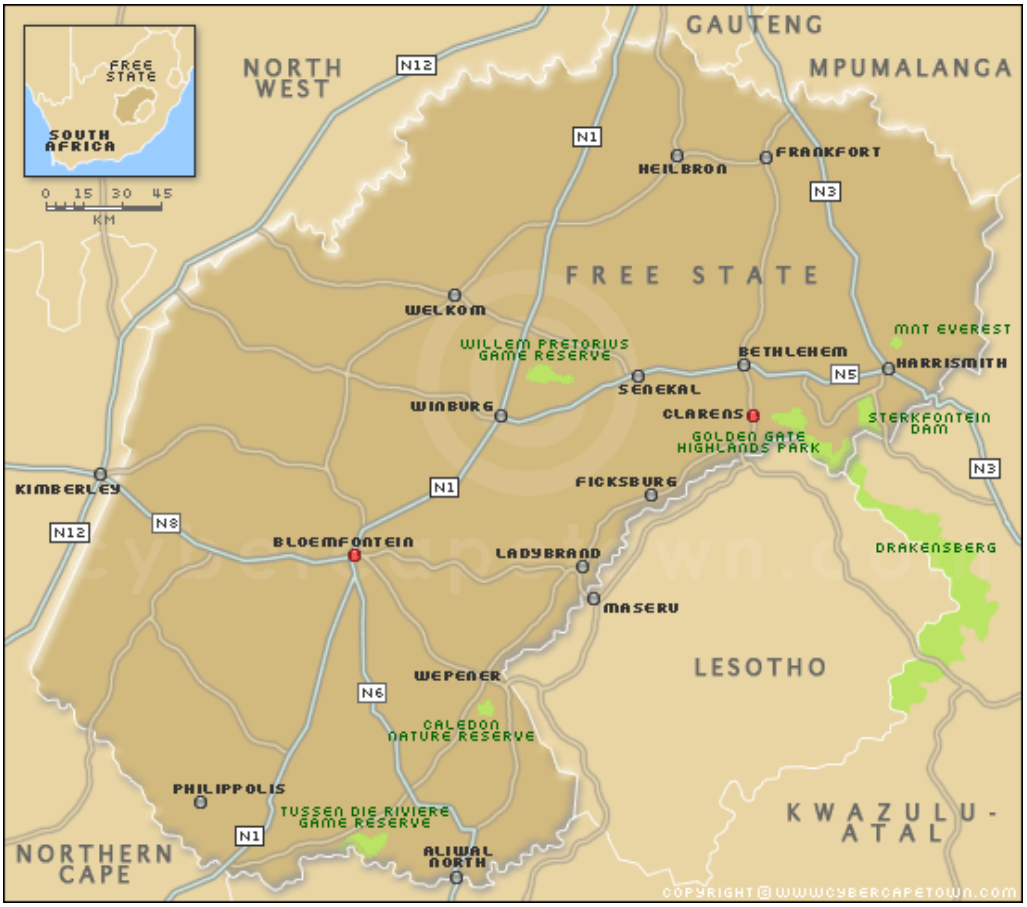

Figure 1.2: Map of the Free State Province.

Source: (Cyber Cape Town, 2011: online).

As a province (Figure 1.2) that is part of a developing country, the Free State is also faced with health challenges. In 2003 the Statistics South Africa published the midyear estimates of the FS population, where it indicated that 85.2% of the 2, 738,159 population had no medical insurance, therefore the approximate 2,306,172 people were mainly dependant on public health services (Statistics South Africa, 2004).

The majority (95.64%) of the Free State population has access to relatively safe drinking water. The remaining 4.3% of the population has access to water from not necessarily safe sources. The implications for this group are that they are faced with increased risks of experiencing waterborne diseases (Statistics South Africa, 2004).

The United Nations Development Programme (UNDP) Disaster Reduction Unit states that South Africa is not generally regarded as a country at high risk of disasters, but is beset by many risks

and hazards both natural and man-made. The majority of South Africa's population is living in fragile and vulnerable conditions as a result of high levels of poverty, low standards of living, high levels of unemployment, lack of access to resources, unequal patterns of asset ownership and distribution, environmental degradation, and slow economic growth. Institutional arrangements and capacities to respond to these disasters were extremely limited in the past, and are still minimal in underdeveloped parts of the country (UNDP, 2007:1).

According to the Free State Provincial Disaster Management Plan (2007:9), the province is prone to the following major hazards:

- Animal Disease
- Fires (veld/structural)
- Floods/Severe storms
- Rainfall and landslides
- Hazardous Material
- Human Epidemic
- Major Infrastructure Failure
- Terrorist Activity
- Water Contamination
- Heat Wave
- Extreme Cold
- Snow.

The Free State Provincial Disaster Management Plan (2007:70-81), states that FS Emergency Medical Services (FS EMS) is one of the crucial role players that needs to partake in the prompt and efficient response to disaster and major incidents that occur in the Province. The FS EMS is not only required to play a crucial role in the managing of disasters, but also in the chain of providing the day to day health care to the FS inhabitants. On average there are 25,000 emergency incidents attended to per annum.

The provincial EMS serves the FS community with approximately 1,500 operational staff that are qualified in different levels of care. Ninety-six of the 1,500 staff are a combination of managers and supervisors that are spread out in specific locations to manage the province's EMS service.

The province has limitations as the majority of the staff are qualified in the entry level of the EMS qualification, with the result that there are limited resources and capacity in knowledge and skill to fulfil the day to day emergency needs of the province.

In spite of its limitations, the FS EMS plays a cardinal role in disaster response that is occurring locally like the 1988 and 2011 floods in the FS province. FS EMS also contributes support to disasters abroad such as availing its staff with specific expertise to partake in disaster response; for example the 2010 Haiti earthquake and 2011 Japan earthquake and tsunami.

1.3. PROBLEM STATEMENT

There is a lack of education and training of the different parties involved in the medical management of disasters (Hubloue & Debacker, 2010:129-130). Wang and Chang (2006:60) state that EMS professionals lack training in disaster response, and Bradt and Drummond (2007, 364-368) state that there are currently no explicit interagency standards for the education and training or evaluation of health personnel who respond to disasters. MacFarlane, Joffe and Naidoo (2006:451-456) support the above literature by indicating that there is a scarcity of skills to deal with the management of disasters.

Wang and Chang (2006:60) state that the reasons for EMS professionals lacking training in disaster response are the lack of national standards in the EMS curricula components for addressing disaster response, the lack of education/training and equipment grants, and lack of well established roles during a public health emergency. The above statement of Wang and Chang identifies a lack in disaster response education and training in EMS professionals worldwide.

In the South African environment the possibility of lack in the disaster response education and training fraternity was attempted to be mitigated by the National Disaster Management Framework of 2005. The National Disaster Management Framework (2005:162-169) states that national, provincial and municipal organs of state need to plan, organize and implement training programmes relevant to their respective areas of responsibility. These training programmes need to be constructed as ongoing training interventions that can include short courses, workshops, seminars, in-service training and where appropriate, it needs to be designed as part of the formal education system and should be in line with the national education and training

framework. The South African Disaster Management Act (South Africa, 2002) encourages a broad-based culture of risk avoidance and the promotion of disaster management education and training throughout South Africa (South Africa, 2002:19).

As a role-player in disaster management with a responsibility for making strategic decisions, the FS EMS managers and supervisors are obliged to be trained and educated in disaster management as required by the South African National Disaster Management Act (South Africa, 2002) and the South African Disaster Management Framework of 2005. It is therefore required that they be up to par with the international disaster management training requirements and recommendations.

Ciottone (2006: 20-25) states that the EMS management level is one of three levels of responsibility established during a disaster, and that there are specific training objectives that need to be undergone prior to the performing of these functions and responsibilities. Preparatory functions of management personnel are required to occur to ensure that emergency managers are adequately informed and trained to meet their functions and responsibilities during a disaster incident.

When taking all the above literature into account, a definite need is identified for a study to ascertain whether the FS EMS managers and supervisors are being trained and educated in disaster management as required by the National Disaster Management Framework of 2005, and whether they comply with international disaster management training requirements and recommendations.

1.4. AIM OF THE STUDY

The aim of the study flows from the research problem (Burns & Grove, 2005:71; Pilot & Beck, 2004:65). The aim of this study is to investigate the possibility of a human resource gap in disaster management qualifications and training amongst the EMS supervisors and managers in the Free State Provincial Government Emergency Medical Service (FS EMS), South Africa, and possibly to make recommendations for a disaster management education and training programme for the FS EMS.

1.5. OBJECTIVES

Objectives are more specific, measurable explanations of the aim. It enables the researcher to determine whether the problem has been solved, and what recommendations may be made (Uys & Basson, 2000:27). Objectives are the “steps” that need to be taken to reach the aim of the study (De Vos, Strydom, Fouche & Delport, 2005:104).

The objectives of this study are as follows:

- To determine a baseline of the FS EMS managers and supervisors’ current education and training in disaster management.
- To determine whether the FS EMS managers and supervisors are currently being trained and educated in disaster management training programmes as required by the National Disaster Management Framework of 2005.
- To determine the specific disaster management training objectives that are a requisite for the EMS managers and supervisors to meet national and international requirements and recommendations.
- To make recommendations for a disaster management education and training programme for the FS EMS.

1.6. RESEARCH QUESTIONS

The following research questions will guide and direct the exploration of the research problem in the study:

- Are the managers and supervisors in the FS EMS adequately educated and trained in disaster management?

- How do the FS EMS managers and supervisors’ education, training and qualifications in disaster management compare with national and international requirements and standards?

- Do the current EMS training curriculums include areas of disaster management?

1.7. EXPLANATION OF TERMS

For the purpose of this study, the explanation of terms from Wallis and Smith (2011:1-3) will be used.

Hazard

A *hazard* is anything natural, man-made or a combination thereof that may pose a danger to adversely affect human health, property, activity and/or the environment. The specific hazard varies in space and time and differs between populations. Only when a hazard is converted to an event can it potentially become a major incident or *disaster* (Wallis & Smith, 2011: 1-3).

Risk

A *risk* refers to something negative happening. It refers to the probability that a hazard may become an event − the probability that the hazard may happen. A risk only applies to one specific hazard. Risk factors refer to measures taken to modify the hazard. Risk markers are an attribute of the hazard, indicating that an event may occur (Wallis an& Smith, 2011: 1-3).

Prevention

Prevention is done to prevent the event from happening. Prevention is thus the aggregate of approaches and measures to ensure that the hazard does not cause an event. It does not refer to decreasing the intensity or scale of the event (Wallis & Smith, 2011: 1-3).

Mitigation

Mitigation is the process that is undertaken to reduce the immediate damage by the impact on society (Wallis & Smith, 2011: 1-3).

Preparedness

Preparedness is the aggregate of all measures and policies taken before the event occurs, and which reduces the damage that would have been caused by the event (Wallis & Smith, 2011: 1-3).

Simple/Compound major incidents

In a *simple incident* (event), the infrastructure, such as communication lines and roads, remains intact; in a *compound incident* (event), the impact results in damage to the infrastructure, making it more difficult to respond to, or manage, the situation (Wallis & Smith, 2011: 1-3).

Compensated/ Uncompensated major incidents

Compensated incidents refer to a situation where the casualties can be managed by utilizing the preparedness and buffering capacity of the society. The extraordinary resources that are activated can deal with the casualties- the load is less than the capacity. An *uncompensated incident* refers to a situation where the impact of the event causes so much damage (including number of casualties) that, in mobilizing all the available resources, using all the preparedness measures and taking buffering capacity into account, the society (or health care facility) will not be able to cope with the number of casualties- the load exceeds the capacity (Wallis & Smith, 2011: 1-3).

Disaster

Disaster, the World Health Organization (WHO) defines a disaster as "*the result of a vast ecological breakdown in the relationship between man and his environment, a serious and sudden disruption of such a scale that the stricken community needs extraordinary efforts to cope with it, often with outside help or intentional aid"*. A hazard is responsible for the causing of an event in which the impact resulted in damage and the extraordinary resources that the community could mobilize are not adequate to compensate for the damage. It is therefore an uncompensated major incident. Disasters are often also compound in nature, as damage is caused by the impact to infrastructure, making recovery more difficult (Wallis & Smith, 2011: 1-3).

Disaster Management

Disaster Management is the process of managing a disaster when the normal community and organizational arrangements are overwhelmed by an event, and extraordinary responses are needed (Wallis & Smith, 2011: 1-3).

Disaster Medicine

Disaster medicine is the study and collaborative application of various health disciplines to the prevention, preparedness, response to and recovery from the health problem arising from a disaster. This is achieved in cooperation with agencies and disciplines involved in comprehensive disaster management (Wallis & Smith, 2011: 1-3).

1.8 CONCEPTUAL FRAMEWORK

The Disaster Management Act (South Africa, 2002) defines Disaster Management as a continuous and integrated multi-sectoral, multi disciplinary process of planning and implementation of measures aimed at:

- Prevention or reducing of the risk of disasters
- Mitigating the severity or consequences of disasters
- Emergency preparedness
- A rapid and effective response to disasters
- Post disaster recovery and rehabilitation.

  (South Africa, 2002:6).

The above definition compares perfectly with the disaster management cycle also known as the Disaster Management Continuum, and is used in this research as the conceptual framework (see Figure 1.1).

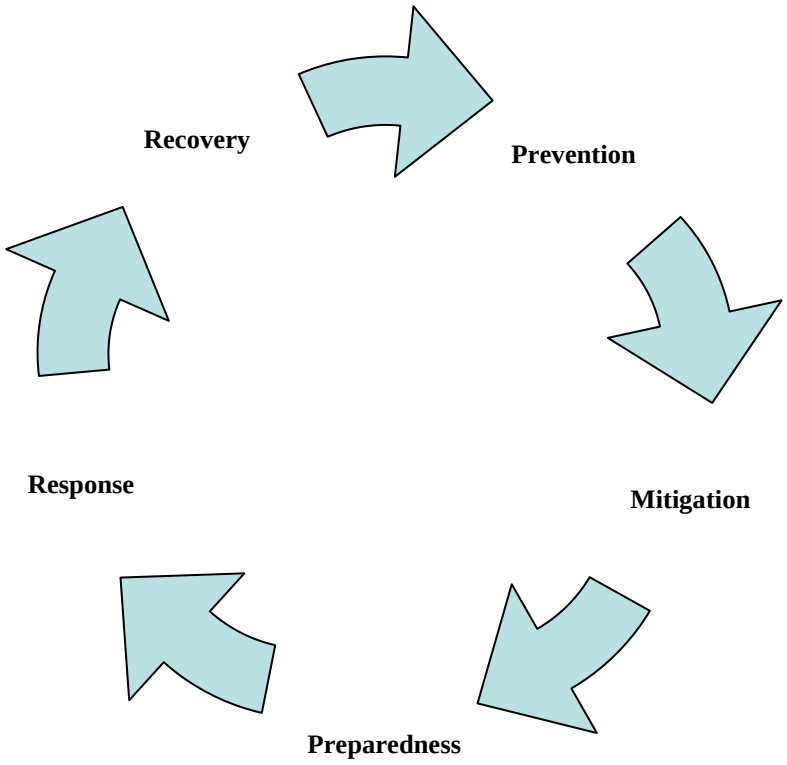

Figure 1.3: Disaster Management Continuum

In addition to their daily functions and responsibilities, the EMS is also a key role player during disaster incidents. EMS is required to participate in the phases of disaster management which are preparedness, mitigation, planning, response and recovery (cf. 2.3). However, EMS has a lead role to fulfil in the Disaster *Response* phase. During the response phase the EMS is required to collaborate with other appropriate agencies in a unified command structure as determined by the specific disaster (National Association of EMS Physicians, 2007:1). This study focuses on EMS's role and responsibilities during the disaster response phase, as it is the core component that EMS fulfils during a disaster incident.

The disaster response phase is part of the "post disaster" phases (cf. 2.3) which also includes disaster recovery. On the other hand are the pre-disaster phases which are disaster prevention and planning, mitigation measures and preparedness (cf. 2.3). The disaster response phase (post- disaster phase) is interdependent upon the pre-disaster phases (prevention, mitigation and preparedness); therefore the EMS managers and supervisors will also be dependent upon the training and education in all the disaster management phases.

1.9 ASSUMPTIONS AND DELIMITATIONS

The main assumption made in this study is that the function of the EMS in South Africa in relation to disaster management is guided by the following legislative documents:

- DMA (South Africa, 2002) and the DMF of 2005
- South African Health Profession's Act (South Africa, 1974).

The delimitation of the study is that the focus is specifically on FS EMS managers and supervisors and not on all EMS staff involved in disaster management. The study does not include the other provincial EMS systems. However, the findings of this study could be extrapolated to other provinces, since they are likely to have the same situation as the Free State Province.

1.10 STRUCTURE OF THE RESEARCH

This study comprises of five chapters, each with a brief introduction that gives the frame of the chapter, the main body, and a chapter summary that captures the highlights, and also links the chapter with the next.

- *Chapter 2* presents a review of the related literature and includes the history of EMS; the role of EMS in a disaster and disaster management education and training recommendations.

- *Chapter 3* captures the research methodology that was used in the study, and is discussed under research design, research techniques, population, sample, pilot study, data gathering, validity, reliability, ethical questions and data analysis.

- *Chapter 4* is the analysis of the data obtained from the questionnaire and the interpretation of the results. This chapter is discussed under the background and demographics of respondents, and the analysis and interpretation of data with regards to the disaster management education and training.

- *Chapter 5* discusses the conclusions and recommendations of the study.

CHAPTER 2
LITERATURE REVIEW

2.1 INTRODUCTION

This chapter provided an in-depth investigation and evaluation of assessed literature on the disaster management education and training requirements for the Emergency Medical Service (EMS) managers and supervisors. This investigation provided supportive evidence in determining a baseline for the needs and requirements in disaster management education and training. The information obtained subsequently were used in the quantification of the information gap, and for the formulation of the research questionnaire.

The structure of the review started with information on the history and the role of EMS in a disaster; this created a baseline of understanding of the functions and responsibilities that EMS fulfils during a disaster. The information obtained in relation to the topic has been structured in a funnelling method, starting from international authorities' recommendations and ending with the Free State Region. The areas of discussion consisted of disaster management education and training recommendations and regulations that are made by international authorities, best practice recommendations by International workgroups and experts, nationally at governance level, nationally at specialty level, nationally at sub-specialty level and the Free Sate region.

2.2 THE HISTORY OF EMERGENCY MEDICAL SERVICE

Since the beginning of recorded human history it was found that different forms of Emergency care have been rendered in the field. The Bible (Luke 10:34) contains a parable of the *"Good Samaritan"*, which describes where a man who was beaten was cared for by a Samaritan. His wounds were cared for by pouring on oil and wine and then bandaged. The Samaritan then put the injured man on his own donkey and took him to an inn, and took care of him. There are also recordings of a society called *"The Knights Hospitallers"* that were known for caring and rendering assistance in Europe to wounded soldiers in the battlefield during the period of the Middle-Ages (Knights Hospitallers, 2009:[s.a.]).

The first recorded specialized vehicle that was used as an ambulance was the *"Ambulances Volantes"*, and was designed by Dominique Jean Larrey (1766–1842), who was Napoleon Bonaparte's chief physician (Skandalakis, *et al.,* 2006: 1392-1399; Jose & Ortiz,1998:1).Civilian ambulance services were first established in the United States in the late 1860s in Cincinatti and New York City. These ambulance services were hospital-based and limited to the transport of patients to the hospital (Key, 2002: 914).

The automobile was developed in the late 19th century, and in addition to horse-drawn models, early 20th century ambulances were powered by steam, gasoline and electricity, reflecting the competing automotive technologies then in existence. In the last year of the 19th century the first motorized ambulance was brought into service by Cincinatti, and was followed in 1900 by New York City. These first motorized ambulances extolled its virtues of greater speed, more safety for the patient, faster stopping and a smoother ride. These first two automobile ambulances were electrically powered with two horse power motors on the rear axle (Barkley, 1978:1).

In the United States of America, it was not until the 1960s that civilian out-of-hospital care continued to consist of a little more than the transport of the sick and injured to the hospital. In the late 1960s and early 1970s the emergency medical systems began to develop and provide advanced therapeutic interventions in the out-of-hospital setting (Key, 2002: 914).

Looking at the history and the development of EMS it is undoubtedly tinged with a rich militaristic tradition with deep roots in disaster medicine. Pre-hospital treatment and transportation of an injured victim have been done since the beginning of recorded human history. These different factors and influences have largely contributed to the development and progress of norms, standards and legislation of the modern day EMS, and it is believed to still have much to provide. This literature review is conducted in the light of the role and responsibilities that EMS fulfils during the disaster response phase, as it is the core component that EMS fulfils during a disaster incident.

2.2.1 Modern Day Emergency Medical Service

The Emergency Medical Service is a branch of the emergency service, which has a dedicated core function in providing out-of-hospital acute medical care and/or transport to definitive care,for patients with illnesses and or injuries, which the patient or the medical practitioner believes to constitute a medical emergency (United States of America. National Highway Traffic Safety Administrator, 2010).

Internationally it has been fifty years since the development of modern EMS systems, whereby EMS has developed into a sophisticated system of out-of-hospital emergency care. With the worldwide advancement of technology and medical knowledge, there is access to sciences and information to the modern-day paramedic that was never even imagined in the “pioneer” days of EMS (Key, 2002:913).

EMS’s primary goal for patients that are in need of urgent medical care is to provide treatment with the objective to treat the condition satisfactorily or to arrange for the timely and appropriate removal of the patient to the next point of definitive care, which could be an emergency department at a hospital. The term Emergency Medical Service evolved to reflect a change from a simple transportation system (ambulance service) to a system in which actual medical care occurs in addition to transportation. In some developing regions, such as parts of Africa, the term “Emergency Medical Service” should not be used or may be used inaccurately, since the specific “service” does not provide treatment to the patient/s, but only provides transportation to the point of care (Transport News Network, 2006; Thomson, 2005:16).

In some EMS services or jurisdictions, there may be EMS units equipped and staff qualified to be able to handle technical rescue operations such as extrication, water rescue, and search and rescue, for indstance in the town of Colonie (United States of America. Emergency Medical Services,. 2010). Training and qualification levels for members and employees of emergency medical services vary widely throughout the world. In some systems, members may be present who are qualified only to drive the ambulance with no medical training (Transport News Network, 2006; Thomson, 2005:16;). The EMS system norm is to have personnel with at least basic first aid certifications, such as basic life support (BLS). Additionally many EMS systems are staffed with advanced life support (ALS) personnel, including paramedics, nurses or less commonly, physicians (Mid-America Regional Council, 2011)

The rendering of pre-hospital emergency medical care, the training required to provide the care and also the different qualifications vary widely throughout the world. However, as a member of the emergency services that are rendering pre-hospital care to a world that is rapidly adapting to the advancements in medical knowledge and technology it is imperative that the EMS is kept up to par with the advancements in all their fields of responsibility.

2.2.2 Emergency Medical Service in South Africa

MacFarlane, Van Loggenberg and Kloeck (2005:145) elaborate on the modern day EMS in South Africa, and state that it has progressed and developed rapidly over the past thirty years. From merely an “ambulance driver” with the only requirement being a driver’s licence to a highly skilled advanced life support practitioner with technical rescue capabilities.

Mack (2005:94-96) and MacFarlane, *et al*. (2005: 145-147) are of the opinion that one of South Africa’s most valuable assets in EMS is its dedicated staff that are well qualified and also their extensive clinical experience. This led to a proposal of international exchange programmes, and the sharing of experience and specialist expertise from around the world. They state that the pre-hospital situation in South Africa is largely a result of insufficient personnel and poorly maintained vehicles in the public sector. They ascribe the fact that the public sector is found lacking, to financial constraints. They state, however, that there is a growing competency in the private sector to provide sophisticated pre-hospital care and exceptional clinical expertise.

The pre-hospital services in South Africa have improved by leaps and bounds, as it has moved from isolated fire departments providing basic medical assistance, to a very complex and sophisticated system of ground and air response which addresses the need of the whole country to varying degrees (Mack, 2005:94-96; MacFarlane, *et al.,* 2005: 145-147). The EMS in South Africa is adapting to the advancements in medical knowledge and technology in the field of pre-hospital care, resulting in a rapid progression towards a very complex and sophisticated EMS system.

2.3 THE ROLE OF EMERGENCY MEDICAL SERVICE IN A DISASTER

Wallis and Smith (2011:27) state that the pre-hospital environment is a challenging venue to manage a disaster or a major incident, however, there are many countries that have been able to successfully implement a formalized major incident management system.

The South African Health Professions Act (South Africa, 1974) gives broad guidance on the role of the EMS by stating that “emergency care” is the rescue, evaluation, treatment and care of an ill or injured person in an emergency care situation and the continuation of treatment and care during the transportation of such a person to or between health establishment(s). This Act also states that emergency care requires to be provided by “emergency care personnel” who are persons registered under section 17 of the Health Professions Act. Paramedics, ambulance emergency assistants (AEA), basic ambulance assistants (BAA), operational emergency care orderlies (OECO), emergency care assistants (ECA) and/or persons who hold a valid first aid certificate issued by a first aid organisation that is accredited by the Professional Board for Emergency Care Personnel (PBECP) can be registered under section 17 of the Health Professions Act. The emergency care personnel render a service in an “emergency care situation” which is defined as circumstances during which a person is injured or is for some other reason in mortal danger and in need of emergency care, which includes disaster/mass casualty incidents.

These day to day roles and responsibilities of the EMS that are described in the South African Health Professions Act of 1974 are similar to when a disaster occurs. EMS as part of the multi-disciplinary team is required to provide effective, responsible pre-hospital care; however, there are multiple considerations that have to be made long before the first EMS unit arrives at the disaster scene. To gain a better understanding of what the roles are that EMS needs to fulfil prior and during a disaster, the following four disaster management phases are outlined by Ciottone, *et al.*.(2006:22).

- *Prevention and Planning Phase:* The EMS needs to partake in the hazard and vulnerability analysis. This analysis establishes the vulnerability of risk and identifies key components of the operative response plan, and includes the identification of specific hazards, threats to life, property and preventative steps to diminish potential losses. These measures that are used to reduce potential loss of life are commonly referred to as disaster mitigation measures. Mitigation measures may be achieved through a combined effort of all members of the multi-disciplinary planning team; these measures may include, but not be limited to public awareness campaigns, involvement of legislative action and community participation (Ciottone, *et al.,* 2006:22).

- *Preparedness Phase:* Preparatory functions of management personnel, which include EMS, must occur to ensure that responders, emergency managers and citizens are adequately informed of and trained on appropriate operational expectations (Ciottone, *et al.,* 2006:22).

- *Response Phase:* During the response phase the emergency responders need to implement the Incident Command System (ICS) early and effectively. When responders are functioning in the ICS model, they assume the specific tasks to mitigate the incident. The areas of priority for the EMS are triage, treatment and transport. The EMS has specialized medical units that are staffed with specifically trained personnel and equipment. These units may assume additional duties as directed by the incident commander (Ciottone, *et al.,* 2006:22).

- *Recovery/Analysis Phase:* The initial and long-term recovery efforts are directed towards the reconstruction and rehabilitation of infrastructure and the community; EMS systems are not usually actively involved in this primary action; however it does play a role in contributing to the systems reassessment and improvement. Some critical areas where EMS is involved in are the analysis of specific methodologies that are used during incident management, and the efficiency of triage that can be a useful contribution to the global disaster management community (Ciottone, *et al,* 2006:22).

The EMS has a definite role to fulfil in disaster management and therefore the staff (especially managers and supervisors) are required to be educated and trained in these areas of responsibility.

2.4 RECOMMENDATIONS TOWARDS DISASTER MANAGEMENT EDUCATION AND TRAINING

In this section the study includes a diversity of information that is obtainable from all levels of disaster health education and training. The sub-headings will comprise of the following: internationally authorities recommendations; international workgroups, experts and best practice recommendations; nationally at governance level; nationally at speciality level; nationally at sub-speciality level and regionally − Free State Province. The objective is to establish whether there

are clear competencies that the EMS managers must have during the disaster response phase, and whether there is a disaster management education and training model for EMS managers and supervisors.

2.4.1 International Authorities Recommendations

In 1992 the United Nations (UN) established the inter-agency standing committee (IASC) which served as the primary mechanism for inter-agency coordination of humanitarian response to disasters internationally. The IASC is chaired by the UN Emergency relief Coordinator (ERC) who serves as Under-Secretary-General for Humanitarian Affairs. In 2005, the ERC commissioned an independent report to examine the humanitarian response capacities of the three international humanitarian networks (UN, Red Cross/Red Crescent Movement, and Non-Government Organizations), to identify gaps, and to make recommendations for addressing them.The report was published in August 2005 as the Humanitarian Response Review (HRR).

One of the major gaps identified in the HRR was the low level of preparedness of the humanitarian organizations − particularly in terms of human resources and sectoral capacities. In order to strengthen response capacities, the HRR recommended the development and application of benchmarks and indicators to measure performance with priority placed on human resources (Bradt & Drummond, 2007:360-361).

This HRR has catalyzed recent reforms in disaster response through the inter-agency standing committee. One of the core focuses is the strengthening of humanitarian coordination. This has resulted in that lead agencies such as the World Health Organization (WHO); Red Cross/Red Crescent and other non-government organizations (NGO's) initiated pre-deployment training for selected health personnel. The Indian Ocean Tsunami of December 2004 even further strengthened the HRR's recommendations (Bradt & Drummond, 2007:361-362). In May 2005 the World Health Assembly directed WHO to intensify support for all member states that were affected by disasters through needs assessments, health coordination, gap filling, and capacity building.

As a means to fulfil that mandate, WHO started a pilot training course in November 2005. This course was to prepare health professionals to rapidly, safely, and efficiently be deployed in a crisis as part of a public health response team. They were also required to effectively partake in

an inter-agency field team. At the same time, a regional meeting of countries from South East Asia, convened by WHO called for benchmarks in human resource development, training, and education (Bradt & Drummond, 2007:362).

Murray, Clifford, Seynaeve and Fisher (2006: 156) state that there is a global attempt to address the international gaps in disaster management. During the 2003 World Congress in disaster and emergency medicine held in Melbourne Australia, WHO requested that the World Association of Disaster and Emergency Medicine (WADEM) consider the development of international standards and guidelines on education and training for multidisciplinary health responses to major events that threaten the health status of a community. A working group of the education committee of WADEM was established and published an initial paper on the issues relating to this activity. This led to a series of meetings that were convened by the working group and in October 2004, a WADEM international seminar was convened in Brussels (Belgium) by the education committee to discuss disaster education and training. During this seminar, it became apparent that there was no single tool available to assess knowledge, skills, and resources within this field. Therefore an assessment tool was constructed and administered to 50 of the delegates to assess if the tool would facilitate information-sharing and curriculum development in disaster health education.

The WADEM Education Committee devised a reference scheme for disaster health training and education based on seven educational levels (see Table 1) within a framework that is based on a model that is known as the “Bradt model”. This model for disaster health education includes two levels of specialist qualifications in disaster health: (1) core disaster health for practitioners; and (2) specialist in disaster health for managers. The participants agreed that an international system of standards, guidelines, and accreditation for disaster health education could lead to better coordinated health responses to disasters.

The committee also alluded to the problems created by cultural and language differences among disaster health workers that were raised in the World Health Organization/Pan-American Health Organization (WHO/PAHO), and stated that cultural and language boundaries should be considered during training, especially in international deployment teams. The committee also recommended that as all were faced with an increasingly global world; therefore ideally all disaster management students should learn a second language, preferably one used by WHO

(English, French, Spanish, Arabic, Russian or Chinese). It was also suggested that there should be different courses for domestic and international deployment. A multilingual handbook was also suggested to be useful in a field work scenario (Murray, Clifford, Seynaeve & Fisher, 2006: 158-160).

TABLE 2.1 THE SEVEN EDUCATIONAL LEVELS FOR DISASTER HEALTH TRAINING (Murray, Clifford, Seynaeve & Fisher, 2006: 158-160).

Level of Training	Respondent
Level 1	Community
Level 2	Responder Basic
Level 3	First Responder, divided into provider; tactical and strategic
Level 4	First Responder Graduate
Level 5	Professional/Master's
Level 6	Specialist/Consultants
Level 7	Doctoral/Management

The levels of training (Table 2.1) that the committee recommended in particular were the Levels 2, 3 and 5.The education committee recommended that an international accrediting body for disaster health education and training be established and that individual government ministries (e.g. Ministry of Education) or universities should perform their own accreditation, and that WADEM could provide guidelines and independent validation, and also monitor the quality of existing courses. The committee suggested that individual countries should adopt an international system of standards, guidelines and accreditation. This could be set up through WHO with the assistance of the Organisation for Economic Cooperation and Development (OECD), PAHO and WADEM (Murray, *et al.,* 2006: 161).

The Humanitarian Charter and Minimum Standards in disaster response emphasize the requirements and standards towards disaster management training in stating that health workers should have the proper training and skills for their level of responsibility. The health agencies have an obligation to train staff to ensure that their knowledge is up-to-date as training and supervision will be high priorities especially where staff have not received continuing education or when new health systems and protocols are introduced. It is also recommended that training programmes should be standardized and linked to national programmes (The Sphere Project, 2004: 268). Agencies should adhere to the health standards and guidelines of the country where the disaster response was being implemented (Sphere , 2004: 263).

A strong ethical aspect is emphasized by the fact that managers (which includes EMS managers and supervisors) are accountable for their decisions in a disaster situation and have a particular responsibility in ensuring adequate security and compliance with codes and rules of conduct as well as support for their staff (Sphere, 2004: 41-42). In concluding the international recommendations, the following could not be found:

- The development of international standards and guidelines on education and training for multidisciplinary health responses as required from the WADEM by WHO.
- No single tool was found available to assess knowledge, skills, and resources within the Disaster health Education and Training environment.
- No international system of standards, guidelines, and accreditation for disaster health education could be found.
- No specific disaster health courses that were suggested for domestic and international deployment.
- Even though there is an identification of the different levels of training required and also the target group for the training; however, each of the level's core competencies and responsibilities could not be established.

The lack of a steadfast international baseline for disaster health education and training poses quite a challenge for each of the lower levels that is required to benchmark and/or meet international requirements.

2.4.2 International workgroups, experts, best practice recommendations

The lack in the inter-agency standards for the education and training in disaster health that is observed under the "international authorities' recommendations, is also expected to be found with the "International workgroups, experts, best practice recommendations". The reason for this expectation is that each agency is currently responsible for establishing its own disaster response structures, and the developing and accrediting of its training courses. Therefore it should not be expected to find uniformity; however, it is expected that each agency will be implementing a model that best suites its current need, and that the agencies make use of the principles of best practice that are currently accessible. This section will consist of a diversity of information that is obtained from international workgroups and experts, with the objective to

establish whether there are clear competencies that the EMS managers should portray during the disaster response phase.

Bradt and Drummond, (2007:361) state that *clinical medicine*, *public health*, and *disaster incident management* have been characterized as core disciplines underlying the expertise required in disaster medicine. While these three core disciplines do not address all issues relevant to disaster health, such as engineering, economics, anthropology, sociology, and religion; the core disciplines embrace fundamental technical expertise required within the health sector. Table 2.2 portrays the key competencies relevant to disaster medicine, as proposed by Bradt and Drummond (2007:361).

TABLE 2.2 KEY COMPETENCIES RELEVANT TO DISASTER MEDICINE

Core Disciplines	Key Competencies
Clinical Medicine	- pre-hospital care, treatment and transport - standardized case management (common diseases and injuries of primary care, as well as disaster specific pathology, relying on standardized case management tools embodied in the Integrated management of childhood illness, reproductive health minimum initial service package, and interagency emergency health kit, etc.) - referral thresholds, rules for denial
Public Health	- rapid epidemiological assessment - environmental health - hazardous material handling and safety - epidemic preparedness - outbreak investigation and communicable disease control - immunization programs - disease surveillance - health policy and personnel planning
Disaster Management	- site security - urban search and rescue - hazard analysis, vulnerability reduction - inter-agency coordination (incident command systems vs. emergency operation centres) - medical logistics - geographic information systems - public information and media relations - community recovery

Bradt and Drummond, (2007:364) stipulate a list of criterion-referenced qualifications that are acquired through post-graduate degree programmes in clinical medicine and public health (two of the three core disciplines). However, they state that it has been found that health professional qualifications alone are an inadequate expression of expertise in disaster medicine. Therefore they recommend that field experience be taken into account. The paramedic qualification

(diploma course) was found amongst the list of qualifications. They further state that a hallmark qualification for competency in disaster incident management (third core discipline) has not been internationally accepted.

This lack of international standardization complicates the attempts to characterize expertise in this discipline. This lack of international standardization has resulted in the development of stakeholders developing specific benchmarks in career particular pathways which result in an overlap between professions in the training of fundamental concepts. It has also resulted in an extensive array of pre-deployment training courses that are available for health professionals. One of the examples of these courses is the Major Incident Medical Management and Support Course (MIMMS) for the Advanced Life Support Group. The MIMMS course is also being implemented in the South African environment.

Bradt and Drummond (2007, 364-368) state that there are currently no explicit interagency standards for the education and training or evaluation of health personnel who respond to disasters. They propose the use of verifiable “criterion referenced qualifications”, which comprise of a *technical education and training* component; *field experience* component; *language competency* component and a *peer awards* for field activities component. These four components are valued as the key qualifications that carry weight towards the process of personnel selection. A quantitative assessment tool is then used as a support tool for disaster managers to select personnel. The tool assesses and weights each of the four components; whereafter a grand total is awarded to the prospective candidate.

The authors conclude in stating that disaster field operations require multi-disciplinary expertise, and that disaster medicine providers require technical competence to render an informed opinion, as well as the administrative authority to draw on necessary human, material, and financial resources. They also proposed that field experience should be weighted the heaviest, followed by technical education and training, and lastly the language competency and peer awards to be weighted equally. The above literature by Bradt and Drummond describes the key competencies for each of the core disciplines; however, the implementation, standards, guidelines, and accreditation requirements seem to be each country and discipline’s own prerogative.

Smiley, *et al.* published literature in 2004 that sheds more light on the disaster response environment and include some specific norms and standards that need to be met by the EMS. This will assist in establishing a better understanding of what can be required from EMS personnel; and specifically the EMS managers and supervisors. One of the norms that they recommend is that the different spheres of the disaster response structures are required to be established within eight hours of a situation where mass casualties are present. They state that the reason for the less than eight hour target, is that it has been found that all the spheres of the entire disaster structure are unable to effectively form and respond within a short response profile (Smiley, *et al.,* 2004:11). This, however, cannot be the case for the EMS disaster response teams as there are victims that have contracted acute life-threatening injuries or illnesses and need *immediate* medical intervention, versus the eight hour establishment of disaster structures for a disaster incident.

Smiley, *et al.* (2004:11) state that 50-80% of the acute casualties would likely have been transported to the closest medical facility within 90 minutes following a disaster event. They further elaborate that the immediate response will be required from the "day to day" EMS system, and conclude that the foundation of the medical disaster response is a strong "day to day" EMS system, as the majority of the acute casualties have already been transported to definitive care prior to the arrival of the activated disaster management structures.

As a result of the above findings Smiley, *et al*. (2004:11) recommend two specific strategies that should be employed to prepare for the medical response to disaster events; the first is that the EMS systems should be strengthened which includes appropriate education and training of all levels of staff and the second is that measurable benchmarks for disaster response should be established. This latter aspect poses quite a challenge as there is a lack of internationally accredited norms, standards and accreditation for disaster health courses, resulting in each country and service "benchmarking" from a different source, and therefore strengthening the continuation of the current lack of international standardization in disaster health education and training.

Ciottone, *et al.* (2006:22) strengthen the above statements in stating that optimal disaster response can only be achieved when disaster preparedness is well planned, as preparedness encompasses the training and education of both public safety personnel and members of the

community. They state that response-preparatory functions of management personnel need to occur to ensure that responders, emergency managers (including EMS managers and supervisors), and citizens are adequately informed and trained in appropriate operational expectations. Deployable teams need to be formed and designed to be a rapid response element to supplement local medical care. The responsibility of these teams may include triaging of patients, providing high quality medical care despite the challenging environment found within disaster scenes and assisting with patient evacuations. EMS personnel usually participate in the primary deployment teams and are often used in more of a primary care role. It is also advocated that the rapid response teams (primary deployment teams) need to be equipped to sustain operations for 72 hours without additional resources. Typically EMS systems and personnel may be equipped or prepared to function for 24 to 48 hours, however, major disaster scenes are rarely mitigated completely without a more significant time commitment.

Hameed, Hussain, Butt and Aslam (2006:1) state that there is a dire need to develop guidelines to standardize education and training in multi-disciplinary health response to major events that threaten the health status of a community. They require that evidence-based standards and guidelines for education and training need to be developed for all members of the healthcare system.

Ciottone, *et al.* (2006:22) advocate the use of the *Emergency Response Guidelines* that were released by the Office of Domestic Preparedness (ODP) in 2002 for the United States of America. These are guidelines that are used to assist agencies in establishing a baseline understanding of the training necessary to safely and effectively respond to incidents. These guidelines can also be used as a guide for international response.The guidelines provide an integrated compilation of knowledge, skill, and responder capabilities for use as a reference by providers as well as course developers and trainers. The Emergency Response Guidelines specify training objectives and establish the baseline level of operational knowledge of three distinct *levels of responsibility* during the disaster response phase, these are, namely awareness, performance, and management. The guidelines elaborate on the specific requirements for each response discipline. The three *levels of responsibility* as described by Ciottone, *et al. (*2006:22) will be briefly discussed:

- *Awareness-level* guidelines pertain to basic level emergency medical technicians, fire fighters and law enforcement officers. These are the primary personnel within this category that are expected to be among the first to encounter an incident. Once management operations are underway the awareness level personnel assume a more supportive role. These providers are responsible for recognition and referral after encountering a hazardous environment. The training objectives establish a basic understanding of operational actions, including the notification of a need for additional specialized resources, maintenance of scene control, and demonstrated competence of self-protection measures (Ciottone, *et al.* 2006:22).

- *Performance-level* guidelines apply primarily to advanced level providers on scene, including paramedics and fire fighters involved in rescue or fire suppression operations or a hazardous material event. The performance level providers need to efficiently multi-task dependant on the Incident Command System (ICS) assignments, thus resulting that these providers need to have a strong working knowledge of the ICS and have an ability to follow the procedure of the Unified Command System (UCS). The provider needs to integrate and implement the two structures to achieve the management of the incident. .Performance level procedures include the establishment of adequate communication capabilities to manage the incident; securing triage, treatment, and transport areas; and coordinating multiple responding agencies. Competencies also need to be shown in self-protection measures, rescue and decontamination operations, also the evacuation procedures for managing victims (Ciottone, *et al.* 2006:22-23).

- *Management level or Planning level* are typically service administrators, supervisors, and emergency management officials. A pre-requisite is for those to manage at this level is that they have completed both awareness and performance level objectives. Individuals responsible for training at this level will be part of the leadership and management of sub-ordinate emergency medical personnel during the response operation. The objectives that need to be achieved include planning before the incident as well as managing the resources that are used to conduct the event. Management personnel also need to be able and capable of overseeing the medical surveillance of their subordinates (Ciottone, *et al.* 2006:23).

The Emergency Response Guidelines specify disaster management training objectives and establish the baseline level of operational knowledge of three levels of responsibility. The disaster management training objectives for each of the three levels have been adapted from Ciottone, *et al.* (2006:23):

Awareness Level

- Recognition of hazardous materials (HAZMAT) incidents.
- Know the protocols that are used to detect agents or materials of Weapons of Mass Destruction (WMD).
- Understand principles of self and community protection measures, and be able to implement these principles for incidents of WMD and HAZMAT.
- Be knowledgeable of procedures for protecting a potential crime scene.
- Know and be able to follow the agencies or organization's scene security and control procedures for WMD and Hazmat scenarios.
- Be able to use communication equipment properly and be able to contact authorities to request additional assistance or emergency response personnel.

Performance Level

- Requires the successful completion of appropriate training at awareness and performance levels.
- Know and understand the Incident Command System and the Unified Command System, and be able to assist with the implementation thereof when needed.
- Know and follow self-protection measures, as well as rescue and evacuation procedures.
- Know and follow procedures for working at the scene of a potential WMD incident.

Management Level

- Have successfully completed appropriate training in awareness, performance and management levels.
- Know and be able to follow the Incident Command System (ICS) and the Unified Command system (UCS) procedures. Understand how the systems are implemented and integrated.
- Know and be able to follow protocols to provide emergency medical treatment to persons involved in the event.

- Know and be able to follow self-protection measures.
- Knows the plans and assets available for transporting the victims of events to primary care facilities.
- Know and be able to follow procedures for protecting a potential crime scene.
- Know and be able to follow department procedure for medical monitoring of response personnel involved.

The area of priority amongst all three levels of EMS responders needs to be the rendering of responsible pre-hospital care. For this goal to be enabled the responders must first integrate an Incident Control System into the response plan, which will allow effective management of the disaster scene. During the response phase multiple response agencies need to be coordinated as this will ensure effective operations. All the responders on the disaster scene (which includes the EMS managers and supervisors) need to be familiar with the structure of the ICS and the UCS (Ciottone, *et al.,* 2006:23).

The *Emergency Response Guidelines* is a United States of America initiative, however, there is also the Major Incident Medical Management and Support (MIMMS), Advanced Life Support Group that is more common in Australia, Britain and South Africa. The Major Incident Medical Management and Support (MIMMS) (2002:85-88) specify the responsibilities of an ambulance commander which is a *Silver Commander* and can be compared to the level of the *Performance level's* supervisor that is outlined in the Emergency Response Guidelines. The "ambulance commander" is defined as the official that is in charge of the ambulance resources at the scene in the event of a major incident occurring.

The ambulance commander's responsibilities at a major incident are the overseeing of all command, safety, communication, assessment, triage, treatment and transport of the EMS discipline. It is also stated that the ambulance commander should not be directly involved in patient care and should be situated at the command vehicle whereby regular liaison can occur with other "Silver Commanders". The ambulance commander's duties are described by MIMMS, (2002:85-88) as follows:

- To liaise with the Medical Commander, Police Commander and Fire Commander.
- To delegate key tasks to other ambulance officers.

- To ensure communications are adequate for all health service personnel.
- To carry out the assessment of the scene.
- To determine where mobile medical teams are drawn from.
- To determine which hospitals will receive the casualties, in liaison with the Medical Commander.
- To ensure effective primary triage is established.
- To oversee treatment provided by ambulance personnel.
- To organize the most suitable transport for casualties.
- To confirm access and egress routes with the police.
- To determine the need for support from voluntary agencies in an ambulance aid role and to oversee treatment provided by these personnel.
- To arrange for replenishment of equipment.
- To liaise with the Police regarding media briefings.

The Ambulance Commander forms a part of the on-site EMS management and supervision, and therefore the roles, responsibilities and duties are relevant and can be assigned to the FS EMS managers and supervisors in the event of a disaster.

In spite of the clear responsibilities and duties that institutions such as MIMMS and the Emergency Response Guidelines have published, there still seems to be huge gaps in training and education. Wang and Chang (2006:60) state that there is abundant evidence described in the literature that EMS professionals lack training in disaster response. Hubloue and Debacker (2010:129-130) feel that several studies on medical disaster preparedness, and lessons learned from recent disasters indicate that there is a lack of education and training of the different parties involved in the medical management of disasters. Wang and Chang (2006:60) elaborate further that the reasons for EMS professionals lacking training in disaster response is due to the lack of national standards in the EMS curricula components for addressing disaster response, the lack of education/training and equipment grants, and lack of a well-established role during a public health emergency.

Wang and Chang (2006: 61) state that they have attempted to bridge the training gap by investigating the paramedic training programme in Taiwan, and that they sought associations between the paramedic training programme and the disaster medicine objectives. They have

been able to identify the gaps and to integrate the disaster medicine training in the paramedic training programme successfully. The following disaster medicine components have been identified and divided into a basic and an advanced category of training:

Basic disaster medicine training components:

- Introduction to National Disaster Medical System (NDMS)
- Introduction of Disaster Medical Assistance Team (DMAT)
- Incident Command System (ICS)
- Mass casualty incident (MCI) management
- Principles of logistics
- Field evaluation
- Principles of public health
- Refugee's care

Advanced disaster medicine training components:

- Blast injury
- Crushing syndrome
- Compartment syndrome
- Traumatic asphyxia
- Particulate health problem
- Post-traumatic stress disorder (PTSD)
- Personal protective equipment (PPE) and decontamination

Lennquist (2005:300) and Pfenninger, *et al.* (2010: 9) support the integration of disaster management training in the medical related curriculums, such as medicine, nurse and ambulance training. Hameed, Hussain, Butt and Aslam (2006:1) recommend that "case or scenario based education" be included as a regular training method for health care professionals. It is not surprising to find that the lack in the inter-agency standards for the education and training in disaster health has filtered down from the "international authorities' recommendation" to the "International workgroups and experts' recommendations". In concluding the "International workgroups and experts' recommendations" the following could not be found in the literature:

- An internationally accepted model that portrays the clear competencies that the EMS managers should portray during a disaster incident.
- An internationally accepted disaster management education and training model for EMS managers and supervisors.

Literature was found that portrayed competencies and training models that were used by specific organizations and countries; however, no literature could be found that specified the disaster management competencies and specific training requirements for EMS managers and supervisors in the South African context.

2.4.3 Nationally at governance level

The *"International workgroups and experts' recommendations"* portrays a lack of literature that specifies the disaster management competencies and specific training requirements for EMS managers and supervisors in South Africa. This section will consist of information that is obtained from South African legislation pertaining to the EMS and disaster management. The objective is to establish whether there are clear disaster management guidelines and requirements for EMS managers that have been specified at the South African Governance level.

The South African Health Professions Act (South Africa, 1974), gives general guidance on the duties and responsibilities that pertain specifically to the profession of emergency care. These are described as follows:

- The identification of the emergency care needs of a person in an emergency care situation.
- The evaluation of the emergency care needs of a person in an emergency care situation with due regard to his or her safety and the implementation of precautions to ensure his or her safety.
- The rescue of a person from an emergency care situation or from a potential emergency care situation.
- The provision of emergency care to a person in an emergency care situation.
- The prevention of further injury to, and the combating of possible complications of an illness or injury to a person in an emergency care situation.

- The transportation in an emergency care situation of an injured or seriously ill person to, at or between health establishment(s) by an approved ambulance service.

The above-stated duties and responsibilities not only apply to the day-to-day rendering of emergency calls but also in disaster response situations. Therefore the EMS managers will need to portray the management of the above duties during a disaster incident.

Pelling and Holloway, (2006:11) state that the evolution of South Africa's disaster management legislation took place during a time of intensifying disaster risk in the country, and was significantly influenced by international developments that were related to disaster risk reduction. The changes to South Africa's disaster management policy and legislation were made over a period of approximately eleven years – from June 1994 to April 2005 – which was an era of massive legislative reform in the post-apartheid South Africa. The National Disaster Management Framework (NDMF) was published in the Government Notice 654 of April 2005. As in the case with the Disaster Management Act, the description "risk" is also not part of the title of the National Disaster Management Framework. However, the framework does place explicit emphasis on the disaster risk reduction concepts of disaster prevention and mitigation as the core principles to guide disaster risk management in South Africa.

The South African Disaster Management Act (South Africa 2002) encourages a broad-based culture of risk avoidance and the promotion of disaster management education and training throughout South Africa; it also advocates research into all aspects of disaster risk management (South Africa, 2002:19).The South African Disaster Management Act (South Africa, 2002) does not specify the disaster management competencies and specific training requirements for EMS managers and supervisors in South Africa, however, it was found to promote disaster management education and training for all disaster management role players throughout the entire South Africa.

2.4.4 Nationally at specialty level

Nationally at governance level the South African Disaster Management Act (Soluth Africa, 2002) portrays a lack of the specific disaster management competencies and training requirements for EMS managers and supervisors. The objective of this section is to establish whether there are

clear disaster management guidelines and requirements for EMS managers that have been specified nationally at speciality level.

MacFarlane, Joffe and Naidoo (2006:451-456) indicate that there is a scarcity of skills to deal with the management of disasters in the South African context. The National Disaster Management Framework (NDMF) is developed to meet the legislative objectives of the Disaster Management Act, and therefore needs to mitigate the scarcity of skills that is alluded to above. The NDMF comprises of key performance areas (KPAs) and supportive enablers that are required to achieve the specific objectives of the Disaster Management Act (National Disaster Management Centre, 2011:43). The NDMF states that one of the enablers of the Disaster Management Act (South Africa, 2002) is an education, training, public awareness and research programme that need to be implemented at all levels of involvement of disaster management. (South Africa, 2005:156-157).

The National Disaster Management Framework (South Africa, 2005:162-169) requires that national, provincial and municipal organs of state need to plan, organize and implement training programmes relevant to their respective areas of responsibility. These training programmes need to be constructed as ongoing training interventions that can include short courses, workshops, seminars, in-service training and where appropriate it needs to be designed as part of the formal education system and should be in line with the national education and training framework.

The NDMF (South Africa, 2005:162-164) states that specific education programmes need to be developed and implemented by tertiary institutions for disaster management professionals, and that aspects of disaster management must be integrated into existing education programmes. The NDMF requires that quality professional courses, workshops, seminars and conferences be developed and the focus should be on issues of disaster risk management.

The NDMF further states that training outside the formal primary, secondary and tertiary education system has a pertinent role to play in the drive to transfer skills and capacitate disaster management stakeholders or other interested persons. Such training programmes may include accredited interventions registered with the National Qualification Framework (NQF) which may earn trainees, credits towards a registered qualification, as well as programmes that

are not accredited. The National Disaster Management Centre (NDMC) is required to promote registration of training programmes, such as short courses and workshops with the relevant Sector Education and Training Authority (SETA). This will ensure that the short learning programmes credits can count towards a formal qualification (South Africa, 2005:165-166).

The NDMF (South Africa, 2005:165) states that the training interventions may include:

- Modular courses
- Short courses
- Workshops
- Conferences
- Seminars
- Mentorships
- In-Service Training
- Learnerships
- Self teaching, experiential training
- Mass communication
- Indigenous knowledge
- Drills exercises and rehearsals.

The NDMF requires that training programmes for government officials and policy makers need to include aspects of disaster education and may include development planning, hazard identification and assessment, communicable diseases, dry-land agriculture, particularly rural appraisal, applied climate sciences and geographic information system (GIS). These training programmes presented need to embrace the multidisciplinary and interdisciplinary dimensions of disaster reduction (South Africa, 2005:166).

The NDMF (South Africa, 2005:166) requires that the training of government officials should be conducted in the context of the national education and training guidelines provided by the Skills Development Act (South Africa, 1998), the Skills Development levies Act (South Africa, 1999), and the South African Qualifications Authority Act (South Africa, 1995).

The NDMC is the responsible body for the promoting, facilitating and overseeing the development and implementation of training programmes and materials for practitioners and government officials in disaster management and associated fields. This also includes stakeholders, communities, policy makers, trainers and facilitators. The national, provincial and municipal organs of state are required to plan, organize and implement training programmes relevant to their respective areas of responsibility in consultation with local and national authorities (South Africa, 2005:166-167). The NDMF does not specify the disaster management competencies and specific training requirements for EMS managers and supervisors in South Africa; however, it provides a general guidance towards the disaster management education and training requirements, and the disaster management accreditation processes.

2.4.5 Nationally at Sub-specialty level

Nationally at speciality level the NDMF of 2005 lacks the identification of the specific disaster management competencies and training requirements for EMS managers and supervisors. The objective of this section is to establish whether there are clear disaster management guidelines and requirements for EMS managers that have been specified nationally at sub-speciality level.

The National Health Information System Project (National HIS Project) of South Africa (2007: 23-35) states that the target *response time* for day to day EMS calls with a *code red priority* is less than 15 minutes for urban areas and less than 40 minutes for rural areas (*code red priority* is an emergency call that requires immediate response by an ambulance. This includes life-threatening injuries or illnesses that require immediate transport to a medical facility. The *response time* is the time it takes an emergency vehicle to reach an emergency medical scene, calculated from the time of the first call to the control room until the time that the emergency vehicle arrives on the scene).

By linking the criteria of the National HIS project of South Africa with the statement made by Smiley, *et al.* (2004:11) where they state that that the immediate response to a disaster will be required from the “day to day” EMS system, and they conclude that the foundation of the medical disaster response is a strong “day to day” EMS system. This in itself poses a challenge as the “day to day” EMS system is still required to meet the non-disaster related emergencies and their *response time* requirements.

Wallis and Smith (2011:28) add to the challenged situation and state that the Command and Control of an incident should be the first priority to be established when any major incident occurs. The factor of time is emphasized to be so critical that for every five minutes without command it takes approximately 30 minutes longer to bring the incident under control. This statement requires that the EMS managers and supervisors be actively involved in the command and control of the disaster incident, and does not exclude the responsibility in the management of the "day to day" non-disaster related emergencies.

Wallis and Smith (2011:28) propose that the *"overall control"* of the scene should be the responsibility of one of the emergency services, which falls mostly under the auspices of the police. The *"control"* of the incident entails one individual being responsible for the horizontal communication and coordination among all the different agency services present (or required) at the scene. The *"command"* on the other hand refers to the authority within each emergency or support service. Each service is required to have one individual who is in command of a specific service and communicates through vertical channels with the service. The EMS managers and supervisors are required to fulfil the functions of the vertical channels of command during a disaster incident, and therefore need to fully comprehend the roles and responsibilities that the task requires.

Wallis and Smith (2011: 28-29) give a perspective on the levels of responsibility or also known as the command tiers that are recognized internationally and these are the *Bronze command, Silver command* and the *Gold command*. The *Bronze command* is specific to the *Awareness level* and performs the operational tasks and are situated in the "hot" zone of the scene, they are bound by the inner cordon. Each service is represented by a designated sector commander. The Silver Command is confined by the outer cordon at the scene, and is tasked with all the tactical aspects related to the incident. A Silver commander is usually designated by each service to form a unified command team. The *Silver command* is specific to the performance level. Wallis and Smith (2011: 28) further state that the *Gold command* serves as the strategic backbone of the incident, and may involve provincial or national authority and is often remote from the scene. The *Gold command* is specific to the management level.

In concluding this section it was found that there were some general disaster management guidelines and requirements for EMS managers that had been specified nationally at sub-speciality level.

2.4.6 Regionally:Free State Province

The researcher is currently employed at the Free State College of Emergency Care (FS CoEC) which is a sub-directorate in the Free State Department of Health, and is responsible for EMS training in the FS. The FS CoEC does not provide disaster management training for EMS managers; however, the college does provide the Emergency Care Technician (ECT) course. The ECT course is a mid-level qualification which focuses on the EMS practitioner level's requirements, and is not specifically designed for the EMS managers' needs. The ECT course does, however, include some disaster management outcomes and has a rescue elective.

The job description of the EMS provincial manager states that the official needs to respond to disasters, and is also required possessing disaster management skills. No further information pertaining to the disaster management competencies and specific training requirements could be found (Free State Department of Health, 2010:1-2). According to the director of FS EMS: Mr. A.K. Munilal (personal communication, 10 October, 2011) he stated that qualifications in disaster management were not included in the appointment requirements for EMS managers and supervisors.

According to the Free State Provincial Coordinator for the humanitarian relief organization *Rescue South Africa:* Mr. J.A. Fleischman (personal communication, 10 October, 2011) he indicated that the FS Department of Health availed EMS staff to respond to the 2010 Haiti earthquake and 2011 Japan tsunami and earthquake. He also stated that the deployment criteria for these international disasters were based on the EMS official individuals' rescue qualifications and areas of rescue expertise.
According to Mr. A.K. Munilal (personal communication, 10 October, 2011), the FS EMS managers and supervisors played a key role in the policy development, disaster preparedness and rendering of an emergency service for the 2010 FIFA world cup held in the Free State province.

In concluding the information obtained pertaining to the Free State Region, it was found that the FS EMS managers and supervisors were responsible for, and were partaking in disaster management response activities. However, the following could not be found:

- A provincially accepted model that portrays clear competencies that the EMS managers should portray during a disaster incident.
- A provincially accepted disaster management education and training model for EMS managers and supervisors.

2.5 SUMMARY

The role of EMS in disaster management is definite, and for the EMS to be able to fulfil their responsibility during a disaster it requires that there is a strong day to day EMS system that is able to carry the burden in the response phase, especially whilst the different spheres of the disaster response structures are being formed and the additional resources activated to assist with the incident.

Disaster incident management lacks international consensus on the specific qualifications that are required to meet the competency in the deployment to a disaster incident. Education and training in disaster management is a weighted criteria that can be used as a requirement for personnel selection to a disaster scene, however, it is not bearing as much weight as hands-on field experience in an acute disaster setting.

The literature reflects a lack in the inter-agency standards for the education and training in disaster health and this is found to have filtered down from the “international authorities’ recommendation” to the “Regional Free State” level. There is found to be no international accepted model that portrays clear competencies that the EMS managers should portray during a disaster incident and there is no internationally accepted disaster management education and training model for EMS managers and supervisors.Literature was, however, found that portrayed competencies and training models that were used by specific organizations and countries, but none was found relating to the South African context.

CHAPTER 3

METHODOLOGY

3.1 INTRODUCTION

The research methodology will be discussed in this chapter. Methodology is defined as the entire strategy for the research study (Burns & Grove, 2005:211). In this study the methodology refers to the research design, research techniques, population sample, pilot study, data gathering, validity, reliability, ethical questions and data analysis.

3.2 RESEARCH DESIGN

A research design is defined as the plan, strategy or overview that the researcher uses to answer the research question (Theodore, Wagenaar & Babbie, 2005:56). In this study a *quantitative descriptive design* was used to investigate the possibility of a human resource gap for disaster management qualifications and training amongst the EMS supervisors and managers in the Free State Provincial Government's Emergency Medical Service. The quantitative descriptive design was derived from a combination of terms, namely the *descriptive design* and the *quantitative design*. The explanation of the terms is as follows:

- *A descriptive design* is to observe, describe and document the aspects of the study (Babbie, 2007:89; Brink, 2006:102; Babbie, 2005:91; Polit & Beck, 2004:192), to ensure an accurate portrayal of the characteristics of persons, situations or groups and/or the frequency with which certain phenomena occur (Polit & Beck, 2004:716), and possibly to give an accurate explanation of the phenomena (Punch, 1998:15). During this study the

researcher attempted to investigate the human resource gap in disaster management qualifications and training amongst the EMS supervisors and managers in the Free State Provincial Government's Emergency Medical Service, and also attempted to give an accurate description thereof and to make possible recommendations.

- A *quantitative design* was chosen as the researcher would be investigating the human resource gap for disaster management qualifications and training amongst the EMS supervisors and managers using quantitative measures. Structured questionnaires were administered to the respondents. In quantitative studies the questionnaires are constructed in a structured manner, and open-ended questions are included where qualitative data is required (Leedy & Omrod, 2005:188).

The study made use of a non-experimental quantitative study. A non-experimental quantitative study is done when the lack of experimental control makes the design less able to determine cause and effect. It is highly effective in gathering knowledge regarding a specific situation (Brink, 2006:102).During this study it was aimed to gather more information regarding the topic of the study, and to give an accurate description thereof. No form of control, manipulation or interventions should be performed by the researcher (Brink, 2006:102,104; Welman, Kruger & Mitchell, 2006:92-93; Burns & Grove, 2005:232).

A quantitative design was chosen as the disaster management training and education of EMS managers and supervisors were assessed and described as it was currently occurring. That was done to assist in identifying strengths and problems with the current practice. No manipulation of the situation was done by the researcher.

3.3 RESEARCH TECHNIQUES

Descriptive designs are concerned with gathering information from a representative sample of the population. The emphasis in the collection of data in descriptive studies is on structured observation, questionnaires and interviews (Brink, 2006:103; Babbie, 2005: 183-186). During this study questionnaires were used to gather data from the EMS supervisors and managers in the Free State Provincial Government's Emergency Medical Service. The EMS managers and supervisors are referred to as respondents.

A questionnaire is defined as a printed self-report form designed to elect information that can be obtained through written responses of the subject (Burns & Grove, 2005:748). In the questionnaire, the respondent, who is the unit of analysis, writes down his answer in response to questions printed in a document (Brink, 2006:146). After the completion of the empirical investigation, a questionnaire drafted in English was composed (Brink, 2006:151; Burns & Grove, 2005:396; Polit & Beck, 2004:385; Uys & Basson, 2000:60).

The questionnaire contained open-ended and closed questions, but consisted mostly of closed questions that offered the respondent alternative replies, from which the subjects could choose the one that most closely matched the appropriate answer (Polit & Beck, 2004:349; Uys & Basson, 2000:65). A few open-ended questions were used to give freedom to the respondents and therefore offered the possibility of spontaneity and elaboration (Polit & Beck, 2004:350). Open-ended questions were used to obtain some quantitative aspects of the study (Brink, 2006:149; Leedy & Omrod, 2005:188), which placed less restriction on the respondents and obtained a more diverse response from the respondents (Brink, 2006:149; Pilot & Beck, 2004:349,350). Open-ended question were used where the researcher was not certain whether all possible alternatives had been included in the closed question (Uys & Basson, 2000:66).

3.3.1 Advantages of a questionnaire

A questionnaire is a quick way of obtaining data from a large group of people (Brink, 2006:147). A large number of respondents, including those who live vast distances away can be included in the research study by mailing or electronic sending. Thus, they may save the researcher travel expenses (Leedy & Omrod, 2005:185). Approximately 96 EMS supervisors and managers in the Free State Provincial Government's Emergency Medical Service were approached to take part in the research study, and it was projected that those that were accessible would participate in the study. The number was approximate as there were constantly new appointments of staff being made. Only 50 questionnaires were received; thus resulting in a return rate of 52%.

Questionnaires are in general much less costly and require less time and energy to administer. With a fixed amount of funds or time, a large and more geographically diverse sample can be obtained with mailed or web-based questions (Brink, 2006:147; Polit & Beck, 2004:350; Uys & Basson, 2000:65). Owing to financial constraints, time restrictions and the vastness of the Free State province, the choice of a questionnaire was well suited for this study. Subjects feel a

greater sense of anonymity and more likely to provide honest answers (Brink, 2006:147; Polit & Beck, 2004:350).

The questionnaire is presented in a consistent manner, and there is less opportunity for bias (Burns & Grove, 2005:748). The absence of an interviewer also ensures that there will be no interviewer's bias (Polit & Beck, 2004:350). The questionnaires was set out in a structured manner with mostly closed-ended questions that were used. That gave the researcher the advantage to reduce digression in the response from the respondents and also to easily code and analyse the data using a spreadsheet computer programme. The format is standard for all subjects and is not dependant on the mood of the interviewer (Brink, 2006:147).

3.3.2 Disadvantages of a questionnaire

Disadvantages, limitations and problems that may be faced when using a questionnaire is that a questionnaire should not take longer than thirty minutes to complete. This limitation necessarily limits the field covered in the questionnaire and the questionnaire is generally labelled as a more superficial instrument than an interview (Uys & Basson, 2000:65-67).

Other disadvantages are that there may be a need for sufficient space when the respondent needs to provide an answer for an open-ended question. People who receive questionnaires do not always return them – in other words there may be a low return rate – and the people who do return them are not representative of the originally selected sample (Brink, 2006:147; Leedy & Omrod, 2005:185; Uys & Basson, 2000:70).

The above challenges were attended to by the researcher in that the questionnaire was structured in a manner that it would take an average of ten minutes to complete. Sufficient space was provided where the respondent could supply an answer. When there was reluctance in questionnaire response then the researcher contacted the respondents as he was in possession of the contact details of most of the EMS managers and supervisors. In spite of these actions it still resulted in a low return rate of 52%.

Even when people are willing participants in a questionnaire study, their response will reflect their reading and writing skills, and perhaps their misinterpretation of one or more questions. The researcher is apt to gain only limited, and possibly distorted, information (Leedy & Omrod,

2005:188) because there is no opportunity to clarify any items that may be misunderstood (Brink, 2006:147; Burns & Grove, 2005:398). This challenge was overcome by the fact that the researcher was known to the respondents, and his contact details were available on the information sheet that was accompanying the questionnaire. The respondents were also encouraged to make contact with the researcher should they encounter any uncertainties.

Respondents may also fail to answer some of the items (Brink, 2006:147). The respondents were encouraged on the information sheet to complete the entire questionnaire and to leave no question unattended. On receiving the completed questionnaires the researcher checked that all the questions were answered in full, if not, the researcher requested the respondent to complete the lacking areas.

3.4 POPULATION

Population is the total collection of the study object (individuals, objects, groups of events) that conforms to the designed criteria and is accessible for the study (Welman, *et al.,* 2006:52; Polit & Beck, 2004:290; Uys & Basson, 2000:86;).The definition of the population depends on the sample criteria and the similarity of subjects (Burns & Grove, 2005:40; De Vos, Strydom, Fouche & Delport, 2005:193). A population is the full set of cases from which a sample is taken (Welman, *et al.,* 2006:53; Leedy & Omrod, 2005:267; Neuman, 2000:516). The population of this study was the managers and supervisors in the FS Provincial Government EMS.

The target population is the aggregate of cases with which the researcher would like to make contact (Polit & Beck, 2004:290; Neuman, 2000:201); thus the total set of individuals that meet the inclusion criteria (Burns & Grove, 2005:342; Polit & Beck, 2004:290; Neuman, 2000:201), and which the researcher would ideally like to generalise for results (Welman, *et al.,* 2006:126). The target population was the managers and supervisors in the FS provincial government EMS. The target population was estimated at approximately 96 managers and supervisors in total. The researcher attempted to administer a questionnaire to all accessible managers and supervisors in the FS EMS. Only 50 managers and supervisors returned completed questionnaires to the researcher.

3.5 SAMPLE

A sample is a part or fraction of a whole or subset of a larger set, selected by the researcher to participate in the research study (Babbie, 2005:113; Polit & Beck, 2004:731; Uys & Basson, 2000:87). A sample thus consists of a selected group of the elements or units from which information is collected (Brink, 2006:124).

3.5.1 Sampling

In this study the sample population is coinciding with the target population, as sampling is defined as the process whereby the sample is drawn from the population (De Vos et al., 2005:193; Babbie & Mouton, 2001:175; Uys & Basson, 2000:87). The reason for the coinciding is that there is a small target population (approximately 96 managers and supervisors in total), and therefore the researcher attempted to administer a questionnaire to all accessible managers and supervisors in the FS EMS. The researcher possessed a list with most of the names and contact details of the more senior managers and supervisors in the FS EMS, and the researcher was able to follow up and remind numerous respondents to circulate and submit the questionnaires. The sample population resulted in 50 managers and supervisors responding.

3.6 PILOT STUDY

A pilot study is a small-scale version of the major study (Brink, 2006:54,166; De Vos *et al.,* 2005:206). It is developed much like the proposed study, using the same setting, treatment, data collection and analysis techniques (Burns & Grove, 2005:42). The aim of the pilot study is to provide a miniature “trial run” of the methodology, to ensure that the planned methodology is effective and to identify and eliminate possible unexpected problems with the research design (Brink, 2006:54; Welman, *et al.,* 2006:148; Burns & Grove, 2005:42; De Vos *et al.,* 2005:207; Uys & Basson, 2000:103).

A small-scale sample of the population was achieved by using five EMS managers and supervisors situated in Bloemfontein (Motheo district) to complete the questionnaire as a “trial run”. These EMS managers and supervisors eventually formed part of the study (Welman, *et al.,* 2006:148; De Vos, *et al.,* 2005:207; Uys & Basson, 2000:103). The pilot study affords the researcher the opportunity to recognise and address some of the problems by obtaining information for improving the research, making adjustments to the instrument, or re-assessing the feasibility of the study (Brink, 2006:54). After the completion of the pilot study the

respondents indicated that all the questions were understandable. The respondents were all able to complete the questionnaire within ten minutes. No major areas of challenge or change were identified; however, the respondents did give some inputs that constituted minor changes to the improvement of the questionnaire. Owing to only minor changes that were made, the five completed questionnaires from the pilot study were included in the results of the study.

The reason for selecting these managers and supervisors is due to their easy accessibility and being centrally located. As there were no changes to be made, the data obtained in the pilot study were included in the results of the study. The design of questions, sequencing of questions or procedure for recording requires evaluation to ensure that it is measurable, reliable and valid (Burns & Grove, 2005:42,396). The instrument was tested to ensure that it was understandable, in the correct sequence, the process of recording was correct, none of the required questions were left out, and that the variables were measurable.

The time needed to complete the questionnaire was also determined. The completion of the questionnaire averaged at ten minutes. The respondents did not have any questions nor mentioned any areas that were not understood. As stated by De Vos, *et al.* (2005:211), the completed questionnaires were coded and taken to a biostatistician to ensure that questions had been correctly coded.

3.7 DATA GATHERING

Data collection is the process of selecting subjects, and then the gathering of data from these subjects. The actual steps of collecting the data are specific to each study, and are dependent on the research design and measurement methods (Burns & Grove, 2005:430). In this study data was gathered by means of structured questionnaires. The questionnaires were distributed electronically, and by hand. The researcher also requested the managers and supervisors to distribute the questionnaires amongst each other. Thirty questionnaires were returned by hand, and twenty questionnaires were received electronically.

3.7.1 Challenges during data gathering

The due date for returning the questionnaires had to be postponed for another week, due to two reasons; the first was that a large group of the managers and supervisors were attending a week

long workshop and could not be accessed. The other reason was that certain areas in the province had a problem with the server, and therefore could not receive the questionnaires electronically. The questionnaires were re-sent after the problem had been corrected.

There was also reluctance in the completion of the questionnaires. The researcher overcame this challenge by contacting the managers and supervisors to encourage and remind them to complete the questionnaire. The researcher went in person to managers and supervisors that were easily accessible and who had not yet submitted questionnaires. These attempts were fruitful, as the researcher was able to collect fifty completed questionnaires. The researcher kept a check-list of the managers and supervisors that had submitted their completed questionnaires. The more senior managers were also contacted to ensure that they remind their sub-ordinates to complete the questionnaires. There was one of the managers that collected all his subordinates' questionnaires and submitted them all together. These actions assisted the researcher to overcome the challenges that were faced during the data gathering.

3.8 VALIDITY

Validity refers to the degree to which an instrument measures what it is supposed to be measuring (Uys & Basson, 2000: 80). Validity was ensured by submitting the study and research instrument to senior researchers and writers at the University of the Free State. Internally and externally appointed content experts in the field of research were consulted (Brink, 2006:160; Pilot & Beck, 2004: 423; Uys & Basson, 2000:82). The researcher is also a qualified advanced life support paramedic and rescuer, and is employed as a manager at the Free State College of Emergency Care. The researcher has extensive working experience in the FS EMS. Validity was ensured by doing a thorough literature review in the field of disaster management education and training (Brink, 2006:160). The pilot study was tested to determine whether the planned methodology and questionnaire were effective (Leedy & Omrod, 2005:110).

3.9 RELIABILITY

Reliability is defined as the degree of consistency or accuracy with which an instrument measures the attribute it is designed to measure (Brink, 2006:163; Burns & Grove, 2005: 42; Pilot & Beck, 2004:374; Uys & Basson, 2000:75). Polit and Beck (2004:35) state that reliability

refers to the accuracy and consistency of information obtained in a study. They also state that the concept of reliability is important in interpreting the results of statistical analyses.

Reliability was achieved when the FS EMS managers and supervisors all completed the same questionnaire. The researcher himself circulated and received all the questionnaires himself. The statistical data received from the FS EMS managers and supervisors was randomly compared with training data from the Free State College of Emergency Care. The training data base of the FS Department of Health, and the content of the Disaster Management Training and Education Centre for Africa (DiMTEC) training programme were consulted. Confirmability is similar to objectivity and is the degree to which study results are derived from characteristics of participants and the study context, and not from researcher biases (Polit & Beck, 2004:36). This was achieved by the questionnaire being completed by the FS EMS managers and supervisors themselves and was not manipulated by the researcher. The conclusion and recommendations for the findings of the investigation are strengthened by an extensive literature study.

3.10 DATA ANALYSIS

The research findings were analyzed using simple statistical methods, and captured on a spreadsheet. The results were presented in the form of tables, charts and figures. The data analyses were overseen and analyzed by a qualified statistician at the Department of Statistics, University of the Free State.

3.11 ETHICAL STANDARDS

Permission from the Head of Free State Department of Health was obtained prior to the conduction of the study (Annexure A). The respondents of the study received a descriptive document regarding the study (Annexure B). All information obtained was depersonalized and treated as confidential. Information gathered was revealed to the researcher and the Department of Statistics at the University of the Free State, where the data was analyzed. The results of the study may be published and presented at a conference for academic purposes. All sources consulted by the researcher were referenced in the research document.

3.12 SUMMARY

In this chapter the research methodology was discussed and reference was made to the research design, research techniques, population sample, pilot study, data gathering, validityreliability, ethical questions and data analysis. In the following chapter the results will be presented and discussed. Descriptive statistics, namely medians and percentages for continuous data and frequencies and percentages for categorical data are calculated.

CHAPTER 4
DATA ANALYSIS AND INTERPRETATION OF RESULTS

4.1 INTRODUCTION

In this chapter the analysis of the results obtained from the questionnaire survey of managers and supervisors in the Free State provincial EMS are discussed, and interpreted. The research findings are analyzed and presented using simple statistical methods. The results are presented in the form of tables, charts and diagrams. A total of fifty EMS managers and supervisors from the Free State Provincial Government were included in the sample population, and therefore the results that were obtained were from the 50 respondents.

The outline of this chapter consists of two parts, namely the background and demographics of the respondents and secondly the analysis and interpretation of the data regarding the disaster management education and training for EMS managers and supervisors in the Free State provincial government.

4.2 BACKGROUND AND DEMOGRAPHICS OF RESPONDENTS

4.2.1 Gender

It is clear from Figure 4.1 that the majority of the respondents were males (76%). The FS Department of Health is attempting to correct the gender representation in EMS. However, previously the profession has shown a lack of interest from females as the occupation is physically very demanding.

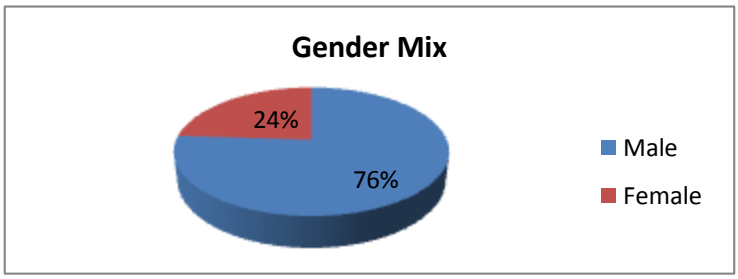

Figure 4.1: Gender

4.2.2 Age

Of the respondents, 52% were in the 31-40 age group and 30% in 41-50 age bracket. The majority of the supervisors (82%) were in the of 31-50 age group which could be assigned to the fact that years of experience in the EMS profession was an appointment criteria for managerial and supervisory positions. A matter of concern is to see the tapering down of age representation. With only six per cent of the respondents that are over the age of 50 years, it can be an indication of the short "life-span" of an EMS official in the profession. This short "life span" can be assigned to the high physical, mental and emotional demand of the profession.

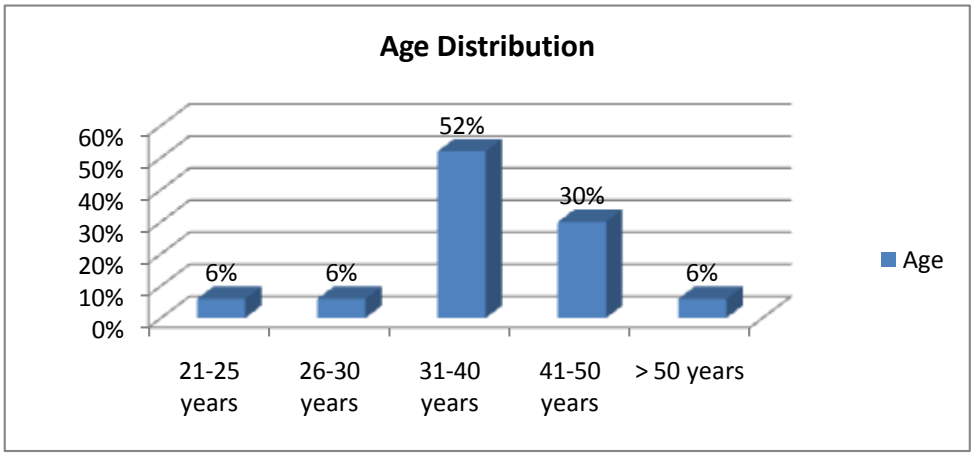

Figure 4.2: Age Distribution

4.2.3 Race

Figure 4.3 shows the distribution of the managers by race. The whites are 22% of the sample; the black managers are in the majority with 54%. Coloureds and Asian constitute the rest. Figure 4.3 is also a reflection of the race demographics of the Free State province.

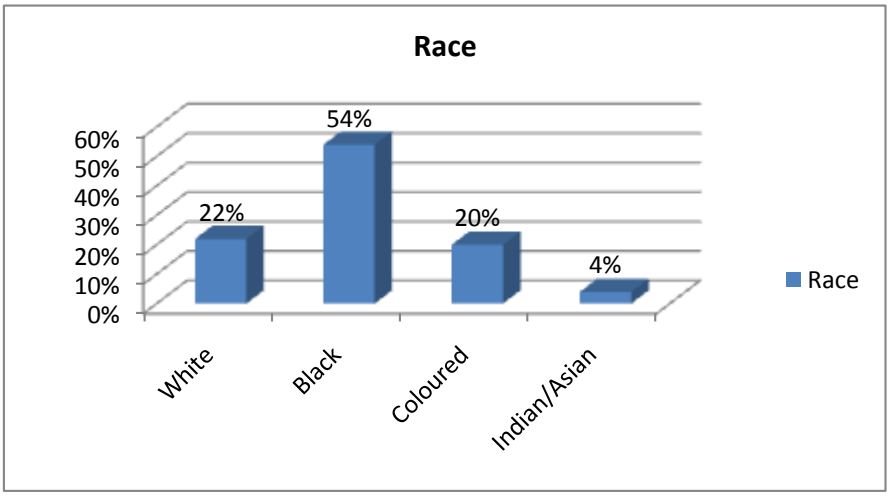

Figure 4.3: Race

4.2.4 Positions

Thirty-two per cent of the respondents were station managers, 16% were district managers, shift leaders, EMS lecturers, and EMS course coordinators were 12%.

TABLE 4.1 EMS MANAGER OR SUPERVISOR POSITION

Position in EMS	Per cent
Provincial Manager	2.00
District Manager	16.00
Sub-District Manager	4.00
Station Manager	32.00
Shift Leader	12.00
Advanced Life Support Paramedic	6.00
EMS Course Coordinator	12.00
EMS Lecturer	12.00
Senior Manager	2.00
Acting Deputy Principal	2.00
Grand Total	**100.00 (50)**

4.2.5 District

Most response came from managers in the Motheo district. The Motheo district is rich in resources as it hosts the EMS Head Office, the EMS Training College and the Centralized Control Centre, and it is for this reason that the increased response is validated. Three of the

managers are responsible for managing the entire province, which consists of all the above districts. There were only two respondents from Fezile Dabi.

TABLE 4.2 DISTRICT REPRESENTATION

District	Per cent
Motheo	60.00
Xhariep	6.00
Thabo Mofutsanyana	10.00
Lejwelephutswa	14.00
Fezile Dabi	4.00
All of the above districts	6.00
Grand Total	**100.00 (50)**

4.2.6 Total years of service in Emergency Medical Service

The majority (74%) of the respondents have more than ten years experience in the EMS profession (Figure 4.4). Comparing the years of experience with the levels of education in Table 4.3, it is a concern to find that the majority of the respondents have more than ten years of experience; and on the other hand the majority of the respondents' highest medical qualification is categorized as a short course and is non-tertiary accredited.

This can be due to the fact that the appointment criteria for filling the entry level supervisory or managerial level is to have a minimum Ambulance Emergency Assistant qualification. On the other hand, the FS EMS is also faced with the challenge of a huge backlog in its staff's further education and training. The FS EMS has trained numerous Advanced Life Support paramedics (which is the higher level qualification - and very much in demand); however, the majority of these newly trained practitioners are attracted by overseas contracts and private services. Therefore in spite of the continuous training by the FS EMS there are only a few management positions filled by higher levels of qualified EMS practitioners.

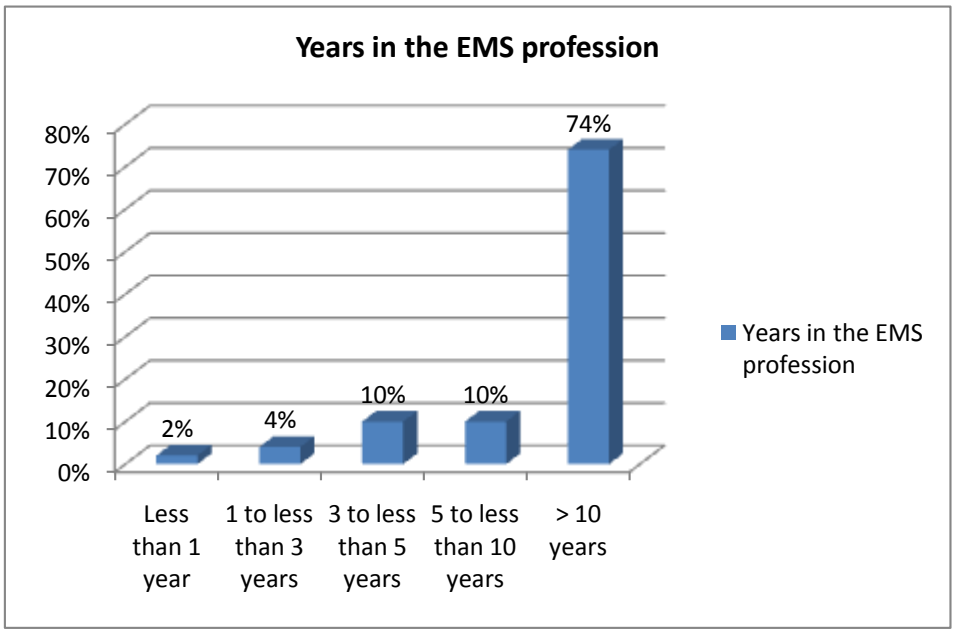

Figure 4.4: Total years of service in EMS

4.2.7 Years of Managerial/ Supervisory experience

Twenty-eight per cent of the respondents have been managing and supervising for more than ten years, 24% for five to ten years, and 22% for three to five years. Management and supervision of fewer than three years constitute the rest (figure 4.5).

Figure 4.5: Years of Managerial/Supervisory experience

4.3 DISASTER MANAGEMENT EDUCATION AND TRAINING

4.3.1 Qualifications in Emergency Medical Care

It is important to note that 58% of the respondents' highest medical qualification (Table 4.3) is the AEA certificate, which is categorized as a short course and is non-NQF rated and non-SAQA registered. Twenty per cent of the respondents are qualified with a National Diploma in Emergency Medical Care, and only six per cent obtained a tertiary accredited Bachelors Degree in Emergency Medical Care.

TABLE 4.3 QUALIFICATION IN EMERGENCY MEDICAL CARE

Highest medical Qualification in EMC	Per cent
Basic Ambulance Assistant (BAA)	2.00
Ambulance Emergency Assistant (AEA)	58.00
Emergency Care Technician (ECT)	-
Critical Care Assistant (CCA)	14.00
National Diploma. EMC	20.00
Bachelor degree/ECP :EMC	6.00
Grand Total	**100.00 (50)**

When comparing the current FS EMS managers and supervisors' qualifications with the published disaster management literature by Bradt and Drummond (2007:364), it is found that they recommend education in post-graduate degree programmes, specifically in clinical medicine and public health. However, they also state that health professional qualifications alone are an inadequate expression of expertise in disaster medicine. Therefore they recommend that field experience also be taken into account.

The paramedic qualification (diploma course) is, however, found amongst the list of recommended qualifications. There is only a total of 26% (Diploma 20% and Bachelor degree 6%) that meets the recommended technical education and training criteria. This indicates that there is a gap in the FS EMS managers and supervisors' education and training in disaster management. In addition to the above statement, the NDMF (South Africa, 2005:162-164) tertiary institution for disaster management professionals, and aspects of disaster management must be integrated into existing educational programmes.

Aspects of disaster management have been integrated into the ECT course, and have a rescue elective. The research, however, indicates that there was none of the respondents that were qualified as an ECT, which could be as a result of the ECT being a newly implemented course, and no appointees have yet been made in management/supervisory positions.

Table 4.4 indicates that 34% of the respondents are trained in Basic Medical Rescue which is a non-tertiary accredited certificate; 28% of the respondents have no additional EMS-related qualifications, and 16% have tertiary accredited rescue modules. This is an indication that aspects of disaster management education and training are being implemented in the FS EMS.

TABLE 4.4 EMERGENCY MEDICAL SERVICE RELATED QUALIFICATIONS

Highest additional EMS related qualification	Per cent
None	28.00
Basic Medical Rescue (BMR)	34.00
Intermediate Medical Rescue (IMR)	6.00
Advanced Medical Rescue (AMR)	14.00
Rescue (Tertiary accredited modules)	16.00
Other	2.00
Grand Total	**100.00 (50)**

4.3.2 Baseline of managers and supervisors' education and training

The majority, 42% of the respondents indicated that they had poor knowledge of disaster management, 30% had good knowledge, 16% very poor and 12% indicated excellent knowledge (Figure 4.6). Analysing the data in the light of the Disaster Management Act (South Africa, 2002) there is a gap, as the DMA requires that disaster management education and training need to be promoted for all disaster management role players throughout the entire South Africa.

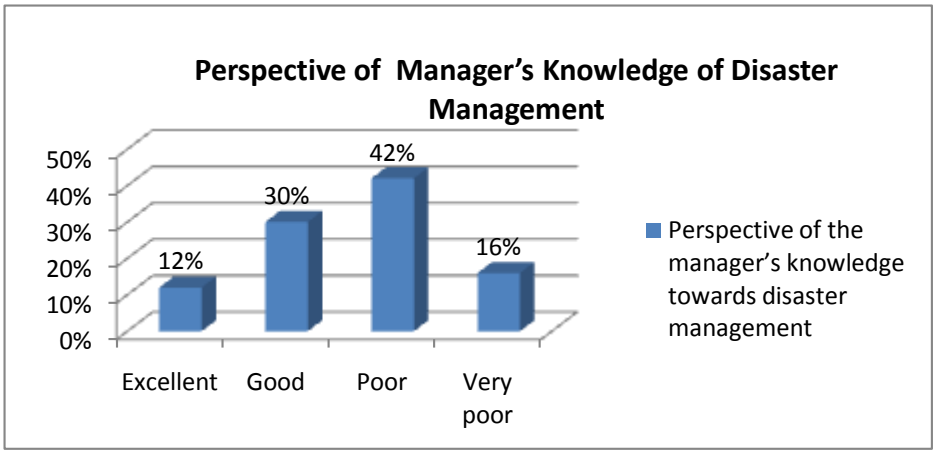

Figure 4.6: Perspective of disaster management knowledge

As reflected in Figure 4.7, the research indicated that 38% of the respondents were familiar with the content of the Disaster Management Act (South Africa, 2002), and the National Disaster Management Framework (South Africa, 2005). Of the respondents, 36% indicated that they were not familiar, and 26% were uncertain. This information can contribute towards the setting of a baseline for the FS EMS managers and supervisors' current education and training in disaster management.

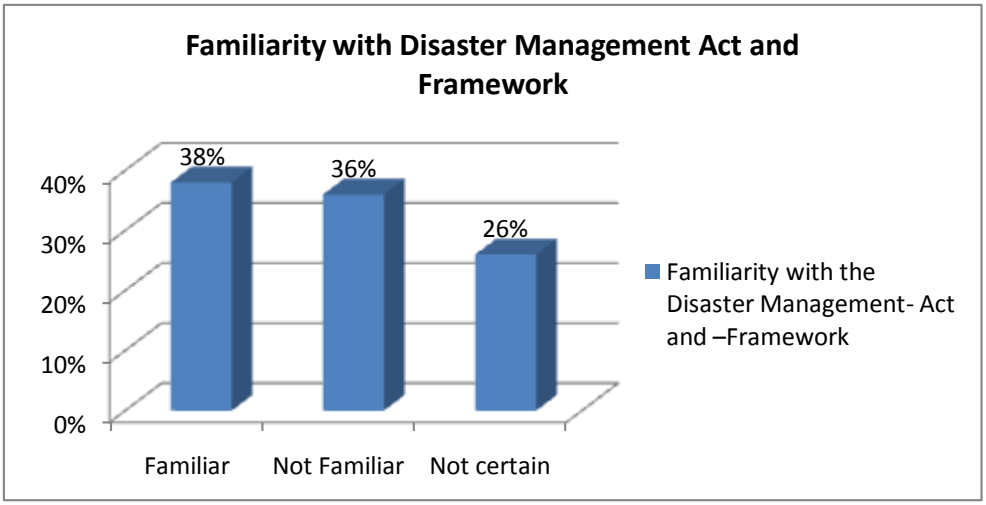

Figure 4.7 Familiarity with the Disaster Management- Act and –Framework

Figure 4.8 indicates that 66% of the respondents participated in a training exercise whereby their service's disaster response plan/major incident plan was implemented, while 26%

indicated that they had never participated in such an exercise. Disaster management field experience is highly recommended by Bradt and Drummond (2007:364) who state that disaster field operations require multi-disciplinary expertise, and that disaster medicine providers require technical competence to render an informed opinion, as well as the administrative authority to draw on necessary human material, and financial resources. These principles are stimulated in field scenarios. They also proposed that field experience should be weighted heavier than technical education and training.

When comparing the recommendations made by Bradt and Drummond (2007:364) with the 66% of the respondents that participated in disaster management field experience (even though it had been exercises), it seems as if the FS EMS has been moving in the right direction, as they are also implementing the training recommendation that is made by Hameed, Hussain, Butt and Aslam (2006:1) that "case or scenario based education" be included as a regular training method for health care professionals. There is, however, still a gap of 34% (26% and 8%) that needs to be bridged.

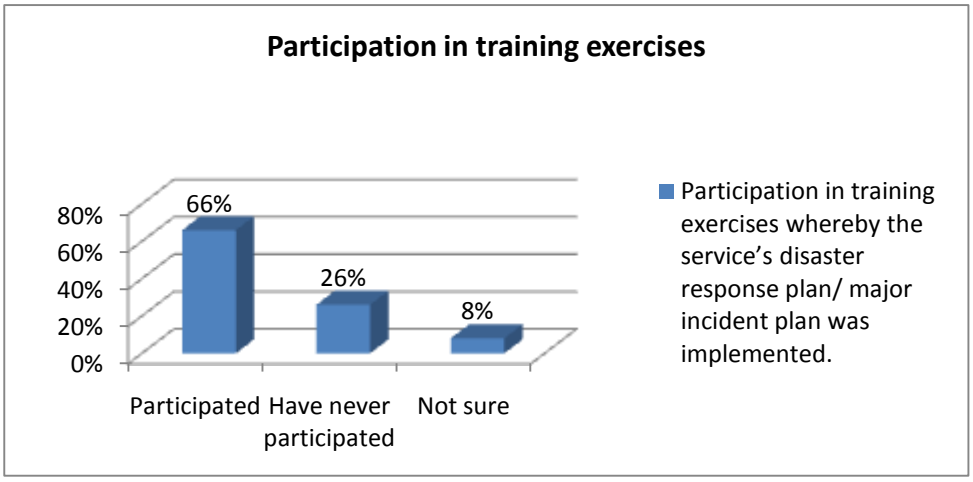

Figure 4.8: Participation in disaster training exercises when response plan was implemented

According to Table 4.5, 52% of the respondents had experience in being deployed in a local disaster area, 16% in a provincial disaster area; none in a national disaster area, 10% in an international disaster area and 44% had never been deployed in a disaster area. The discussion and recommendation for the field experience in Figure 4.8 will also be suitable for Table 4.5, as the difference is real life versus scenario-based field experience.

TABLE 4.5 DEPLOYMENT AT DISASTERS

Deployment to disasters	Per cent 100.00 (50)	
	Yes	No
Local disaster	52.00	48.00
Provincial Disaster	16.00	84.00
National Disaster	-	100.00
International Disaster	10.00	90.00
Never been deployed in a disaster	44.00	56.00

Figure 4.9 reflects that the majority of the respondents (64%) indicated that they were familiar with their functions and responsibilities during a disaster, 26% indicated that they were not sure, and ten per cent indicated that they were not familiar with their functions and responsibilities during a disaster incident.

By comparing the data in Figure 4.9 with Figure 4.8 and Figure 4.10, it is clear that 64% of the respondents (Figure 4.9) are familiar with their functions and responsibilities during a disaster. Then Figure 4.10 shows that 66% of the respondents have not received training to equip them to fulfil their functions in a disaster situation. Therefore the question can be posed as to how would the 64% respondents know what their functions are if 66% had not received any training. The answer is to be found in the recommendation that is made by Bradt and Drummond (2007:364) where they propose that field experience is weighted heavier than technical education and training.

This proposed theory is reflected in Figure 4.8 where it indicates that 66% of the respondents had participated in disaster management field exercises. A conclusion that can be drawn is that disaster management field experience is a form of education and training and can be informative regarding a participant's functions and responsibilities. This also serves as a confirmation that disaster management education and training are taking place in FS EMS, although the training schedule needs to be intensified to breech the training gap.

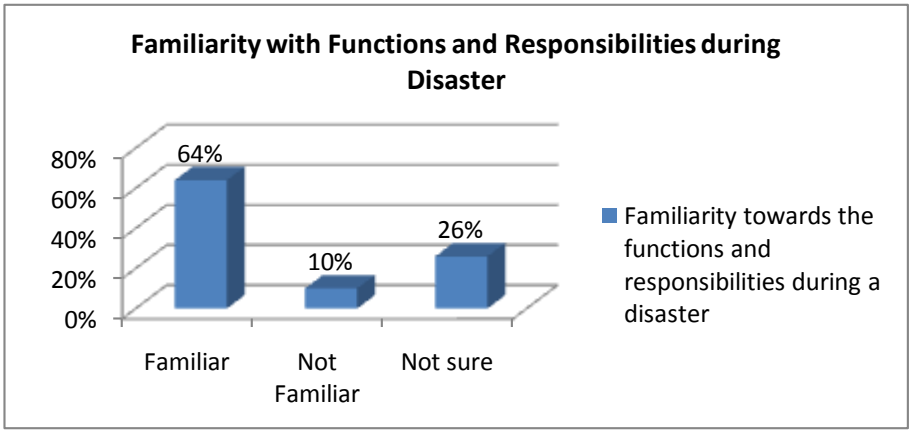

Figure 4.9: Familiarity towards the functions and responsibilities during a disaster

The Figure below (Figure 4.10) indicates that 66% of the respondents did not receive training to equip them to fulfil their disaster management functions. The remaining 34% indicated that they received training. The data obtained in the research identifies a training gap of 66% when it is compared with the Humanitarian Charter and Minimum Standards in Disaster Response as it states that the standards regarding disaster management training is that health workers should have the proper training and skills for their level of responsibility. The health agencies have an obligation to train staff to ensure that their knowledge is up-to-date as training and supervision will be high priorities especially where staff have not received continuing education or when new health systems and protocols are introduced. It is recommended that training programmes should be standardized and linked to national programmes (Sphere, 2004: 268).

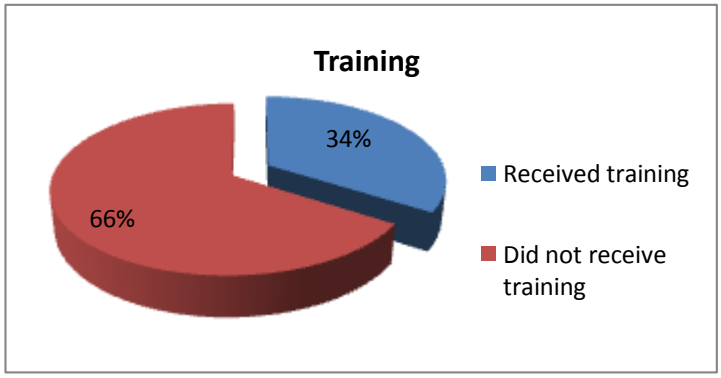

Figure 4.10 Training attended to equip staff to fulfil functions in a disaster situation

Figure 4.11 indicates that the majority (96%) of the respondents felt that there was a need for the FS EMS managers and supervisors to undergo disaster management training.

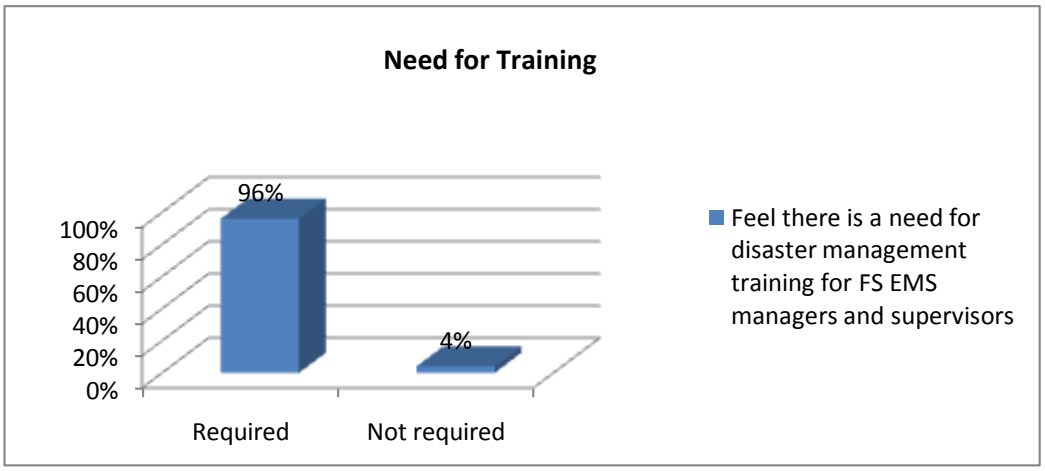

Figure 4.11: Need for Disaster management training for FS RMS managers and supervisors

4.3.3 Specific national and international disaster management training objectives and requirements

Table 4.6 shows a representation of the forms of disaster management training attended by the respondents. The areas with the most weighting are disaster drills, mock-exercises and rehearsals with 68%, then workshops with 56%, and in-service training with 42%. The information in this table gives an indication that FS EMS managers and supervisors are currently being trained and educated in disaster management training programmes as required by the National Disaster Management Framework of 2005. However, there are areas of strong and weak representation. These areas of weakness need to be strengthened by a training programme as it is described in the National Disaster Management Framework (2005:162-169) where it is required that national, provincial and municipal organs of state need to plan, organize and implement training programmes relevant to their respective areas of responsibility. These training programmes need to be constructed as ongoing training interventions that can include short courses, workshops, seminars, in-service training and where appropriate it needs to be designed as part of the formal education system and should be in line with the national education and training framework.

Formal tertiary education is only represented at 16%, which identifies a gap when the statement made in the NDMF (South Africa, 2005:162-164) is taken into account. The NDMF states that specific educational programmes need to be developed and implemented by tertiary institutions for disaster management professionals, and that aspect of disaster management must be integrated into existing educational programmes. The NDMF also requires that quality professional courses, workshops, seminars and conferences be developed, and the focus should be on issues of disaster risk management.

TABLE 4.6 ATTENDANCE OF THE DIFFERENT FORMS OF DISASTER MANAGEMENT TRAINING

Forms of Disaster Management Training Attended	Per cent 100.00 (50)	
	Yes	No
Formal Tertiary education	16.00	84.00
Modular courses	20.00	80.00
Short Courses	40.00	60.00
Workshops	56.00	44.00
Conferences	24.00	76.00
Seminars	24.00	76.00
Mentorship programmes	4.00	96.00
In-Service Training	42.00	58.00
Learnership programme	4.00	96.00
Experiential training	18.00	82.00
Drills, mock-exercises and rehearsals	68.00	32.00
Table -Top scenarios	42.00	58.00

Table 4.7 indicates a mixture of the disaster management components in which the respondents received training. The training attendance for specific components range from an 8% to 76%. The 76% totals the respondents that received training in hazardous material and 92% had not received training in refugee care. A conclusion can be drawn that there are forms of disaster management education and training that are taking place in the FS EMS, although it is unequally distributed. This imbalance can be corrected by implementing a scheduled disaster management training plan for the FS EMS.

In Table 4.7 the research also indicates a gap as only 46% of the respondents received training in disaster response, and 50% in disaster preparedness. This finding strengthens the statements made by Wang and Chang (2006:60) where they find that EMS professionals lack training in disaster response. Hubloue and Debacker, (2010:129-130) state that several studies on medical

disaster preparedness, and lessons learned from recent disasters indicate that there is a lack of education and training of the different parties involved in the medical management of disasters. Table 4.7 sets a baseline of the FS EMS managers and supervisors' current education and training in disaster management. This information can be used to assist in developing a training needs analysis, and in drafting a training programme for the FS EMS managers and supervisors.

TABLE 4.7 TRAINING IN DISASTER MANAGEMENT COMPONENTS

Components In Which Training Had Been Received.	**Per cent 100.00 (50)**	
	Yes	**No**
Introduction to disaster management	56.00	44.00
Hazardous Materials	76.00	26.00
Major Incident Medical Management	68.00	32.00
Incident Command System	66.00	34.00
Unified command System	26.00	74.00
Mass Casualty Incident Management	70.00	30.00
Principals in logistics during a disaster	18.00	82.00
Field evaluation during a disaster	36.00	64.00
Principles of Public Health	22.00	78.00
Refugee's Care	8.00	92.00
Treatment of blast injuries	48.00	52.00
Treatment of Crushing Syndrome.	50.00	50.00
Treatment of Compartment Syndrome	48.00	52.00
Treatment of Traumatic Asphyxia	56.00	44.00
Post Traumatic Stress Disorder	47.00	58.00
Personal Protective Measures	56.00	44.00
Community Protective Measures	24.00	76.00
Weapons of Mass Destruction	20.00	80.00
Rescue Procedures	60.00	40.00
Evacuation and transport procedures	54.00	46.00
Communication procedures	62.00	38.00
Media relations	32.00	68.00

Components In Which Training Had Been Received.	Per cent 100.00 (50)	
Management of a crime scene	34.00	66.00
Medical monitoring of response personnel	40.00	60.00
Decontamination	44.00	56.00
Disaster Prevention and planning	34.00	66.00
Disaster Preparedness	50.00	50.00
Disaster Response	46.00	54.00
Disaster Recovery and Analysis	24.00	76.00

Pertaining to Table 4.8; Ciottone, *et al. (*2006:23) indicate that the pre-requisite for those to fulfil EMS management level functions during a disaster incident is that they complete both awareness and performance level objectives. Management personnel also need to be able and capable of overseeing the medical surveillance of their subordinates.

When comparing this statement by Ciottone, *et al.* (which is categorised as international workgroups experts, and best practice recommendations) with the data obtained from the research it reflects in Table 4.8 that 32% of the respondents indicated that they fulfilled managerial level responsibilities during a disaster, 24% performance level responsibilities and only 22% awareness level responsibilities. When evaluating the findings in the light of Ciottone *et al.'s* statement, then the expectation should rather be that the percentage of awareness and performance level should be exceeding the managerial level and not the other way round as found in the FS EMS data.

TABLE 4.8 LEVELS OF RESPONSIBILITY DURING DISASTER DEPLOYMENT

Levels of Responsibility Fulfilled During Disaster Deployment	Per cent 100.00 (50)	
	Yes	**No**
Awareness level	22.00	78.00
Performance level	24.00	76.00
Managerial level	32.00	68.00
Observer	10.00	90.00

4.4 SUMMARY

By analysing the data and interpreting the results, there is found to be substantial evidence that the FS EMS managers and supervisors are currently being trained in aspects of disaster management. The data obtained will serve as a baseline of the FS EMS managers and supervisors' current education and training in disaster management. There are, however, gaps that have been identified and whereby specific recommendations can be made to uplift the disaster management education and training in the FS EMS. These recommendations will be thoroughly discussed in Chapter 5.

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

5.1 INTRODUCTION

There is abundant evidence described in the literature that EMS professionals lack training in disaster response (Wang & Chang, 2006:60). Hubloue and Debacker (2010:129-130) state that several studies on medical disaster preparedness, and lessons learned from recent disasters indicate that there is a lack of education and training of the different parties involved in the medical management of disasters. MacFarlane, Joffe and Naidoo (2006:451-456) support the above literature by indicating that there is a scarcity of skills to deal with the management of disasters.

In this study it was attempted to investigate the possibility of a human resource gap in disaster management qualifications and training amongst the EMS supervisors and managers in the Free State Provincial Government's Emergency Medical Service. The findings made it clear that there were several positive aspects in the already established practice of disaster management education and training in the FS EMS; however, it was also apparent that there was opportunity for revision and improvement. Conclusions and recommendations based on both the literature and empirical investigations are presented in this chapter.

5.2 RESEARCH QUESTIONS AND THE AIM OF THE STUDY

The following research questions were explored and investigated:

- Are the managers and supervisors in the FS EMS educated and trained in disaster management?
- How do the FS EMS managers and supervisors' education, training and qualifications in disaster management compare with national and international requirements and standards?
- Do the current EMS training curriculums include areas of disaster management?

The aim of this study was to investigate the possibility of a human resource gap in disaster management qualifications and training amongst the EMS supervisors and managers in the Free State Provincial Government's Emergency Medical Service (FS EMS), South Africa, and to make possible recommendations towards a disaster management education and training programme for the FS EMS.

The objectives of this study were:

- To determine a baseline of the FS EMS managers and supervisors current education and training in disaster management.
- To determine whether the FS EMS managers and supervisors are currently being trained and educated in disaster management training programmes as required by the National Disaster Management Framework (South Africa, 2005).
- To determine the specific disaster management training objectives that are requisites for the EMS managers and supervisors to meet national and international requirements and recommendations.

5.3 CONCLUSIONS

The role of EMS in disaster management is definite (cf. 2.3), and for the EMS to be able to fulfil its responsibility during a disaster it requires a strong day to day EMS system that is able to carry the burden in the response phase, especially whilst the different spheres of the disaster response structures are being formed, and the additional resources activated to assist with the incident.

Disaster incident management lacks international consensus on the specific qualifications that are required to meet the competency in the deployment in a disaster incident. However, education and training in disaster management is a weighted criteria that can be used as a requirement for personnel selection to a disaster scene, although it is not bearing as much weight as hands-on field experience in an acute disaster setting.

The literature also reflects a lack of inter-agency standards for the education and training in disaster health and this is found to have filtered down through the levels from the *"international authorities' recommendation"* to international workgroups, experts and best practice

recommendations; nationally at governance level; nationally at speciality level; nationally at sub-speciality level, and was also found to have filtered to the *"Regional Free State"* level. There was also found to be no internationally accepted model that portrays clear competencies that the EMS managers should portray during a disaster incident. There was found to be no international accepted disaster management education and training model for EMS managers and supervisors. The South African Disaster Management Act (South Africa, 2002) does not specify the disaster management competencies and specific training requirements for EMS managers and supervisors in South Africa, although it was found to promote disaster management education and training for all disaster management role players throughout the entire South Africa.

As with the DMA, the NDMF does not specify the disaster management competencies and specific training requirements for EMS managers and supervisors in South Africa; however, it provides general guidance on the disaster management education and training requirements, and the disaster management accreditation processes. The lack of clarity regarding responsibilities across the different spheres of the South African government shows that there is currently no formal indication of which organ of state, at which sphere of government should perform management or supportive functions in the different types of disaster incidents.

Literature however, portrays competencies and training models that are used by specific organizations and certain countries, but none relating to the South African context. It has also been determined that there is currently in the South African context, EMS training curriculums that portray the inclusion of disaster management components. With the analysis of the data and the interpretation of the results, it was found that the FS EMS managers and supervisors were being trained in aspects of disaster management. However, the gaps that have been identified are the lack in both theoretical knowledge, and practical experience in disaster management.

5.4 RECOMMENDATIONS

The recommendations that are made are consistent with, and take into account current developments, best practice guidelines and limited access to tangible and intangible resources in the disaster management environment.

5.4.1 Development of Disaster Management Education And Training

Owing to the lack of national and international consensus on the specific qualifications that are required to meet the competency in the deployment in a disaster incident, it is recommended that the FS College of Emergency Care (FS CoEC) in collaboration with the Disaster Risk Management Training and Education Centre for Africa (DiMTEC) at the University of the Free State (UFS) use the information obtained in this study's literature review and the empirical investigations to create a disaster management education and training programme specifically for the FS EMS managers and supervisors. UFS- DiMTEC provides disaster risk management training from short courses till Master's level; therefore its contribution towards the development of a training programme will be of great value.

The two training institutions should compare their resources and establish an educational team that will be responsible for the creation and conducting of the educational programme. The educational programme should be structured in a well balanced method as prescribed by the literature in this study. There should be weighting in theoretical and practical sessions, however the practical training should be weighted heavier that the theoretical component. There should also be a continuing education (refresher) programme to ensure all managers and supervisors are regularly updated and participating in active training.

5.4.2 RESEARCH DATA USED AS A TOOL FOR QUALITY ASSURANCE

It is recommended that the data obtained be used as a baseline for the FS EMS managers and supervisors' current level of education and training in disaster management. This baseline information can be used by the FS CoEC to inform the development of a capacity-building guide that will be created specifically for the disaster management training of the FS EMS managers and supervisors. The capacity-building guide will serve as a directive-tool when the disaster management education programme for EMS is being created. This will ensure that the areas of identified gaps are bridged holistically.

After the training programme has been rolled out, and training conducted for a period of two years, it is recommended that the questionnaire be repeated and comparisons made. This will

also serve as a tool to establish the effectiveness of the newly created training programme. It can be used to guide the improvement plan of the programme.

5.4.3 Disaster Management Education and Training a priority

The senior manager of the provincial department of health in the Human Resource Development (HRD) directorate needs to be informed of the gap in disaster management training amongst the EMS managers and supervisors. It will be proposed to the senior manager HRD that disaster management education and training for EMS managers and supervisors need to be included as a provincial training priority.

The National Disaster Management Centre needs to be consulted on the availability and accessibility of the different accredited disaster management training providers in South Africa. After a list of the training providers with the unit standards has been obtained, the FS CoEC; DIMTEC and the Skills Development Unit of the HRD directorate needs to establish a modular training course that is structured in an easily accessible manner for the full-time employees. The unit standard for each module of study needs to be structured in such a way that it builds up towards a full qualification in disaster management.

5.4.4 Disaster Management training to be included in curriculums

The Health Profession Council of South Africa (HPCSA) Professional Board of Emergency Care (PBEC) needs to be informed of the gap in the disaster management training of the FS EMS managers and supervisors. It will be proposed to the PBEC that as a mitigation measure to narrow this gap, it must be considered to include disaster management training in all EMS training conducted in South Africa, as it is assumed that the other provinces are faced with similar challenges.

5.5 CONCLUDING REMARKS

In this study it is clear that there is a human resource gap in disaster management qualifications and training amongst the EMS supervisors and managers in the Free State Provincial Government's Emergency Medical Service. The findings make it clear that there are several positive aspects in the already established practice of disaster management education and

training in the FS EMS; however, it is apparent that there is opportunity for revision and improvement which will contribute to bridging the gap.

It is also concluded that the Free State Emergency Medical Service is an organ of state and is legally bound to implement the Disaster Management Act (South Africa, 2002), and the National Disaster Management Framework is to be used as a working guide. By holistically implementing the current legislation and the Framework in the Free State, it will result in the province to be served by a more resilient multi-disciplinary team, which will result in safer communities.

LIST OF REFERENCES

Author Unknown. 2009. *Knights Hospitaller*. [Online]. Available from: http://www.theknightshospitallers.org/history.php [Accessed 09 December 2010].

Babbie, E. 2005. *The basics of social research* Canada: Thomson Learning Incorporated.

Babbie, E. 2007. *The practice of social research.* Canada: Thomson Learning Incorporated.

Babbie, E. & Mouton, J. 2001. *The practice of social research*. South-Africa: Oxford University Press.

Barkley, K.T. 1978. *The Ambulance: The Story of Emergency Transportation of Sick and Wounded through the Centuries*. Hicksville, NY: Expedition Press.

Bledsoe, B.E. & Barnes, D. 2004. Traction Splint. *JEMS*, August; 64-73.

Bradt, D.A. & Drummond, C.M. 2007. Professionalization of Disaster Medicine- An appraisal of criterion-referenced qualifications. *Prehospital Disaster Medicine.* Vol. 22: 5.

Brink, H. 2006. *Fundamentals of research methodology for health care professionals.* Cape Town: Juta & Co. (Pty) Limited.

Brookes, J. 1831. *Thoughts on the best means of lessening the destructive Progress of Cholera; in a Letter to the Eight Hon.* Viscount Melbourne. London.

Burns, N. & Grove, S.K. 2005. *The practice of Nursing Research, Conduct, Critique and Utilization.* Philadelphia: Elsevier.

Ciottone, G.R., Anderson, P.D., Heide, E.A., Darling, R.G., Jacoby, I., Noji, E.K. & Suner, S. 2006. The role of Emergency Medical Services (EMS) in disaster. *Disaster Medicine.* Elsevier health sciences.

Cyber Cape Town. 2011. [Online]. Available from: http://cybercapetown.com/Maps/SouthAfrica/ [Accessed 24 October 2011].

De Vos, A.S., Strydom, H., Fouche, C.B. & Delport, C.S.L. 2005. *Research at grass roots, for the social sciences and human service professions*. Pretoria: Van Schaik Publishers.

European Commission. 2001. *State of implementation of the single European emergency call number 112.* Brussel. Belgium.

Free State Department of Health, 2010. *Job description: EMS provincial manager.* Organizational Development. Bloemfontein.

Free State Provincial Disaster Management Centre. 2007. *Provincial Disaster Management Plan*. Draft Copy. Bloemfontein. Free State.

Government of South Africa. 1974. *Health Professions Act*, no. 56 of 1974. Pretoria: Government Printer.

Government of South Africa. 2002. *Disaster Management Act*, no. 57 of 2002. Pretoria: Government Printer.

Government of South Africa. 2005. *Summary of National Disaster Management Framework*. Government Gazette: 27534, 29 April. Pretoria. Government Printer.

Hameed, W., Hussain, M.M., Butt, I.F. & Aslam, M. 2006. Medical education and training for disaster management: An urgent need. *Pakistan Armed Forces Medical Journal*, 4, December.

Hubloue, I. & Debacker, M. 2010. Education and research in disaster medicine and management: inextricably bound up with each other. *European Journal of Emergency Medicine,* 17, p. 129–130.

Jose, C.P.T. & Ortiz, M. 1998. "The Revolutionary Flying Ambulance of Napoleon's Surgeon". *U.S. Army Medical Department Journal, October-December 1998.*

Key, C.B. 2002. Operational Issues in EMS. *Emergency Medicine Clinics of North America*, 20, p.919-927.

Kouwenhoven, W.B., Jude, J.R. & Knickerbocker, G.G.1960. Closed-chest cardiac massage, *JAMA*.173:193-197.

Kuehl, A. E. 2002. *Prehospital Systems and Medical Oversight*. 3rd Edition. National Association of EMS Physicians.

Leedy, P.D. & Omrod, J.E. 2005. *Practical Research, Planning and Design*. Canada: Pearson Education Incorporated.

Lennquist, S. 2005. Education and Training in Disaster Medicine. *Scandanavian Journal of Surgery*, 94, p. 300-310.

MacFarlane, C., Joffe, A.L. & Naidoo, S. 2006. Training of disaster managers at a masters degree level: From emergency care to managerial control. *Emergency Medicine Australasia,* 18, p. 451-456.

MacFarlane, C., Van Loggenberg, C. & Kloeck, W. 2005. International EMS systems: South Africa- past, present and future. *Resuscitation*, 64, p.145-148.

Mack, D. 2005. The Johannesburg EMS experience. *Journal of Emergency Medical Service*, March, p.94-96.

McCall, W. 2002. "The American Ambulance" [Online]. Available from: http://www.*wikipedia.org/wiki/History_of_the_ambulance* [Accessed 09 December 2010].

Murray, V., Clifford, J., Seynaeve, G. & Fisher, J.M. 2006. Disaster Health Education and training: A pilot Questionnaire to understand current status. *Prehospital Disaster Medicine*, volume 21, number 3, p. 156-167.

South Africa.. National Disaster Management Centre. 2011. Implementing the National Disaster Management Framework. *NETaRNRA report.*

Neuman, W.L. 2000. *Social Research Methods. Qualitative and Quantitative approaches.* Boston: Allen & Bacon.

Pelling, M. & Holloway, A. 2006. Legislation for mainstreaming disaster risk reduction. *NETaRNRA report.* National Disaster Management Centre. South Africa.

Pfenninger, E.G., Domres, B.D., Stahl, W., Bauer, A., Houser, C.M. & Himmelseher, S. 2010. Medical Student disaster medicine education: the development of an educational resource. *International Journal of Emergency Medicine*, 3, p. 3-20.

Pilot, D.F. & Beck, C.T. 2004. *Nursing Research, Principles and Methods*.
Philadelphia: Lippincott Williams & Wilkins.

Punch, F. 1998. *Introduction to Social Research. Quantitative and Qualitative Approaches.* London: SAGE Publications Limited.

Skandalakis, P.N., Lainas P., Zoras, O., Skandalakis, J.E. & Mirilas, P. 2006. “To afford the wounded speedy assistance": Dominique Jean Larrey and Napoleon. *World Journal of Surgery*, August; 30(8):1392-9.

Smiley, D.R., Loboda, A., Starling, C. & Rubin, J. 2004. Transformation from planning to operations: Emergency Medical Services in Disaster Response. Annals of Disaster Medicine, Volume 3, No. 1, p.11-26.

Statistics South Africa. 2004. *Free State Provincial Profile.* Report no. 00-91-04. Pretoria. [Online]. Available from: http://www.statssa.gov.za [Accessed 13 December 2010].

Theodore, C., Wagenaar, E. & Babbie, E. 2005. *Study guide for the basics of social research* Canada: Thomson Learning Incorporation.

South Africa. The National Health Information System Project. 2007. *Data management guidelines.* Emergency Medical Service. Department of Health.

The Sphere Project. 2004. *Humanitarian charter and minimum standards in disaster response*. . United Kingdom: Oxfam Publishing.

Thomson, N. 2005. Emergency Medical Service in Zimbabwe. *Resuscitation*, 65, 15-19.

Transport News Network. 2006. [Online]. Available from: http://www.tnn.co.uk [Accessed 13 December 2010].

United Nations Development Program (UNDP). 2007. *Disaster Reduction Unit.* [Online]. Available from: http://www.undp.org.za/the-country-programme [Accessed 9 December 2010].

United States of America. 1996. National Highway Traffic Safety Administrator. EMS Agenda for the Future. Virginia: Government Printer.

United States of America. 2010. National Highway Traffic Safety Administrator. [Online]. Available from: http://www.ems.gov/other/faq.html#3 [Accessed 12 December 2010].

United States of America. 2010. Emergency Medical Services, Town of Colonie. [Online]. Available from: http://www.colonie.org/ems/ [Accessed 13 December 2010].

Uys, H.H.M. & Basson, A.A. 2000. *Research Methodology in Nursing*. Pretoria: Penrose Book Printers.

Wallis, L. & Smith, W. 2011. *Disaster Medicine*. South Africa: Academic Press.

Wang, T. & Chang, H. 2006. Disaster Medicine Training for Paramedics in Taiwan. *Annals of Disaster Medicine*. Volume 4. Number 2.

Welman, C., Kruger, F. & Mitchell, B. 2006. *Research methodology.* Cape Town: Oxford University Press.

ANNEXURE A

DESCRIPTIVE DOCUMENT REGARDING THE STUDY

ANNEXURE B

QUESTIONNAIRE

ANNEXURE C

PERMISSION FROM THE HEAD OF THE FS DEPARTMENT OF HEALTH TO CONDUCT RESEARCH IN THE DEPARTMENT