EDUCATIONAL RECOMMENDATIONS FROM THE KNOWLEDGE, ATTITUDES AND PRACTICE OF FREE STATE PROVINCE PARAMEDICS REGARDING VACCINATION POLICIES

by

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DECLARATION

I hereby declare that the compilation of this dissertation is the result of my own independent investigation. I have endeavoured to use the research sources cited in the text in a responsible way and to give credit to the authors and compilers of the references for the information provided, as necessary. I have also acknowledged those persons who have assisted me in this endeavour. I further declare that this work is submitted for the first time at this university and faculty for the purpose of obtaining a Master's Degree in Health Professions Education and that it has not previously been submitted to any other university or faculty for the purpose of obtaining a degree. I also declare that all information provided by study participants will be treated with the necessary confidentiality.

Mr Z Arends **Date**

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DEDICATION

I would like to dedicate this dissertation to my awesome and loving wife, Anuscha Rozel Arends; my beautiful daughters, Quanika and Natania Arends; and handsome son Raphael Arends. To my parents and every family member and friend, for your love, prayers and support throughout my studies.

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LIST OF ACRONYMS

ACIP	Advisory Committee on Immunization Practices
AEA	Ambulance Emergency Assistant
ALS	Advanced Life Support
ANT	Ambulance Emergency Technician
ARV	Antiretroviral
B.Tech	Bachelor of Technology
BAA	Basic Ambulance Assistant
BBF	Blood and Bodily Fluids
BBP	Bloodborne Pathogen
BBPs	Bloodborne Pathogens
BLS	Basic Life Support
CCA	Critical Care Assistant
CPD	Continuous Professional Development
DoH	Department of Health
ECA	Emergency Care Assistant
ECP	Emergency Care Practitioner
ECCSA	Emergency Care Society of South Africa
ECT	Emergency Care Technician
EMC	Emergency Medical Care
EMCET	Emergency Medical Care Education and Training
EMS	Emergency Medical Services
EMSSA	Emergency Medicine Society of South Africa
EPI	Extended Programme of Immunisation
FSCoEC	Free State College of Emergency Care
FSDoH	Free State Department of Health
HAV	Hepatitis A Virus
HB	Hepatitis B
HBV	Hepatitis B Virus
HCV	Hepatitis C Virus
HCWs	Healthcare Workers
HE	Higher Education
HGT	Haemo-glucose Test
HIV	Human Immunodeficiency Virus
HL	Health Literacy
HOD	Head of the Department
HPCSA	Health Professions Council of South Africa
HPE	Health Professions Education
HSREC	Health Sciences Research Ethics Committee
iCAM	Interactive Communication and Management
ILS	Intermediate Life Support
IPC	Infection Prevention and Control
KAP	Knowledge, Attitude and Practice
MMR	Measles, Mumps and Rubella
N.Dip AET	National Diploma in Ambulance and Emergency Technology
N.Dip EMC	National Diploma Emergency Medical Care
N6	National diploma

NECET	National Emergency Care Education and Training
NGOs	Non-governmental Organisations
NQF	National Qualifications Framework
NSI	Needlestick Injury
NSIs	Needlestick Injuries
OHS	Occupational Health and Safety
PBEC	Professional Board for Emergency Care
PEP	Post-exposure Prophylaxis
PHC	Primary Healthcare
PPE	Personal Protective Equipment
SAAHE	South African Association of Health Educationalists
SADoH	South African Department of Health
SAQA	South African Qualifications Authority
SOPs	Standard Operating Procedures
UFS	University of the Free State
WHO	World Health Organisation
WIL	Work Integrated Learning

GLOSSARY

Emergency care personnel: Personnel who are registered with the Health Professions Council of South Africa (HPCSA) under the auspices of the Professional Board for Emergency Care (NECET 2017:1).

Emergency Care Qualification Framework: A framework for education and training of emergency care personnel in South Africa (NECET 2017:1).

Emergency care: The evaluation, treatment and care of an ill or injured person in a situation in which such emergency evaluation, treatment and care is required, and the continuation of treatment and care during the transportation of such person to or between health establishments (NECET 2017:1).

Emergency Medical Services: An organisation or body that is dedicated, staffed and equipped to operate an ambulance, medical rescue vehicle or medical response vehicle in order to offer emergency care (NECET 2017:1).

Health Professional: Health professionals study, diagnose, treat and prevent human illness, injury and other physical and mental impairments in accordance with the needs of the populations they serve (WHO 2017:online).

Health Professions Council of South Africa (HPCSA): The statutory body established in terms of the Health Professions Act, 1974 (Act no.56 of 1974).

Immunisation: A process by which resistance to an infectious disease is induced or augmented (Sanders 2005:951).

Immunity: The quality of being insusceptible to or unaffected by a particular disease or condition (Sanders 2005:951).

Knowledge, attitudes and practice (KAP): A KAP survey is a representative study of a specific population to collect information on what is known, believed and done in relation to a particular topic (WHO 2008:6).

Paramedic: A person trained to give emergency medical care to people who are seriously ill with the aim of stabilizing them before they are taken to hospital (Lexico dictionary:online). In the South African context, "paramedic" is a protected title that can only be used by persons registered on the ANT register at the Professional Board for Emergency Care. However, in this study, "paramedic" is used as a collective term for all short course and tertiary qualifications on the HPCSA registry.

Vaccination: Any injection of attenuated or killed microorganisms, such as bacteria, viruses, or rickettsia, administered to induce immunity or to reduce the effects of associated infectious diseases (Sanders 2005:1934).

Vaccine: Preparation containing microorganisms for producing immunity to disease (Sanders 2005:1934).

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SUMMARY

Keywords: Occupational health and safety, Healthcare workers, Occupational hazards, Vaccination, Educational recommendations

The Occupational Health and Safety Act, 1993 (Act no. 85 of 1993) promotes the health, safety and protection of employees against occupational hazards. Although managers are expected to implement the above policy, it remains the responsibility of every employee to ensure their health and safety at all times. However, Healthcare workers (HCWs), in particular paramedics, are at increased risk of contracting infectious diseases due to the hands-on nature of their work. A number of life-threatening infectious diseases have been identified and classified as occupational hazards, which puts paramedics at increased risk - some of which are vaccine-preventable. However, a low compliance with vaccination policies have been reported amongst HCWs, including paramedics. Possible reasons for this phenomenon are investigated and recommendations to enhance future compliance are made from reviewing of the results. The need for appropriate vaccination of paramedics has been identified. Research was therefore required to address this problem and so ensure the preparedness of paramedics when managing patients in the pre-hospital environment. This study developed educational recommendations that may enhance compliance of Free State Province paramedics with vaccination policies.

The aim of the study was to explore the knowledge, attitudes and practice (KAP) of Free State Province paramedics regarding vaccination policies, and to develop educational recommendations that may enhance future compliance.

This study was done in the field of Health Professions Education (HPE) and lies in the domain of pre-hospital Emergency Medical Care (EMC). In this study, the researcher explored the KAP of Free State Province paramedics with reference to their compliance with vaccination policies.

The researcher made use of an explorative, non-experimental research design. Questionnaires were used to collect quantitative data which were statistically analysed and presented as percentages and frequencies, and reported on in tables and figures.

Additionally, the literature study conducted in conjunction with the findings of this study provided reasons for paramedics' low compliance with vaccination policies within the Free State Province. The findings of the study became the basis from where educational recommendations to enhance paramedics' compliance with vaccination policies, was derived.

This study contributes to Health Professionals, in particular paramedics, being more informed about the risks associated with exposure to occupational hazards. It is recommended that paramedics be vaccinated in order to be protected against vaccine-preventable infection and diseases.

EDUCATIONAL RECOMMENDATIONS FROM THE KNOWLEDGE, ATTITUDES AND PRACTICE OF FREE STATE PROVINCE PARAMEDICS REGARDING VACCINATION POLICIES

CHAPTER 1

ORIENTATION TO THE STUDY

1.1 INTRODUCTION

In this research project, the researcher carried out an in-depth study with the view to investigate the current knowledge, attitudes and practice (KAP) of vaccination and policies related to it, within the Free State Province. According to Khan and Ross (2013:5), there appears to be low compliance of vaccination coverage among Healthcare workers (HCWs) in general. Paramedics, along with medical doctors and nurses, are classified as HCWs (Papagiannis, Tsimtsiou, Chatzichristodoulou, Adamopoulou, Kallistratos, Pournaras, Arvanitidou and Rachiotis 2016:1). This study was aimed to determine the reasons for this phenomenon and to develop educational recommendations that may enhance future compliance.

The nature of a paramedic's work and regular exposure to occupational hazards are factors that contribute to morbidity and mortality. Therefore, any attempt at preventing paramedics getting infected should be made. Lee, Park, Lee, Kim and Park (2018:250) are of the view that vaccination against vaccine-preventable diseases is the most effective method to prevent HCWs contracting targeted diseases. However, vaccination coverage of HCWs globally, still remains suboptimal despite attempts to improve the uptake thereof. Vaccination offers protection to both paramedic and patient from an infection-control perspective. The importance thereof can therefore not be stressed enough.

Education in this regard is essential to fill possible knowledge gaps about vaccination. In an effort to increase vaccination coverage, a study conducted by Papagiannis *et al.* (2016:5) concluded that educational programmes were targeted not only to improve the attitude of future HCWs regarding vaccination, but also to clarify some of the misconceptions associated with it. The aim of education is thus to sustain individual and

societal improvement (Turkkahraman 2012:38). According to the Center for Global Development (2006:online), education also prepares people in the prevention of disease and how to use health services effectively. Therefore, the research findings of this study will be aimed at enhancing future compliance of Free State Province paramedics with regards to vaccination policies and to educate them about safe practices concerning their health.

1.2 BACKGROUND TO THE RESEARCH PROBLEM

The Occupational Health and Safety Act, 1993 (Act no. 85 of 1993) promotes the health, safety and protection of employees against occupational hazards. As such, preventative measures should be implemented to reduce the risk of infection in the event of occupational exposure. Occupationally acquired infections threaten the overall safety and lives of HCWs. Health risks associated with the Hepatitis B virus (HBV) infection are the most prevalent. According to Harris and Nicolai (2010:86), infection is caused by exposure to contaminated blood and bodily fluids (BBF) that contain infectious pathogens.

HCWs are susceptible to life-threatening infections following occupational exposure to contaminated BBF of patients. According to Harris and Nicolai (2010:86), infectious pathogens such as the human immunodeficiency virus (HIV), HBV, and hepatitis C virus (HCV) contaminate BBF and are therefore considered to be occupational hazards. These are only some of the infections that can be contracted by paramedics.

In light of the often intensified nature and increasing demands of the Emergency Medical Care (EMC) profession, paramedics are prone to mistakes which impact their health and safety. According to Harris and Nicolai (2010:87), the intense, invasive and time-critical nature of life-saving procedures performed by paramedics often affect their compliance with universal precautions. This implies that paramedics sometimes disregard their own safety, which makes them vulnerable to contracting sickness and disease. It is for this reason that the necessary precautions are taken to ensure the safety of HCWs, and paramedics in particular.

HCWs are expected to use preventative measures like universal precautions and vaccination to enhance their personal safety. Universal precautions reduce the risk of occupational exposure to bloodborne pathogens (BBPs) while vaccination protects

against vaccine-preventable infections. There are essentially two crucial aspects to take in account: prevention and protection. Personal protective equipment (PPE) and safe practices (e.g. not recapping needles) reduce the risks thus preventing disease transfer to paramedics. However, emergency medical services (EMS) providers or paramedics are not consistently using universal precautions as a means of preventing disease transfer (Harris & Nicolai 2010:93). Likewise, this statement is supported by Batra, Goswami, Dadhich, Kothani and Bhargava (2015:276) who also reported the practice of universal precautions to be suboptimal among HCWs in developing countries.

Furthermore, paramedics who adopt safe practices and adhere to universal precautions are not exempted from the chance of contracting disease. It is simply not enough to ensure their health and safety. The pre-hospital environment is uncontrolled and sometimes unforgiving. According to Alves and Bissell (2008:219), pre-hospital medical care is provided in the least controlled environment - which further increases the risks associated with delivering pre-hospital EMC. According to Mahomed, Jinabhai, Taylor and Yancey (2007:497), pre-hospital care involves the resuscitation and stabilisation of patients, prevention of further injuries and the transportation of patients to hospital. All of these involve patient contact, which increases the probability of paramedics contracting life-threatening infections or transmitting it to their patients.

In addition, sources of infection are not just limited to physical contact with contaminated BBF of patients, but also include the mode of transport used by paramedics to transport patients between healthcare facilities. Ambulances are a breeding ground for micro-organisms. In a study conducted by Alves and Bissell (2008:223), it was concluded that bacterial pathogens remain present in EMS vehicles despite cleaning in-between calls. Proper disinfection and sterilisation of EMS vehicles are therefore required to reduce the risk of cross-contamination and infection. However, services to ensure the routine decontamination and sterilisation of ambulances are not always utilised in the public sector.

Given the risks of infection associated with occupational exposure to contaminated BBF, one would expect that paramedics adopt practices that ensure their safety at all times. At the outset, it was unclear what transpires in the Free State Province, which is what this study explores. However, a low compliance with regards to vaccination policies and universal precautions have been reported among HCWs (Harris & Nicolai 2010:93; Khan & Ross 2013:5). This raises a major concern, because immunity serves dual purposes.

It protects HCWs against contracting vaccine-preventable infections and prevents cross-infection from HCWs to patients. Furthermore, previous studies have recorded HCWs to have suboptimal levels of protection against HBV (Sondlane, Mawela, Razwiedani, Selabe, Lebelo, Rakgole, Mphahlele, Dochez, De Schryver & Burnett 2016:1), thus increasing the probability of paramedics becoming infected, which further impacts on service delivery due to increased absenteeism from work.

Vaccination against vaccine-preventable infections are therefore extremely important as it offers protective immunity against a particular infectious agent (Mahomed *et al.* 2007:497). It is considered to be an important preventative measure. Those individuals who have immunity have developed protective antibodies to fight against infection. Immunity combats contraction and transmission of occupationally acquired diseases. Vaccines have made a meaningful contribution to the welfare of society. According to Visser and Hoosen (2012:C39) vaccination has the ability to reduce morbidity and mortality within a community. It could have a similar effect on HCWs.

The most infectious pathogen threatening the health of paramedics and HCWs in general is the HBV. Hepatitis B (HB) is a serious liver disease that causes considerable morbidity and mortality (Machiya, Burnett, Fernandus, Francois, De Schryver, van Sprundel & Mphahlele 2015:256). Furthermore, according to Sondlane *et al.* (2016:1), it puts people at increased risk of death from cirrhosis and hepatocellular carcinoma. It is considered as a major global health problem with an estimated 240 million people being chronic carriers. In addition, it is also highly endemic with over 8% of the sub-Saharan Africa's population having the disease (Sondlane *et al.* 2016:1).

While HBV is highly infectious, it is also vaccine-preventable. Consequently, due to its high prevalence, the South African National Department of Health recommends HCWs to be vaccinated against HBV before they come into contact with patients (Sondlane *et al.* 2016:1). According to Burnett, Kramvis, Dochez and Meheus (2012:C48), HBV is considered 100 times more infectious than HIV following a Needlestick injury (NSI). Immunisation strategies for the control and prevention of HBV infection are essential and include vaccinating potentially high-risk groups against HB infection (Burnett *et al.* 2012:C46-C48). HCWs, in particular paramedics seem to be desensitised to these risks, as evidenced in their low compliance with universal precautions and vaccination policies.

Though a vast number of vaccines are available today, it is still unclear as to which vaccines would best ensure the preparedness of paramedics. Those not yet immune require vaccination against vaccine-preventable infections for protection. According to Khan and Ross (2013:1), HBV is the most easily transmitted bloodborne pathogen (BBP) to HCWs and vaccination against it is of outmost importance. In countries like Europe, it is official policy that all newly enrolled at-risk HCWs be informed and vaccinated against the HBV (Burnett *et al.* 2012:C48). This is certainly not the case for newly enrolled at-risk HCWs in South Africa. Also, although HBV is the most prevalent of all, it is not the only vaccination required for HCWs to have.

The World Health Organisation (WHO) recommends a minimum of HBV vaccination for HCWs (Nkoko, Spiegel, Rau, Parent & Yassi 2014:382). However, differences of opinions exist, as Souter (2013:1) recommends that the number of vaccinations required for HCWs should include vaccinations against HB, influenza (seasonal), pertussis, MMR (measles, mumps and rubella), and varicella. Also, specially selected groups of HCWs that work in high-risk facilities, such as laboratories and quarantine (outbreaks), might be required to take additional vaccination as indicated by a particular setting.

1.3 PROBLEM STATEMENT

Pre-hospital EMC plays a pivotal role in the health system. The nature of the work of paramedics puts this cohort at increased risk of contracting and transmitting infections (Galanakis, Jansen, Lopalco & Giesecke 2013:1). According to Batra *et al.* (2015:276) paramedics have a greater risk of HBV/HCV transmission, yet they receive HBV vaccination less often than doctors. Therefore, paramedics are expected to adhere to policies, standard operating procedures (SOPs) and universal precautions, which have been established to reduce these risks and protect the individuals in the event of occupational exposure to infectious pathogens. However, paramedics' compliance with these safety measures are inconsistent (Harris & Nicolai 2010:93).

Vaccination is an alternative method implemented to protect HCWs against vaccine-preventable infections. It offers immunity that serves as additional protection for paramedics. According to Nkoko *et al.* (2014:382), the WHO's recommendations to ensure HCW safety includes universal precautions, HB immunisation, PPE, and post-exposure management. Despite these recommendations of WHO, vaccine uptake rates of HCWs in general appears to remain low (Galanakis *et al.* 2013:1).

Furthermore, the lack of EMS-specific national and provincial policies on communicable diseases and infection control in South Africa seems to aggravate matters (Mahomed *et al.* 2007:497). These policies are important for translation into SOPs, which can provide clear operational direction, and ensure the safety and preparedness of paramedics against the transmission of occupationally acquired hazards. Despite the various types of vaccinations available, paramedics seems to be reluctant to protect themselves in this regard and when they do, it is limited to HB vaccination only (Galanakis *et al.* 2013:1).

Finally, the importance of Primary Healthcare (PHC) as part of the undergraduate curriculum for EMC is not stressed enough. This raises another concern, since the majority of patients that paramedics come into contact with in the pre-hospital environment require some form of PHC intervention, yet it remains the primary responsibility of nursing staff and doctors to deliver such care. Infection control forms a critical part of the curriculum of PHC, where matters such as the importance of personal hygiene, protection and prevention of disease transmission are emphasised. It can therefore be argued that the reluctance of paramedics towards vaccine uptake can be attributed to the possible knowledge gaps that may exist about the importance and benefits of vaccination.

In South Africa, a vast number of these occupational hazards threaten the lives of paramedics, of which some are vaccine preventable. This implies that HCWs are obliged to protect themselves and others through vaccination. The need for appropriate vaccination of paramedics has therefore been identified.

1.4 OVERALL GOAL OF THE STUDY

The overall goal of the study was to determine the KAP of paramedics regarding vaccination and policies related to it. Also, to re-emphasize the risks associated with exposure to contaminated BBF of patients, with the intent to encourage paramedics' compliance with vaccination policies. Results from this study can be used as recommendation for vaccine education, which may be useful for future research and the design of a learning programme.

1.5 AIM OF THE STUDY

The aim of the study was to explore the KAP of Free State Province paramedics regarding vaccination policies, and to develop educational recommendations to enhance vaccination compliance.

1.6 RESEARCH QUESTIONS

In order to address the problem stated, the following research questions were addressed:

a) What is the knowledge, attitudes and practices (KAP) of paramedics regarding vaccination policies in the Free State Province?
b) What educational information would paramedics want to have about vaccination and how would they want it delivered?

1.7 OBJECTIVES OF THE STUDY

From the research questions the following objectives were identified:

a) To contextualise and conceptualise the topic by conducting a literature study and describing the context in which Free State Province paramedics work.
b) To determine the KAP of paramedics regarding vaccination policies - a questionnaire was used consisting of several sections to address each area of the stated research question (RQ1).
c) To develop educational recommendations - data was drawn from the literature study and findings of the KAP study (RQ2).

1.8 RESEARCH DESIGN OF THE STUDY AND METHODS OF INVESTIGATION

1.8.1 Design of the study

In this study, the researcher made use of an explorative, descriptive, non-experimental research design which, according to De Vos, Strydom, Fouche' and Delport (2011:144), is used in descriptive studies in which the units that have been selected to take part in the research are measured on all the relevant variables at a specific time without any manipulation. Survey research, which is the most widely used non-experimental design

in social science research, was used. According to Creswell (2014:41-42), it provides a quantitative or numeric description of trends, attitudes or opinions of a population by studying a sample of that population. This statement is further supported by Maree (2016:174), who defines survey research as the assessment of the current status, opinions, beliefs and attitudes of a known population.

Moreover, the researcher used a cross-sectional design which, according to De Vos *et al.* (2011:156), can be used to determine whether a particular problem exists within a particular group of participants, as well as the severity of the problem that exists.

1.8.2 Methods of investigation

The methods used in this research begin with an in-depth literature study to conceptualise and contextualise the research problem and so gain a deeper understanding about the possible lack of compliance of Free State Province paramedics with vaccination policies. It places the researcher's efforts in perspective by including the topic in a larger knowledge pool, creating a foundation based on existing, related knowledge (De Vos *et al.* 2011:134-135). Literature was also used for the development of the KAP questionnaire, which was the research tool in this study.

The questionnaire was distributed by means of convenience sampling across the five districts of the Free State Province. Questionnaires were hand delivered to selected stations from where the official placed in charge distributed it from respondents during their shift exchange, where respondents was reporting on or off duty at the particular time. Questionnaires are the most frequently used data collection method when conducting survey research (De Vos *et al.* 2011:156). It is a crucial instrument used to obtain facts and opinions about a particular phenomenon, which can be used to address a stated research problem. In other words, questionnaires are specifically designed to collect data that are relevant to the research problem. A detailed discussion of the research methodology is presented in Chapter 3.

A schematic overview of the study is given in Figure 1.1.

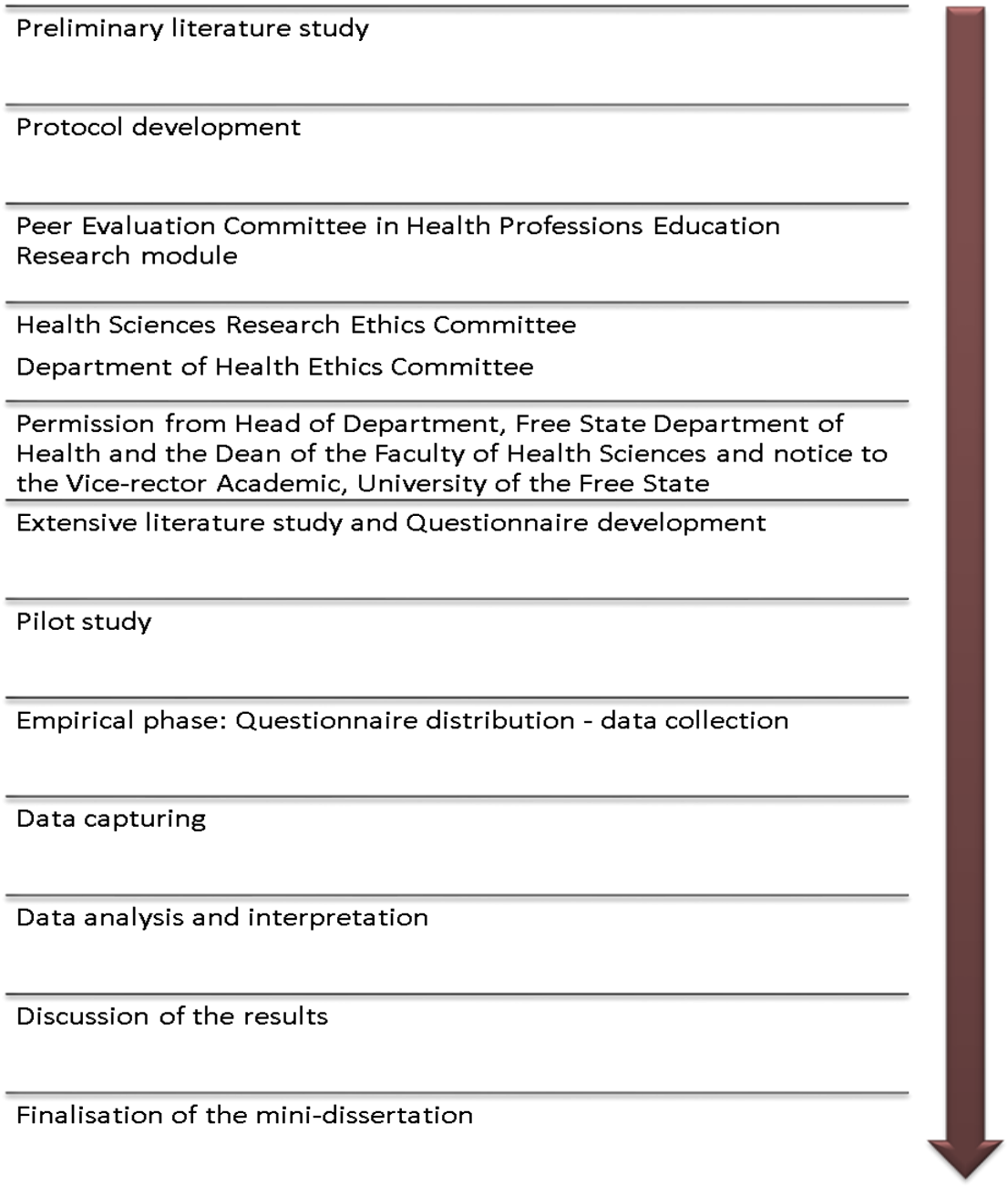

Figure 1.1: A schematic presentation of this study

1.9 DEMARCATION OF THE FIELD AND THE SCOPE OF THE STUDY

This study was done in the field of Health Professions Education (HPE) and lies in the domain of pre-hospital EMC. In this study, the researcher explored the KAP of Free State Province paramedics with reference to their compliance with vaccination policies.

1.10 SIGNIFICANCE, VALUE AND CONTRIBUTION OF THE STUDY

1.10.1 Significance

The significance of this study is that the reasons why paramedics do not follow policy regarding vaccination are identified, and based on that, valuable recommendations for vaccine education is made. These recommendations can contribute to the development of an applicable and needs-based education programme for HCWs regarding vaccination policies and processes. Therefore, the study may contribute to HCWs in general to become more informed about the risks associated with exposure to occupational hazards. Furthermore, the results from the KAP study aims to add to the existing body of knowledge of paramedics regarding vaccination. In addition, this information may be useful to direct future studies and contribute to the development of possible future training programmes.

1.10.2 Value

The researcher attempts to break the barriers associated with vaccination and explore alternative options that might contribute to better compliance and vaccination coverage. Also, information recovered from the findings of this study will be disseminated by means of training programmes, may educate paramedics on the aspects of cross-infection and so protect patients from potential harm. Educational recommendations should therefore place emphasis on the risks associated with vaccine-preventable infections, and how best paramedics can combat infection and transmission of disease through vaccination. Data gathered in this study will form the basis for these recommendations, which may inform the development of training programmes in the future.

1.11 IMPLEMENTATION OF THE FINDINGS

The report containing the findings of the research will be brought to the attention of the Health Professions Council of South Africa (HPCSA), in particular the Professional Board for Emergency Care (PBEC) as the custodians and policy-makers of paramedics in South Africa. In addition, educators at educational institutions such as universities and colleges training future HCWs will also be informed accordingly.

The research findings will be submitted to academic journals for publication, as the researcher envisions to contribute to the current body of knowledge. Additionally, to establish a larger educational footprint, the research findings may also be presented at international and local conferences, such as Emergency Medicine Society of South Africa (EMSSA) and Emergency Care Society of South Africa (ECCSA), or educational platforms such as the South African Association of Health Educationalists (SAAHE).

1.12 ARRANGEMENT OF THE REPORT

This section of the study provides a brief summary and an outline of the study.

In Chapter 1, **Orientation to the study**, a brief introduction to and background of the study are provided, and the research problem as well as the research question are stated. The overall goal, aim and objectives are given and the research design and methods employed are briefly discussed to give the reader an overview of what is contained in the report. It further demarcates the field of the study and the envisaged significance and value of the outcome for Health Professions Education.

Chapter 2, **Conceptualising and Contextualising the use of vaccination policies by paramedics in the Free State Province** examines HCWs' compliance with vaccination policies from an international and national and local perspective.

In Chapter 3, **Research design and methodology**, the research design and the methods applied are described in detail. The data collection methods and data analysis are discussed.

Chapter 4, **Data analysis and discussion of the findings**, presents the results and findings of the questionnaire as the data collecting method employed in the study.

In Chapter 5, **Discussion of results: Educational recommendations to enhance compliance of Free State Province paramedics with vaccination policies**, the results of the survey and educational recommendations will be discussed as final outcome of the study.

Chapter 6, **Conclusion, recommendations and limitations of the study**, consists of an overview of the study, the conclusion reached, while the recommendations and the implications of the study are brought to the attention of the reader.

1.13 CONCLUSION

This chapter summarises the conclusion of the study. As a next step, Chapter 2, entitled **Conceptualising and contextualising of the use of vaccination policies by paramedics in the Free State Province**, will report on the study of relevant literature.

CHAPTER 2

CONCEPTUALISING AND CONTEXTUALISING THE USE OF VACCINATION POLICIES BY PARAMEDICS IN THE FREE STATE PROVINCE

2.1 INTRODUCTION

The term "Healthcare Worker" bears reference to all personnel who have contact in one or other way with patients, irrespective of their level of training in medicine (Ozisik, Tanriover, Altinel & Unal 2017:1198). This group includes a number of professionals such as doctors, nurses, physiotherapists, dietitians, chaplains, cleaning, catering and laboratory personnel, as well as paramedics (Ozisik *et al.* 2017:1198; Papagiannis *et al.* 2016:1).

Vaccination of HCWs against vaccine-preventable diseases has proven to be highly effective and beneficial. According to Field (2009:615), it is a minor medical procedure that has the ability to reduce and eliminate the risks of contracting a targeted disease. Similarly, it also reduces the risk of infecting those who comes into contact with the person that has been vaccinated. It is therefore an effective intervention preventing cross-infection between HCWs and patients. According to the WHO (2018:1), immunisation currently prevents between 2 and 3 million deaths per year. Additionally, it is regarded as one of the most successful and cost-effective interventions of public health today. Still, despite its obvious successes, vaccination uptake among HCWs remains suboptimal (Ozisik *et al.* 2017:1198).

The question thus remains whether or not HCWs' knowledge regarding vaccination are sufficient. If so, how well is it displayed in their attitudes towards vaccination in their daily practices? According to Ozisik *et al.* (2017:1203), it is one's level of health literacy (HL) about vaccination that improves vaccine uptake, not one's level of education. HL is defined "as the individual's ability to acquire, interpret, and understand basic medical information and services, with a view to protecting and improving, and regaining the health of the individual" (Ozisik *et al.* 2017:1202). This means that high levels of HL are required among HCWs to ensure their compliance with vaccination policies. In addition,

it places emphasis on the importance of being informed about health related issues as HCWs.

Paramedics are in the frontline and thus at increased risk of contracting vaccine-preventable and other communicable diseases. This is with reference to the nature of their work which exposes them to these health risks. In an attempt to combat and reduce some of these risks associated with occupational exposure to vaccine-preventable diseases, a number of interventions - including HCWs targeted vaccination strategies to control disease outbreaks - have been implemented. These outbreaks place a heavy burden on health systems due to costs associated with HCWs absenteeism, prolonged hospitalisation (HCWs and patients), antibiotics and an increased number of medical and surgical interventions required per patient that could otherwise have been prevented (Obike 2017:8-9; Ozisik *et al.* 2017:1200; The National Infection Prevention and Control Policy and Strategy 2007:6).

Numerous authors question the effectiveness of interventions to increase vaccine uptake amongst HCWs, which is evident in the poor vaccination rates reported amongst HCWs (Lee *et al.* 2018:250) - despite consistent pleas for HCWs to be vaccinated. In this chapter, the researcher performs an in-depth literature overview to determine possible reasons to this phenomenon.

2.2 BACKGROUND OF THE EMERGENCY MEDICAL CARE PROFESSION IN SOUTH AFRICA

EMS play a crucial role in the healthcare system. Paramedics operate in the pre-hospital setting under the auspices of EMS. They are regarded as the first medical responders that fill the gap between the "incident" and the hospital. Paramedics therefore need to keep patients alive until they get to a hospital where they can receive definitive care. Their qualifications range from basic to the most advanced level, which are closely linked to their respective capabilities and scopes of practice (Dalbock 1996:120-121). Advanced Life Support (ALS) paramedics are highly skilled and knowledgeable about EMC. They are trained to deliver EMC in the most unforgiving of circumstances. This can be attributed to the maturation of emergency medical care education and training (EMCET) over the years.

Nonetheless, EMCET was not always this established. In fact, prior to 1980, no professional qualification or registration with a professional board existed in the pre-hospital setting. According to Vincent-Lambert, Bezuidenhout and Jansen van Vuuren (2014:6) emergency care training then was fragmented and differed among provinces. This led to the introduction of a number of standardised short courses which were accredited by the HPCSA in 1985. These short courses consisted of a three-week Basic Life Support (BLS) course as the entry level, an eight-week Intermediate Life Support (ILS) course as the mid-level worker, and a four-month Critical Care Assistant (CCA) course as ALS (Dalbock 1996:120-121). The CCA qualification is registered under the category, "Paramedic". The course was later extended to nine months due to the incorporation of five months of roadwork or work integrated learning (WIL) as we know it today. The primary focus of these short courses was on clinical skills training, and their scope of practice was based on rigidly defined medical directives and clinical protocols (Vincent-Lambert *et al.* 2014:6). Subsequently, these short course qualifications promoted robotic behaviour among the officials who obtained it as they followed these clinical protocols to the point. Thus, leaving clinical decision making and governance to medical doctors for the most part.

Furthermore, a shortage of qualified emergency medical doctors led to inadequate clinical governance nationally. The need for formal higher education (HE) qualifications that would permit independent clinical decision making and practice among paramedics was identified. According to Vincent-Lambert *et al.* (2014:6), the first of this kind was a three-year National Diploma in Ambulance and Emergency Technology (National diploma {N.Dip} AET), introduced in 1987, which was also registered under the category "Paramedic" on the HPCSA professional register. This was shadowed by a Bachelor of Technology (B.Tech) Degree in EMC in 2003, which could be obtained by completing an additional, two-year, part-time post N.Dip EAT.

The emergence of HE qualifications in the pre-hospital setting posed a number of challenges. Articulation between short courses and HE qualifications became merely impossible. Short courses not being aligned to the National Qualifications Framework (NQF), as well as the fact that they were non-compliant with the requirements of South African Qualifications Authority (SAQA) regarding the registration of qualifications on NQF, were only some of the major contributing factors (Vincent-Lambert *et al.* 2014:6). More recently, a newly proposed three-tiered structure, as illustrated in Table 2.1 below,

was adopted by the Emergency Care Qualification Framework that embodies the future of emergency care training in SA (NECET 2017:7).

Table 2.1: Emergency Care Qualification Framework of paramedics in South Africa

EMERGENCY CARE QUALIFICATION FRAMEWORK			
Tier	**Name of qualification**	**NQF level and credits**	**HPCSA register**
1. Entry level qualification	Higher Certificate in EMC	NQF 5 120 credits	Emergency Care Assistant
2. Mid-level qualification	Diploma in EMC	NQF 6 240 credits	Emergency Care Technician
3. Professional qualification	Professional Bachelor Degree in EMC	NQF 8 480 credits	Emergency Care Practitioner (ECP)

The two newly accredited qualifications are the Emergency Care Assistant (ECA) qualification (which will replace the BLS qualification) and the Emergency Care Technician (ECT) qualification {which will replace the ILS qualification as the mid-level worker} (Vincent-Lambert *et al.* 2014:6). The alignment of pre-hospital EMC qualifications to NQF and SAQA, is essential to professionalise the EMC profession, which previously appeared to not be considered as such due to the lack of HE status.

The researcher is fully aware that those officials holding the Ambulance Emergency Technician (ANT) registration (CCA and N.Dip EMC) are registered under the category "Paramedic". However, in the context of this study, the term paramedic will refer to all pre-hospital Emergency Care providers within the Free State Province holding any of the short course and HE qualifications. The target population for this study therefore included all paramedics within the public sector of the Free State Province that are currently practicing and have active registration with the HPCSA.

2.3 LEGISLATIVE FRAMEWORK ON VACCINATION

Legislation is an important instrument used by government as a means of organising society and protecting citizens. Furthermore, it determines the rights and responsibilities of those to whom it is applicable (De Jager 2000:3). According to the WHO (2019:online), "a society's laws are the most solemn and formal articulation of its values; they recognize, reinforce and give permanence to a society's norms". Legislation therefore forms the root from where rules and regulations, policies and procedures are derived for

implementation. These are further translated into guidelines and SOPs for effective implementation at operational level.

Entrenched within the South African Constitution, Act 108 of 1996 (24)(a), everyone has the right to an environment that is not harmful to their health or well-being *(South African Constitution Act 108 of 1996:1251-1252)*. This right is not subjective, but all-inclusive and speaks to the diversity of people living in South Africa regardless of their ethnicity, gender, profession, etc. In the context of pre-hospital EMS, it implies that this constitutional right applies to both patients and paramedics and should be upheld by any means possible. Major role players of pre-hospital EMS include the Department of Health (DoH), national and provincial level, and the HPCSA, in particular PBEC. They collectively uphold the roles as healthcare policymakers, auditors and researchers. Simply put, these role players are there to safeguard patients and guide professionals.

In terms of legislation pertaining to vaccination, the following Acts and policies bear reference. The National Health Act 61 of 2003 provides a "framework for a structured uniform health system within the Republic of South Africa, taking into account the obligations imposed by the Constitution and other laws on the national, provincial and local governments with regard to health services; and to provide for matters connected therewith". According to section 25 (2)(w) of Chapter 4, provincial health services and departments are responsible for the provision of services for the management, prevention and control of communicable and non-communicable diseases (*National Health Act 61 of 2003:13*).

Consequently, with the continuous recurrence of infectious diseases and the threat it pose to the health system, the constant need to redesign and strengthen existing systems arise. Therefore, in attempt to improve the safety of health services for all stakeholders, a national directive called The National Infection Prevention and Control Policy and Strategy was implemented to improve the management of health care associated infections at all levels of government. According to this policy, "infection prevention and control refers to measures, practices, protocols and procedures aimed at preventing and controlling infections and transmission of infections in health care settings". In terms of promoting employee health, this document makes provision for the development of national policies and/or guidelines on the management of occupational infections through employee vaccination programmes (National Infection Prevention and Control Policy and Strategy 2007:15).

Furthermore, the Occupational Health and Safety Act 85 of 1993 makes mention of the "health and safety of persons at work and for the health and safety of persons in connection with the use of plant and machinery; the protection of persons other than persons at work against hazards to health and safety arising out of or in connection with activities of persons at work" (*Occupational Health and Safety Act 85 of 1993:1*). Thus, it is mandated to ensure the personal and collective health and safety of all workers in general. BBPs are considered to be an occupational hazard for HCWs in direct contact with BBF of patients. Therefore, in accordance with the National Health Act, section 12(1)(b) of the Occupational Health and Safety Act 85 of 1993, employers of employees exposed to occupational hazards in their line of duty should ensure as far as reasonably practicable that exposure to such hazards are limited or better yet, prevented *(Occupational Health and Safety Act 85 of 1993:3)*. As much as this is an important duty of the employer, health and safety in the workplace is everyone's responsibility.

At provincial level, the Provincial Infection Prevention and Control {IPC} policy (Polelo 2017:3) was implemented with the purpose of guiding facilities in ensuring that their focus is fixed on prevention of infection and the clinical governance of processes related to infection surveillance within the Free State. However, IPC only focuses on cleaning, complex sterilization and decontamination procedures, and not on how HCWs can be empowered in terms of vaccination, thus lacking major insight in terms of vaccination-specific policies and procedures associated therewith. These policies are important for translation into SOPs, which can provide clear operational direction, and so ensure the safety and preparedness of paramedics against these occupationally acquired hazards.

Therefore vaccination-specific policies for HCWs would provide a more hands-on approach to the process of vaccination. Currently, it appears that no such policies exist, at national nor provincial level. According to Burnett *et al.* (2012:C45), the South African Department of Health (SADoH) recommends that HCWs be vaccinated against HB, but this is not mandatory and there seems to be no national policy regarding this. As a result, HB vaccination uptake in HCWs is sub-optimal. In addition, it appears that no provincial guidelines on prophylactic immunisations for HCWs exist. Likewise, the lack of EMS-specific national and provincial policies on communicable diseases and infection control in South Africa is further associated with poor compliance (Mahomed *et al.* 2007:497). Vaccination policies for HCWs will provide more guidance and insight regarding vaccination, which ultimately may improve vaccine uptake of paramedics in the Free

State Province. It can therefore be argued that the lack of EMS-specific vaccination policies have de-emphasised the importance of vaccination among paramedics.

2.4 HEALTHCARE WORKERS' PERSPECTIVE ON THE IMPORTANCE OF VACCINATION POLICIES

Policies on vaccination continue to play a critical role in protecting the public's interest pertaining to health and disease prevention (Barazza, Schmit & Hoss 2018:1). More especially, vaccination policies that recommend the vaccination of HCWs, as their lack of compliance to these policies can produce healthcare-associated outbreaks which can be fatal to immunosuppressed patients (Lee *et al.* 2018:250). The purpose of vaccination policies are therefore to increase vaccination rates and reduce disease outbreaks (Barazza *et al.* 2018:1). It is a means of preventing the devastating consequences associated with disease outbreaks i.e. morbidity, mortality, increased health care costs and possible litigation (National Infection Prevention and Control and Strategy 2007:6). Also, previous studies have revealed a higher mortality rate associated with patients hospitalised in hospitals that had a smaller percentage of vaccinated employees (Field 2009:616).

Vaccination is thus regarded as the most effective medical advance in the prevention of illness and death (Field 2009:615). This statement is supported by Lee *et al.* (2018:250) who labels vaccination as the most effective method of preventing infectious diseases among HCWs. It is highly recommended for HCWs as this group is more susceptible to contracting and spreading contagious diseases (Field 2009:615). Nonetheless, there has always been resistance to vaccination. Many HCWs share this resistance and end up transmitting these diseases, in particular influenza, to very vulnerable patients (Parmet 2018:763).

Various recommendations have been made in the hope of increasing HCWs' compliance with vaccination policies. According to Lee *et al.* (2018:251), vaccination recommendation programmes should focus on enhancing immunity and the management of infectious diseases amongst HCWs. Additionally, a number of recommendations and strategies introduced to improve HCWs vaccine uptake are discussed below (cf. 2.4.2.).

2.4.1 The importance of vaccination for Healthcare Workers

Vaccination provides protective immunity against a targeted infectious agent such as HBV (Mahomed *et al.* 2007:497). It prevents cross-infection between HCWs and colleagues, HCWs and patients, and HCWs and those they come into contact with, such as their families and friends. This is likely to occur in general, but more especially during epidemics. According to Ozisik *et al.* (2017:1200) the chances of HCWs contracting influenza during high-season of the disease is estimated at 25%. In this instance, HCWs can become a source of infection to patients. Therefore, in order to reduce the risk of infection significantly, the most suitable solution would be to have all HCWs vaccinated against vaccine-preventable infections.

HCWs directly responsible for the general health and well-being of patients are obliged to advise them accordingly; thus, assuming their role as mentors that advocate lifelong vaccination to their patients. As role models and mentors, HCWs play a vital role in the lives of their patients, and so encourage a certain change in behaviour in them (Ozisik *et al.* 2017:1200). HCWs are also expected to lead by example. Although paramedics do not hold the primary responsibility for promoting lifelong vaccination to their patients, they are obligated to share important information that promote health.

Vaccination also has a direct and indirect impact on cost implications related to medical expenses generated through vaccine-preventable infection. Direct implication includes costs associated with examinations, consultations, inpatient admission and treatments, whereas indirect implication refers to costs estimated by the loss of work productivity and absenteeism (Ozisik *et al.* 2017:1200).

2.4.2 Strategies and recommendations to improve Healthcare Workers' compliance with vaccination policies

A number of strategies have been introduced in an attempt to improve vaccination rates among HCWs. According to Ozisik *et al.* (2017:1198), these strategies include among others regular updating of guidelines, developing recommendations for a specific country or institution, monitoring vaccination rates, and improving vaccine accessibility.

Another strategy is stigmatizing. This is quite an extensive approach that seems to be effective in the United Kingdom. During this process, HCWs who refuse to take

recommended vaccines are required to wear a mask while working. This practice is intended to increase discomfort and humiliation in those non-compliant with vaccination policies - to the point where they eventually cave in and vaccinate (Stead, Critchlow, Eadie, Sullivan, Gravenhorst & Dobbie 2019:70).

Education related to adult vaccination is regarded as another strategy to improve vaccination rates among HCWs (Ozisik *et al.* 2017:1202). This is aimed at increasing vaccination coverage rates by means of enhancing HCWs' level of knowledge and medical literacy. Additionally, attempts such as making vaccines free and more easily accessible can motivate and encourage vaccine uptake among HCWs. Another is improving the health literacy {HL} of HCWs (Ozisik *et al.* 2017:1202). A more aggressive approach to improving vaccine uptake among HCWs is the implementation of mandatory policies. According to Ozisik *et al.* (2017:1199), although mandatory policies raise ethical concerns, it is the only suitable alternative to protect the public's health when voluntary policy programmes have failed.

Table 2.2 below summarises the list of vaccinations as recommended for HCWs by the Advisory Committee on Immunization Practices (ACIP), WHO, Australia and Turkey respectively. These are only some of the organisations or countries that regularly publish updated guidelines and standards regarding vaccination. According to Ozisik *et al.* (2017:1199), vaccination guidelines and national practices regarding mandatory versus recommended vaccines, vary among the different countries.

Table 2.2: Vaccination recommendations for Healthcare Workers, in the light of current guidelines

	ACIP (2011)	**WHO (2015)**	**Australia (2015)**	**Turkey**
Influenza	All	All	All	All
Hepatitis B	Those who work with blood or body fluids, post-contact	Those who work with blood or body fluids	All	All
MMR	If not immune	All (except mumps)	If not immune	If not immune
Pertussis (Tdap)	All	No recommendation	All	All
Diphtheria	No exclusive recommendation	All	No exclusive recommendation	No exclusive recommendation
Tetanus	No exclusive recommendation	No recommendation	No exclusive recommendation	No exclusive recommendation
Pertussis	No exclusive recommendation	Under review	No exclusive recommendation	No exclusive recommendation

Table 2.2: Vaccination recommendations for Healthcare Workers, in the light of current guidelines (follows)

Varicella	If not immune	If not immune	If not immune	If not immune
Hepatitis A	No recommendation	No recommendation	Personnel working with risk groups	No recommendation
BCG (Bacillus Calmette Guerin)	No recommendation	No recommendation	Those under the risk of exposure to multidrug resistant tuberculosis (TB)	No recommendation
Rabies	No recommendation	No recommendation	Laboratory personnel	No recommendation
Q Fever	No recommendation	No recommendation	Laboratory personnel	No recommendation
Anthrax	No recommendation	No recommendation	Laboratory personnel	No recommendation
Small pox	No recommendation	No recommendation	Laboratory personnel	No recommendation
Poliomyelitis (IPA)	Laboratory personnel	All should receive primary vaccination	Laboratory personnel	Laboratory personnel
Typhoid fever	Laboratory personnel	No recommendation	Laboratory personnel	Laboratory personnel
Yellow fever	No recommendation	No recommendation	Laboratory personnel	No recommendation
Quadruple Meningococcal conjugate	Laboratory personnel	No recommendation	Laboratory personnel	Laboratory personnel
Japanese encephalitis	No recommendation	No recommendation	Laboratory personnel	No recommendation

As adopted by Ozisik et al. (2017:1199).

Seasonal influenza and HB vaccination are generally recommended for HCWs (Ozisik *et al.* 2017:1199). According to Parmet (2018:763) the influenza vaccine continues to be inadequate and highly contentious due to them targeting constantly changing surface antigens which have to be reformulated each year on the basis of a predicted viral strain.

Likewise, unvaccinated and incompletely (those who did not complete the vaccination series and/or have anti HB antibodies concentration of less than 10mIU/ml following a full course) vaccinated HCWs at risk of exposure to blood and/or bodily fluids, are recommended and encouraged to receive HB vaccination. According to Bansal and Nimbalkar (2015:15), a serological test confirming the presence and persistence of anti

HB antibodies and protective concentration of greater and equal to 10mIU/ml following a full course (3 doses) of vaccination series, constitutes an individual's immunity to the HBV.

According to Ozisik et al. (2017:1199), the WHO recommends that HCWs should be vaccinated based on the risk of occupational exposure to vaccine-preventable infections. This implies that preparedness of HCWs from an immunisation perspective are determined by the vaccine-preventable disease/s they are exposed to in the workplace. This, highlights the need to perform risk assessments in EMS to identify the vaccine-preventable diseases paramedics are exposed to in their line of duty and to counter these risks through vaccination.

The need for periodic checking of antibody titers and repeated booster doses in healthy immunocompetent individuals or HCWs has been de-emphasised. This is based on the concept of immune memory, which implies lifelong protection to an individual who responded to a primary vaccination series of a targeted disease (Bansal & Nimbalkar 2015:14-15). However, with the current HIV pandemic in South Africa, affecting both HCWs and patients, one can argue that the issue surrounding immunocompetent HCWs are debatable and thus necessitates periodic checking of titers among HCWs. This is in light of the fact that HIV-positive individuals tend to lose their anti HB antibodies more quickly than HIV-negative individuals, and as such do not stand a good and sustained immune response to natural HBV exposure, or the HB vaccine (Machiya *et al.* 2015:260; Sondlane *et al.* 2016:1).

However, despite these recommendations and strategies implemented to improve vaccine uptake among HCWs, vaccination rates still remain far below targets (Ozisik *et al.* 2017:1198), because recommendations do not compel anyone to adhere to what is recommended. It simply informs HCWs and raises the expectation, hoping that they will choose to be vaccinated (Field 2009:615). This means that a more aggressive approach to ensuring vaccine uptake is required since voluntary vaccine uptake among HCWs have proven to be unsuccessful (Ozisik *et al.* 2017:1199). Consequently, the implementation of mandatory policies should be considered everywhere.

2.4.2.1 Healthcare Workers' perspective on mandatory vaccination policies

In an attempt to enhance compliance with vaccination policies, mandatory approaches may be required to achieve higher vaccination rates among HCWs. According to Stead *et al*. (2019:69) mandatory influenza policies have the ability to improve vaccine uptake among HCWs where a more permissive approach to vaccination have failed in the past. Similarly, in accordance with Lee *et al.* (2018:254), mandatory vaccination policies are considered to be the most effective in terms of increasing vaccination rates among HCWs. Additionally, according to Stead *et al.* (2019:70), mandatory approaches to vaccination are becoming a popular trend in the world.

However, much resistance to the implementation of mandatory policies are becoming increasingly apparent. This, regardless of its successes in improving vaccination rates among HCWs. Despite the fact that mandatory vaccination policies are considered to be the most effective approach in improving vaccination rates among HCWs, it is associated with ethical and legal matters (Lee *et al.* 2018:254). Mandatory vaccination is considered to be ethically questionable as it violates a person's autonomy (Blockman 2016:online). Nevertheless, it can be justified in the event where the HCW's autonomy is in conflict with what is in the best interest of their patients.

Newly graduated Healthcare professionals and students in training at the beginning of their careers accept an overriding ethical imperative embodied in the Hippocratic Oath (Field 2009:618). Herewith they pledge to put their patient's needs first and most importantly, to do no harm. Furthermore, as mandated by this oath, the prevention of harm is also widely considered to be acceptable grounds for constraining an individual's autonomy (Ozisik *et al.* 2017:1199), thus implying that the prevention of harm to others outweighs an individual's constitutional right and preservation of autonomy. In light of this, mandatory policies on vaccination have led to litigation due to HCWs challenging the implementation of these policies (Barazza *et al.* 2018:3).

It can be argued that the rights of HCWs need to be honoured and respected in the same way patients' rights do. However, this right should be reviewed in the event when their non-compliance with vaccination policies result in harm - or worse - death of their patients (Ozisik *et al.* 2017:1199). A similar view is shared by Field (2009:616) which

states that the autonomy of HCWs to make decisions regarding their own health, should carry less weight than the well-being of people depending on them for care.

2.5 BARRIERS ASSOCIATED WITH THE IMPLEMENTATION OF VACCINATION POLICIES

A number of reasons for HCWs not being vaccinated have been identified. These according to Ayalew and Horsa (2017:2) include amongst others the unavailability and costs associated with some vaccines, as well as HCWs being too busy to complete a full course vaccination series. Likewise, religious and secular beliefs have been identified as additional reasons for HCWs refusing to get vaccinated (Parmet 2018:763). Other reasons have also been identified as inertia and the fear of vaccine (Papagiannis *et al*. 2016:6). A similar finding by Sheikh, Haque, Ismail, Hussein and Simbak (2017:368) confirmed the fear of injection and vaccine safety as barriers of vaccine uptake.

Additionally, the lack of knowledge, financial concern including insurance coverage, high costs, inadequate reimbursement, query regarding vaccine effectiveness, and potential of infection associated with vaccination, are all reasons identified for the poor vaccination rates among HCWs (Sheikh *et al.* 2017:368). Last but not least, some HCWs validate their decision not to vaccinate by the possibility that vaccination induces a false sense of security to those that do comply (Chawla, Chawla & Chaudhary 2016:748).

2.6 A GLOBAL PERSPECTIVE ON THE KNOWLEDGE, ATTITUDES AND PRACTICE OF HEALTHCARE WORKERS REGARDING VACCINATION POLICIES

A KAP survey according to WHO is a representative study of which a specific population collects information on what is known, believed and done in relation to a particular topic (WHO 2008:6). In this context, HCWs' knowledge about vaccination and related policies, how they felt about vaccination, and their behaviour towards vaccination was measured in a number of studies. In these studies it was highly recommended that HCWs at high risk of contracting communicable diseases through occupational exposure be vaccinated. However, recommendations do not guarantee compliance. Also, HCWs have the right to choose whether they want to be vaccinated or not. It only raises the expectation that those affected would outweigh the risks versus benefits of complying with vaccination policies, and so choose to vaccinate. It is therefore vitally important that HCWs'

knowledge about vaccination is sufficient in order for them to make well-informed decisions in this regard.

Despite the evidence of vaccine efficacy in vaccination programmes, it has always been opposed in one way or another by HCWs (Stern & Markel 2005:618). This might be attributed to a lack of knowledge in the specified field of prevention and control of infectious disease or about a particular vaccine. In a cross-sectional study conducted in Malaysia - which included a target population of 629 HCWs, mainly consisting of doctors and nurses, it was established that the knowledge of a particular group about a particular vaccine was for the most part directly proportionate to the attitude displayed by that group towards that vaccine (Sheikh *et al.* 2017:369). This implies that a high level of knowledge about vaccination or a vaccine among HCWs usually leads to improved attitudinal change regarding vaccination. It therefore emphasises the importance of knowledge about a particular topic, as this greatly affects how one would respond to it.

HCWs' knowledge about and attitudes towards vaccination and related policies have proven to be positive predictors of vaccine uptake. This statement is supported by Papagiannis *et al.* (2016:4-5) who determined that higher knowledge and positive attitudes towards vaccination among HCWs students increased their likelihood to be vaccinated. In addition, it has also become apparent that vaccine uptake among student HCWs are generally significantly higher in comparison to those in the workforce. This might be attributed to fact that younger HCW students are more knowledgeable or that recently more information might have been disseminated to HCWs as compared to the past (Machiya *et al.* 2015:259). This could certainly be the case if included in the undergraduate and postgraduate training of paramedics.

On the contrary, knowledge as a predictor of vaccine uptake has not always proven to be true. In fact, in a study conducted by Machiya *et al.* (2015:259), it was determined that knowledge was not a predictor of vaccine uptake; however, profession was. In this study, the authors made mention of a South African study conducted in 2010 whereby doctors were found to be 3.2 times more likely to be vaccinated with at least one dose of HB vaccination, while a Nigerian study concluded that nurses were more likely to complete the full course of HB vaccination. Therefore, these conflicting results may suggest against profession as a predictor of HB vaccination, but rather the norms and standards applicable to different healthcare professions in different countries (Machiya *et al.* 2015:259).

2.7 MAJOR RISK FACTORS CONTRIBUTING TO THE EXPOSURE AND TRANSMISSION OF BLOODBORNE PATHOGENS AMONG HEALTHCARE WORKERS

There are essentially two ways HCWs can get exposed to BBPs namely percutaneous and mucocutaneous exposure. Percutaneous exposure refers to a break in the skin caused by a needlestick or sharps that is contaminated with BBF. Mucocutaneous exposure, on the other hand, refers to exposure that occurs as a result of bodily fluids that come into contact with open wounds, nonintact skin such as found in eczema, or mucous membranes such as the mouth and eyes (Goel, Kumar, Lingaiah & Singh 2017:20).

2.7.1 Percutaneous exposure to Bloodborne Pathogens

Needlestick injuries (NSIs) is a common and very serious work-related hazard HCWs are exposed to. It is defined as injuries caused by needles such as hypodermic needles, blood collection needles, intravenous stylets, and needles used to connect parts of intravenous delivery systems (Goel *et al.* 2017:20). Likewise, Gheshlagh, Aslani, Shabani, Dalvand and Parizad (2018:1) define needlestick and sharps injuries as "impairments caused by a needlestick, a piece of broken ampule, cannula, surgical blade, or other sharp instruments contaminated with blood or body secretions". The WHO reported in the World Health Report 2002 that of the 35 million HCWs globally, as many as 2 million experience percutaneous exposure to infectious diseases each year. However these statistics only reflect the cases that were reported.

According to Goel *et al.* (2017:21), it is believed that in spite of the prevalence of occupational exposure, 40-75% of these injuries are not reported. This raises a serious concern as these HCWs do not receive post-exposure prophylaxis (PEP) against diseases such as HIV, HBV and HCV, thus placing them at serious risk of becoming infected with the particular disease. In 2008, this number grew substantially as the number of HCWs affected increased to more than 35 million (Gheshlagh *et al.* 2018:1). NSIs are further responsible for 40% of HCWs suffering from HBV and HCV infection and 2.5% affected by HIV worldwide. This makes NSIs a regular occurrence among HCWs globally. The number of HCWs infected with the HBV could have been significantly reduced if they had been vaccinated against the virus prior to exposure.

Consequently, every effort to reduce and prevent such exposures should be made to ensure the safety of HCWs and those that come into contact with them. These injuries threaten the lives of HCWs due to the potential risk of transmitting BBPs, thus having a direct impact on morbidity and mortality of HCWs. In addition, sustained NSIs further contribute to negative health consequences, psychological distress, fear, tension, and anxiety in HCWs - resulting in increased absenteeism from work, which ultimately compromises health care service delivery (Gheshlagh *et al.* 2018:1).

2.7.1.1 Determinants of Needlestick Injuries

There are several factors that contribute to the incidence of NSIs among HCWs. However, the three main factors are engineering, organisational and behavioural factors (Gheshlagh *et al.* 2018:8). Engineering factors refer to the form/type of device e.g. replacing conventional needles with safety-engineered devices that reduce the incidence of NSIs significantly. Organisational factors, on the other hand, refer to the effectiveness of occupational health and safety (OHS) policies in the event of reporting such injuries. Lastly, behavioural factors, with particular reference to the bad habits and ignorance displayed by HCWs, who in spite of frequent education and caution, insist on recapping needles. Additionally, factors such as HCWs' non-compliance with specific SOPs, improper/lack of wearing PPE, and inappropriate use and disposal of sharps into sharps containers are believed to worsen matters (Gheshlagh *et al.* 2018:8).

Wilburn and Eijkemans (2004:452) identified the following as the determinants of NSIs:

- "The overuse of injections and unnecessary sharps;
- The lack in supplies of disposable syringes, safer needle devices, and sharps-disposal containers;
- Lack of access to and failure to use sharps containers immediately after injection;
- Inadequate or shortage of staff;
- Recapping of needles after use;
- Lack of engineering controls such as safer needle devices;
- Passing instruments from hand to hand in the operating suite; and
- Lack of awareness of hazards and lack of training".

2.7.1.2 Complications associated with Needlestick Injuries

NSIs with contaminated needles pose a high possibility of transmitting BBPs. According to Wilburn and Eijkemans (2004:451), the different bloodborne infections transmittable through NSIs include HIV, HBV and HCV, Diphtheria, Gonorrhoea, Syphilis and Haemorrhagic fever. These risks associated with NSIs put the emphasis on prevention and control of infectious diseases into a new perspective. HCWs should be extremely cautious when performing interventions that require the use of needles, ampules, cannulas, surgical blades, or any other sharp instruments which becomes contaminated with blood or body secretions, as exposure to these can cause HCWs to become infected (Gheshlagh *et al.* 2018:1).

The risk of infection following an NSI from an infected patient is estimated at 0.3% for HIV; 3% for HCV; and 6%-30% for HBV (WHO 2003:online). This implies that some BBPs pose a greater threat of being transmitted following an NSI as compared to others. Wilburn and Eijkemans (2004:455) estimate that an astounding 40% of hepatitis transmission is as a consequence of occupational exposure. Therefore, implementing effective measures to reduce and/or prevent the prevalence of NSIs is essential.

2.7.1.3 Control and preventative measures

Prevention of NSIs is the most effective control measure that avoids BBPs from being transmitted. According to Ayalew and Horsa (2017:2-3), prevention is considered to be the most efficient means towards improved health. Others may include supplying HCWs with standard and safe equipment, holding regular training workshops regarding safety issues in the work environment, employing more staff, and reducing working hours (Gheshlagh *et al.* 2018:8). Also implementing very strict SOPs regarding the appropriate disposal of needles and sharp objects into a sharps container immediately after use, and replacing sharps containers after they are ¾ full, could qualify as preventative measures. Another factor that contributes to NSIs is the cost implications associated with safety-enhanced devices specifically designed to reduce and/or prevent the risks of such unfortunate events. These include, amongst others, retractable needles, specially designed jet ports on administration sets that do not require needles to inject and safety lancets.

Despite all these preventative measures and efforts of raising awareness, the incidence of NSIs amongst HCWs are still on the rise. Aside from bad habits and failure to comply with health and safety policies in the workplace, this can also be attributed to the lack of management's oversight. Management must see to it that a committee (such as an infection-control or health and safety committee) is established to regulate, control and ensure compliance with health and safety policies in the workplace. In particular, policies that will enforce adherence to universal precautions and other control measures. Nevertheless, compliance to these policies would be difficult to monitor without proper quality assurance mechanisms put in place and followed through by managers.

The importance of implementing effective preventative measures regarding infections from occupational exposure of HCWs to BBPs cannot be overstressed. According to Wilburn and Eijkemans (2004:451) these may include:

- "immunisations against HBV,
- eliminating unnecessary injections,
- implementing proper universal precautions,
- eliminating needle recapping and disposing of sharps into sharps containers immediately after use,
- use of safer devices such as needles that sheath or retract after use,
- provision and use of personal protective equipment, and
- proper training of workers in the risks and prevention of transmission".

2.7.1.4 Post-exposure Prophylaxis

PEP is antiretroviral (ARV) drugs or treatment provided immediately after someone is exposed to blood and body fluid which is likely to transmit bloodborne infections such as HIV, HBV and/or HCV (Spink 2008:1-7). Every HCW who sustains an NSI should have access to PEP, within hours of the injury, along with counselling, confidential testing, and follow-up (Wilburn & Eijkemans 2004:454). Some literature advocates that access to PEP within 1-2 hours (ideally), in correlation with successful completion of 28 days of uninterrupted appropriate prophylaxis, achieves the best results. This literature also states that the efficacy of PEP post 72 hours are highly unlikely (Venter 2008:37-38). However, the emphasis remains on gaining access to PEP as soon as possible after exposure as it significantly reduces the chances of infection with these BBPs.

2.7.2 Mucocutaneous exposure to Bloodborne Pathogens

Despite the fact that more attention and emphasis are placed on the importance of preventing NSIs among HCWs, the threats posed by nonsharps or mucocutaneous exposure cannot be ignored. Incidents of mucocutaneous exposure can occur by accidental splashing of blood into the eyes or a skin cut of a HCW (Goel *et al*. 2017:20-21). PPE such as gloves, masks, goggles and gowns are effective preventative measures against mucocutaneous exposure to BBPs. However, previous studies has reported poor compliance of HCWs with wearing PPE (Harris & Nicolai 2010:93). In this instance, immediate post-exposure measures taken include the washing of hands, determining the status of the source of exposure, and if the HCW knew their status of HIV, HBV and HCV positivity (Goel *et al.* 2017:21).

2.8 CONCLUSION

Chapter 2 provided a literature overview of HCWs' KAP regarding vaccination and policies related to it. The findings of the literature overview provided background to the study and discussed the types of exposure to vaccine-preventable diseases, as well as statistics on vaccine-compliance of HCWs from an international as well as South African perspective. In addition, the need for and importance of HCWs to be vaccinated against occupationally acquired hazards such as communicable diseases was identified. Emphasis was also placed on the importance of preventative measures such as universal precautions and vaccination to enhance HCWs' personal safety.

In Chapter 3, the research aim, design and methodology of the study will be discussed.

CHAPTER 3

RESEARCH DESIGN AND METHODOLOGY

3.1 INTRODUCTION

This chapter provides a theoretical perspective on the research design and methodology used to analyse the KAP of Free State Province paramedics regarding vaccination policies. Thereafter, a detailed description of due processes regarding sample selection, the pilot study, the data collection and data analysis processes, will follow. Finally, this chapter will be concluded by discussing the reliability, validity and ethical considerations applicable to this study.

3.2 THEORETICAL PERSPECTIVES ON THE RESEARCH DESIGN

According to Maree (2016:72), a research design is nothing more than "a plan or strategy that moves from the underlying philosophical assumptions to specifying the selection of participants, the data-gathering methods to be used and the data-analysis to be done". The latter is supported by Trafford and Leshem (2008:90), who explain a research design as a strategy that sets out how the researcher proposes to undertake his/her research. This implies that a research design enables the researcher to put the planning towards their research into perspective.

In this study, the researcher made use of an explorative, descriptive, non-experimental research design (cf. 1.8.1). Furthermore, survey research was deemed ideal for this sample as the researcher assessed the current KAP of Free State Province paramedics regarding vaccination policies and to provide a numeric description of the findings. In addition, a cross-sectional analysis of the survey population was performed to determine whether the perceived problem existed or not; that is, the possible non-compliance of Free State Province paramedics with regards to vaccination policies.

3.2.1 The Knowledge, Attitude and Practice survey

The researcher conducted a KAP survey which, according to WHO (2008:6), is a representative study of a specific population (paramedics) to collect information on what is known, believed and done in relation to a particular topic (vaccination). A KAP survey therefore measures the KAP of a community (Kaliyaperumal 2004:7). In this study, the researcher wishes to raise awareness regarding the importance of vaccination, and make educational recommendations based on the findings of the KAP survey.

The researcher determined what paramedics know about vaccination; what their attitudes are towards vaccination; as well as their use of vaccination as a preventative measure in their practice. This will best be achieved through conducting a KAP survey. The knowledge portrayed by paramedics in the questionnaire may indicate whether or not they understand the importance of vaccination. According to Kaliyaperumal (2004:7), knowledge possessed by a community refers to their understanding of a given topic. Attitude refers to a community's feelings about vaccination policies; and practice refers to how well their knowledge and attitude is demonstrated through their actions. Furthermore, a KAP survey can also identify existing knowledge gaps, cultural beliefs and behavioural patterns of a given community (WHO 2008:6), all of which would be highly favourable in this context.

Du Monde (2011:online) describes a KAP study as a quantitative method used to provide access to quantitative information. Processes involved in using a quantitative approach include data collection, analysis, interpretation and writing up of the results (Creswell 2014:23).

3.3 RESEARCH METHODS

The researcher conducted a quantitative, descriptive study and made use of a self-administered questionnaire with open-ended, closed, dichotomous and multiple-choice questions. The research method that forms the basis of this study is a literature study, while the empirical phase of the study consisted of a KAP questionnaire to conduct a survey.

In this section, each method will be detailed and described.

3.3.1 Literature study

The aim of a literature study is to conceptualise and contextualise a research problem, to uncover it within a body of theory. It places the researcher's efforts into perspective by including the topic in a larger knowledge pool, thereby creating a foundation based on existing and related knowledge (De Vos *et al.* 2011:134-135).

A Literature study was done to contextualise and conceptualise the topic on international, national and local platforms, as well as to review the legislative framework from where vaccination policies should be derived. All applicable policies were consulted, and the advantages and disadvantages of each, including the consequences of non-compliance to these policies, were discussed. Furthermore, available literature was used to develop the KAP questionnaire for this study. Additionally, existing literature was used in Chapter 4 to triangulate research findings into the existing body of knowledge.

3.3.2 Questionnaire

The researcher selected to use a questionnaire in this study. The questionnaire was available only in English as this language is commonly used to communicate among paramedics in the Free State Province. Questionnaires are the most frequently used data collection instrument when conducting survey research (De Vos *et al.* 2011:156). It is a crucial instrument used to obtain facts and opinions about a particular phenomenon, which can be used to address a stated research problem. In other words, questionnaires are specifically designed to collect information relevant to the research problem. The data extracted from the questionnaires received were coded and tabulated onto an Excel spreadsheet for analysis by the Department of Biostatistics, School of Biomedical Science, at the University of the Free State (UFS).

In this study, the researcher's method of choice was a KAP survey, which according to Du Monde (2011:online), comprises predefined questions that are configured in a standardised questionnaire. Questions raised in the questionnaire were specifically aimed at addressing the research problem and questions. The questionnaires were hand delivered by the researcher to selected stations from where the official placed in charge distributed it to respondents whose participation were voluntary and completely anonymous. The questionnaire consisted predominantly of closed-ended questions which, according to De Vos *et al.* (2011:198), are used when the researcher is able to

determine beforehand, all significant responses to a particular question. In addition, the open-ended questions within the questionnaire allowed respondents the opportunity to express their views regarding vaccination (cf. 3.3.2.4). The questionnaire encompassed five sections, namely demographics, knowledge, attitudes, practice and general to further explain their responses selected.

3.3.2.1 Types of questionnaire

De Vos *et al.* (2011:186-190) identifies various ways questionnaires may be distributed for data collection purposes. These include Mailed questionnaires, Telephonic questionnaires, Questionnaires delivered by hand, Self-administered questionnaires, Group-administered questionnaires, and Electronic questionnaires. Each questionnaire is exclusively designed to ensure that researchers gather as much information as needed to address the research problem. However, despite the various questionnaires having one thing in common, that is, to achieve high response rates from participants, they also have distinct differences. It is therefore important that researchers using a survey research design, carefully select the most appropriate manner in which they distribute a questionnaire, as this has an effect on response rates. There are, however, a few aspects researchers should take into consideration when using questionnaires. It is important to take the literacy state of respondents into consideration as their ability to read, write, and follow instructions can also affect their response rates (Welman *et al.* 2005:152-153). In this study, the researcher delivered the questionnaires by hand.

3.3.2.2 Advantages and disadvantages of the questionnaire

The particular way of distributing the questionnaire in this study has a number of advantages that contribute greatly to the overall success of the study. Hand-delivered questionnaires do not only generate relatively high response rates, but also enables respondents to seek clarity about probable issues they may have encountered on the researcher's return (De Vos *et al.* 2011:188). In this way, the questionnaire provides the researcher with some form of control over the completion of the questionnaire, which has proven to be effective with the high response rate in this study (cf. 4.1). Hand-delivered questionnaires also saves time as the researcher already makes an appointment to collect completed questionnaires at the time of delivery. This was one of the many advantages of using hand-delivered questionnaires in this study. On the contrary, according to Welman, Kruger and Mitchell (2005:153), a researcher's lack of

control not only leads to poorly completed questionnaires, but low response rates as well. Disadvantages of hand-delivered questionnaires in this study included cost-implications and the fact that a small geographical area was covered per occasion (De Vos *et al.* 2011:188). This is why the researcher had to place an official in charge at selected stations to further distribute the questionnaires.

3.3.2.3 Questions used in questionnaire survey

In the quest to obtain desired information from respondents, the types of questions asked in the questionnaire are key (De Vos *et al.* 2011:196). For this reason, the questions in the questionnaire were specially formulated to address the research questions and objectives of the KAP study. The questionnaire comprised open-ended, closed, dichotomous and multiple-choice questions. Open-ended questions used in this study allowed the respondent the opportunity to express their views and opinions about issues related to the study. In addition, the researcher was able to test their KAP regarding vaccination. According to De Vos *et al.* (2011:196), open-ended questions might be best if the researcher wishes to learn how respondents think, or discover what they deem as important, or simply just to seek a possible answer to a question. In a study conducted by Friborg and Rosenvinge (2013:1397), the authors found that open-ended questions provided more in-depth information as compared to closed questions.

Closed questions on the other hand provides a number of responses a particular respondent can choose from. According to De Vos *et al.* (2011:198), it provides respondents the opportunity of selecting from one or more options. With regards to Dichotomous questions, only two response possibilities are offered to the respondent. These types of questions have the tendency to lengthen the questionnaire excessively as they are usually followed by questions that explore both response options (De Vos *et al.* 2011:198). Finally, multiple-choice questions were asked where the respondent were provided with three or more response options. According to De Vos *et al*. (2011:199), these types of questions are usually used when information obtained can be logically divided into hard and fast categories.

3.3.2.4 Questionnaire as used in the current study

The questionnaire consisted of four sections entitled: demographics; knowledge, attitude and practice survey with regards to vaccination among paramedics; general/educational requirements, and case scenario.

The sections of the questionnaire were laid out as follows:

- **Section A: Demographics** asked questions related to the respondents' age, gender, qualifications, region/districts they are employed in and their ability to access the Internet.

- **Section B: Knowledge, Attitude and Practice survey with regards to vaccination among paramedics** asked questions related to respondents' knowledge, attitudes and practice regarding vaccination and what it entails. Section B was further sub-divided into the following sub-sections:
  - B1 – Knowledge: Questions and/or statements in this sub-section were specifically aimed at testing the knowledge of participants regarding vaccination and policies related to it.
  - B2 – Attitude: Questions and/or statements in this sub-section were specifically aimed at testing the attitude participants had towards vaccination and policies related to it.
  - B3 – Practice: Questions and/or statements in this sub-section were specifically aimed at testing how participants practice on a daily basis and whether their personal practices would necessitate the need for them to be vaccinated.

- **Section C: General/Educational requirements** revolved around respondents' feelings, opinions, and preferences with regards to information and courses related to vaccination.

- **Section D: Case Scenario** allow participants to relate, critique and reflect on the character's actions or lack thereof to the best of their ability. In doing so, participants could display their understanding about policies related to NSI and the grace period for PEP provided to reduce the risks associated with NSI.

A number of literature sources were consulted from articles and journals accessed through search engines like Google and Google Scholar, academic databases of the UFS and research platforms such as Ebscohost and Science Direct. Information extracted from these sources became the basis from where the questions in the questionnaire were developed. The full questionnaire can be viewed in Appendix B2.

3.3.3 Target population and Sampling

A target population refers to a group of people who possess and share certain specified characteristics (De Vos *et al.* 2011:223). In this study, the target population consisted of paramedics who were registered with the HPCSA and employed in the public sector of the Free State Province. The population held various qualifications, including BLS, ILS, CCA, and N. Dip EMC, ECT and ECP qualifications. In a recent study conducted in the HPE programme at the UFS, a researcher made use of the same target population as proposed in this study. According to the study conducted by Sookram (2016:48), the total population included 1 554 pre-hospital Emergency Care providers in 2016 within the public sector. This made up the target population for this study, which was too large to make complete coverage feasible. Therefore, a sample had to be selected from this group.

The sampling method of choice is non-probability sampling, which according to De Vos *et al.* (2011:231), is when the odds of selecting a particular individual as part of a sample is uncertain. This makes it ideal for this study as the research is focused on paramedics as a whole, rather than a particular group of individuals. Furthermore, the type of sampling used was convenience/accidental sampling, which according to De Vos *et al.* (2011:232), is convenient as respondents are usually those that are nearest and easily available. Convenience sampling thus complimented the study by expediting the data collection phase within the districts, as respondents were those nearest to selected stations and most easily available.

The Free State Province is divided into five districts. These districts are identified as Thabo Mofutsanyane, Xhariep, Lejweleputswa, Mangaung/Motheo and Fezile Dabi.

3.3.3.1 Survey population

A survey population is a group of potential participants to whom the researcher wishes to generalise the results of a study (Salkind 2000:86).

In this study, all the participants were employed by the Free State Department of Health (FSDoH) and actively registered with the HPCSA under the various qualifications listed above. The survey population consisted of male and female paramedics within the respective districts who were available at the time of data collection. A total of 218 questionnaires were delivered to the five districts, but only 171 were completed and returned.

3.3.3.2 Sample size

Larger samples generally are more representative and allow the researcher to come to more accurate conclusions (De Vos *et al.* 2011:224). However, the costs associated with larger samples are exceedingly more than that of smaller ones. In accordance with De Vos *et al.* (2011:225), 14% of the total number of 1554 paramedics in the Free State Province was selected. The sample size extended to a total of 218 respondents which made the sample large enough to be representative. According to De Vos *et al.* (2011:224), larger samples make it possible for researchers to draw more representative and accurate conclusions. In addition, representativeness of a sample is important and implies that a sample has almost the same distribution of characteristics as that of a population (De Vos *et al.* 2011:226). Therefore, the participants within this sample represents the population in its entirety. It is only then that the researcher will be able to generalise the findings of the study.

3.3.3.3 Pilot study

According to Barker as cited by De Vos *et al.* (2011:237), a pilot study is a procedure used to test and validate a particular instrument by means of administering it to a small group of participants that represents the larger intended population to be tested. It is a very important tool one can use to test the effectiveness and functionality of an instrument used to conduct research. The former is supported by Bryman and Bell (2014:91) who point out that a pilot study can be helpful to determine how well research methods work. This implies that a pilot study is nothing more than a "dry run".

Researchers use this platform to do all prior checks before the main investigation is launched.

There are, however, important conditions when conducting a pilot study. That is, participants in the pilot study are not allowed to partake in the main investigation and it should be conducted in the same manner as the main investigation (De Vos *et al.* 2011:241). Notwithstanding the above-mentioned conditions, alterations to the instrument are allowed once the pilot study has been conducted. Thus, the purpose of conducting a pilot study is to detect flaws, clarify unclear and ambiguous content (questions), and to notice non-verbal behaviour such as discomfort and embarrassment about the content (Welman *et al.* 2005:148).

The researcher conducted a pilot study to ensure that the questions in the questionnaire are unambiguous and clear, also that it will be understood at the level of all paramedics regardless of their level of qualification in the field. Participants selected for the pilot study were representative of the whole population. This means that one paramedic per level of qualification was selected in the public sector, which totalled three participants (1xBLS+1xILS+1xALS=3). Each of them received an information letter and a hard copy of the questionnaire, which was hand delivered to them. Pilot study participants were requested to highlight any ambiguous, unclear and biased questions, as well as record the overall time spent completing the questionnaire. Each of the respondents received two weeks to complete the questionnaire.

Once the completed piloted questionnaires were returned, the researcher made all necessary alterations to the questionnaire to ensure maximum effectiveness of the tool. One of the participants identified the need for a confidentiality clause which the researcher included as part of the questionnaires to be used in the main study. Some grammar and punctuation mistakes were identified and rectified. In addition, questions that were unclear were identified e.g. questions where participants could select more than one option were not clearly specified, hence it was restructured accordingly. Also, repeated questions and inconsistencies with the formatting of the questionnaire were identified and corrected. An average time of 25 minutes to complete the questionnaire were recorded. These cases were not included in the main study.

3.3.3.4 Data gathering

A total of 218 questionnaires were printed and the hard copies were placed inside specially marked containers. These specially marked containers were then distributed throughout the districts and hand delivered to selected stations within the five districts. One container was delivered per district (maximum of five containers) at the commencement of the data collection phase. Furthermore, two hundred (200) of the 218 questionnaires were divided equally between the five districts at 40 each. The remaining 18 were distributed among Free State College of Emergency Care (FSCoEC) clinical staff. For the sake of transparency, each of the questionnaires had an invitation letter with information about the study attached as a front page. Questionnaires were made available to respondents during shift exchange, where respondents reporting on or off duty at the particular time were asked to participate in the study.

Stations were selected on the basis of their staff complement and proximity to Bloemfontein. This means that the stations (one per district) with the largest staff complements in closest proximity to Bloemfontein were selected. The process of representivity was explained to the official placed in charge to facilitate the distribution process between the various shift systems at the selected stations. These stations also became the distribution points for neighbouring stations within the respective districts.

Those who agreed to participate in the study were given a maximum of two weeks to complete the questionnaire. The invitation letters attached to the questionnaires guaranteed participants' anonymity and the fact that no questionnaire will be able to be traced back to them. Respondents were requested to deposit completed questionnaires in the marked containers, placed at the selected stations. A date was then set for four weeks post-delivery, whereby the researcher collected the completed questionnaires in these containers from selected stations. This was done to allow those respondents who completed a questionnaire within the second week of distribution ample time to do so.

After the four weeks (post distribution of questionnaires to the stations), the questionnaires were collected from selected stations. Only 105 completed questionnaires were received, which was a 48.2% response rate. The researcher then decided to include a group of paramedics who fall into the scope of the target population, who attended courses at the FSCoEC at the time. This group of paramedics worked in the five districts selected for this study. This was ideal as it was easier to distribute and collect completed

questionnaires from a single setting during the course. In addition, special provision was made for those who could not deliver the completed questionnaires to the selected stations in the specified timeframe. Respondents either delivered it personally to the researcher or sent it via EMS patient commuter buses, which commutes patients to and from Bloemfontein on a weekly basis. This improved the overall response rate to 171 (78.4%). All completed questionnaires collected were stored behind two locks in a file cabinet to ensure safekeeping - only to be viewed by researcher, supervisor and biostatistician.

3.3.3.5 Data analysis

Data collected was captured, coded and tabulated by the researcher onto an Excel spreadsheet for analysis. All quantitative data was interpreted and analysed by the researcher with the aid of the Department of Biostatistics at the UFS. Open-ended questions were coded which, according to Welman *et al.* (2005:214), is used to analyse and make sense of the data. The researcher quality assured the correct capturing of the data by performing spot checks, thereafter sending it to his supervisor for verification. The supervisor also co-coded the analysis of the qualitative data. Quantitative data was presented in the form of frequencies, percentages, figures and tables while qualitative data was presented in the form of categories and themes that were also quantified.

3.3.3.6 Data interpretation

Data, once captured and analysed, were displayed in various forms. The findings were interpreted and presented by the researcher. In this study, the researcher used Excel's graphical capabilities to present data in graphs, charts, tables and figures. This was used for discussions. The following was reported for each question:

- N = which represents total number of participants that participated in the research
- n = which represents the total number of participants who answered the specific question

If more than one response was given to a question, this was also clearly stated in the results. Data gathered and interpreted from the findings of this study formed the basis of recommendations for education of HCWs in regards to vaccination. These Educational recommendations can be viewed at the end of Chapter 5.

3.4 ENSURING THE QUALITY OF THE STUDY

3.4.1 Credibility/Internal validity

Validity, according to De Vos *et al.* (2011:173), refers to whether or not an instrument can measure what it intends to measure, and if it can be measured accurately. Subsequently, Bryman and Bell (2014:38) support this statement by referring to validity as whether or not a measure of a concept actually measures that which is intended to be measured. Furthermore, Roberts, Priest and Traynor (2006:43) describe validity as the extent to which a measure can accurately represent the concept it claims to measure. Simply put, validity is a measure of how truthful the results of research is.

In this study, the researcher used a questionnaire to measure the KAP of paramedics regarding vaccination policies. The questions were formulated on the basis of the objectives and aim of the study. Furthermore, the questionnaire was submitted to an ethics committee of the UFS for approval. This process was preceded by intense scrutiny of the researcher's supervisor, an evaluation committee and biostatistician to test the face validity of the instrument.

3.4.2 Data quality (reliability)

Bryman and Bell (2014:39) states that validity presumes reliability, which implies that a measure can only be reliable if it is valid. Furthermore, according to De Vos *et al.* (2011:177), reliability is the measure at which a measuring instrument such as a questionnaire is able to produce stable and consistent results. This statement is further supported by Frankfort-Nachmias and Nachmias (1994:163), who define reliability as the extent to which a questionnaire, test, observation or any measurement procedure produces the same results on repeated trials. This implies that a variable is considered reliable if it is measured a few times under the same conditions and still manage to produce the same results.

As was pointed out earlier, the researcher pre-tested the questionnaire in a pilot study. This was important in order to clarify any uncertainty and ambiguity regarding the questions. It also seeks to illuminate any form of bias on behalf of the researcher. In doing so, the researcher endeavours to present reliable information.

3.5 ETHICAL CONSIDERATIONS

3.5.1 Approval

The researcher obtained approval for the research from the Health Sciences Research Ethics Committee (HSREC) at the UFS; the official HSREC 17 document was used to obtain approval for this study from the relevant UFS authorities. Final approval from the HSREC, ethics approval from the Ethics Committee of the FSDoH was granted for conducting the study.

The Head of the Department (HOD) of the FSDoH gave approval for participants to take part prior to commencement of the study. The HSREC number: **UFS-HSD2017/1187** obtained on approval was used on all documentation regarding this study.

3.5.2 Information letter

Two weeks prior to commencing with data collection, the researcher e-mailed invitation letters (cf. Appendix B1) to all EMS district managers. Invitation letters contained all the necessary information about the study. The purpose was to notify them of the study that was to commence in their respective districts. They were also requested to inform those they supervised, who formed part of the sampling, about the study. Furthermore, emphasis was placed on the fact that participation in the study was voluntary. The same invitation letter was attached to all questionnaires before distribution for validation and transparency purposes.

3.5.3 Right to privacy and confidentiality

In this study, all personal information by which participants could be implicated was kept confidential. Only information relevant to the study and the participant's professional status was made known. The researcher made use of number coding to ensure the confidentiality and anonymity of respondents. Hence, no names or any personal identifiers appeared on the data sheets sent for statistical analysis. All information was managed in a strictly professional and confidential manner.

3.5.4 Minimising potential misinterpretation of results

In order to minimise the potential misinterpretation of results in this study, data captured on Excel spreadsheets by the researcher was forwarded to the Department of Biostatistics for co-analysis. Once analysed, spreadsheets containing analysed data were send to the researcher to interpret. Data was then presented in the form of graphs, charts, tables, and figures, which was interpreted by the researcher and verified by his supervisor.

3.6 CONCLUSION

This chapter explained the methodology used to conduct the study as well as the due processes that were applied during the course of this study. The questionnaire was developed as a tool from where applicable data in response to the study could be generated. This chapter also provides insight into how this data was captured and processed. So, now that the basis of the research has been explained, the results and findings of the survey are presented in Chapter 4.

CHAPTER 4

DATA ANALYSIS AND DISCUSSION OF THE FINDINGS

4.1 INTRODUCTION

In Chapter 3, the methodology used in this research study was discussed. Chapter 4 will provide the results of the study, data analysis and a discussion of the findings of the study.

The study consisted of survey research using a questionnaire to explore the KAP of Free State Province paramedics regarding vaccination policies. Data used in this study was gathered from a self-administered questionnaire that consisted of open-ended, closed, dichotomous and multiple-choice questions. The pilot study consisted of three paramedics representing each level of care, namely BLS, ILS and ALS. All required corrections following the pilot study were made to the questionnaire before the main survey was conducted. The participants who participated in the pilot study were excluded from the main study.

The sample population consisted of 218 participants (14% of the total target population). A total of 218 questionnaires were printed, of which 200 (40 each) were equally distributed among the five districts of the Free State Province. The remaining 18 were distributed among the clinical personnel of the FSCoEC. The research package issued to potential participants consisted of hard copies of the information letter and questionnaire. Those who participated in the survey were required to place all completed questionnaires within specially marked boxes situated at the main stations of each district.

The demographic description (Section A) of the sample is presented first. The data collected for each participant included: age, gender, highest level of education, highest professional qualification, region of work, Internet accessibility, active e-mail address, mode of transport used to get around, as well as accessibility of Interactive Communication and Management system (iCAM) facilities.

Secondly, Section B presents the descriptive information of the KAP of paramedics regarding vaccination policies. Section B is further subdivided into subsections; B1: Knowledge, B2: Attitudes, and B3: Practice. This is to test each section of KAP respectively of paramedics' regarding vaccination policies. Thirdly, Section C deals with the general/educational requirements of participants concerning vaccination and policies related to it. Finally, Section D assesses participants' ability to apply what they know about NSIs and policies related it, to a case scenario.

From the questionnaires, it could also be ascertained whether or not participants' level of knowledge regarding vaccination policies were optimal or not. In addition, whether they endorsed unsafe practices, thereby necessitating the need for vaccination against vaccine-preventable diseases. Also, whether or not their attitudes concerning vaccination and mandatory policies were positive or not.

The data collection period took place between September 2018 and October 2018 (approximately 2 months). A total of 171 completed questionnaires were collected at the end of the data collection phase, which constituted a 78.4% response rate. Data collected during this study were verified and validated by a statistician at the Department of Biostatistics, at the UFS.

Diamantopoulos and Schegelmilch (2000:41) describe a process of editing as data cleaning as to avoid errors in the matrix of questionnaires both during and immediately after collection of the data. In the data, some errors, missing data and several areas where items had no response to were identified. Furthermore, 11 (6.4%) of the 171 completed questionnaires were poorly completed. In spite of this, the approach of the Department of Biostatistics was to include all questionnaires and to use all the data that was available regardless of how well questionnaires were completed.

As the aim of the study was to explore the KAP of Free State Province paramedics regarding vaccination policies, and to develop educational recommendations to enhance compliance, data were collected accordingly. Results from each section of the questionnaire will now be described and discussed. In the data presented, "N" refers to the number of participants who answered the questionnaires, while "n" refers to the number of participants who actually answered the specific question.

4.2 DESCRIPTIVE ANALYSIS OF DEMOGRAPHIC INFORMATION

This section includes the statistical analysis and distribution of the demographic information of the research participants.

4.2.1 Age distribution of the participants

Figure 4.1 indicates the age distribution of the sample. Of the 171 participants, 2 (1.2%) did not answer the question on age.

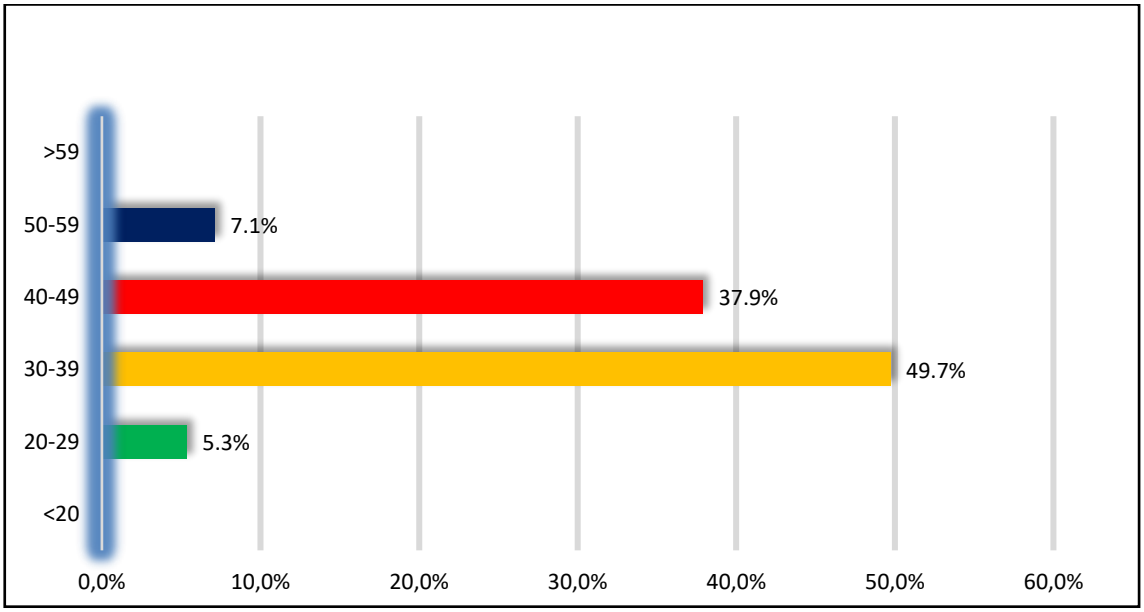

Figure 4.1: Total age distribution of participants (N=171) (n=169)

Discussion: The majority of participants (n= 84; 49.7%) fall into the age group of 30-39, followed by 64 (37.9%) aged between 40-49, 12 (7.1%) aged between 50-59, and 9 (5.3%) aged between 20-29. There were no participants younger than 20 years or older than 59 years. The results indicate that the minimum age of the sample was 20 years and the maximum age of the sample was 59 years, with a median age of 40 years.

4.2.2 Gender distribution among the participants

Figure 4.2 indicates the gender distribution of the sample. Of the 171 participants, 5 (3%) did not answer the question related to gender distribution.

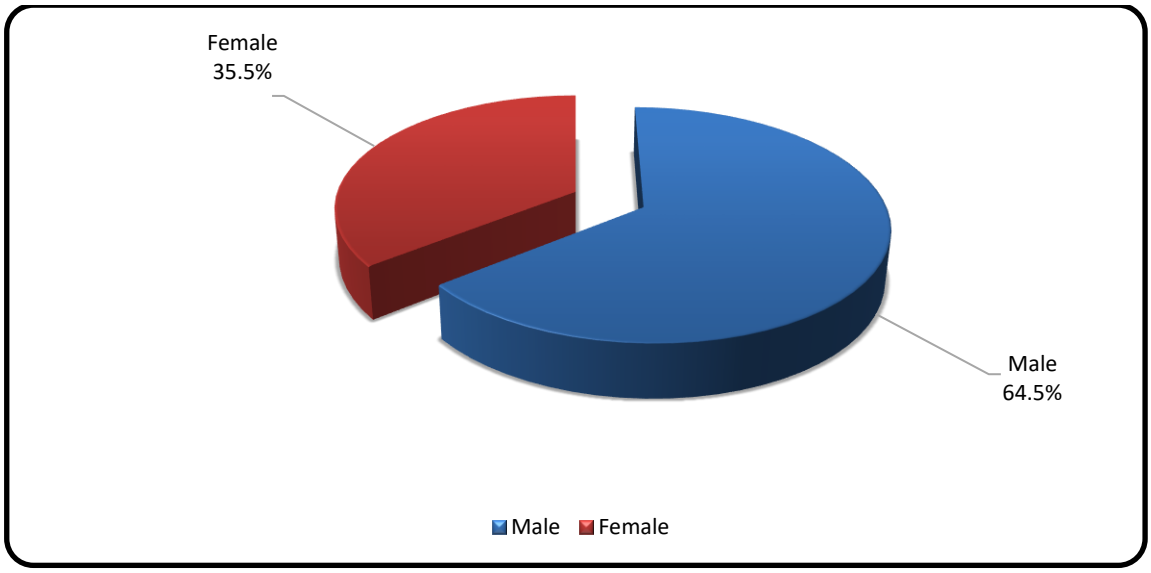

Figure 4.2: Gender distribution of participants (N=171) (n=166)

Discussion: The gender distribution of the study population in Figure 4.2 shows a total number of 107 males (64.5%) and the total number of 59 females (35.5%). The ratio of males to females correlates well with the actual gender distribution as far as the appointment of Emergency Care providers within the Free State Province is concerned. Due to the nature and physical demand of the work, it is no coincidence that the characteristic sign of gender distribution in this study population is male dominance.

4.2.3 Highest level of education

Figure 4.3 indicates the highest level of education obtained by the sample. Of the 171 participants, 1 (0.6%) did not complete the question on highest level of education.

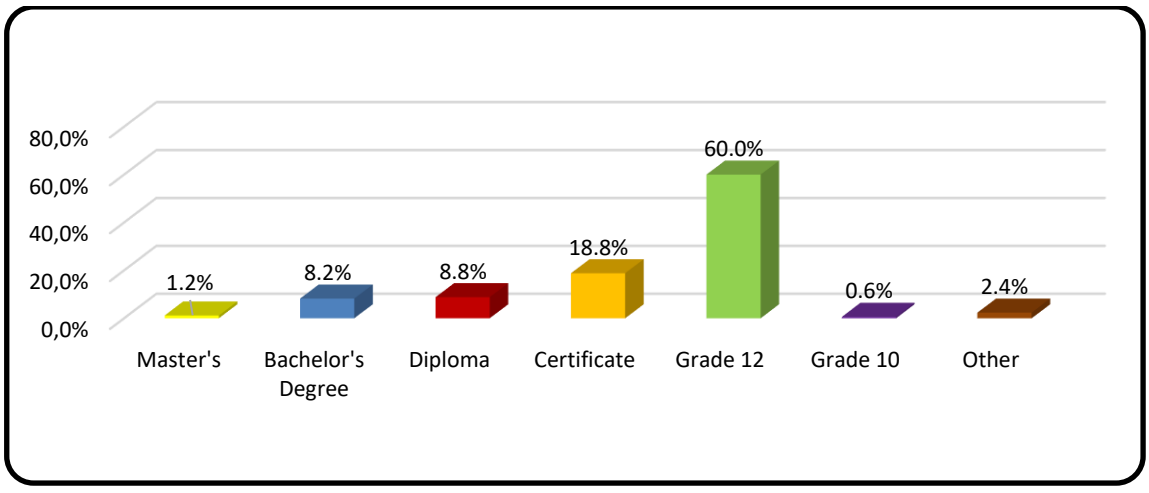

Figure 4.3: Highest level of education (N=171) (n=170)

Discussion: In terms of the highest level of qualification, the following options were presented to participants to select from: Doctorate, Master's, Bachelor's Degree, Diploma, Certificate, Grade 12, Grade 10 and Other.

Figure 4.3 indicated that the majority of participants (n=102; 60.0%) obtained Grade 12 as their highest level of education, followed by 32 (18.8%) of participants who obtained a national certificate. A few participants (15 {8.8%} and 14 {8.2%}) obtained a Diploma and Bachelor's degree qualifications respectively. A very small minority (n=2; 1.2%) obtained a Master's degree and 1 (0.6%) obtained Grade 10. No participant had obtained a Doctorate degree.

Of the 4 (2.4%) participants who selected the option "Other", 1 (0.6%) did not give an example. The others included the following examples as their highest levels of qualification: Grade 11, National diploma (N6) in Electrical Engineering Science and NQF level 5. The latter being at undergraduate level. The degree was not reported.

4.2.4 Highest Emergency Medical Services qualification

Figure 4.4 indicates the highest EMS qualification obtained by the sample. Of the 171 participants, 2 (1.2%) did not answer the question.

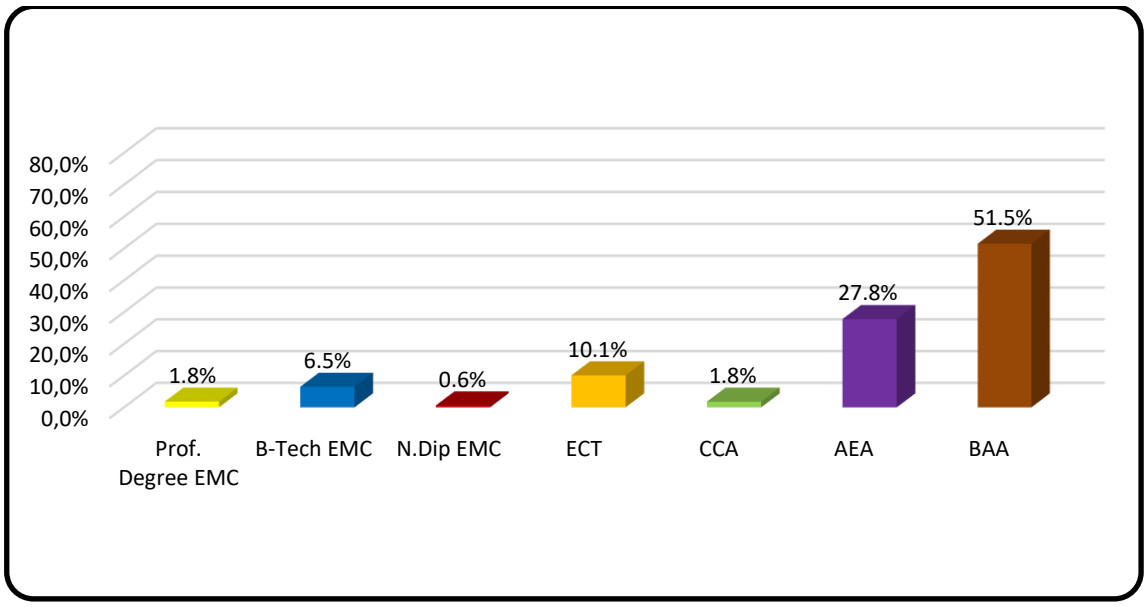

Figure 4.4: Highest Emergency Medical Services qualification (N=171) (n=169)

Discussion: In terms of the highest level of qualification, the following options were presented to participants to select from: Doctorate EMC; Master's EMC; Bachelor's Degree EMC; N.Dip in EMC; ECT; ECA; CCA; Ambulance Emergency Assistant (AEA); Basic Ambulance Assistant (BAA) and Other.

Figure 4.4 indicates that the majority of participants (n=87; 51.5%) obtained a BAA as their highest EMS qualification, followed by 47 (27.8%) of participants who obtained an AEA qualification. These are two of the three professional short course qualifications introduced in 1985. The other ones is CCA, which was obtained by 3 (1.8%) of participants.

A few participants, 17 (10.1%), obtained an ECT qualification with B-Tech EMC 11 (6.5%); N.Dip EMC 1 (0.6%); and Prof. Degree EMC 3 (1.8%) qualifications in the minority. No participant had obtained an ECA, Master's EMC or Doctorate EMC qualification. Also, of the 169 participants who answered this question, no one selected the option "Other".

4.2.5 Region/district working in

Figure 4.5 indicates the region/district participants worked in. All 171 (100%) participants answered the question on the region/district they work in.

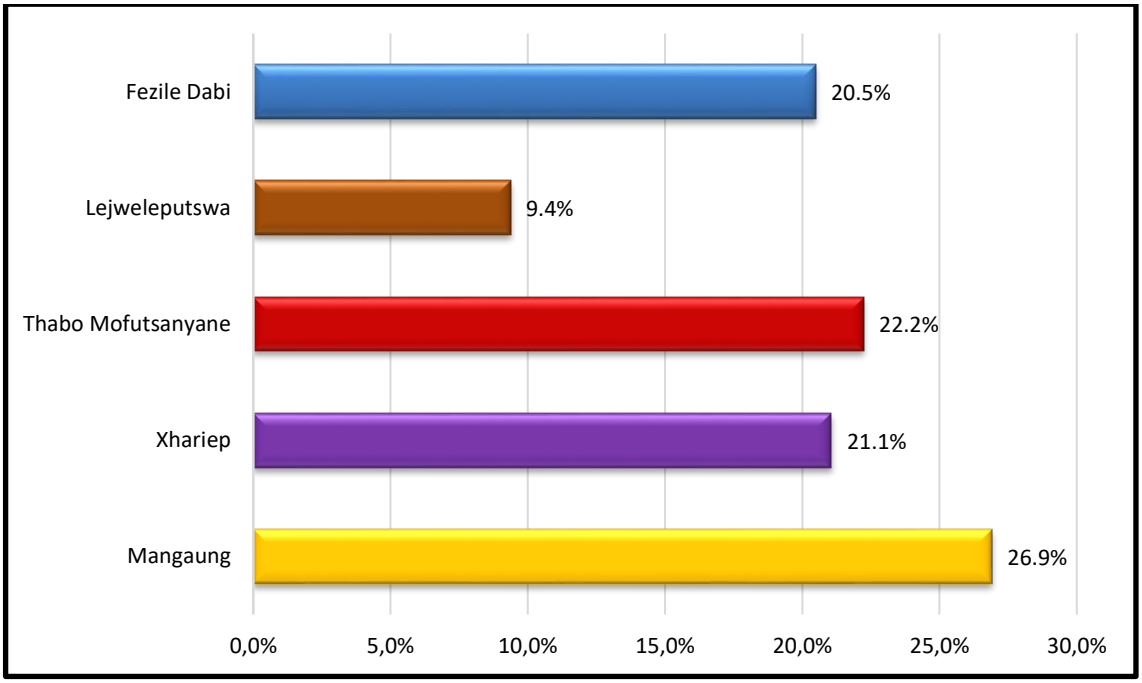

Figure 4.5: Region/district working in (N=171) (n=171)

Discussion: EMS in the Free State Province are divided into five districts i.e. Fezile Dabi, Lejweleputswa, Thabo Mofutsanyane, Xhariep and Mangaung. Figure 4.5 indicated that the majority of participants (n=46; 26.9%) in this study work in the Mangaung district, 38 (22.2%) work in Thabo Mofutsanyane district, 36 (21.1%) work in the Xhariep district, 35 (20.5%) work in the Fezile Dabi district and 16 (9.4%) work in the Lejweleputswa district.

4.2.6 Internet access

Figure 4.6 indicates the number of participants who had Internet access in general. Of the 171 participants, 4 (2.3%) did not answer the question on Internet access.

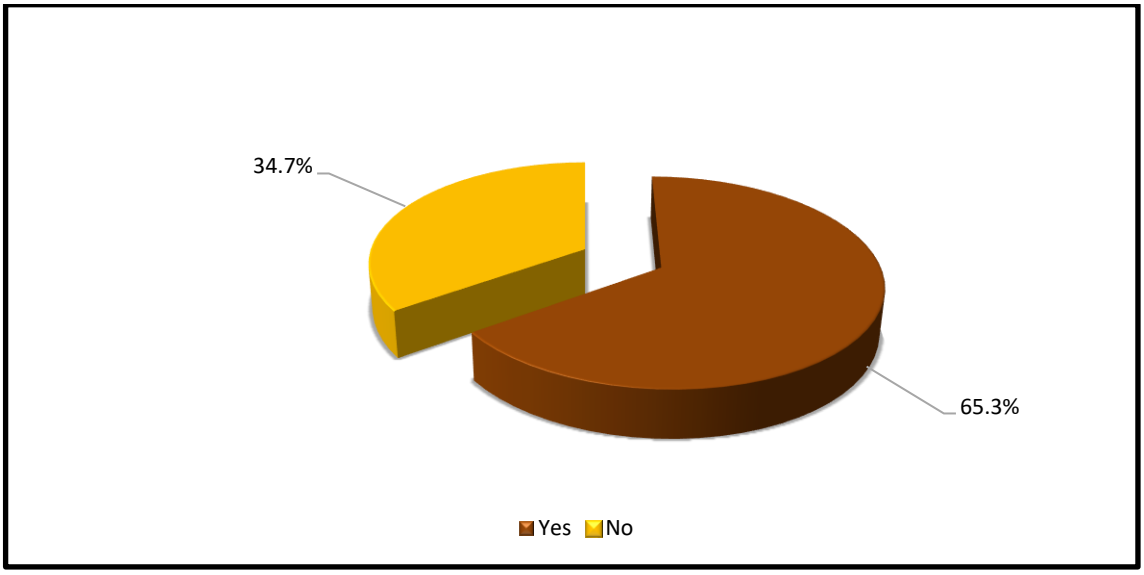

Figure 4.6: Internet Access (N=171) (n=167)

Discussion: The results indicate that the majority of participants (n=109; 65.3%) had Internet access, while 58 (34.7%) did not. This data strengthens the possibility of creating an online course about vaccination for HCWs.

4.2.7 Active e-mail address

Figure 4.7 indicates how many participants had an active e-mail address. Of the 171 participants, 3 (1.8%) did not answer the question on e-mail address.

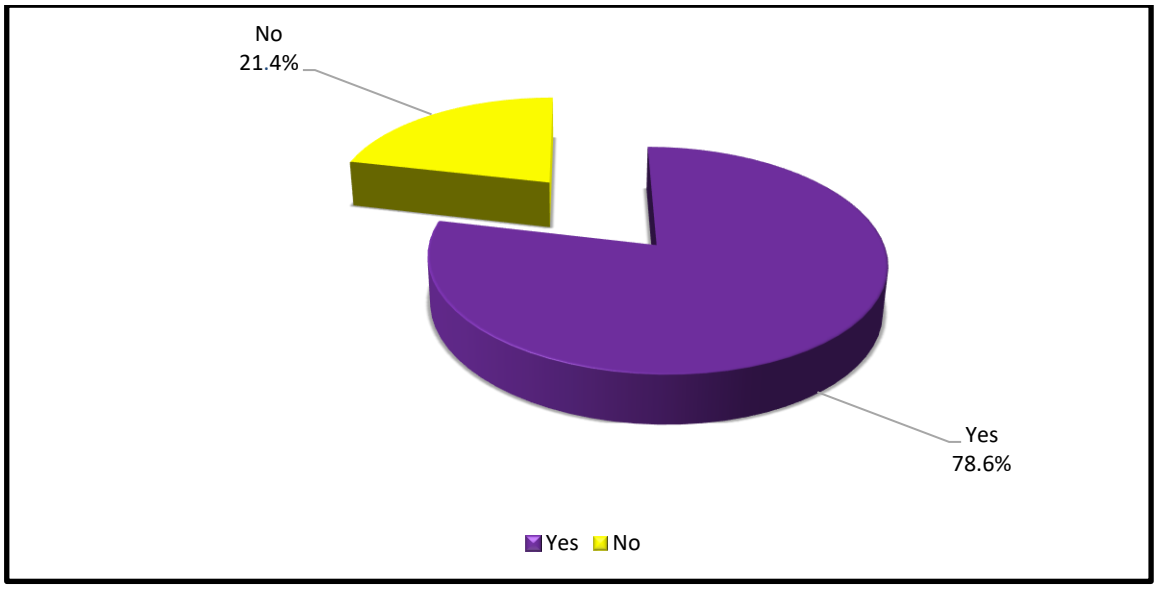

Figure 4.7: Active e-mail address (N=171) (n=168)

Discussion: The results indicate that the majority of the participants (n=132; 78.6%) had an active e-mail address, while 36 (21.4%) did not. These results show that any online or other courses could potentially be advertised over e-mail since it seems it might reach the majority.

4.2.8 Mode of Transportation

Figure 4.8 indicates the mode of transportation utilised by participants. Of the 171 participants, 8 (4.9%) did not answer the question on the mode of transportation.

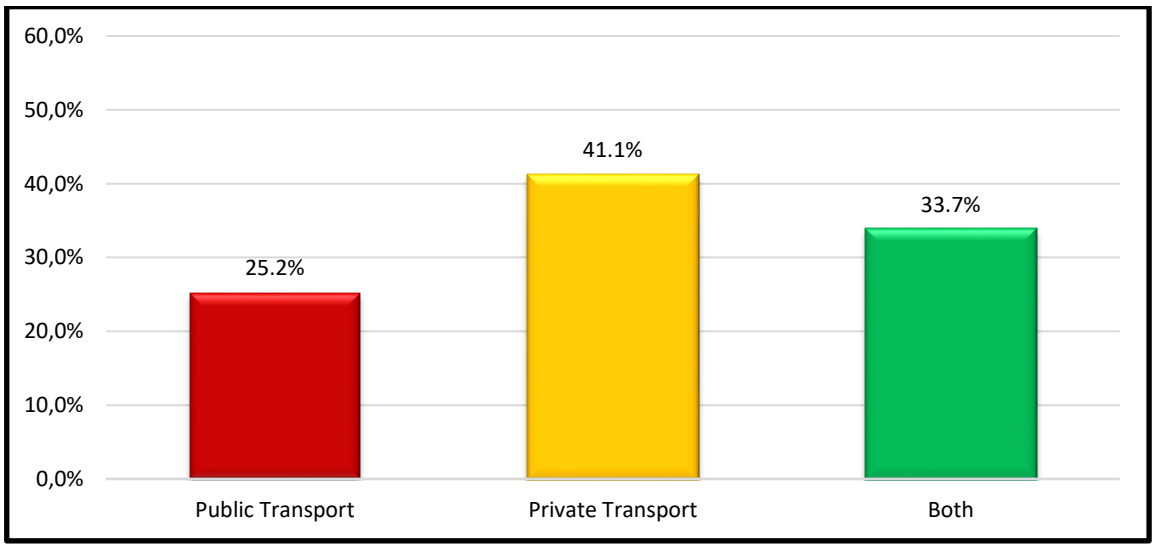

Figure 4.8: Mode of Transportation (N=171) (n=163)

Discussion: Figure 4.8 indicates that the majority of participants (n=67; 41.1%) made use of private transport to get around, followed by 55 (33.7%) of participants that made use of both public and private transport, while the minority (n=41; 25.2%) made use of only public transport. It appears that the majority of participants (n=163; 95.3%) had a means to get around. Therefore, it can be argued that no matter the mode of transport used, they would be able to attend iCAM sessions at an active satellite site located closest to them.

4.2.9 Interactive Communication and Management facility access

Table 4.1 indicates how many of the participants had access to iCAM facilities. Of the 171 participants, 4 (2.3%) did not answer the question.

Table 4.1: Interactive Communication and Management facility access (N=171) (n=167)

	N	Response options	
		Yes	No
Access to iCAM	167	52.1%	47.9%

Discussion: The results indicate that just over half of the participants (n=87; 52.1%) had access to iCAM facilities, while 80 (47.9%) did not. iCAM can be used as a platform to distribute information about vaccination or present a course on vaccination. It creates one classroom in many locations. Access to the sites is important if it ought to be used for educational purposes.

4.3 ANALYSIS RELATED TO KNOWLEDGE

In order to establish the level of knowledge participants have about vaccination and policies related to it, data was collected accordingly. This information is presented in the following subsections.

4.3.1 Understanding of the term vaccination

In an open-ended question, the participants were asked to explain in their own words what their understanding of the term vaccination was. A total of 143 participants completed the open-ended question. Only 60 (42.0%) of the participants showed

understanding of the term vaccination. Their explanation of the term vaccination was in line with the definition of vaccination as the act of introducing a vaccine into the body to produce immunity to a specific disease (Centre of Disease Control and Prevention 2018:online). The majority of participants (n=78; 54.6%) incorrectly answered the question, thus showing a misunderstanding of the term vaccination. Of the 143 participants, 5 (3.5%) admitted that they did not know what the term meant. Table 4.2 summarise a few verbatim texts from the open-ended question.

Table 4.2: Understanding of the term Vaccination (N=171) (n=143)

Question	Correct	Reason (Theme)	Verbatim Quotes	Incorrect	Reason (Themes)	Verbatim Quotes
In your own words, explain the term (or your understanding of the term) vaccination. (n=143)	60	Knowledgeable	"Injection of a killed microbe in order to stimulate the immune system against the microbe, thereby preventing disease." "It is the introduction of a vaccine into the human body. To allow the natural biological cellular stimulation to produce immunity to a specific disease." "Treatment with a vaccine to produce immunity against a disease" "Vaccination produce immunity against diseases"	78	Not knowledgeable about vaccination	"I don't know" "I think is an madication but I don't know about it." "Is when you give a person needle stick or hapatitis A virus we say you vaccinate that person" "Prevention of immunity against a disease." "Injection to control infections, etc." "For health reason one need to get vaccinated to protect him from desease, that he might be infected while on duty." "Is an injection we receive from prevent us from any disease"

4.3.2 Knowledge gained from information sources

Figure 4.9 indicates the number of participants who had received information about vaccination. Of the 171 participants, 9 (5.3%) did not answer the question on information gained about vaccination.

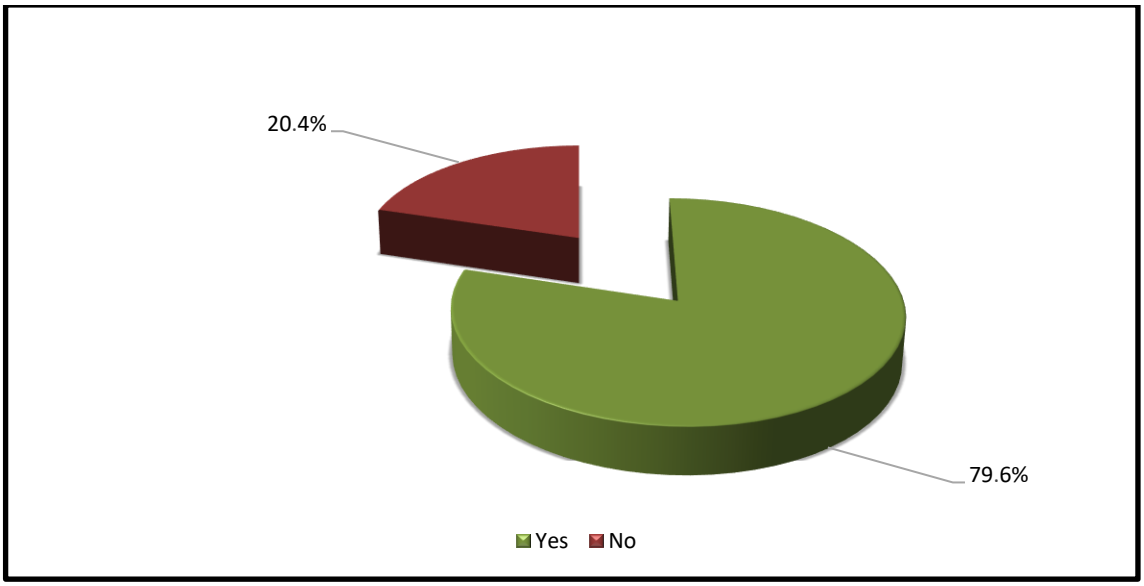

Figure 4.9: Information gained about vaccination (N=171) (n=162)

Discussion: Of the 162 participants that answered the question on whether they gained information about vaccination or not, 129 (79.6%) indicated that they had received information about vaccination while 33 (20.4%) indicated to never have received information about vaccination; thus, leaving a rather large group (20.4%) of paramedics uninformed and ill prepared against vaccine-preventable infections and diseases.

Furthermore, Figure 4.10 indicates the various sources from where information about vaccination was gained. Of the 171 participants, only 129 (79.6%) indicated to have ever received information about vaccination.

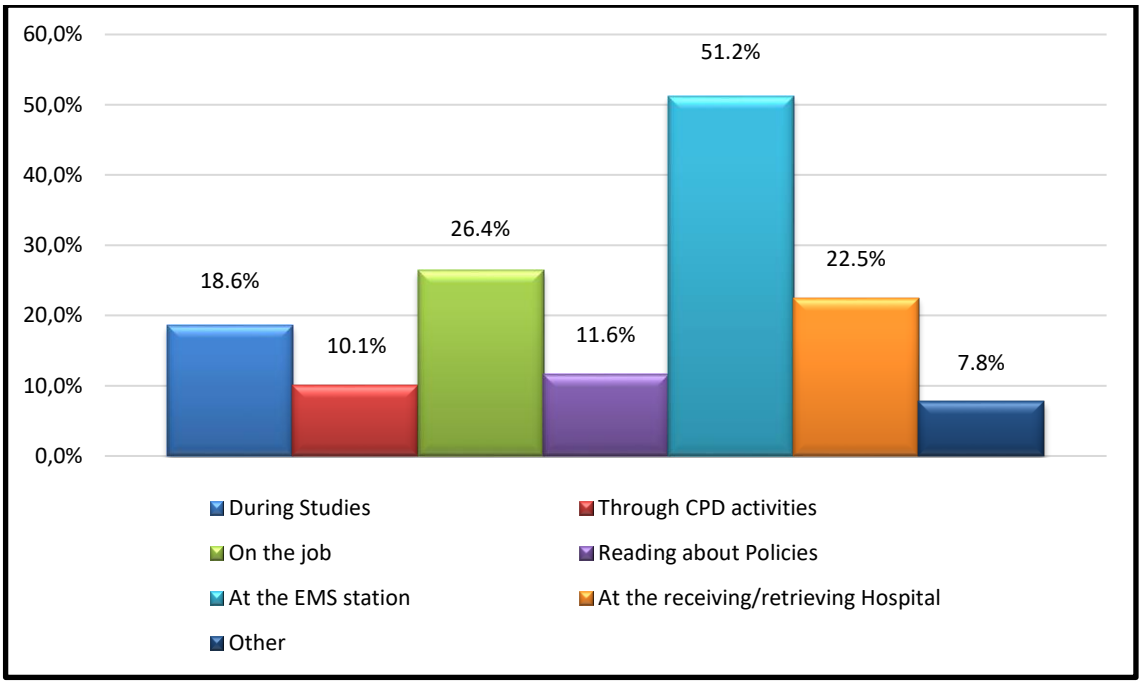

Figure 4.10: Sources of information (N=171) (n=129)

Discussion: Figure 4.10 indicates the various sources from where information about vaccination was gained. Participants were allowed to select more than one option applicable to them. Just over half of the participants (n=66; 51.2%) indicated that they received information about vaccination at their respective EMS stations, followed by 34 (26.4%) who indicated to have received information about vaccination on the job. In addition, 29 (22.5%) of the participants indicated to have received information at receiving/retrieving hospitals, while only 24 (18.6%) indicated to have received information about vaccination during their studies.

A few participants (n=15; 11.6%) indicated to have gained information about vaccination while reading policies. Others (n=13; 10.1%) through engaging in continuous professional development (CPD) activities, while no participant indicated to have received information about vaccination through a Union.

Of the 10 (7.8%) of participants who selected the option "Other" the following examples were given: colleagues, medical doctor, friends, during overseas trips, local clinical, military, non-governmental organisations (NGOs), school, and through an occupational nurse.

4.3.3 Knowledge about vaccinations available for Emergency Medical Services personnel

Figure 4.11 indicates participants' knowledge about vaccination available for EMS personnel.

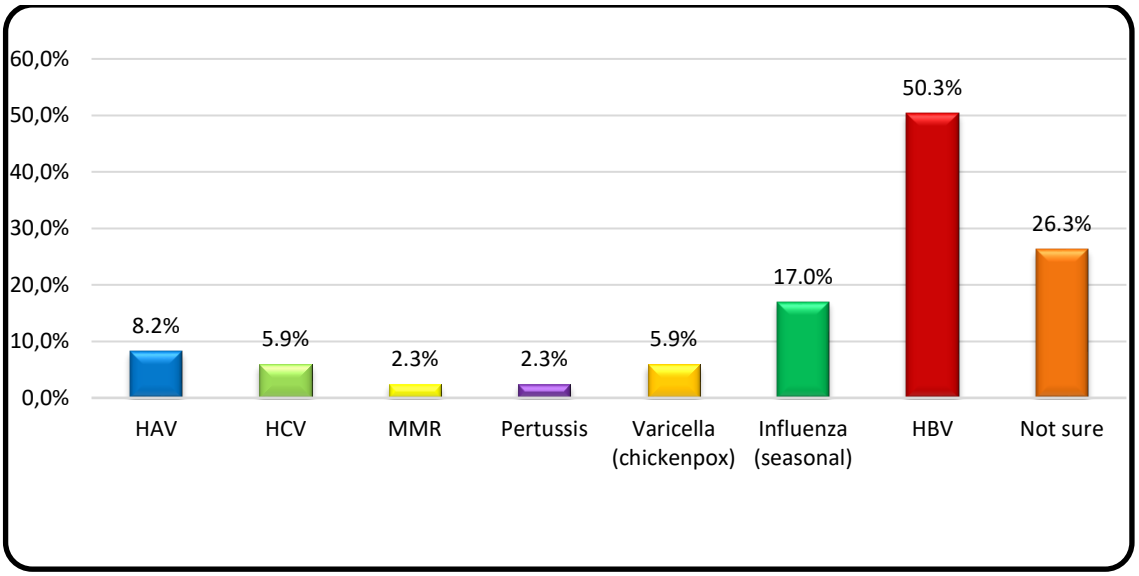

Figure 4.11: Knowledge about vaccination available for Emergency Medical Services personnel (N=171) (n=202)

Discussion: Figure 4.11 indicates the knowledge participants had about the vaccinations available for EMS personnel. Participants were allowed to select more than one option applicable to them. The majority (n=86; 50.3%) of participants knew about HBV vaccines available to EMS personnel, followed by 29 (17.0%) who indicated that Influenza (seasonal) was available to EMS personnel.

A few of the participants knew about Hepatitis A virus {HAV} (n=14; 8.2%), Varicella (n=10; 5.9%), HCV (n=10; 5.9%), MMR (n=4; 2.3%) and Pertussis (n=4; 2.3%) vaccines' availability to EMS personnel. In addition, 45 (26.3%) participants were unsure; hence, it can be argued that they did not know which vaccinations were available for EMS personnel.

4.3.4 Knowledge about recommended vaccinations for Emergency Medical Services personnel

Figure 4.12 indicates participants' knowledge about recommended vaccinations for EMS personnel.

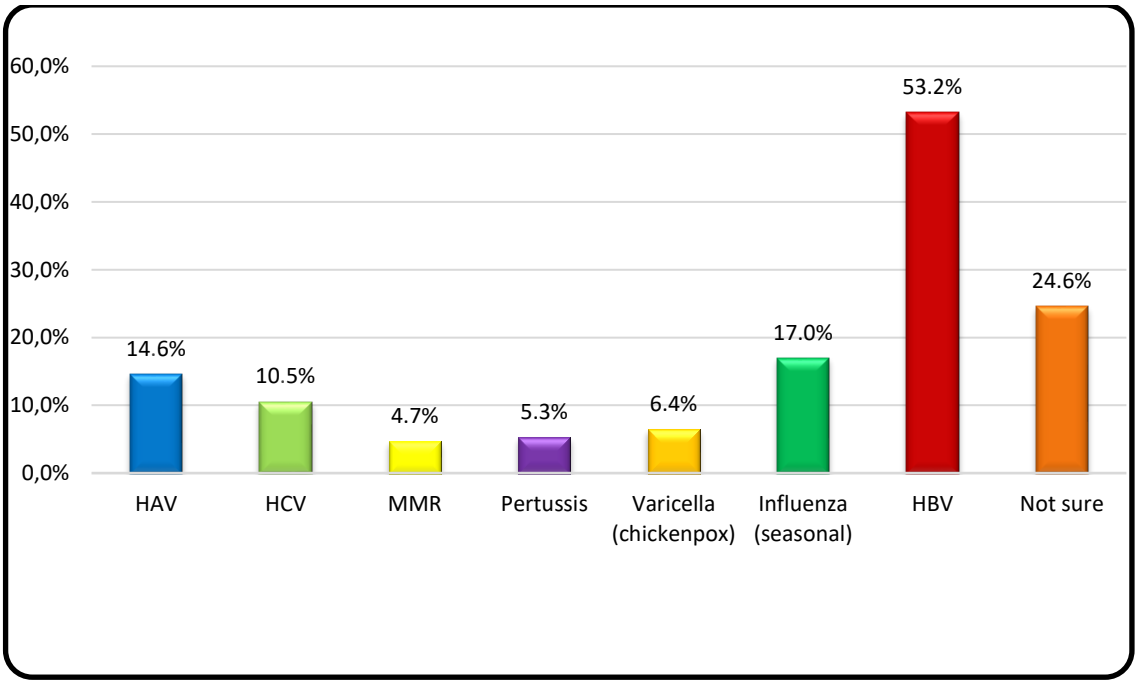

Figure 4.12: Recommended vaccinations for Emergency Medical Services personnel (N=171) (n=233)

Discussion: Figure 4.12 indicates the knowledge participants have about the vaccines recommended for EMS personnel. Participants were allowed to select more than one option applicable to them. Just over half of the participants (n=91; 53.2%) were knowledgeable about HBV vaccines recommended for EMS personnel, followed by 29 (17.0%) who indicated that Influenza (seasonal) was recommended to EMS personnel.

A few of the participants knew about HAV (n=25; 14.6%), HCV (n=18; 10.5%), Varicella (n=5; 6.4), Pertussis (n=9; 5.3%) and MMR (n=8; 4.7%) vaccines recommended for EMS personnel. In addition, 42 (24.6%) of participants were unsure, hence it can be argued that they did not know which vaccinations were recommended for EMS personnel.

4.3.5 Self-evaluated knowledge of vaccinations

Table 4.3 indicates participants' self-evaluated knowledge of vaccinations and policies related to it.

Table 4.3: Self-evaluated knowledge of vaccination (N=171)

	n	Response options		
		Agree	**Disagree**	**Don't know**
Sufficient knowledge about vaccinations	167	32.3%	47.9%	19.8%
Familiar with national policy on vaccination for health professionals	166	21.7%	56.0%	22.3%
No provincial vaccination policies for health professionals within the public sector of the Free State Province exists	165	12.1%	43.0%	44.9%
Understand obligation towards vaccination as a health professional	163	49.1%	27.6%	23.3%
Being vaccinated serves as protection against vaccine-preventable diseases	167	81.4%	3.6%	15.0%
Vaccination poses the risk of becoming infected with the specific disease one is vaccinated against	164	31.1%	30.5%	38.4%

Discussion: In this question participants had to self-evaluate their knowledge of vaccinations and policies related to it by selecting either Agree, Disagree or Don't know from the statements provided. Of the 167 (97.7%) participants who responded to the statement on whether or not their knowledge about vaccinations were sufficient, 80 (47.9%) disagreed with the statement, while a few (n=54; 32.3%) agreed with the statement and 33 (19.8%) indicated that they did not know.

Regarding the statement of being familiar with national policy on vaccination for health professionals, only 166 (97.1%) of the 171 participants responded to the statement. Just over half (n=93; 56.0%) indicated that they disagreed with the statement of them being familiar with the national policy on vaccination for health professionals, while a few (n=36; 21.7%) agreed with the statement and 37 (22.3%) indicated that they did not know.

Regarding the statement that no provincial vaccination policies for health professionals within the public sector of the Free State Province exists, only 165 (96.5%) of the 171

participants answered the statement. A total of 71 (43.0%) indicated that they disagreed with the statement, hence indicating that there are provincial vaccination policies for health professionals within the public sector of the Free State Province. A few (n=20; 12.1%) indicated that they agreed with the statement, while 74 (44.9%) indicated that they did not know.

Regarding the statement that participants understand their obligation towards vaccination as health professionals, only 163 (95.3%) of the 171 participants responded to the statement. A total of 80 (49.1%) indicated that they agreed with the statement, while a few (n=45; 27.6%) disagreed with the statement and 38 (23.3%) indicated that they did not know.

Regarding the statement of being vaccinated serves as protection against vaccine-preventable diseases, only 167 (97.7%) of the 171 participants answered the statement. The majority (n=136; 81.4%) indicated that they agreed with the statement, while the minority (n=6; 3.6%) disagreed with the statement and 25 (15.0%) indicated that they did not know.

Regarding the statement of vaccination posing a risk of becoming infected with the specific disease one is vaccinated, only 164 (95.9%) of the 171 participants answered the statement. A similar number agreed (n=51; 31.1%) and disagreed (n=50; 30.5%) with the statement, while the majority (n=63; 38.4%) indicated that they did not know.

4.3.6 Self-evaluated knowledge about safe practices in Emergency Medical Services

Table 4.4 indicates participants' self-evaluated knowledge about safe practices in EMS.

Table 4.4: Self-evaluated knowledge about safe practices in Emergency Medical Services (N=171)

	n	Response options		
		Agree	Disagree	Don't know
Needles can be recapped for safety purposes, only if a sharps container is not immediately available	163	57.7%	35.6%	6.7%
N95 face masks should only be worn when the risk of inhaling airborne pathogens are confirmed	166	55.4%	39.8%	4.8%
Gloves are recommended only when the risk of exposure to blood is present	169	14.8%	82.2%	3.0%
Safety goggles are recommended only when the risk of flying debris is present on an emergency scene	166	20.5%	71.1%	8.4%

Discussion: In this question, participants had to self-evaluate their knowledge about safe practices in EMS by selecting either Agree, Disagree or Don't know from the statements provided. Only 163 (95.3%) participants responded to the statement that needles can be recapped for safety purposes only if a sharps container is not immediately available. A total of 94 (57.7%) agreed with the statement, while 58 (35.6%) disagreed with the statement and only 11 (6.7%) indicated that they did not know.

Regarding the statement that N95 face masks should only be worn when the risk of inhaling airborne pathogens are confirmed, only 166 (97.1%) of the 171 participants responded to the statement. Just over half of the participants (n=92; 55.4%) indicated that they agreed with the statement, while 66 (39.8%) disagreed with the statement and the minority (n=8; 4.8%) indicated that they did not know.

Regarding the statement that medical gloves are recommended only when the risk of exposure to blood is present, 169 (98.8%) of the 171 participants responded to the statement. The majority (n=139; 82.2%) indicated that they disagreed with the statement, while 25 (14.8%) agreed with the statement and the minority (n=5; 3.0%) indicated that they did not know.

Regarding the statement that safety goggles are recommended only when the risk of flying debris is present on an emergency scene, only 166 (97.1%) of the 171 participants responded to the statement. The majority (n=118; 71.1%) indicated that they disagreed

with the statement, while 34 (20.5%) agreed with the statement and the minority (n=14; 8.4%) indicated that they did not know.

4.3.7 Knowledge of infection through direct contact with contaminated blood and bodily fluids

Figure 4.13 indicates participants' knowledge of being infected through direct contact with contaminated blood and bodily fluids. Of the 171 participants, only 165 (96.5%) answered the question.

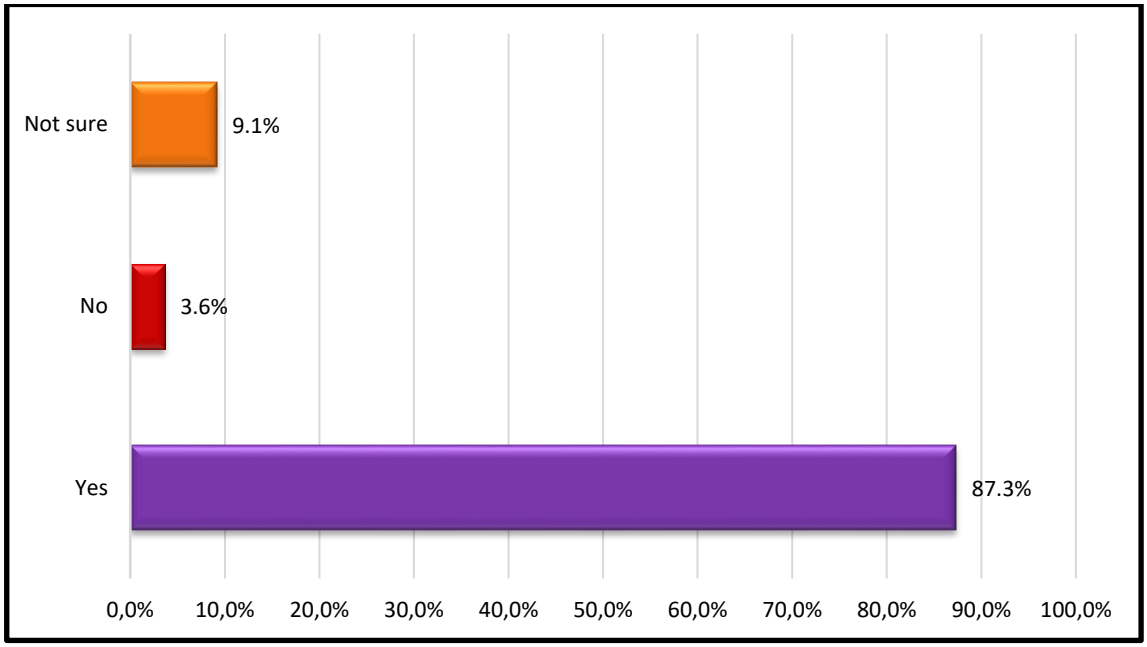

Figure 4.13: Knowledge of infection through direct contact with contaminated blood and bodily fluids (N=171) (n=165)

Discussion: Regarding the question on participants' knowledge of being infected through direct contact with contaminated BBF, the majority (n=144; 87.3%) indicated that they knew that one can be infected through direct contact with contaminated BBF, while 6 (3.6%) indicated that you could not and 15 (9.1%) indicated that they were not sure.

4.3.8 Knowledge about occupational health and safety

Table 4.5 indicates participants' knowledge about OHS.

Table 4.5: Knowledge about occupational health and safety (N=171)

	n	Response options		
		Yes	**No**	**Not sure**
Have an Occupational Health and Safety representative at EMS facility/station	169	49.1%	37.9%	13.0%
Know all due processes post-exposure to blood and bodily fluids and/or needlestick injury	168	54.8%	23.8%	21.4%

Discussion: In this question, participants' knowledge about OHS was tested. Of the 169 (98.8%) participants who responded to the question on whether or not they had an OHS representative at their facility/station, 83 (49.1%) indicated that they did, while 64 (37.9%) indicated that they did not. Of the 169 participants that answered the question, 22 (13.0%) of participants indicated that they were not sure.

Regarding the questions on whether participants knew all due processes post-exposure to BBF and/or NSI, only 168 (98.3%) of the 171 participants answered the question. Just over half (n=92; 54.8%) indicated that they did know, while 40 (23.8%) indicated that they did not know. Of the 168 participants that answered the question, only 36 (21.4%) participants indicated that they were not sure.

4.4 ANALYSIS RELATED TO ATTITUDES

In order to establish the attitudes participants have about vaccination and policies related to it, data were collected accordingly. This information is presented in the following subsections.

4.4.1 Attitudes towards wearing personal protective equipment

Figure 4.14 indicates participants' attitudes towards wearing PPE. Of the 171 participants, only 169 (98.8%) answered this question.

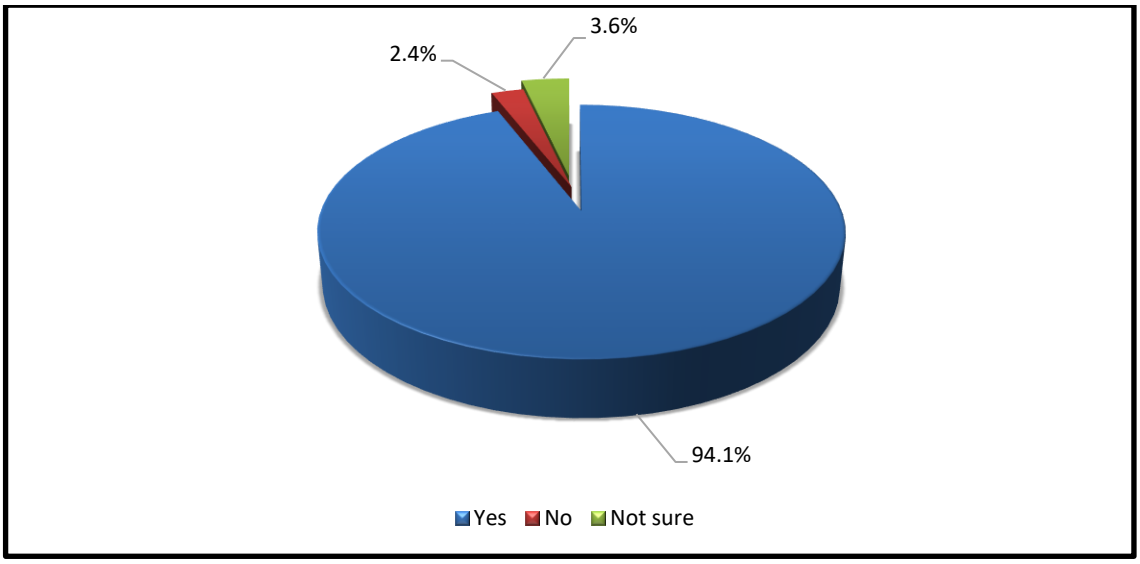

Figure 4.14: Attitudes towards wearing personal protective equipment (N=171) (n=169)

Discussion: In this question, participants' attitudes towards wearing PPE were assessed. The participants were provided with the following options: Yes, No or Not sure in question 3.1 of the questionnaire. Of the 169 (98.8%) participants who responded to the question, the majority (n=159; 94.1%) indicated that wearing PPE is important when treating patients, while 4 (2.4%) indicated that it was not. Of the 169 participants that answered the question only 6 (3.6%) of participants indicated that they were not sure whether wearing PPE when treating patients were important. This was a positive finding as the majority of participants identifies the importance of wearing PPE when treating patients.

A total of 142 participants completed the open-ended section where they were required to explain their answer on whether they think wearing PPE is important when treating patients. Of the 142 participants, 127 (89.4%) correctly indicated that PPE are important equipment used to minimise and/or prevent occupationally acquired hazards or diseases that may pose a threat to themselves, colleagues and/or patients. Only 15 (10.6%) of participants wrongly indicated the importance of PPE when treating patients.

4.4.2 Attitudes towards vaccinations against vaccine-preventable infections

Figure 4.15 indicates participants' attitudes towards the importance for paramedics to be vaccinated against vaccine-preventable infections. Of the 171 participants only 167 (97.7%) answered the question.

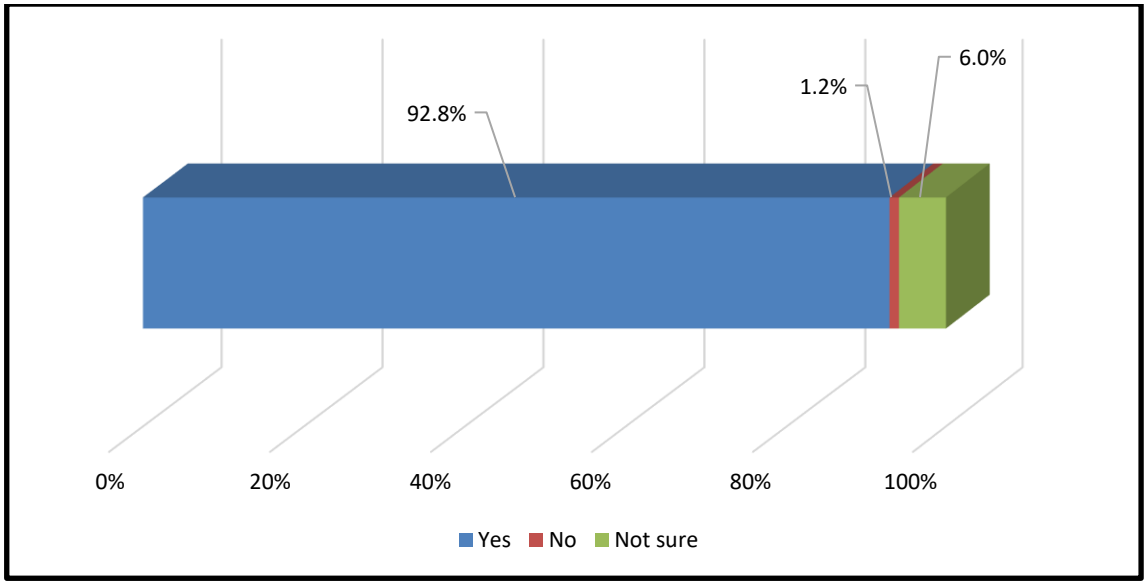

Figure 4.15: Attitudes towards vaccinations against vaccine-preventable infections (N=171) (n=167)

Discussion: In this question, participants' attitudes towards vaccinations against vaccine-preventable infections were assessed. Of the 167 participants who responded to the question, the majority (n=155; 92.8%) indicated that it is important for paramedics to be vaccinated against vaccine-preventable infections, while 2 (1.2%) indicated that it was not. Of the 167 participants that answered the question, only 10 (6.0%) participants indicated that they were not sure whether it is important for paramedics to be vaccinated against vaccine-preventable infections.

A total of 131 (76.6%) participants completed the open-ended section where they were required to explain their answer on whether or not they thought it is important for paramedics to be vaccinated against vaccine-preventable infections. Of the 131 participants, 121 (92.4%) correctly indicated that it is important for paramedics to be vaccinated against vaccine-preventable infections. Paramedics are in the front line and thus at increased risk when treating patients. Hence, they require protection in the form of vaccination, against contracting and/or spreading extremely dangerous vaccine-

preventable BBPs to colleagues, family and patients. Only 10 (7.6%) participants wrongly indicated that it is not important for paramedics to be vaccinated against vaccine-preventable infections.

4.4.3 Attitudes towards Hepatitis B only vaccination

Figure 4.16 indicates participants' attitudes towards HB only vaccination. Of the 171 participants, only 169 (98.8%) answered this question.

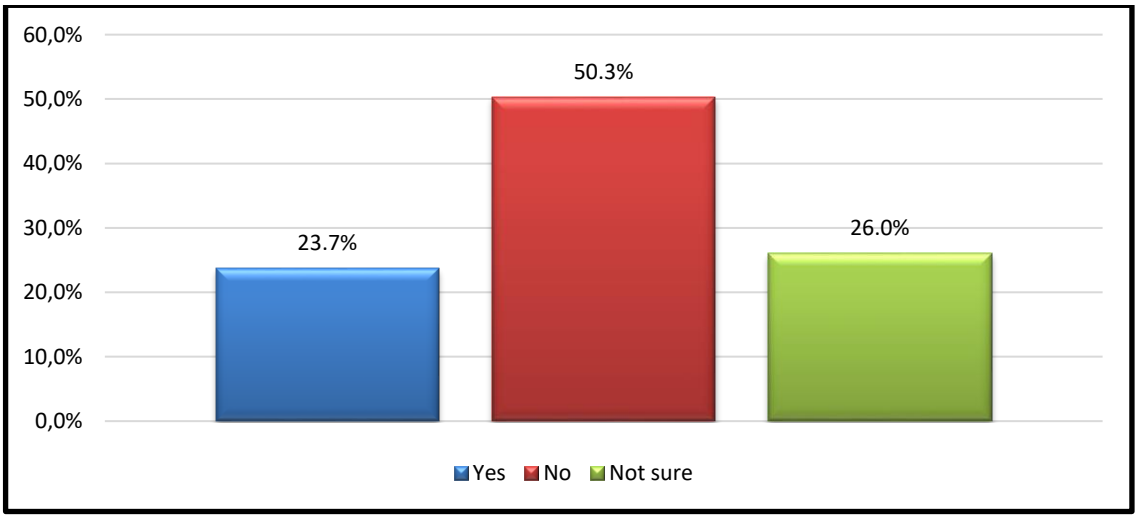

Figure 4.16: Attitudes towards Hepatitis B only vaccination (N=171)(n=169)

Discussion: In this question, participants' attitudes towards HB being sufficient as the only vaccination to ensure the protection of paramedics against vaccine-preventable diseases were assessed. Of the 169 participants who responded to the question, half of the participants (n=85; 50.3%) indicated that it was not, while 40 (23.7%) indicated that it was. In addition, of the 169 participants that answered the question, 44 (26.0%) indicated that they were not sure whether HB only vaccination was sufficient to ensure the protection of paramedics against vaccine-preventable diseases.

4.4.4 Agreement and disagreement about vaccination practices

Table 4.6 indicates participants' opinions on whether they agree or disagree with statements about vaccination practices.

Table 4.6: Agreement and disagreement about vaccination practices (N=171)

	n	Response options		
		Agree	**Disagree**	**Don't know**
Enough emphasis is placed on how paramedics can be protected against vaccine-preventable infections	167	27.0%	47.3%	25.8%
I would attend a CPD session on vaccinations where applicable policies and procedures regarding it are explained and/or discussed	168	91.7%	3.6%	4.8%
I would benefit from receiving additional information about vaccination	168	95.2%	1.8%	3.0%
I would inform other co-workers if and when they would do something that would expose them and others to risk	169	94.1%	1.2%	4.7%
Vaccination should be enforced upon all pre-hospital EMS personnel treating patients	165	89.1%	5.5%	5.5%
No pre-hospital EMS personnel involved in patient care should be allowed to practice without receiving the vaccinations as prescribed/recommended by National Health	165	73.3%	16.4%	10.3%

Discussion: In Table 4.6, participants had to either Agree, Disagree or indicate that they Don't know from the statements provided about vaccination practices. Regarding the statement on whether enough emphasis is placed on how paramedics can be protected against vaccine-preventable infections, only 167 (97.7%) participants responded to the statement. A total of 79 (47.3%) disagreed with the statement, implying that not enough emphasis is placed on how paramedics can be protected against vaccine-preventable infections. A few (n=45; 27.0%) agreed with the statement, while 43 (25.8%) indicated that they did not know.

Regarding the statement on whether participants' would attend a CPD session on vaccinations where applicable policies and procedures regarding it are explained and/or discussed, only 168 (98.3%) of the 171 participants answered the statement. The majority (n=154; 91.7%) agreed with the statement, implying that they would attend a CPD session on vaccinations where all applicable policies and procedures regarding it are explained and/or discussed. The minority (n=6; 3.6%) disagreed with the statement, while 8 (4.8%) indicated that they did not know.

Regarding the statement on whether participants would benefit from receiving additional information about vaccination, only 168 (98.3%) of the 171 participants responded to the statement. The majority (n=160; 95.2%) agreed with the statement, implying that they would benefit from receiving additional information about vaccination. The minority (n=3; 1.8%) disagreed with the statement while 5 (3.0%) indicated that they did not know.

Regarding the statement on whether participants would inform other co-workers if and when they would do something that would expose them and others to risk, only 169 (98.8%) of the 171 participants answered the statement. The majority (n=159; 94.1%) agreed with the statement, while the minority (n=2; 1.2%) disagreed with the statement and 8 (4.7%) indicated that they did not know.

Regarding the statement on whether vaccination should be enforced upon all pre-hospital EMS personnel treating patients, only 165 (96.5%) of the 171 participants answered the statement. The majority (n=147; 89.1%) agreed with the statement, implying that they would welcome mandatory vaccination policies. A similar number of participants disagreed (n=9; 5.5%) and indicated that they did not know (n=9; 5.5%).

Regarding the statement that no pre-hospital EMS personnel involved in patient care should be allowed to practice without receiving the vaccinations as prescribed/ recommended by National Health, only 165 (96.5%) of the 171 participants responded to the statement. The majority (n=121; 73.3%) agreed with the statement, while a few (n=27; 16.4%) disagreed with the statement and 17 (10.3%) indicated that they did not know.

4.5 ANALYSIS RELATED TO PRACTICES

In order to determine the personal practices of participants with regards to vaccinations and policies related to it, data was collected accordingly. This information is presented in the following subsections.

4.5.1 Personal practices with regards to vaccinations and safety

Table 4.7 indicates participants' personal practices with regards to vaccinations and safety.

Table 4.7: Personal practices with regards to vaccinations and safety (N=171)

	n	Response options		
		Yes	**No**	**Not sure**
Received all childhood immunisations	169	65.1%	4.1%	30.8%
Affiliated with a humanitarian aid organisation	164	8.5%	79.3%	12.2%
Ever travelled abroad	146	42.5%	57.5%	0%

Discussion: In Table 4.7, participants had to either answer Yes, No or Not sure from the questions provided about personal practices with regards to vaccinations and safety. Regarding the question on whether participants have received all their childhood immunisations, only 169 (98.8%) of the participants answered the question. The majority (n=110; 65.1%) indicated that they did, while the minority (n=7; 4.1%) indicated that they did not. Of the 169 participants that answered the question, 52 (30.8%) indicated that they were not sure whether they had received all childhood immunisations.

Regarding the question on whether participants were affiliated with a humanitarian aid organisation, only 164 (95.9%) of the participants answered the question. The majority (n=130; 79.3%) indicated that they were not. However, only 14 (8.5%) indicated that they were affiliated with a humanitarian aid organisation, while 20 (12.2%) indicated that they were not sure.

Regarding the question on whether participants ever travelled abroad, only 146 (85.4%) of the participants answered the question. A total of 84 (57.5%) indicated that they never travelled abroad, while 62 (42.5%) indicated that they did. Of the 146 participants that answered the question, no one indicated they were not sure.

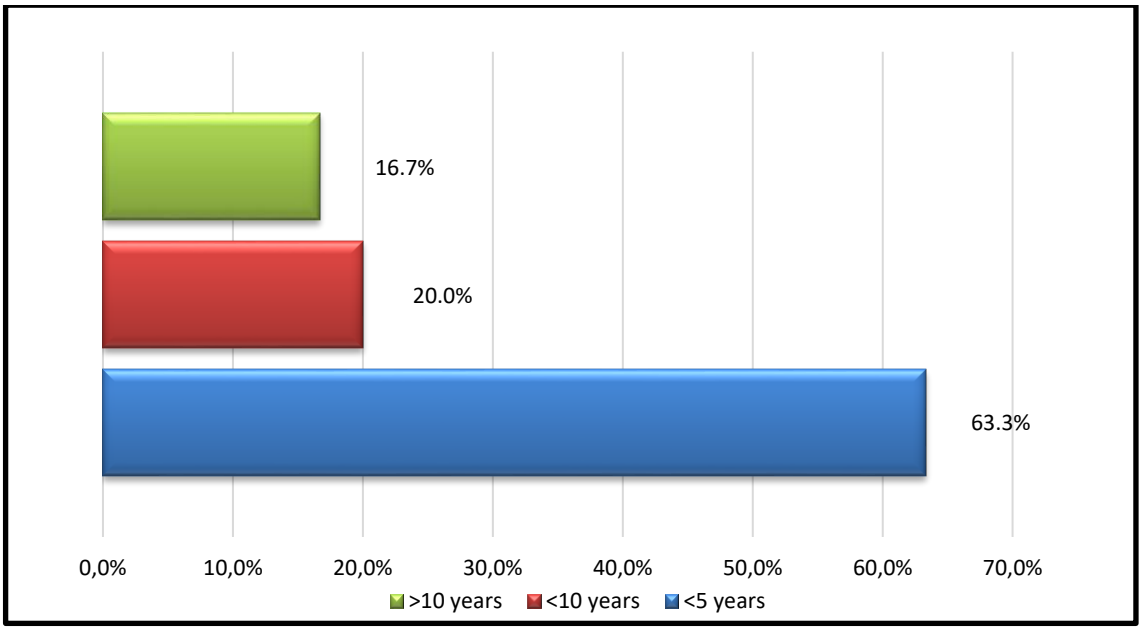

Figure 4.17: Last travelled abroad in years (N=171) (n=62)

Of the 62 (42.5%) participants that answered the question on whether they ever travelled abroad (cf. Table 4.7), as many as 38 (63.3%) indicated that the last time they travelled abroad was <5 years, while 12 (20.0%) indicated <10 years and 10 (16.7%) indicated >10 years, as illustrated in Figure 4.17.

In a follow-up question, participants were asked whether any vaccinations were required in the country they travelled to, of which the majority (n=44; 71.0%) indicated that no vaccinations were required. A few (n=12; 19.4%) indicated that there was vaccinations required in the country they travelled to, while 6 (9.7%) indicated that they were not sure.

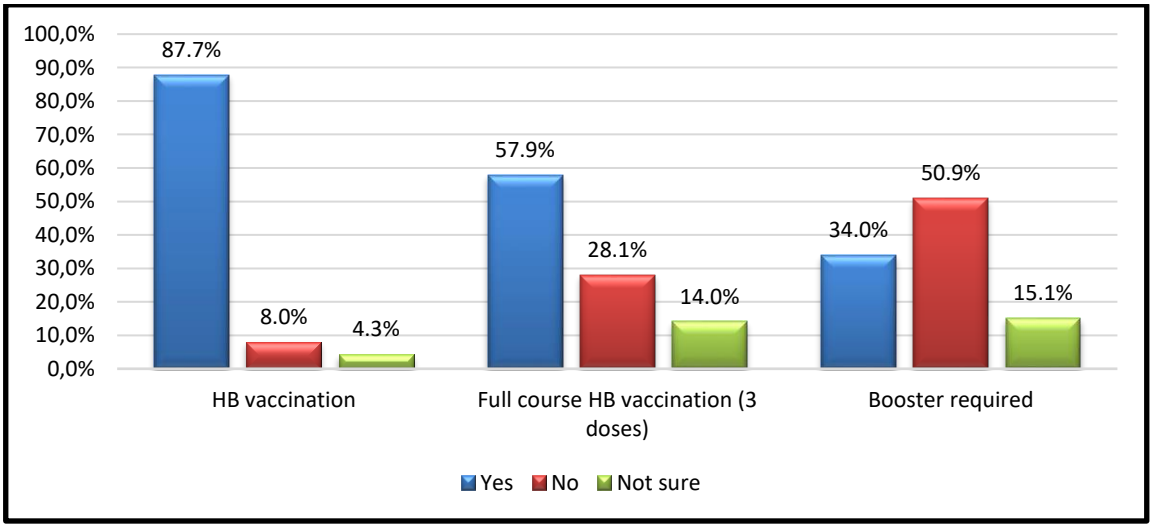

Figure 4.18: Vaccination against Hepatitis B (N=171)

Regarding the question on whether participants have been vaccinated against HB, only 163 (95.3%) of the participants responded to the question (cf. Figure 4.18). The majority (n=143; 87.7%) indicated that they had been vaccinated against HB, while only 13 (8%) indicated they were not. Of the 163 participants that answered the question, 7 (4.3%) indicated they were not sure.

In a follow-up question (cf. Figure 4.18), participants who answered "Yes" (87.7%) were asked whether they completed the full course (all three doses) of HB vaccination, of which over half (n=95; 57.9%) indicated that they did. A few (n=46; 28.1%) indicated that they did not complete the full course of HB vaccination, while 23 (14%) indicated that they were not sure. However, there is a 30% deviation between participants that initially indicated that they have been vaccinated against HB and those that actually completed the course.

Regarding the question where participants who answered "Yes" to being vaccinated against HB were asked whether they were ever required to take a booster dose of HB vaccine, half (n=81; 50.9%) indicated that they were not. Of the participants that responded to the question, 54 (34.0%) indicated that they were, while 24 (15.1%) indicated that they were not sure.

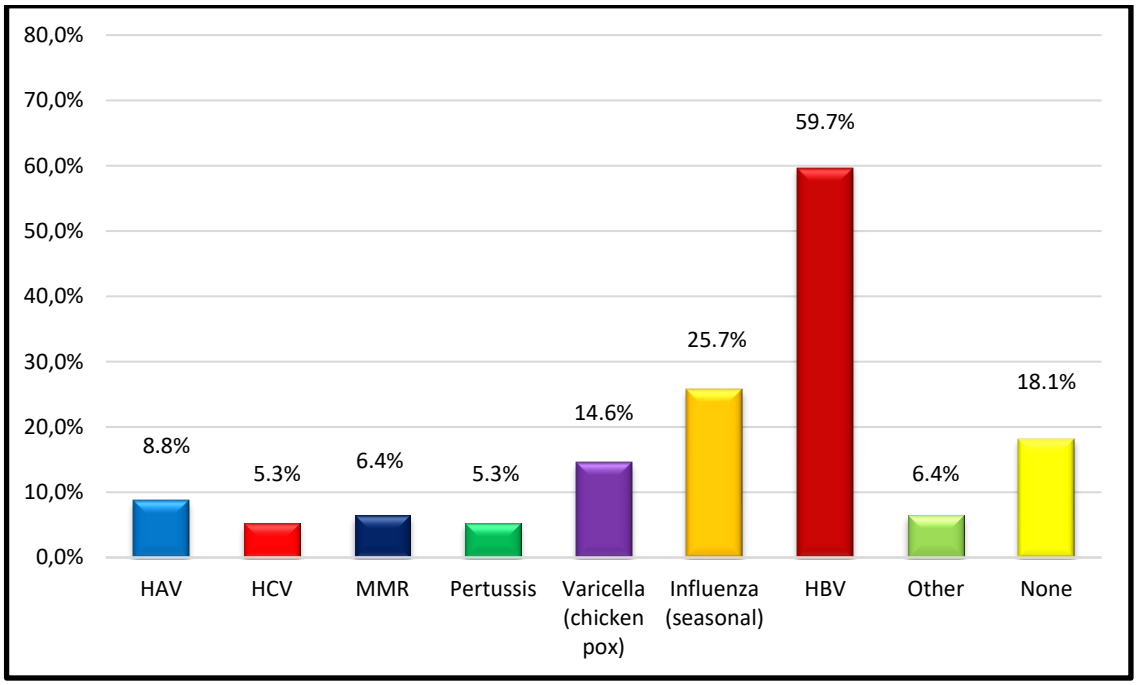

Figure 4.19: Vaccine-preventable infections vaccinated against (N=171) (n=257)

Figure 4.19 indicates the vaccine-preventable infections participants have been vaccinated against. Participants were allowed to select more than one option applicable to them. A total of 102 (59.7%) indicated they were vaccinated against HBV, followed by 44 (25.7%) who indicated to be vaccinated against Influenza (seasonal).

A few of the participants indicated to be vaccinated against Varicella (n=25; 14.6%), HAV (n=15; 8.8%), MMR (n=11; 6.4%), Pertussis (n=9; 5.3%) and HCV (n=9; 5.3%).

Of the 11 (6.4%) of participants who selected the option "Other", the following examples were provided as additional vaccine-preventable infections. These include: swine flu, yellow fever, and polio, which was probably indicated by the group of participants who indicated that they have travelled abroad. One of the reasons for travelling abroad in this sample could be work or practice related e.g. to provide humanitarian aid to countries left in ruin following a natural disaster.

Additionally, 31 (18.1%) of the participants indicated that they had not been vaccinated against any vaccine-preventable infection.

The 11 (6.4%) participants who selected the "Other" option provided the following examples: HIV, HBV, swine flu, yellow fever and polio. However, there is no vaccine for HIV, which implies that the participant wrongly indicated to be vaccinated against the disease.

4.5.2 Use of minimum Personal Protective Equipment when treating a patient

Table 4.8 indicates participants' practice regarding their use of minimum PPE when treating patients.

Table 4.8: Use of minimum Personal Protective Equipment when treating a patient (N=171)

	n	Response options		
		Yes	No	Not sure
Wears N95 mask every time when treating a patient	165	7.3%	91.5%	1.2%
Wears safety goggles every time when treating a patient	164	7.9%	89.6%	2.4%
Wears disposable medical gloves every time when treating a patient	166	68.1%	29.5%	2.4%

Discussion: In Table 4.8 participants had to either answer Yes, No or Not sure from the questions provided about their use of minimum PPE when treating a patient. Regarding the question on whether participants wear a N95 mask every time when treating a patient, only 165 (96.5%) of the participants answered the question. The majority (n=151; 91.5%) indicated that they did not, while the minority (n=12; 7.3%) indicated that they did. Of the 165 participants that answered the question, 2 (1.2%) indicated that they were not sure whether they wear a N95 mask every time they treated a patient.

Regarding the question whether participants wear safety goggles every time they treat a patient, only 164 (95.9%) answered the question. The majority (n=147; 89.6%) indicated that they did not, while 13 (7.9%) indicated that they did. Of the 164 participants that answered the question, 4 (2.4%) indicated that they were not sure whether they wear safety goggles every time they treated a patient.

Regarding the question whether participants wear disposable medical gloves every time when treating a patient, only 166 (97.1%) answered the question. A total of 113 (68.1%) indicated that they did, while 49 (29.5%) indicated that they do not. Of the 166 participants that answered the question, 4 (2.4%) indicated that they were not sure whether they wear disposable medical gloves every time when treating a patient.

4.5.3 Exposure to Blood and Bodily Fluids in the past six months

Figure 4.20 indicates participants' exposure to BBF in the past six months. Of the 171 participants, only 165 (96.5%) answered the question.

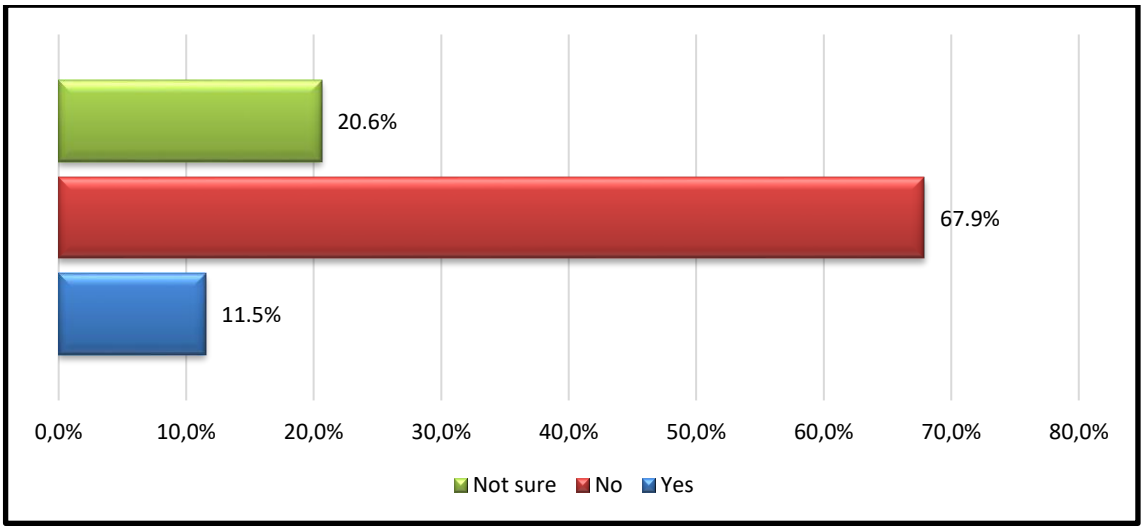

Figure 4.20: Exposure to Blood and Bodily Fluids in the past six months (N=171) (n=165)

Discussion: Regarding the question whether participants had been exposed to BBF in the past six months, a total of 112 (67.9%) indicated that they had not been exposed to BBF in the past six months, while only 19 (11.5%) indicated that they were. Of the 165 participants that answered the question, 34 (20.6%) indicated they were not sure.

In a follow-up question, the 19 (11.5%) participants who were exposed to BBF in the past six months were asked whether they reported the incident to an OHS representative. Just over half (n=10; 52.6%) indicated that they did not, while 9 (47.4%) indicated that they did.

4.5.4 Use of safety device lancets

Figure 4.21 indicates participants' use of safety device lancets. Of the 171 participants, only 165 (96.5%) answered the question.

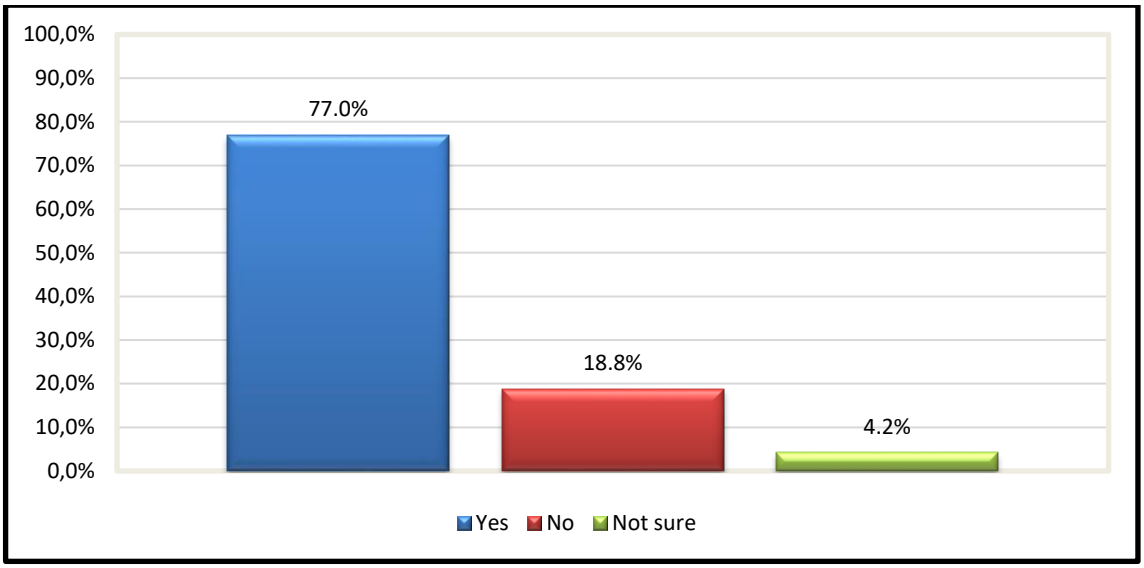

Figure 4.21: Use of safety device lancets (N=171) (n=165)

Discussion: Regarding the question whether participants use safety device lancets every time they perform a Haemo-glucose Test (HGT) on a patient, the majority (n=127; 77.0%) indicated that they did, while 31 (18.8%) indicated that they did not and 7 (4.2%) indicated they were not sure.

4.5.5 Use of hypodermic needles

Figure 4.22 indicates participants' use of hypodermic needles. Of the 171 participants, 166 (97.1%) answered the question.

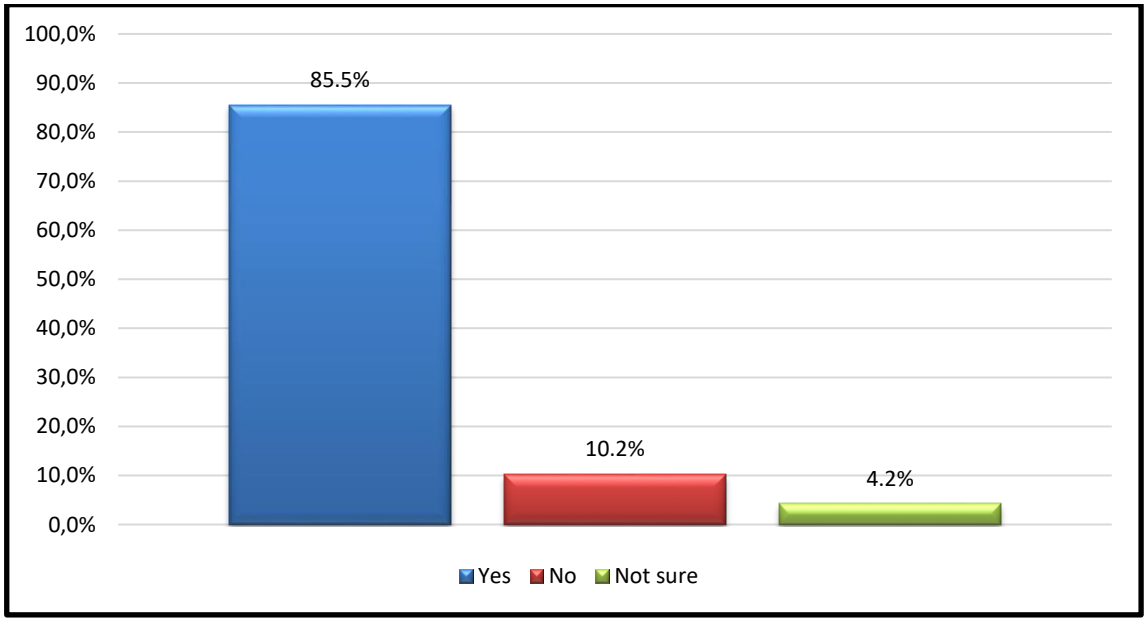

Figure 4.22: Use of hypodermic needles (N=171) (n=166)

Discussion: Regarding the question whether participants at times when a safety device lancet is not readily available, use a hypodermic needle as a replacement to perform a HGT on a patient, the majority (n=142; 85.5%) indicated that they did, while 17 (10.2%) indicated that they did not and 7 (4.2%) indicated that they were not sure.

4.6 EDUCATIONAL REQUIREMENTS

In terms of Educational requirements, participants' interest and preferences considering completing a course on vaccination and policies related to it were tested. The following data pertaining to the latter was collected.

4.6.1 Interest in completing a course on vaccination

Figure 4.23 indicates participants' interest in completing a course on vaccination. Of the 171 participants, only 164 (95.9%) answered the question.

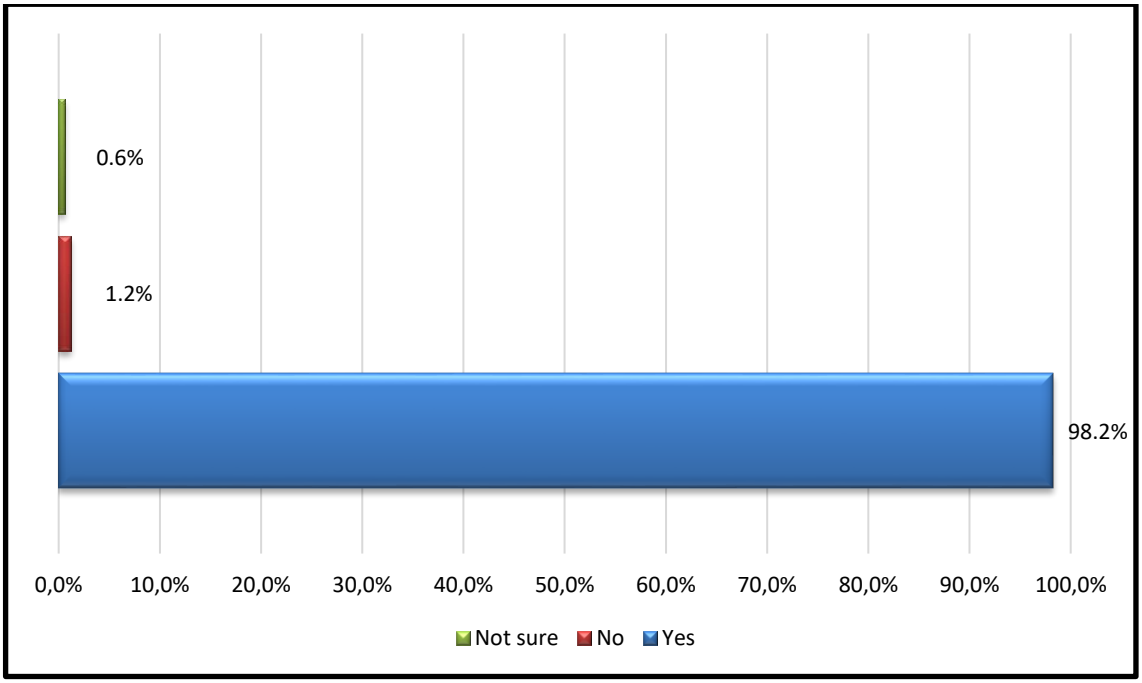

Figure 4.23: Interest in completing a course on vaccination (N=171) (n=164)

Discussion: Regarding the question where participants were asked whether they would be interested in completing a course about vaccination that is specifically designed for pre-hospital EMS personnel, the majority (n=161; 98.2%) indicated that they were, while 2 (1.2%) indicated that they would not and 1 (0.6%) indicated uncertainty in this regard.

4.6.2 Information resource preferences

Figure 4.24 indicates an alternative preference to attending a course. Participants were allowed to select more than one option applicable to them.

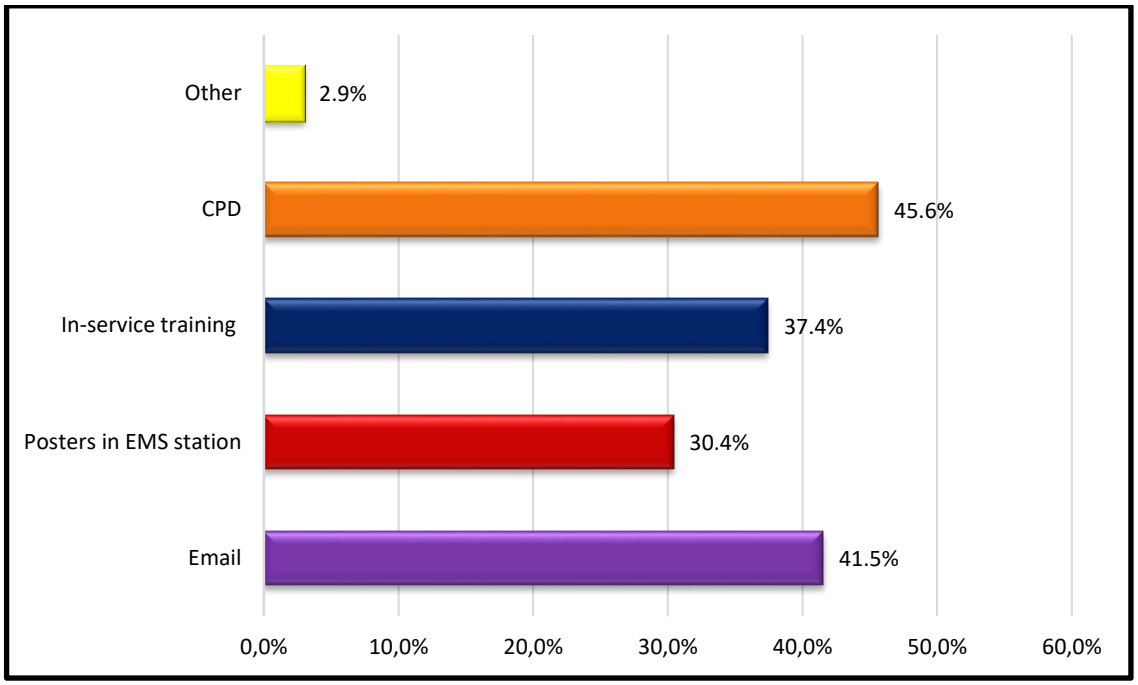

Figure 4.24: Information resource preferences (N=171) (n=270)

Discussion: Regarding the question on how else participants would like to receive information about vaccination as an alternative to attending a course, a total of 78 (45.6%) participants indicated in the form of a CPD session, followed by E-mail (n=71; 41.5%), in-service training (n=64; 37.4%) and posters at EMS stations (n=52; 30.4%). Participants were allowed to select more than one option applicable to them.

The 5 (2.9%) participants who selected the option "Other", provided the following examples as additional information resource preferences: booklets issued to them, information to be accessed at the EMS college, formal policy and academic literature, and social media networks e.g. WhatsApp group.

4.6.3 Opinion about the obtainment of additional information

Figure 4.25 indicates participants' opinions about the obtainment of additional information about vaccination. Of the 171 participants, only 161 (94.2%) answered the question.

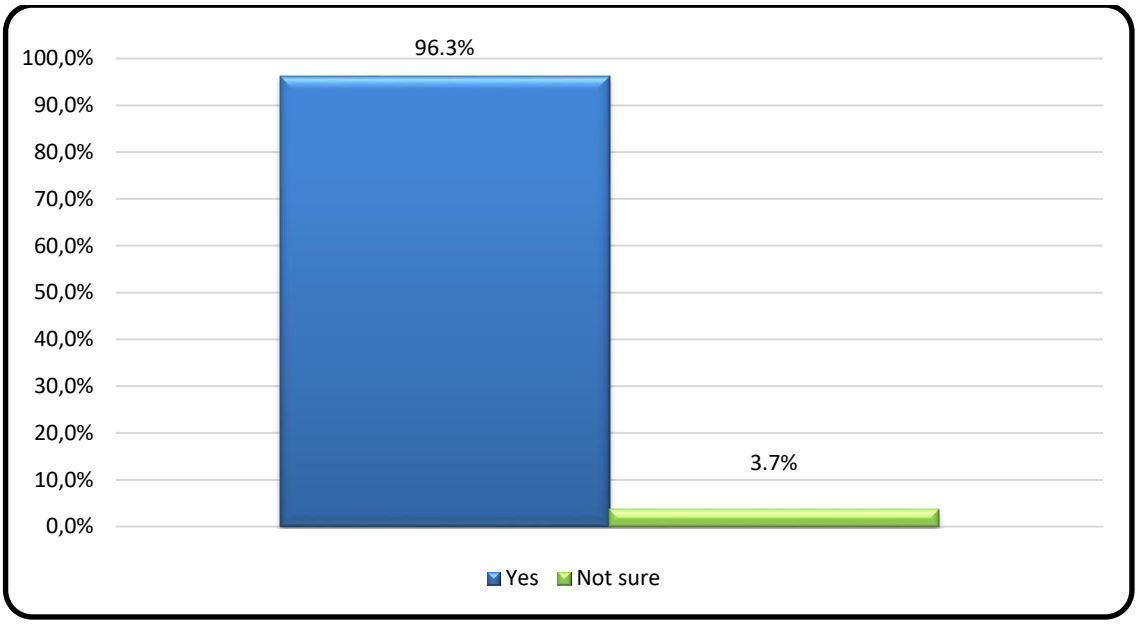

Figure 4.25: Opinion about the obtainment of additional information (N=171) (n=161)

Discussion: Regarding the statement that pre-hospital EMS personnel will benefit from receiving additional information about vaccination, the majority (n=155; 96.3%) indicated that they would, while no participant indicated that they would not. However, 6 (3.7%) indicated that they were not sure whether EMS personnel would benefit from receiving additional information about vaccination or not.

4.7 ANALYSIS OF THE CASE SCENARIO

A case scenario was included as an important method of analysis, where participants' could relate, critique and reflect on the character's actions or lack thereof to the best of their ability. In doing so, participants displayed their understanding about policies related to NSI and the grace period PEP provided to reduce the risks associated with NSI. Therefore it can be argued that their knowledge of infection prevention and control would inform their attitude towards it, which in turn would be reflected by their response to questions within the case scenario.

4.7.1 Needlestick Injury as a result of unsafe practice

Figure 4.26 indicates participants' opinions on whether the character in the case scenario suffering an NSI was as a result of unsafe practice or not.

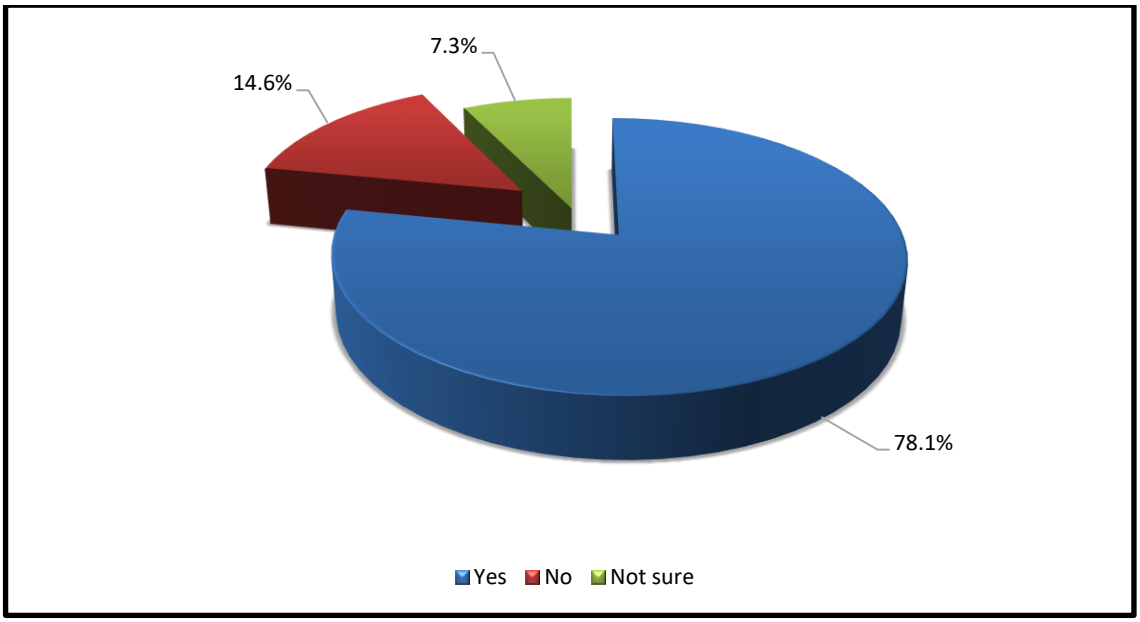

Figure 4.26: Needlestick Injury as a result of unsafe practice (N=171) (n=164)

Discussion: Regarding the question whether the character suffering an NSI in the case scenario was as a result of unsafe practice, only 164 (95.9%) participants responded. The majority (n=128; 78.1%) indicated that the character suffering an NSI was as a result of unsafe practice, while 24 (14.6%) of participants indicated that it was not. However, 12 (7.3%) indicated they were not sure whether the character suffering an NSI was as a result of unsafe practices.

A total of 124 (72.5%) participants completed the open-ended section where they were required to motivate their answer in Question 6.1 of the questionnaire, on whether or not they thought the character suffering an NSI in the case scenario was as a result of unsafe practice or not. A total of 81 (65.3%) participants correctly indicated that the character suffering an NSI in the case scenario, was as a result of unsafe practice. He recapped the needle due to the absence of a sharps container in which the needle should have been effectively disposed of. Recapping of needles is not acceptable under any circumstances and paramedics are encouraged to avoid such unsafe practices. Many (n=43; 34.7%) of the participants who wrongly indicated that the character suffering an NSI was not as a result of unsafe practice gave the following reasons amongst others: the character didn't do it safe enough; it was an accident; he was trying to protect others from the potential of suffering an NSI; he didn't have a sharps container available. However, none of these reasons are justifiable.

4.7.2 Post-exposure Prophylaxis for Hepatitis B viral infection

Figure 4.27 indicates participants' knowledge of the ideal time for the character to seek PEP against contracting HBV infection.

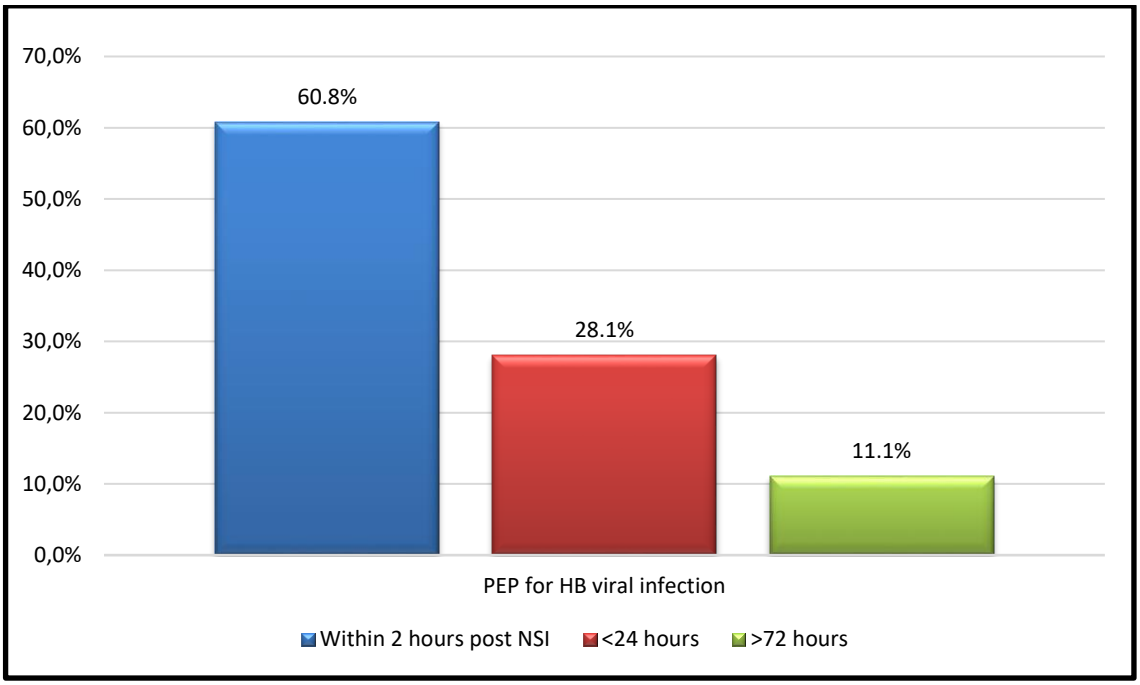

Figure 4.27: Post-exposure Prophylaxis for Hepatitis B viral infection (N=171) (n=153)

Discussion: Regarding the question on the ideal time the character in the case scenario had to seek PEP against contracting the HB viral infection, only 153 (89.5%) participants responded. As many as 93 (60.8%) participants correctly indicated within 2 hours post NSI, while 43 (28.1%) indicated <24 hours post NSI and the minority (n=17; 11.1%) >72 hours post NSI.

4.7.3 Tests following a Needlestick Injury

Figure 4.28 indicates participants' knowledge of the tests that should follow an NSI. Of the 171 participants, only 157 (91.8%) responded to the question.

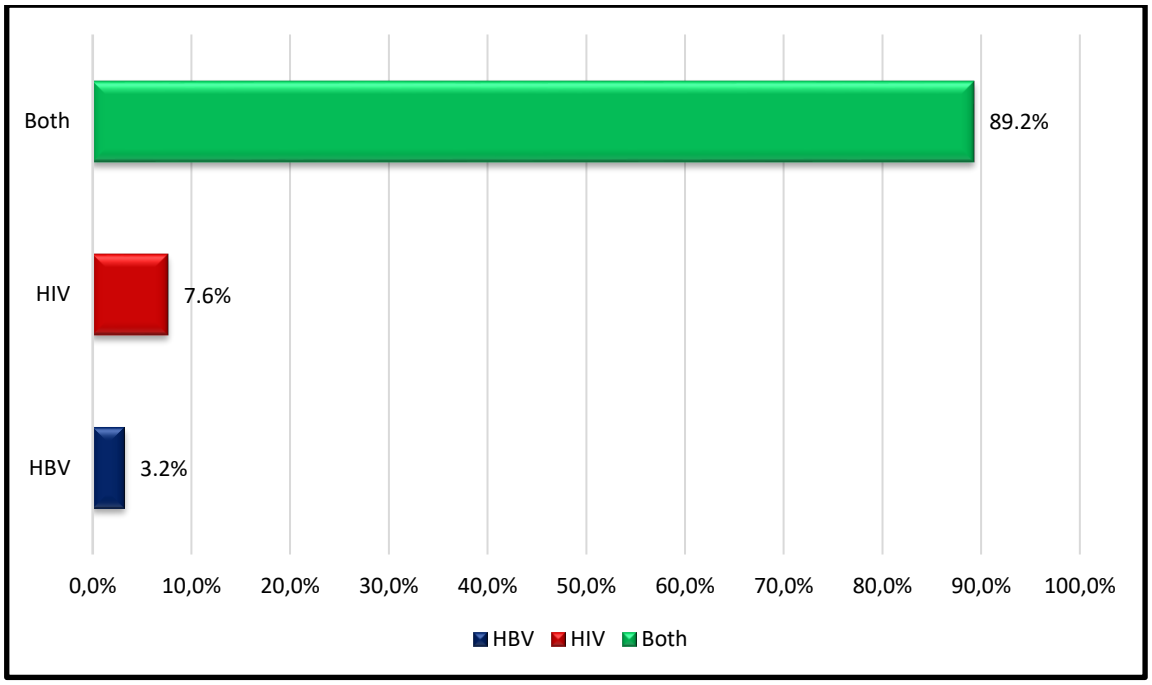

Figure 4.28: Tests following a Needlestick Injury (N=171) (n=157)

Discussion: Regarding the question whether the character and patient in the case scenario should have been tested for HIV, HBV or both, the majority (n=140; 89.2%) correctly indicated both HBV and HIV, while 12 (7.6%) indicated only HIV and 5 (3.2%) indicated only HBV.

4.7.4 Reporting a Needlestick Injury

Figure 4.29 indicates whether participants' would report them suffering an NSI or not. Of the 171 participants, only 161 (94.2%) responded to the question.

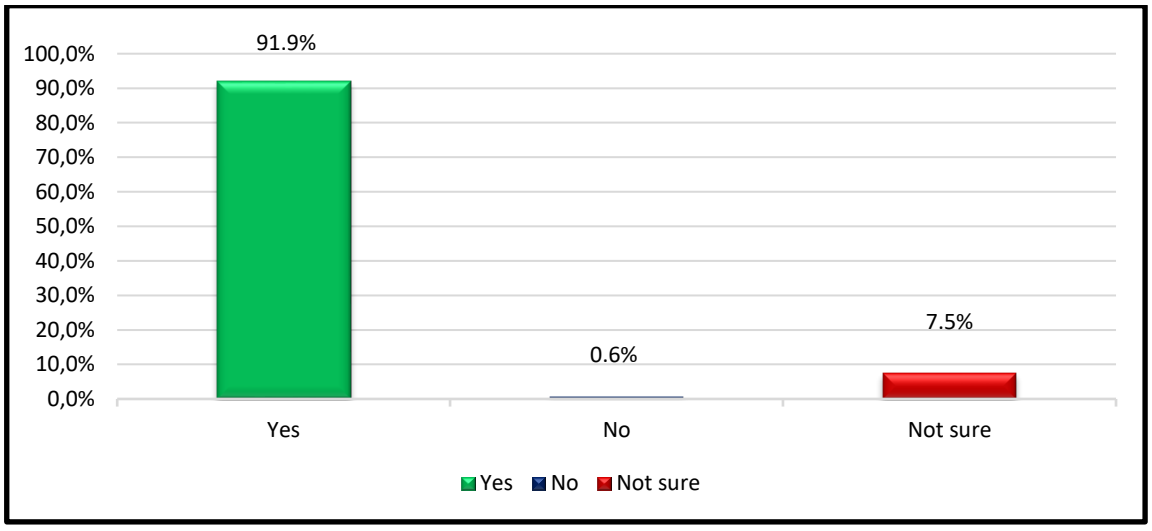

Figure 4.29: Reporting a Needlestick Injury (N=171) (n=161)

Discussion: Regarding the question whether participants would report the matter if they had been exposed to an NSI, the majority (n=148; 91.9%) indicated that they would, while 1 (0.6%) indicated that they would not. However, 12 (7.5%) indicated that they were not sure whether they would report the incident or not.

A total of 112 (65.5%) participants completed the open-ended section where they were required to explain how they would have handled the situation differently post-exposure to an NSI. Of the 112 participants, 75 (67.0%) correctly indicated that they would have reported the incident immediately or within 2 hours to their supervisor so that all due processes post-exposure to an NSI can be followed and PEP can be initiated as soon as possible to avoid infection. Many (n=37; 33.0%) of the participants would have wrongly handled the situation post-exposure to an NSI. The following are some of the reasons that were provided: one participant indicated that they had no idea; another indicated that they would first ask permission from their supervisor to seek PEP; others indicated they would seek PEP within 72 hours etc.

4.8 CONCLUSION

In this chapter, the results of the four sections (Section A-D) of the study were summarised and presented. The results of the study will be discussed in Chapter 5.

The next chapter, Chapter 5, entitled **Discussion of results: Educational recommendations to enhance compliance of Free State Province paramedics with vaccination policies,** provides an in-depth interpretation and discussion of the results. The researcher will also provide educational recommendations in attempt to reduce the burden of disease associated with paramedics' non-compliance with vaccination policies.

CHAPTER 5

DISCUSSION OF RESULTS: EDUCATIONAL RECOMMENDATIONS TO ENHANCE COMPLIANCE OF FREE STATE PROVINCE PARAMEDICS WITH VACCINATION POLICIES

5.1 INTRODUCTION

In Chapter 4, the researcher presented the results of the study, data analysis and a discussion of the findings of the study. Chapter 5 will provide a discussion of the results as captured from the questionnaire. The educational recommendations in Chapter 5.8 were derived at as a result of the in-depth literature study and from the findings of this study.

5.2 DEMOGRAPHIC INFORMATION

The demographic data collected for each participant included: age, gender, highest level of education, highest professional qualification, Internet accessibility, active e-mail address, mode of transport used to get around, as well as accessibility of iCAM facilities.

5.2.1 Age

The age group of participants ranged between 20 and 59 years (cf. Figure 4.1). This implies that the average age of participants who participated in this study was 40 years. It was also noticed that the majority of participants (49.7%) fell into the age group of 30-39. However, the minority (5.3%) fell into the 20-29 range, which was closely followed by 7.1% of the 50-59 category. This is of concern for the mere fact that the category representing the future of the profession is in the minority.

One possible reason for this phenomenon could be that there have not been any recent appointments within the public sector. Also, it could be a direct consequence of the discontinuation of the short courses, where people were able to access short courses more easily without having to go through the rigorous application process of HE. As a result, it becomes very difficult for people to obtain EMC qualifications after school and seeking employment immediately thereafter. Another possible explanation could be that

those who do obtain tertiary EMC qualifications post matric are more inclined to leave the public sector (if already employed) and/or seek employment within the private sector as it offers more financial stability. In addition to doctors and nurses, a similar trend has been observed in the alarming increase of paramedics migrating or working abroad as it offers better working conditions and financial security (Bezuidenhout, Joubert, Hiemstra & Struwig 2009:211).

5.2.2 Gender

The gender distribution according to this study (cf. Figure 4.2) shows that participants partaking in this study was predominantly male (64.5%). The total number of female participants in this study amounted to 35.5%. The ratio of males (64.5%) to females (35.5%) correlates well with the reality of how gender was distributed historically within the EMC profession. Due to the nature and physical demand of the work, it is no coincidence that the profession was characteristically known to be male dominant. However, in recent years the gradual increase of females within the EMC profession became increasingly apparent - which is evident in the findings of the study.

5.2.3 Highest level of education

A positive finding ascertained from this study was the fact that the majority of participants have at least obtained Grade 12 (60.0%) as their highest level of education. This is important as they are eligible to apply for undergraduate and future postgraduate studies. More especially, they are able to apply for any of the newly proposed three-tiered system approved and endorsed by the HE, provided that they meet the criteria as set for the respective HE approved EMC courses. However, it is still evident that those participants who managed to obtain undergraduate and postgraduate qualifications still remains in the minority (cf. Figure 4.3).

5.2.4 Highest Emergency Medical Services qualification

According to this study, the majority of participants obtained a BAA (51.5%) as their highest EMS qualification, followed by 27.8% of participants who obtained an AEA qualification, and 1.8% who obtained a CCA qualification. This implies that the majority of paramedics employed in the public sector are in possession of a short course qualification. A lot still has to be done to allow the transitioning of those with short

courses into tertiary qualifications. In fact, in a study conducted by Nell (2016:102-103), it was found that no guidelines exist for the transition into HE. A few (10.1%) of the participants, however, already obtained an ECT qualification, followed by a B-Tech EMC (6.5%), N.Dip EMC (0.6%) and Prof. Degree EMC (1.8%) qualifications (cf. Figure 4.4).

What is alarming is the fact that no participant in the Free State Province obtained a Master's degree EMC or Doctorate EMC qualification. These postgraduate qualifications are essential in the quest to professionalise EMS. However, it is evident that some of the participants have been doing their postgraduate qualifications in other fields. It could be that participants have lost interest in furthering their education in EMC or it could be attributed to the narrow window of opportunity offered to paramedics in the Free State Province in this regard.

Very few institutions offer these postgraduate qualifications. The first Master's degree EMC programme commenced in 2003, and is currently offered at three institutions in South Africa. Furthermore, only one of these institutions has recently commenced with the Doctorate EMC qualification in 2013. Furthermore, no institution in the Free State Province offers any of these postgraduate qualifications in EMC. Additionally, most of the Master's and Doctorate EMC graduates are employed at various training institutions all over South Africa, so reducing the number of operational participants holding these postgraduate qualifications. Due to very few institutions offering Master's and Doctorate qualifications in EMC, the throughput is small. This, along with the significantly reduced representivity at operational level could justify why no participant in this study obtained a postgraduate qualification in EMC.

5.2.5 Internet access

This study indicated that the majority of participants (65.3%) have Internet access while 34.7% do not. This implies that self-directed learning might be a method of learning to be considered in this population. However, it will only be possible to use by two 3^{rds} of the group who participated in this study (cf. Figure 4.6). A positive find was that the majority of participants showed interest in completing an EMS-specific course on vaccination (cf. Figure 4.23). Creating an online course could be a way to reach a great number of paramedics. This could make courses more accessible and engagement with course content more convenient for participants.

5.2.6 Active e-mail address

According to this study, the majority of the participants (78.6%) have an active e-mail address while the rest do not (cf. Figure 4.7). To address the 21% of participants who reportedly did not have e-mail access, the researcher proposes that e-mails be printed and shared in meetings or in the station tea rooms. This is a positive finding, as correspondence surrounding vaccination can take place. Thus implying that this platform can be utilised effectively for sharing information about vaccination and for providing more insight about any potential courses. Information about vaccination can be presented in the form of articles, journals, books, policies, acts, etc. This information medium is aimed at stimulating interest of participants about vaccination.

5.2.7 Mode of transportation

According to the findings of this study, most of the participants show a means of getting around (cf. Figure 4.8). The researcher finds this well pleasing. All of the 163 participants who responded to the question used either public, private or both as a mode of transportation. The majority (41.1%), of which, indicated that they get around by means of private transport (cf. Figure 4.8). Nevertheless, regardless of the mode of transport used, participants showed a level of independence, which implies that transportation should not be considered as a barrier to attend an EMS-specific course on vaccination.

5.2.8 Interactive Communication and Management facility access

The iCAM can be used as a platform to distribute information about and/or present a course on vaccination. A number of iCAM satellite venues are located close to some EMS stations throughout the Free State Province. It creates one classroom in many locations, thus reducing barriers such as financial implications associated with transportation and accommodation. It creates the ideal platform for broadcasting and rebroadcasting CPD sessions across the Free State Province. In addition, it makes courses more accessible to those working in rural areas. According to this study, the majority (52.1%) of participants indicated to have access to an iCAM facility in their respective districts (cf. Table 4.1). Reasons for participants not having access to iCAM may include a shortage of active satellite sites in their area.

5.3 KNOWLEDGE OF FREE STATE PROVINCE PARAMEDICS REGARDING VACCINATION POLICIES

This section will provide more insight into whether Free State Province's paramedics knowledge about vaccination and policies related to it are sufficient. In order to determine the level of knowledge depicted by participants regarding vaccination and policies related to it, questions in this section of the questionnaire were specifically aimed at testing this phenomenon.

5.3.1 Self-evaluated knowledge about vaccination and policies related to it

In an open-ended question, the participants were asked to explain in their own words what their understanding of the term vaccination was (cf. Table 4.2). The findings showed that participants had a lack of understanding of the term vaccination. More than half (54.4%) of the participants showed a lack of understanding of the term vaccination, while 3.5% admitted that they did not know what the term meant. This is inconsistent with the findings that 79.6% of participants reported to have received information about vaccination (cf. Figure 4.9). The majority (51.2%) identified their respective EMS stations as their primary source of information (cf. Figure 4.10). However, one can question the quality of information participants received on the topic and whether it was sufficiently distributed or not.

Looking at the types of vaccines available to EMS personnel, only a few of the participants knew about HAV (8.2%), Varicella (5.9%), HCV (5.9%), MMR (2.3%) and Pertussis (2.3%). In addition, 26.3% of participants were unsure, hence it can be argued that they did not know which vaccinations were available to EMS personnel. This is alarming as very few showed insight into the various vaccines that are available or recommended to them (cf. Figure 4.11; Figure 4.12). In addition, only 50.3% of participants knew about HBV vaccines available to EMS personnel, and only 53.2% knew it was recommended for EMS personnel (cf. Figure 4.11; Figure 4.12). This could be attributed to the fact that HB and seasonal influenza vaccination are universally recommended for HCWs (Ozisik *et al.* 2017:1199). As a result, more emphasis is placed on these diseases than any of the other vaccine-preventable diseases. This can also explain why participants displayed poor knowledge of other vaccines.

The overall self-reported knowledge about vaccination in this study was reported as low, since only 32.3% of participants agreed that their knowledge about vaccination was sufficient (cf. Table 4.3). The researcher found this disturbing considering the fact that paramedics risk their lives on a daily basis without knowing about the safety measures they can instil for their own protection. This corresponds with earlier findings that the majority of participants lack understanding of the term vaccination (cf. Table 2.1). Knowledge of HCWs about vaccination and related policies have proven to be one of the positive predictors of vaccine uptake (Papagiannis *et al.* 2016:4-5). In view of these findings, it can be postulated that the majority of paramedics in this study are ill prepared in terms of protection against vaccine-preventable diseases.

Testing their knowledge about vaccination policies, just above half (56.0%) of the participants have reported not to be familiar with the National Policy on vaccination for HCWs (cf. 2.3). This is probably because no such policy appears to exist. The 21.7% of participants that indicated that they were, could have referred to the National Infection Prevention and Control Policy and Strategy, which only makes mention of vaccination programmes. However, it is not a vaccination policy. Alternatively, they might have referred to the international recommendations of WHO for HCWs to be vaccinated against the HBV (cf. 1.3). HCWs should be informed about the preventative measures put in place for them as well as how to access and make use of them. According to Barazza *et al.* (2018:1) the purpose of vaccination policies is to increase vaccination rates and reduce disease outbreaks among HCWs. Educational recommendations should also focus on increasing awareness about policies related to infection control and prevention at national and provincial levels.

Furthermore, only 12.1% of the participants were aware that no provincial vaccination policies for HCWs in the public sector existed. The focus of infection control and prevention policies are more on prevention, which includes measures like hygiene (hand wash), the use of PPE and universal precautions. These policies do not place enough emphasis on vaccination as the most effective measure to protect against vaccine-preventable infections and disease. Also, the low compliance of HCWs with regards to vaccination policies and universal precautions necessitates the need for them to be vaccinated (Khan & Ross 2013:5; Harris & Nicolai 2010:93). It is imperative that national and provincial directives be aligned through policy in order to be successfully implemented at operational level.

This study also showed that 49.1% of participants have reported to understand their obligation as HCWs towards vaccination (cf. Table 4.3). Vaccination of HCWs are important as it serves two purposes; that is, to protect against contracting and the spread of vaccine-preventable infection and disease between HCWs and patients (Mahomed *et al.* 2007:497). A positive finding of this study is the fact that the majority (81.4%) of participants knew that vaccination serves to protect against contracting vaccine-preventable diseases. However, only 31.1% were aware that it also poses the risk of infecting the person vaccinated with the specific disease.

The findings show that participants were knowledgeable about the HB vaccine's availability to HCWs in the Free State Province, but mostly lacked knowledge about the full range of vaccines available to HCWs in general. It is evident that the majority of paramedics in the Free State Province are ill-informed about vaccination and policies related to it. Educational recommendations developed from the findings of this study should encourage educational programmes such as EMS-specific short courses and CPD workshops on the topic. Furthermore, to ensure maximum exposure, the researcher also advise the distribution of informative documentation like leaflets and posters, which contain information about vaccination to EMS personnel and at all EMS stations. Not having all the information may lead to misconceptions and non-compliance.

5.3.2 Self-evaluated knowledge about safe practices in Emergency Medical Services

This study showed that more than half (57.7%) of the participants agreed that it is acceptable to recap needles if a sharps container is not readily available (cf. Table 4.4). However, paramedics are trained to make sure that they always have a sharps container at hand when performing such interventions. If they adhere to this principle, they should never be in a situation where they are required to recap needles. According to Gheshlagh *et al.* (2018:8) this is a behavioural factor that contributes significantly to the incidence of NSIs among HCWs. It is regarded as unsafe practice and should not be allowed under any circumstances.

Furthermore, many (55.4%) of the participants reported that N95 face masks should only be worn once the risk of inhaling airborne pathogens are confirmed (cf. Table 4.4). This is alarming since face masks forms part of the minimum PPE required for paramedics to wear in order to protect themselves against airborne BBPs at all times. It is impossible

to diagnose BBPs in the pre-hospital setting. Therefore, paramedics should take all the necessary precautions to reduce and/or prevent the risk of contracting sickness and disease. It is highly recommended that paramedics wear proper PPE as a precautionary measure when treating patients. This implies that N95 face masks should be worn at all times when treating patients regardless of whether an airborne infectious disease such as tuberculosis has been confirmed or not. PPE offers protection against infectious diseases (Harris & Nicolai 2010:93).

The findings of this study reported additionally that the majority (82.2%) of the participants disagreed with the statement that medical gloves should only be worn in the event when exposure to blood is present (cf. Table 4.4). This is a positive finding, since the transferring medium of infection with BBPs is not just blood, but bodily fluids as well. The majority of participants in this study therefore identified the importance of wearing medical gloves when treating patients as transmission of HIV, HBV and HCV can happen across any mucous membrane.

Safe practice concerning wearing safety goggles was also positive. A total of 71.1% of participants identified the importance of wearing safety goggles in an emergency setting. Not only because of the risk of flying debris on emergency scenes, but also because of the risk of BBPs transmission through BBF splash into one's eyes (cf. 2.6.2). These findings correspond with the fact that 87.3% of the participants knew that one can be infected through direct contact with contaminated BBF (cf. Figure 4.13).

The final finding on this topic showed that only 49.1% of participants had an OHS representative at their respective EMS facilities/stations (cf. Table 4.5). This is worrisome, since OHS representatives are important to ensure that all and potential hazards are identified and dealt with accordingly. Also, they have to ensure that everyone is aware of the due processes in the event of an emergency. That is why it is not surprising that only 54.8% of participants reported to know all due processes post-exposure to BBF and/or NSI (cf. Table 4.5). Furthermore, safety practices must be reiterated through refresher courses or while offering educational programmes on vaccination and vaccination policies.

5.4 ATTITUDES OF FREE STATE PROVINCE PARAMEDICS REGARDING VACCINATION POLICIES

This section will provide insight into Free State Province paramedics' attitudes towards vaccination and policies related to it. According to Papagiannis *et al.* (2016:4-5), HCWs' attitudes towards vaccination and related policies have proven to be positive predictors of vaccine uptake. In order to determine the attitudes of participants towards vaccination and policies related to it, questions in this section of the questionnaire were specifically aimed at testing this phenomenon.

5.4.1 Attitudes towards Personal Protective Equipment, Hepatitis B only vaccination and vaccination practices

The findings in this study reported that 94.1% of participants felt that wearing PPE is important when treating patients (cf. Figure 4.14). This is a positive finding considering the importance of PPE as a precautionary and preventative measure against contracting sickness and disease. However, the results are inconsistent with earlier findings where 55.4% of participants reported that N95 face masks should only be worn once the risk of inhaling airborne pathogens are confirmed (cf. Table 4.4). This implies that just because participants know wearing PPE when treating patients are important, does not mean they will. Likewise, HCWs' recommendations to be vaccinated does not automatically guarantee compliance.

In this study, the attitudes of participants to be vaccinated against vaccine-preventable infections were assessed. The majority (92.8%) indicated that it is important for paramedics to be vaccinated against vaccine-preventable infections as they are in the frontline and thus at increased risk when treating patients (cf. Figure 4.15). This is a positive finding, considering the protective immunity vaccination offers. However, the KAP of participants in this study are rather conflicting. Although participants' attitude surrounding vaccination is promising, their knowledge and actual practice is questionable.

In terms of whether paramedics should only receive HB vaccinations, the views of participants were conflicted. Nevertheless, half (50.3%) of the participants indicated that even though it was the most prevalent, HB only vaccination is simply not enough to ensure the protection of paramedics against vaccine-preventable diseases (cf. Figure

4.16). It can therefore be argued that paramedics who only receive HB vaccination are ill-protected.

Furthermore, the findings of this study also reported deficient emphasis placed on how paramedics can be protected against vaccine-preventable infections (cf. Table 4.6). This can be attributed to the perceived lack of vaccination-specific policies for HCWs in the Free State Province. It is evident that there is a lack of information available about vaccination to paramedics of the Free State Province. This statement is founded on the basis that 47.9% indicated that their current knowledge about vaccinations is insufficient, including an additional 19.8% who were unsure (cf. Table 4.3). Therefore, it can be argued that a combined total of 67.7% of participants felt that their knowledge about vaccination is insufficient.

Additionally, the majority (91.7%) of participants showed a great interest in attending a CPD session on vaccination where applicable policies and procedures regarding it is explained and/or discussed (cf. Table 4.6). Also, 95.2% of participants indicated that they would benefit from receiving additional information about vaccination. The researcher finds these results reassuring. It can therefore be postulated from the findings of this study that participants seem to have an overall positive attitude towards receiving the correct information about vaccination through educational intervention. In correlation with other literature, the positive attitude displayed by participants in this study towards vaccination, along with their interest to be educated in this regard, may possibly increase vaccine uptake among paramedics in the Free State Province (cf. 2.6).

5.4.2 Attitudes towards mandatory vaccination policies

According to this study, 89.1% of participants agreed with the statement that vaccination should be enforced upon all pre-hospital EMS personnel (cf. Table 4.6). In addition, the majority 73.3% also agreed that no pre-hospital EMS personnel involved in patient care should be allowed to practice without receiving the vaccinations as recommended by National Health. This is with regards to a more aggressive approach recommended for HCWs to ensure vaccine uptake since voluntary approaches have failed (cf. 2.4.2).

According to Ozisik *et al.* (2017:1199), mandatory policies raise ethical concerns. In addition, it leads to litigation due to the violation of the right of autonomy of those on whom it is enforced (Barazza *et al.* 2018:3; Blockman 2016:online). As a result, the

implementation and use of mandatory vaccination policies are generally discouraged. On the contrary, findings of this study are opposite to the concerns raised by previous authors, as the majority of participants are in favour of mandatory vaccination policies (cf. Table 4.6). Despite the propaganda associated with mandatory vaccination policies, it is considered to be the most effective approach in improving vaccination rates among HCWs (cf. 2.4.2.1).

5.5 PRACTICE OF FREE STATE PROVINCE PARAMEDICS REGARDING VACCINATION POLICIES

In order to determine whether participants' knowledge and attitude about vaccination and safe practices are reflected in their practice, questions in this section of the questionnaire were specifically aimed at testing this phenomenon. This information is presented in the following subsections.

5.5.1 Personal practices with regards to vaccinations

The findings of the study reported only 65.1% of participants had received their childhood immunisations, while 30.8% were not sure whether they did (cf. Table 4.7). This is cause for concern as Measles, HB, Pertussis and Influenza vaccinations recommended to HCWs are also included as part of the immunisations children receive during the course of the Extended Programme of Immunisation (EPI).

HCWs who had not received childhood immunisations have no immune memory against the specific disease and thus increase their chances of getting infected with the disease. (cf. 2.4.2). The risk of paramedics infecting vulnerable patients such as children, geriatrics and more especially immunocompromised patients in their care should not be ignored. According to Inglis-Arkell (2015:online), many of these infectious diseases are worse in adults than in children. Therefore, every effort should be made to enhance vaccine uptake of HCWs to reduce the risk of cross-infection.

The number of participants reported to be affiliated with a humanitarian aid organisation amounted to 8.5%. In the event of a natural disaster, these paramedics are recruited to provide some form of assistance to people affected, which may include rescues, medical aid or humanitarian aid. It is therefore common for paramedics affiliated with a humanitarian aid organisation to adhere to mandatory policies. Paramedics in this

instance either adhere to the immunisation requirements of the mission or country, or risk not travelling at all. It is important to realise that certain countries have specific immunisation requirements. As a result, it is custom for paramedics to have a "Yellow card", otherwise known as an international certificate of vaccinations on which all their immunisations are recorded (WHO 2007:online). This serves as proof of all vaccinations received, which is important in the prevention of international spread of disease.

Furthermore, there are general as well as "mission-specific" immunisations required for people traveling abroad. Of the 42.5% participants that indicated they travelled abroad, only 19.4% reported that vaccinations were required for the respective country they travelled to - which implies that participants had to receive the vaccination prior to traveling to that country. In this context, while taking into consideration the reason why HCWs oppose mandatory vaccination policies (cf. 2.4.2.1), one can argue that HCWs appear to be keener to receive mandatory vaccinations in a social capacity, rather than when enforced at work. This is fortunately not the case in this study, as participants are in favour of mandatory vaccination policies (cf. Table 4.6).

HB is the most prevalent infectious disease HCWs are exposed to and the WHO highly recommends for HCWs to be vaccinated against it (Nkoko *et al.* 2014:382). According to this study 87.7% of participants indicated to have received at least one dose of HB vaccination (cf. Figure 4.18). However, only 57.9% had completed the full course and were thus presumed to have immunity against the disease. This, however, can only be confirmed with a serological test confirming the persistence of anti HB antibodies and protective concentration of greater and equal to 10mIU/ml, following a full course (3 doses) of vaccination series (cf. 2.4.2). It can therefore be argued that a large percentage of Free State Province paramedics do not have immunity against HB. This ties in with previous findings of studies which recorded suboptimal levels of protection of HCWs against HBV (Sondlane *et al.* 2016:1).

5.5.2 Personal practices regarding the use of Personal Protective Equipment when treating patients

PPE can be defined as effective preventative measures against mucocutaneous exposure to BBPs (Goel *et al*. 2017:20-21). This study reported that 91.5% of participants do not wear N95 masks every time they treat a patient (cf. Table 4.8). Furthermore, 89.6% also indicated not to wear safety goggles every time they treat a patient. Thereby,

putting themselves at risk of being infected with BBPs through inhalation and splash injuries. The researcher finds these results disturbing, considering the fact that the paramedics are incident prone due to the uncontrolled pre-hospital environment. A positive finding, though, is the fact that many (68.1%) of the participants wear disposable medical gloves every time when treating a patient. In this instance, participants' knowledge about the risk of infection when coming in direct contact with contaminated BBF (cf. Figure 4.13) was in contrast with how they practise.

When enquiring about the reporting of incidences, the findings of this study are consistent with the findings of Goel *et al.* (2017:21) who reported that about 40-75% of these injuries or incidents are not being reported (cf. 2.6.1). A similar trend is noted with the majority of participants in this study not reporting such incidents to the relevant authorities. A total of 11.5% of participants indicated that they were exposed to BBF in the past six months. However, only 47.4% reported the incident to an OHS representative. The majority (52.6%) indicated that they did not. However, the availability of more and/or knowledge of OHS representatives in all EMS stations in the Free State Province could enhance the reporting of such incidents in future.

5.5.3 Personal practices regarding the use of safety devices when treating patients

Safety-enhanced devices like retractable needles, jet ports on administration sets and safety lancets are specifically designed to reduce and/or prevent the risks of exposure to BBPs through NSI (Gheshlagh *et al.* 2018:8). In this study, the majority (77.0%) of participants indicated that they use safety device lancets when performing a HGT on patients (cf. Figure 4.21). However, in the absence of a safety device lancet, 85.5% indicated that they then reverted to using hypodermic needles to perform a HGT on patients (cf. Figure 4.22). This is alarming, considering the large number of participants that engage in unsafe practices during the performance of their duties. These findings correspond with the findings of Harris and Nicolai (2010:87) that paramedics sometimes disregard their own safety when faced with intense, invasive and time-critical life-saving procedures to perform, thus making themselves vulnerable to contracting sickness and disease.

5.6 EDUCATIONAL REQUIREMENTS

Participants of this study showed a significant interest in completing a course about vaccination that is specifically designed for pre-hospital EMS personnel. A total of 98.2% of participants indicated that they would want to attend an EMS-specific course on vaccination (cf. Figure 4.23). This was no surprise considering earlier findings of participants indicating that their knowledge about vaccination is insufficient (cf. Table 4.3). However, the overall attitude towards educational intervention to improve participants' information and knowledge about vaccination and policies related to it was positive. In addition, the majority (96.3%) of participants indicated that they would benefit from receiving additional information about vaccination (cf. Figure 4.25). Furthermore, as an alternative to attending a course, the majority of participants would want to receive additional information in the following order of preference through: a CPD session (45.6%), e-mail (41.5%), in-service training (37.4%), and posters at EMS stations (30.4%) (cf. Figure 4.24).

5.7 ANALYSIS OF THE CASE SCENARIO

The findings in the case scenario are inconsistent with those reported earlier in previous sections of this Chapter. In section 5.3.2, just over half (57.7%) of the participants indicated that it was safe to recap a needle if a sharps container is not readily available. However, the actions of the character in the case scenario recapping the needle and pricking himself in the process, are reported to be as a result of unsafe practices (cf. Figure 4.26). It is not clear how participants can display such conflicting views in the same study. However, it may be possible that participants have more trust in their own abilities to safely recap a needle, than in others. Also, participants may know the right way to safely dispose of sharps, but several constraints in practice and quick response may hinder that.

Furthermore, it can be postulated from the findings in this case scenario that the majority (60.8%) of participants know all due processes associated with an NSI. This is a positive finding as it is important to seek PEP as soon as possible post-exposure in order to reduce and/or prevent the risks associated with NSI (cf. Figure 4.27). However, there is still a need to educate and inform those who do not know the due processes following an NSI. The majority (89.2%) of participants also correctly indicated that one should be tested for both HIV and HBV following an NSI (cf. Figure 4.28). This is a positive finding

since the tendency is to place more emphasis on testing for HIV than for HBV in this instance. According to Burnett *et al.* (2012:C48) HBV is considered 100 times more infectious than HIV following an NSI.

The findings in this case scenario also indicated that the majority (91.9%) of participants would report if they suffered an NSI. This is contrary to the findings in the literature (as previously indicated in Section 5.5.2) that about 40-75% of these NSI are not being reported (Goel *et al.* 2017:21). This is a positive finding considering the fact that the majority of participants are ill-informed about vaccination and policies related to it, as well as safety officers and reporting procedures. Despite the evident lack of knowledge concerning vaccination, participants were able to indicate correctly that they will report the matter and so seek PEP in attempt to reduce and/or prevent infection with BBPs.

In principle, the participants seem to know what is correct and what is expected of a paramedic in this case. The question thus remains why so many are not complying with safe practices. More research is required to investigate this further.

5.8 EDUCATIONAL RECOMMENDATIONS

Educational recommendations from this study include:

- A need for developing FSDoH vaccination policies to be translated into SOPs as well as strategies to reinforce safe practices among paramedics were identified (cf. 2.3; cf. 2.4; cf. 5.3.2).

- Targeted interventions should include the development of EMS-specific educational programmes on vaccination and policies related to it. The aim of educational programmes should be to educate and empower paramedics regarding vaccination, and to create awareness that may increase compliance among paramedics (cf. 2.4.2, cf. 4.6; cf. 5.3.1; cf. 5.4.1; cf. 5.6).

- Information about vaccination needs to be made freely available and accessible to all EMS personnel in the respective communication preferences of choice (cf. 5.6). With reference to participants' preferred manner of receiving information, the following should be considered: self-directed learning, CPD short courses/sessions, e-mail, and posters and leaflets at EMS stations. In this instance, paramedics will be

well informed about aspects related to prevention and control of infectious diseases, with particular emphasis on vaccination and how best to reduce and/or prevent risks associated with vaccine-preventable infections (cf. 4.6.2).

- Awareness campaigns about the OHS representatives at EMS facilities or institutions should be launched. The aim of these campaigns should be to stress the importance of OHS representatives in the workplace, inform people accordingly about their roles and responsibilities, and ensure that each EMS station has a representative. This strategy may enhance the reporting of incidences associated occupational exposure to BBPs (cf. 2.7.1.1; cf. 2.3; cf. 4.3.8; cf. 5.3.2).

- Education programmes for paramedics should incorporate vaccination programmes in their curriculums and introduce and implement vaccination policies during the training of paramedics. In this way, they will be vaccinated long before they qualify and come into contact with patients (cf. 2.6).

- The use of iCAM as an educational platform should be reintroduced. This implies that accessibility in the areas that are not active should be restored and more of these facilities or satellite sites should be made available, more especially in the rural areas located within the Free State Province (cf. 4.6.1; cf. 5.2.8).

5.9 CONCLUSION

In Chapter 5, the results from Chapter 4 were discussed. In the following chapter, Chapter 6, entitled **Conclusion, recommendations and limitations of the study,** the study will be summated and final conclusions will be drawn.

CHAPTER 6

CONCLUSION, RECOMMENDATIONS AND LIMITATIONS OF THE STUDY

6.1 INTRODUCTION

The researcher conducted the study to determine the KAP of Free State Province paramedics regarding vaccination policies. Findings of the study provided the basis from where educational recommendations were developed to increase compliance, as specified by the aim and overall goal of the study.

In the previous chapter, the results of the study were interpreted in relation to the research questions and objectives.

Chapter 6 presents an overview of the study. In addition, it answers the research questions and addresses the objectives of the study. The chapter is concluded with a general conclusion reached, limitations, recommendations and final concluding remarks of the study.

6.2 OVERVIEW OF THE STUDY

The following two research questions were answered in this study: What is the KAP of paramedics regarding vaccination policies in the Free State Province? What educational information would paramedics want to have about vaccination and how would they want it delivered?

The research questions listed above were presented in Chapter 1 (cf. 1.6). These research questions directed the flow and outcome of the study. The research questions were addressed with the following objectives. The main findings from the two research questions are also reviewed below.

6.2.1 Objectives of the study

Objective 1: To contextualise and conceptualise the topic by conducting a literature study and describing the context in which Free State Province paramedics work (cf. 1.7).

In order to address this objective, an in-depth literature study was conducted. The main findings of the literature study included an overview of the background of the EMC profession in South Africa (cf. 2.2); overview of the legislative framework on vaccination for HCWs (cf. 2.3); HCWs perspective on vaccination policies (cf. 2.4); a global perspective on the KAP of HCWs regarding vaccination policies (cf. 2.5); and major risk factors contributing to the exposure and transmission of BBPs among HCWs. It was ascertained that student HCWs were more likely to comply with vaccination policies than those in the workforce (cf. 2.6). It was also concluded that, despite attempts to raise awareness and means to educate HCWs, their knowledge about vaccination remained suboptimal. Literature on the topic was consulted in an international, national and local context.

Objective 2: To determine the KAP of paramedics regarding vaccination policies (RQ1).

In order to address this objective, a questionnaire was used. The questionnaire was specifically designed to address every area being pursued in the research question. The main findings of the study are:

- Age predisposition shows a severely reduced number of younger paramedics currently employed within the public sector (cf. 5.2.1).

- The ratio of men to women in the EMS of the Free State Province, still remains male dominated (cf. 5.2.2).

- Only a few of the participants had obtained tertiary qualifications (cf. 5.2.3). The majority of the participants were in possession of a short course qualification, which poses a threat of alignment with the National Emergency Care Education and Training (NECET) policy (cf. 5.2.4).

- Only a few of the participants obtained an advanced EMS qualification; such highly skilled and knowledgeable individuals about EMC, are assumed to be more likely to be vaccinated (cf. 2.6).

- The majority of the participants had Internet access, which strengthens the possibility of considering self-directed learning as a method of learning (cf. 5.2.5).

- Another positive finding is the fact that the majority have an active e-mail address, which can be used as an alternative platform from where information about vaccination and policies related to it can be shared (cf. 5.2.6).

- Despite the fact that the majority of participants had a means of getting around, access to active iCAM facilities across the five districts of the Free State Province were still restricted (cf. 5.2.7; cf. 5.2.8). Thus, finance and time to attend a CPD session on iCAM could become a barrier against acquiring the necessary information about vaccination, safe practices and policies related to it.

- Of great concern was the finding that participants' knowledge of the various types of vaccines available to HCWs was poor (cf. 5.3.2).

- Of greater concern was the overall reported knowledge of participants about vaccination in this study being low. The majority of the participants' knowledge about vaccination were suboptimal (cf. 5.3.1). Similarly, this finding corresponds with the fact that the majority of the participants agreed to have insufficient knowledge about vaccination (cf. 5.3.1).

- It appears that no national and provincial policy for the vaccination of HCWs exist (cf. 2.3). This is of extreme concern as it would provide information about vaccination that is crucial for the prevention of sickness and disease among HCWs. Information in this regard should therefore be freely available and accessible to all applicable governmental facilities and institutions (cf. 5.3.1).

- Additionally, the findings from this study reported that OHS representatives are non-existent or not known about in some of the districts' EMS stations (cf. 5.3.2).

- In terms preventing cross-contamination, less than half of the participants understand their obligation towards patients by being vaccinated (cf. 5.3.1).

- Another major concern is the complete disregard for safe practices in the study. The findings of this study report an overall tendency of participants engaging or reverting to unsafe practices in the line of duty. The majority encourage the recapping of needles, use of hypodermic needles to perform an HGT in the absence of a safety device lancet, or not routinely wearing N95 face masks or safety goggles (cf. 5.3.2;

cf. 5.5.3; cf. 5.5.2). This despite the majority of the participants having a positive attitude towards the importance of wearing PPE when treating patients (cf. 5.4.1).

- The overall attitude of participants regarding the vaccination of paramedics against vaccine-preventable infections was positive (cf. 5.4.1).

- A positive finding of this study is the overall positive attitude participants displayed towards the implementation of mandatory vaccination policies (cf. 5.4.2).

- The findings of the study revealed that a large number of participants had not received their childhood immunisations, which makes participants more susceptible to contract and spread communicable diseases (cf. 5.5.1).

- In addition, the findings of the study reported suboptimal levels of protection against HB among participants (cf. 5.5.1).

- When enquiring about the reporting of a mucocutaneous accident, less than half of the participants who had mucocutaneous exposure, reported the incident (cf. 5.5.2). The findings thus suggests that the majority of participants who suffer mucocutaneous exposure would not report and seek PEP, thus exposing them to unnecessary risk.

- Paramedics in the Free State Province are ill-protected against vaccine-preventable diseases recommended for HCWs (cf. Figure 4.19).

- The need for developing a CPD session on vaccination where all applicable policies and procedures in this regard are explained and/or discussed were identified (cf. 5.4.1).

- The findings of the study reported a significant interest among participants to complete a course specifically designed for pre-hospital EMS personnel (cf. 5.6).

- In addition, the majority of participants reported that they would benefit from receiving additional information about vaccination (cf. 5.6).

- The order of preference of participants to receive additional information about vaccination aside from a course: CPD session, e-mail, in-service training and posters at EMS stations (cf. 5.6; cf. 5.4.1).

Objective 3: To make educational recommendations (RQ2).

In order to address this objective, conclusions were drawn from a literature study and data from the findings of the questionnaire. The main findings of the study included the need to develop and/or reinforce policies, SOPs, awareness campaigns, and educational programmes and platforms from where information about the importance of vaccination for HCWs, in particular paramedics, can be disseminated or emphasised. Also, to appoint more OHS representatives to keep all stakeholders accountable for their respective parts in a conducive and safe working environment (cf. 5.8).

6.3 CONCLUSION

This study identified several reasons why paramedics in the Free State Province do not comply with vaccination policies. In addition, both the literature on and results from this study agree to the importance of HCWs, more especially paramedics to be vaccinated against vaccine-preventable diseases. In an attempt to increase vaccine uptake, focus should be placed on raising awareness about the importance of vaccination of HCWs, to develop and implement vaccination policies for HCWs from where SOPs can be derived, and to eliminate the barriers associated with vaccine uptake. Quality assurance measures should be put in place once policies have been developed, and SOPs have been derived to ensure compliance as well as for record-keeping purposes.

In addition, information about vaccination for paramedics and policies related to it should be made freely available and accessible to all. Information in this instance could be developed and presented via short courses, CPD activities, e-mails, posters at EMS stations and self-directed learning through online courses. Education and effective communication are key to the success of this initiative.

6.4 LIMITATIONS OF THE STUDY

The following limitations of the study were identified:

- Literature in terms of vaccination of HCWs in the South African context was limited; even more limiting was literature on the vaccination of paramedics. Therefore, future research and publication in this regard is required. However, conclusions were drawn from literature in an international context.

- National and Provincial vaccination policies for HCWs' in the South African context, seem to be non-existing. However, literature on policies with reference to the vaccination of HCWs, in particular paramedics, in the international context was used where appropriate.

- The reality that less than half of the participants had an OHS representative at their station could have limited the study, as it is not clear whether the poor reporting on BBF is due to limited OHS representatives available, limited knowledge of them, or that participants just did not feel the need to report such incidents. Thus, future studies to determine the reasons why paramedics in the Free State Province do not report BBF exposure should be considered.

- The study had a 78.4% response rate. A total of 11 questionnaires were partially completed or had the same gaps in the information. The questionnaires were included in the study. Data that could have formed part of the study was lost as a result.

6.5 RECOMMENDATIONS

In addition to the recommendations for education in Chapter 5.8, the following recommendations were made from the study:

- National and provincial vaccination policies should be developed to enhance HCWs wellbeing, more especially paramedics' compliance therewith.

- The implementation of mandatory vaccination policies for of paramedics in the Free State Province should be considered.

- More strenuous SOPs should be implemented for quality assurance purposes and to ensure that paramedics observe and comply with safe practices, especially the safe handling and disposal of sharps within the EMS.

- Employers should endorse the use of safety-enhanced devices in an attempt to reduce the incidents of NSIs among paramedics.

- Risk assessment should be conducted to determine the occupational exposure risks in the workplace of paramedics to determine which vaccination/s are necessary.

- Vaccination of HCWs should be based on the risks of occupational exposure to vaccine-preventable infections.

- HCWs' employers should endorse vaccination programmes to illuminate cost-implication as a barrier of compliance to vaccine policies.

- Routine disinfection and sterilisation of EMS vehicles are recommended to reduce the risk of cross-contamination and infection to paramedics and/or patients.

- Serum tests following a full course HB vaccination is required to confirm immunity against HB and thus to ensure the preparedness of Free State Province paramedics in this regard.

- Policies should be made freely available and accessible at all applicable governmental facilities and institutions.

In terms of future research, a qualitative study could be conducted to better understand paramedics' world view on the topic, especially in the case of colleagues not-complying or refusing to comply with policies and regulations regarding vaccination. Also, a similar study may be conducted to determine whether this phenomenon exists in the private sector.

All educational initiatives should be evaluated and quality assured for improvement; this can be done over time and with more research to promote infection control within the pre-hospital setting.

6.6 CONCLUDING REMARKS

In order to ensure the safety and protection of paramedics against vaccine-preventable infections, they are required to be vaccinated. Therefore, EMS-specific vaccination policies should be developed and implemented for paramedics to provide insight and guidance in this regard. Future research and publication is required to evaluate the effectiveness and efficiency of these policies. In addition, barriers associated with the poor compliance of paramedics with vaccine uptake should be reduced - or better yet, eliminated. Furthermore, stricter SOPs are required to ensure that paramedics comply with universal precautions and engage in safe practices when in the line of duty.

More OHS representatives are required to keep employers accountable for providing employees with appropriate SOPs and PPE, while employees are expected to comply with these safety measures put in place to provide a conducive and safe environment for all. Consequently, a qualitative study is welcomed as it could inform more information regarding attitudes and practice of paramedics on this topic. Also, in order to evaluate the effectiveness and relevance of the different educational interventions proposed in this study, further research is advised to determine which of the proposed educational interventions would be best for this sample.

All research questions were addressed in this study. This study shows a directive for further research to be conducted in the area of infection control within the pre-hospital setting. Overall, there is a positive attitude towards or willingness to know more about the topic. If current and newly identified barriers are reduced, there is a high possibility that compliance with vaccination policies may improve. Education and effective communication are key, but this should be guided by formal policies and SOPs and managed accordingly by higher authorities.

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APPENDICES

APPENDIX A

APPENDIX A1 **EVIDENCE OF PERMISSION TO CONDUCT THE STUDY**

APPENDIX A2 **ETHICS COMMITTEE OF THE FACULTY OF HEALTH SCIENCES DOCUMENT**

APPENDIX A1
EVIDENCE OF PERMISSION TO CONDUCT THE STUDY

health
Department of Health
FREE STATE PROVINCE

20 February 2018

Mr. Z Arendse
School of Allied Health Professions
Faculty of Health Science
University of the Free State

Dear Mr. Z Arendse

Subject: EDUCATIONAL RECOMMENDATIONS FROM THE KNOWLEDGE, ATTITUDES AND PRACTICE OF FREE STATE PROVINCE PARAMEDICS REGARDING VACCINATION POLICIES.

- Please ensure that you read the whole document, Permission is hereby granted for the above – mentioned research on the following conditions:
- Participation in the study must be voluntary.
- A written consent by each participant must be obtained.
- Serious Adverse events to be reported to the Free State department of health and/ or termination of the study
- Ascertain that your data collection exercise neither interferes with the day to day running of Free State Provincial Offices nor the performance of duties by the respondents or health care workers.
- Confidentiality of information will be ensured and please do not obtain information regarding the identity of the participants.
- **Research results and a complete report should be made available to the Free State Department of Health on completion of the study (a hard copy plus a soft copy).**
- Progress report must be presented not later than one year after approval of the project to the Ethics Committee of the University of Free State and to Free State Department of Health.
- Any amendments, extension or other modifications to the protocol or investigators must be submitted to the Ethics Committee of the University of Free State and to Free State Department of Health.
- **Conditions stated in your Ethical Approval letter should be adhered to and a final copy of the Ethics Clearance Certificate should be submitted to** sebeelats@fshealth.gov.za **before you commence with the study**
- No financial liability will be placed on the Free State Department of Health
- Please discuss your study with the institution manager/CEOs on commencement for logistical arrangements
- Department of Health to be fully indemnified from any harm that participants and staff experiences in the study
- Researchers will be required to enter in to a formal agreement with the Free State department of health regulating and formalizing the research relationship (document will follow)
- You are encouraged to present your study findings/results at the Free State Provincial health research day
- Future research will only be granted permission if correct procedures are followed see http://nhrd.hst.org.za

Trust you find the above in order.
Kind Regards

Dr D Motau
HEAD: HEALTH
Date: 21/2/2018

APPENDIX A2

ETHICS COMMITTEE OF THE FACULTY OF HEALTH SCIENCES DOCUMENT

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

UFS·UV
HEALTH SCIENCES
GESONDHEIDSWETENSKAPPE

Health Sciences Research Ethics Committee

22-Mar-2018

Dear **Mr Zane Arends**

Ethics Clearance: **EDUCATIONAL RECOMMENDATIONS FROM THE KNOWLEDGE, ATTITUDES AND PRACTICE OF FREE STATE PROVINCE PARAMEDICS REGARDING VACCINATION POLICIES.**

Principal Investigator: **Mr Zane Arends**

Department: **School of Allied Health Professions (Bloemfontein Campus)**

APPLICATION APPROVED

Please ensure that you read the whole document

With reference to your application for ethical clearance with the Faculty of Health Sciences, I am pleased to inform you on behalf of the Health Sciences Research Ethics Committee that you have been granted ethical clearance for your project.

Your ethical clearance number, to be used in all correspondence is:**UFS-HSD2017/1187**

The ethical clearance number is valid for research conducted for one year from issuance. Should you require more time to complete this research, please apply for an extension.

We request that any changes that may take place during the course of your research project be submitted to the HSREC for approval to ensure we are kept up to date with your progress and any ethical implications that may arise. This includes any serious adverse events and/or termination of the study.

A progress report should be submitted within one year of approval, and annually for long term studies. A final report should be submitted at the completion of the study.

The HSREC functions in compliance with, but not limited to, the following documents and guidelines: The SA National Health Act. No. 61 of 2003; Ethics in Health Research: Principles, Structures and Processes (2015); SA GCP(2006); Declaration of Helsinki; The Belmont Report; The US Office of Human Research Protections 45 CFR 461 (for non-exempt research with human participants conducted or supported by the US Department of Health and Human Services- (HHS), 21 CFR 50, 21 CFR 56; CIOMS; ICH-GCP-E6 Sections 1-4; The International Conference on Harmonization and Technical Requirements for Registration of Pharmaceuticals for Human Use (ICH Tripartite), Guidelines of the SA Medicines Control Council as well as Laws and Regulations with regard to the Control of Medicines, Constitution of the HSREC of the Faculty of Health Sciences.

For any questions or concerns, please feel free to contact HSREC Administration: 051-4017794/5 or email EthicsFHS@ufs.ac.za.

Thank you for submitting this proposal for ethical clearance and we wish you every success with your research.

Yours Sincerely

Dr. SM Le Grange
Chair : Health Sciences Research Ethics Committee

APPENDIX B

APPENDIX B1 LETTER OF INVITATION TO PARTICIPATE IN THE STUDY

APPENDIX B2 QUESTIONNAIRE

APPENDIX B1

LETTER OF INVITATION TO PARTICIPATE IN THE STUDY

INVITATION LETTER TO PARTICIPATE IN THE QUESTIONNAIRE

To: Participants in the Questionnaire.

Principal Researcher: Mr Zane Arends, CPD/SLP course Co-ordinator, Free State College of Emergency Care, Free State Department of Health.

Dear Colleague

I am conducting research in fulfilment of the requirements of the Magister Degree in Health Professions Education. The **aim** of the study is to investigate the reasons for paramedics' low compliance to vaccination policies within the Free State Province

You have been selected to participate in this research, because you are a paramedic in the public sector of the Free State Province, and registered with the HPCSA. I am of the opinion that your contribution in this study will be of great value. Please take note that there are no cost implications or payment involved.

Participation in this survey is voluntary. You will remain anonymous and your data will be treated confidentially at all times. Furthermore, you may withdraw or end your participation in this study at any stage. Permission to conduct the study had already been obtained from the Health Sciences Research Ethics Committee of the Faculty of Health Sciences (HSREC no.: **UFS-HSD2017/1187**), University of the Free State and the Head of the Department, Free State Provincial Department of Health.

Contact details:
Health Sciences Research Ethics Committee
Office of the Dean: Health Sciences
Tel: +27 (0)51 401 7795/7794
Email: ethicsfhs@ufs.ac.za

If you require any further information, or wish to withdraw your participation at any stage, you can contact the principal researcher on the contact details listed below.

Thank you in advance for your participation in this research.

Regards

Zane Arends
Principal Researcher
Tel: (Office) 051-405 2772/ 051-492 1396
Cell: 0718666477
Fax2mail: 0864916728
Email address: zanearends3@gmail.com

APPENDIX B2

QUESTIONNAIRE

Questionnaire

Thank you for your willingness to participate in this research study. Please note that by completing this questionnaire you are voluntarily agreeing, but you can withdraw or end at any given time. Also not that the results of the study may be published.

Completion of the questionnaire will take about 25 minutes. Take special note of the **abbreviation list** at the beginning of the questionnaire as this will clarify all the abbreviations you will encounter during completion of this questionnaire. Respondents have two weeks to complete the questionnaire from the time they receive it. All completed questionnaires should be placed in marked containers situated at the respective EMS stations.

Topic	Educational recommendations from the knowledge, attitudes and practice of Free State Province paramedics regarding vaccination policies.

Mark as shown:  Please use a ball pen or thin felt tip

Correction:  Please follow the example as shown on the left

Abbreviations

***BBF** : Blood and bodily fluids*
***MMR** : Measles, Mumps and Rubella*
***NSI** : Needle-stick injury/injuries*
***PEP** : Post-exposure Prophylaxis*
***PPE** : Personal Protective Equipment*
***HGT**: Haemo-glucose Test*
***HAV** : Hepatitis A Virus*
***CPD** : Continuous Professional Development*
***HBV** : Hepatitis B Virus*
***HIV** : Human Immunodeficiency Virus*
***HCV** : Hepatitis C Virus*
***OHS** : Occupational Health and Safety*
***SLP** : Short Learning Programme*
***EMS** : Emergency Medical Services*
***iCAM** : Interactive Communication and Management system*

Section A:	Demographics

Please complete the following questions:

1.1.	**Indicate the category pertaining to your age.**		**<20**		**20-29**
			30-39		**40-49**
			50-59		**>59**
1.2.	**Are you male or female?**		**Male**		**Female**
1.3.	**Indicate your highest level of education.**		**Doctorate**		**Master's**
			Bachelor's Degree		**Diploma**
			Certificate		**Grade 12**
			Grade 10		**Other**
1.3.1.	**If Other, please specify.**				
1.4.	**Indicate from the list provided the highest qualification you obtained in pre-hospital emergency medical services (EMS).**		**Doctorate EMC**		**Master's EMC**
			Prof.Degree EMC		**B-Tech EMC**
			N.Dip EMC		**ECT**
			ECA		**CCA**
			AEA		**BAA**
			Other		
1.4.1.	**If Other, please specify.**				
1.5.	**Please indicate the region/district you are currently working in.**				**Mangaung**
					Xhariep
					Thabo Mafutsanyane
					Lejweleputswa

					Fezile Dabi
1.6.	Do you have access to the internet?		Yes		No
1.7.	Do you have an active email address?		Yes		No
1.8.	How do you get around?		Public Transport		Private transport
			Both		
1.9.	Do you have access to an Interactive Communication and Management system (iCAM) facility?		Yes		No

Section B:	Knowledge, Attitude and Practice survey with regards to vaccination among paramedics

Please complete the following questions:

Section B1: Knowledge

2.1. In your own words explain the term (or your understanding of the term) vaccination.

2.2.	**Have you ever received any information about vaccination?**		**Yes**		**No**

2.2.1.	**If you answered Yes, please specify the source.** *(Mark all applicable to you)*		**During studies**
			Through CPD activities
			On the job
			Through an Union
			Reading about Policies
			At the EMS station
			At the receiving/ transferring hospital
			Other
2.2.2.	**If Other, please specify.**		

2.3. From the list provided, indicate which vaccination/s are available for pre-hospital EMS personnel (specifically for work).

	HAV		**HCV**
	MMR		**Pertussis**
	Varicella (chickenpox)		**Influenza (seasonal)**
	HBV		**Not Sure**

2.4.	**From the list provided, indicate which vaccination/s are recommended for pre-hospital EMS personnel (specifically for work).**				
			HAV		**HCV**
			MMR		**Pertussis**
			Varicella (chickenpox)		**Influenza (seasonal)**
			HBV		**Not Sure**
2.5.	**Regarding *vaccination*. From the statements below please indicate if you: Agree – Disagree – Don't know.**				
2.5.1.	**My current knowledge about vaccinations is sufficient.**		**Agree**		
			Disagree		
			Don't know		
2.5.2.	**I am familiar with the national policy on vaccination for health professionals.**		**Agree**		
			Disagree		
			Don't know		
2.5.3.	**There are no vaccination policies for health professionals within the public sector of the Free State Province.**		**Agree**		
			Disagree		
			Don't know		
2.5.4.	**I fully understand what is expected of me as a health professional with regards to vaccination.**		**Agree**		
			Disagree		
			Don't know		
2.5.5.	**Vaccination serves to protect the host against vaccine-preventable diseases.**		**Agree**		
			Disagree		
			Don't know		
2.5.6.	**Vaccination may infect the host with the specific disease.**		**Agree**		
			Disagree		
			Don't know		

2.6.	**Regarding *safe practices*. From the statements below please indicate if you: Agree – Disagree – Don't know.**

2.6.1.	**Needles can be recapped for safety purposes only if a sharps container is not immediately available.**		**Agree** **Disagree** **Don't know**
2.6.2.	**Face masks (N95) should be worn only when the risk of inhaling airborne pathogens (e.g. viruses, bacteria, fungi) are confirmed.**		**Agree** **Disagree** **Don't know**
2.6.3.	**The use of gloves are recommended only when the risk of exposure to blood is present.**		**Agree** **Disagree** **Don't know**
2.6.4.	**The use of safety goggles are recommended only when the risk of flying debris is present on an emergency scene.**		**Agree** **Disagree** **Don't know**
2.7.	**Do you know that you can be infected by coming in direct contact with contaminated blood and bodily fluids (BBF)?**		**Yes** ☐ **No** ☐ **Not sure** ☐
2.8.	**Regarding Occupational Health and Safety (OHS):**		
2.8.1.	**Do you have an Occupational Health and Safety representative at your facility/station?**		**Yes** ☐ **No** ☐ **Not sure** ☐
2.8.2.	**Do you know the processes that must take place post-exposure to BBF and/or Needle-stick Injury (NSI)?**		**Yes** ☐ **No** ☐ **Not sure** ☐

Section B2: Attitudes			
3.1.	**Do you think wearing personal protective equipment (PPE) is important when treating patients?**		**Yes** ☐ **No** ☐ **Not sure** ☐
3.1.1.	**Explain your answer.**		

3.2. **Do you think it is important for paramedics to be vaccinated against vaccine-preventable infections?** ☐ **Yes** ☐ **No** ☐ **Not sure**

3.2.1. **Explain your answer.**

3.3. **Do you think vaccination against Hepatitis B only, is sufficient to ensure the protection of paramedics against vaccine-preventable diseases?** ☐ **Yes** ☐ **No** ☐ **Not sure**

3.4.	**Regarding the statements below please indicate if you: Agree – Disagree – Don't know.**		
3.4.1.	**Enough emphasis is placed on how paramedics can be protected against vaccine-preventable infections.**		**Agree** **Disagree** **Don't know**
3.4.2.	**I would attend a Continuous Professional Development (CPD) session on vaccinations where all applicable policies and procedures in this regard are explained and/or discussed.**		**Agree** **Disagree** **Don't know**
3.4.3.	**I would benefit from receiving additional information about vaccination.**		**Agree** **Disagree** **Don't know**
3.4.4.	**I would inform other co-workers if they did something that put themselves and others at risk of exposure.**		**Agree** **Disagree** **Don't know**
3.4.5.	**Vaccination should be enforced upon all pre-hospital EMS personnel treating patients.**		**Agree** **Disagree** **Don't know**
3.4.6.	**No pre-hospital EMS personnel involved in patient care should be allowed to practice without having received the vaccinations prescribed by National Health**		**Agree** **Disagree** **Don't know**

Section B3: Practice

The following questions relate to your personal practices. Please answer truthfully. Remember this questionnaire is anonymous and all information will be kept strictly confidential

4.1.	**Have you received all your childhood immunisations?**		**Yes**		**No**		**Not sure**
4.2.	**Are you affiliated with any humanitarian aid organisation such as Gift of the Givers, Rescue South Africa, etc.?**		**Yes**		**No**		**Not sure**
4.3.	**Have you ever travelled outside of South Africa's border?**		**Yes**		**No**		**Not sure**
4.3.1.	**If yes, when last (in years) did you travel abroad?**		**<5**		**<10**		**>10**
4.3.2.	**Were there any vaccinations required for that country?**		**Yes**		**No**		**Not sure**
4.4.	**Have you been vaccinated against Hepatitis B?**		**Yes**		**No**		**Not sure**
4.4.1.	**Have you completed the course (all three doses)?**		**Yes**		**No**		**Not sure**
4.4.2.	**Were you ever required to take a booster dose of Hepatitis B vaccine?**		**Yes**		**No**		**Not sure**
4.5.	**Please indicate all of the vaccine-preventable infections you have been vaccinated against** *(Mark all applicable to you)*		**HAV**		**HCV**		
			MMR		**Pertussis**		
			Varicella (chickenpox)		**Influenza (seasonal)**		
			HBV		**Other**		
4.5.1.	**If Other, please specify.**						
4.6.	**Are you wearing a N95 face mask every time you treat a patient?**		**Yes**		**No**		**Not sure**
4.7.	**Are you wearing safety goggles every time you treat a patient?**		**Yes**		**No**		**Not sure**
4.8.	**Are you wearing disposable medical gloves every time you treat a patient?**		**Yes**		**No**		**Not sure**

4.9.	**Have you had any exposure to BBF in the past six months?**		**Yes**		**No**		**Not sure**
4.9.1.	**If Yes. Did you report the incident to the Occupational Health and Safety representative at your facility/station?**		**Yes**		**No**		**Not sure**
4.10.	**Do you use a safety device lancet every time you perform a Haemo-glucose Test (HGT) on a patient?**		**Yes**		**No**		**Not sure**
4.11.	**At times when a safety device lancet is not readily available, do you use a hypodermic needle to perform a HGT on a patient?**		**Yes**		**No**		**Not sure**

Section C:	General/Educational requirements

5.1.	**Would you be interested in completing a course about vaccination, which is specifically designed for pre-hospital EMS personnel?**		**Yes**		**No**		**Not sure**
5.2.	**Aside from doing a course. Indicate from the list provided, how else you would like to receive information on this topic.**						
			Email				
			Posters in EMS station				
			In-service training				
			CPD				
			Other				
5.2.1.	**If Other, please specify.**						
5.3.	**Pre-hospital EMS personnel will benefit from receiving additional information about vaccination.**		**Yes**		**No**		**Not sure**

Section D:	Case Scenario

(Read the following case scenario and answer the questions pertaining to it)

Gatiep is an advanced life support (ALS) paramedic working the first shift of his "two day-two night" cycle. After establishing an intravenous line ("drip"), in the absence of a sharps container he decides to recap the needle. He then pricks himself in the process. Concerned about being criticised by his management, fellow colleagues and subordinates, he decides to keep quiet about the event. He also decides that he will seek intervention once he reports off duty from his last night shift (>72hours away).

6.1.	**Would you say Gatiep suffering a Needle-stick injury (NSI) is as a result of unsafe practice**		**Yes**		**No**		**Not sure**
6.1.1.	**Motivate your answer.**						
6.2.	**When do you think would have been the ideal time for Gatiep to seek Post-exposure Prophylaxis (PEP) against contracting the Hepatitis B viral infection?**		**Within 2 hours post NSI** **<24 hours** **>72 hours**				
6.3.	**Should Gatiep and the patient be tested for Human Immunodeficiency Virus (HIV), HBV or both after the incident?**		**HBV**		**HIV**		**Both**
6.4.	**If you were to be exposed to a NSI, would you report it?**		**Yes**		**No**		**Not sure**
6.5.	**In one paragraph explain how you would have handled it differently.**						

THE END

APPENDIX C
LETTER FROM LANGUAGE EDITOR

12 August 2019

Luna Bergh

55 Jim Fouché Avenue

Universitas, Bloemfontein

To whom it may concern

This is to certify that I language-edited the dissertation of Zane Arends manually, excluding references and appendices. The author's style was retained and he effected the changes. In this way, both linguistic excellence and the candidate's ownership of his text were ensured.

Sincerely

Luna Bergh

D Litt et Phil

Language and writing specialist