



NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY

**DETERMINING THE MEDICAL READINESS OF GAME RANGERS IN THE NAMIBIAN AUSTERE
ENVIRONMENT**

By
CORNELIA BAUER

The thesis presented in fulfilment of the requirements for the degree of Master of Health Sciences
in the Faculty of Health and Applied Sciences at the Namibia University of Science and
Technology

Supervisor: Dr Morgan Hauptfleisch

Co-supervisor: Ms Nadine Seymour

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ABSTRACT

Wildlife poaching provides a serious threat to conservation and eco-tourism development. Anti-poaching activities have led to increased poacher-ranger conflicts which have caused injuries and deaths on both sides. Rangers are faced with many perils ranging from being attacked by communities and poachers, the wildlife they protect as well as the harsh environment that they operate in, which can lead to injuries, illnesses and death. In order to reduce morbidity and mortality, rangers need to be able to perform initial stabilisation and care when a medical emergency in the field occurs. The main aim of this study was to determine whether anti-poaching operatives and game rangers are equipped to deal with the unique medical emergencies facing them in the often remote and inhospitable Namibian rural environment. Little or no research was found regarding medical readiness of game rangers and their ability to adequately perform initial casualty care in the field, considering their unique workplace challenges. Furthermore, no information could be found on the availability and the adequacy of first aid supplies and equipment to perform such medical duties. This study used a descriptive non-experimental design to determine which medical emergencies were most common in field ranger duties and their medical readiness to deal with such emergencies. Convenience sampling was used to conduct surveys amongst rangers and organisations which employ them. Additionally, a usage and attitude survey was undertaken to establish the most required contents for a personal first aid field kit for field rangers. The analysis is based on 115 medical readiness surveys and 69 field kit surveys. Most rangers in Namibia's remote areas were found to lack first aid training and equipment to deal with medical emergencies, yet the occurrence of injuries and illnesses were very frequent and often serious. The nearest healthcare facilities are often far away and may be insufficient to provide definitive management to a ranger that is seriously injured or ill in the field. Furthermore, Emergency Medical Services in most rural areas are unreliable and rangers depend on own transport, sometimes using a donkey cart, to reach a medical facility. Due to the distinctive challenges that rangers face, standard first aid programmes and kits do not meet their unique requirements. Operating in a wilderness or remote area rangers will not only need extensive knowledge of common injuries and illnesses to care for themselves or a colleague, but they will also need to rely only on the equipment they carry with them. Therefore, rangers must be adequately trained and equipped for emergencies in the field. The study recommends a portable first aid kit based on the most common injuries and illnesses from this unique sector of work.

DECLARATION

I, Cornelia Bauer declare that the work contained in the thesis entitled "Determining the medical readiness of game rangers in the Namibian austere environment" is my original work and that I have not previously in its entirety or partially submitted it at any university or other higher education institution for the award of a degree.


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DEDICATION

For all game rangers and anti-poaching units in Namibia,
thank you for your dedication, commitment and sacrifice to ensure the safety of our wildlife
and biodiversity.

TABLE OF CONTENTS

ABSTRACT	i
DECLARATION	ii
RETENTION AND USE OF THESIS	ii
ACKNOWLEDGEMENTS	iii
DEDICATION	iv
TABLE OF CONTENTS	v
LIST OF TABLES	viii
LIST OF FIGURES	x
GLOSSARY	xii
CHAPTER 1. INTRODUCTION	1
1.1 Background Information	1
1.2 Significance of Research	4
1.3 Aims and Objectives of this Study.....	4
CHAPTER 2. LITERATURE REVIEW	5
2.1 Global Overview.....	5
2.2 A Namibian Perspective	6
2.3 Risks and Deaths of Rangers	8
2.4 Training and Equipping of Rangers	9
2.5 Namibia's Healthcare Infrastructure.....	11
CHAPTER 3. METHODOLOGY	13
3.1 Medical Readiness of Game Rangers.....	13
3.1.1 Design	13
3.1.2 Population and Sampling.....	13
3.1.3 Data Analysis	16
3.2 Personal First Aid Field Kit	18
3.2.1 Design	18
3.2.2 Population and Sampling for Personal First Aid Kit Contents.....	19
3.2.3 Data Collection	19
3.2.4 Data analysis.....	20
3.3 Challenges and Limitations	20

3.4	Ethical Considerations of the Research	21
CHAPTER 4.	RESULTS.....	22
4.1	Demographic Information.....	22
4.1.1	Organisational Data	22
4.1.2	Ranger Data	26
4.1.1	Collective Organisational and Ranger responses.....	31
4.2	Access to Healthcare Facilities.....	34
4.2.1	Organisational Data	34
4.2.2	Ranger Data	36
4.2.1	Collective Organisational and Ranger responses.....	39
4.3	Emergencies.....	42
4.3.1	Organisational Data	42
4.3.2	Ranger Data	44
4.3.3	Collective Organisational and Ranger responses.....	46
4.4	Training	49
4.4.1	Organisational Data	49
4.4.2	Ranger Data	52
4.5	First Aid Equipment.....	53
4.5.1	Organisational Data	53
4.5.2	Ranger Data	54
4.6	Personal First Aid Field Kit	56
4.6.1	Demographic Information of Respondents	56
4.6.2	Recommended Items and Quantities for a Personal First Aid Field Kit.....	57
4.6.3	Importance and Usage Ranking of Items.....	60
4.6.4	Extra Items Suggested	62
CHAPTER 5.	DISCUSSION.....	65
5.1	Overall impression	65
5.2	Demographic Information.....	66
5.2.1	Anti-poaching Activities.....	67
5.3	Access to Healthcare Facilities.....	69
5.3.1	Types of Healthcare facilities.....	69

5.3.2	Distances to Healthcare Facilities	71
5.3.3	Time to Healthcare Facilities	75
5.3.4	Mode of Transport to Healthcare Facilities	76
5.4	Emergencies.....	79
5.4.1	Injuries	79
5.4.2	Illnesses	80
5.4.3	Life-threatening Encounters and Deaths.....	80
5.5	Training	82
5.6	First Aid Equipment.....	85
CHAPTER 6.	CONCLUSION	90
CHAPTER 7.	RECOMMENDATIONS.....	91
REFERENCES	93
APPENDICES.....		101
Appendix A – Organisational Survey on Medical Readiness		101
Appendix B - Ranger Medical Readiness Survey.....		111
Appendix C – Personal First Aid Field Kit Survey		118
Appendix D – Recommended Personal First Aid Field Kit		132
Appendix E – News blog publication on SCIONA webpage		134

LIST OF TABLES

Table 3-1: Type of responses for the organisational survey on ranger medical readiness	15
Table 3-2: Type of responses for the ranger medical readiness survey	15
Table 3-3: Countries as allocated into regions of Africa	17
Table 3-4: Number of responses from different collection points	19
Table 4-1: Type of Organisation of respondents as per the organisational survey	22
Table 4-2: Category of Organisation of respondents as per the organisational survey	22
Table 4-3: Number of rangers in APU as indicated by the organisational survey	24
Table 4-4: Average number of members in a patrolling team as stated by the organisational survey	25
Table 4-5: Common modes of patrols as per the organisational survey	25
Table 4-6: Size of the patrolled area as per the organisational survey.....	25
Table 4-7: Position of respondents as per ranger survey	28
Table 4-8: Type of organisation respondent working for as per ranger survey.....	28
Table 4-9: Number of rangers at a station as per ranger survey	30
Table 4-10: Average number of members in a patrolling team as per ranger survey	30
Table 4-11: Primary mode of patrols used by rangers as per ranger survey	31
Table 4-12: Additional modes of patrol used by rangers as per ranger survey	31
Table 4-13: Distance to nearest medical facility as per organisational responses	35
Table 4-14: Time required to reach the nearest medical facility as per organisational responses	35
Table 4-15: Distance from site to the nearest hospital as per organisational responses	35
Table 4-16: Time to reach the nearest hospital as per organisational responses	36
Table 4-17: Common modes of transport to medical facility as per Organisational responses.....	36
Table 4-18: Distance from site to the nearest medical facility as per ranger surveys	37
Table 4-19: Time to reach the nearest medical facility as per Ranger surveys.....	37
Table 4-20: Distance to nearest Hospital as per Ranger surveys	38
Table 4-21: Time to reach the nearest Hospital as per Ranger surveys.....	38
Table 4-22: Common mode of transport to the facility as per Ranger surveys	39
Table 4-23: Cause of injuries on duty as per organisational survey responses	43
Table 4-24: Type of injuries occurring on duty per Organisational survey responses.....	43
Table 4-25: Year of injuries occurring as per organisational survey responses	43
Table 4-26: Type of illnesses occurring as reported by organisational responses.....	44
Table 4-27: Types of life-threatening encounter as per ranger survey responses	45
Table 4-28: Cause of injury as per ranger survey responses.....	45
Table 4-29: Type of illness occurred on duty as per ranger survey responses	46
Table 4-30: Comparison of the competencies for the various first aid courses	51

Table 4-31: Additional training requirements to be adequately trained for an emergency as per Ranger survey responses.....	53
Table 4-32: Additional equipment required to deal with a medical emergency as per Ranger survey responses	56
Table 4-33: Recommended quantities of first aid items and medication.....	58
Table 4-34: Importance ranking of items in first aid kit.....	60
Table 4-35: Usage ranking of items of first aid kit	61
Table 4-36: Suggested quantity of extra items for PFAFK.....	63
Table 4-37: Importance ranking of extra items for PFAFK	63
Table 4-38: Usage ranking of extra items for PFAFK.....	64
Table 5-1: Percentage of the rural population in relation with population density per region in Namibia	71

LIST OF FIGURES

Figure 1-1: Protected Areas in Namibia including Communal Conservancies, State Protected Areas (National Parks) and Concessions. Retrieved from http://www.nacso.org.na/resources/map	2
Figure 2-1: Number of rhinoceros and elephants poached per annum in Namibia from 2012 to 2018	7
Figure 3-1: Number of CGG per region in Namibia. Adapted from NACSO, 2018	14
Figure 4-1: Percentage of respondents as per Organisational survey in relation to region of operation	23
Figure 4-2: Percentage of ranger's gender from Namibian Responses in Ranger Survey	26
Figure 4-3: Percentage of rangers per age group overall versus Namibian versus Ghana responses to surveys	27
Figure 4-4: Percentage of time serving as a ranger comparing overall versus Namibian versus Ghana responses to surveys	27
Figure 4-5: Percentage of respondents of Namibian ranger survey in relation to region of deployment	29
Figure 4-6: Percentage of category of organisation comparing organisational versus ranger survey responses	32
Figure 4-7: Percentage of region of operation comparing organisational versus ranger survey responses	32
Figure 4-8: Percentage of type of employment comparing organisational and ranger survey responses	33
Figure 4-9: Average number of members in a patrolling team comparing organisational and ranger survey responses.....	34
Figure 4-10: Time it takes to reach nearest healthcare facility considering distance to facility as per Namibian ranger responses	40
Figure 4-11: Time it takes to reach nearest healthcare facility considering distance to facility as per Namibian organisational responses	41
Figure 4-12: Time in relation to distance to the nearest hospital as per Namibian ranger responses.	41
Figure 4-13: Time needed in relation to distance covered to reach a hospital as per Namibian organisational responses	42
Figure 4-14: Causes of injuries comparing organisational and ranger responses	46
Figure 4-15: Types of injuries occurred comparing organisational and ranger responses	47
Figure 4-16: Common illnesses occurred comparing organisational and ranger responses	48
Figure 4-17: Cause of life-threatening encounter of game rangers.....	48
Figure 4-18: Cause of death of rangers comparing organisational and ranger survey responses.....	49
Figure 4-19: Percentage of rangers receiving first aid training as per Namibian organisational responses	50

Figure 4-20: Percentage of rangers having the various first aid levels from organisational and ranger responses	50
Figure 4-21: Number of rangers that have completed the different first aid levels.....	52
Figure 4-22: First aid items carried as part of first aid kit by organisational responses	54
Figure 4-23: First aid items carried as part of standard first aid kit by rangers	55
Figure 4-24: Occupation categories of respondents for PFAFK survey.....	56
Figure 4-25: Percentage of cases for type of casing of the first aid kit.....	57
Figure 4-26: Percentage of cases recommending various first aid disposable items for first aid kit ...	57
Figure 4-27: Percentage of cases selecting recommending various medication to be part of first aid kit	58
Figure 4-28: Extra Items suggested by respondents to be included in a personal first aid field kit	62
Figure 5-1: Location of health facilities in relation to national parks, communal and private conservancies.	70
Figure 5-2: Location communal conservancy offices in relation to health centres	72
Figure 5-3: Location of communal conservancy offices in relation to clinics	73
Figure 5-4: Location of communal conservancy offices in relation to district hospitals	74
Figure 5-5: Map of Namibian emergency medical services and generalized landbound vehicle response times. (: Source: Iskam, 2015	78
Figure 5-6: Percentage of cause of death per African Region. Adapted from IRF & TGLF, 2015, 2016, 2017b, 2018b, 2019b	82
Figure 5-7: Stock items that more than 50% of respondents suggested correlated with probability ranking percentages.....	87
Figure 5-8: Medication that more than 50% of respondents suggested correlated with probability ranking percentages.....	88
Figure 5-9: Extra Items that more than 8% of respondents suggested correlated with probability ranking percentages.....	89

GLOSSARY

AMI	Acute Myocardial Infarction
Anti-poaching activities	Any activities which can include, but are not limited to patrolling an area, ensuring safety for wildlife and possibly engaging poachers when intercepting them.
APU	Anti-poaching unit
CBNRM	Community-based Natural Resources Management
CGG	Community Game Guard
CPR	Cardiopulmonary Resuscitation
DPWM	Directorate of Parks and Wildlife Management
DRC	Democratic Republic of Congo
e-bike	Electric bike
EMS	Emergency Medical Services
EpiPen	Epinephrine Pen
ESAAMLG	Eastern and Southern Africa Anti-Money Laundering Group
FAK	First Aid Kit
FMTBCP	Field Medical Training Battalion Camp Pendleton
GDP	Gross Domestic Product
GIS	Geographic Information System
GRAA	Game Ranger Association of Africa
GRN	Government of the Republic of Namibia
GTF	Global Tiger Forum
Ha	hectare
HoRN	Help our Rhinos NOW
HUAP	Hunters United Against Poaching
IFAK	Individual First Aid Kit
IRF	International Ranger Federation
ISAP	Intelligence Support Against Poaching
Km	kilometre
Km ²	square kilometre
LMIC	Lower- and middle-income countries
Medical Readiness	The ability to perform initial treatment of self or others in the field, having adequate training and equipment available
MET	Ministry of Environment and Tourism
Mm	millimetre
MoHSS	Ministry of Health and Social Services
N\$	Namibian Dollar
NACSO	Namibia Association of Community Based Natural Resource Management Support Organisation
NamPol	Namibian Police
NAPHA	Namibia Professional Hunting Association
NBC	National Broadcasting Corporation
NCE	National Chamber of Environment
NDF	Namibian Defence Force
NDP 5	National Development Plan 5
NGO	Non-governmental Organisation
NPS	National Park Service
NSA	Namibia Statistics Agency
NUST	Namibia University of Science and Technology

NWP	Namibia Wildlife Protection
PAs	Protected Areas
PFAFK	Personal First Aid Field Kit
Rangers	Rangers can include but are not limited to game /field rangers, wardens, guides, nature conservationists, or anyone that is involved in the safekeeping of wildlife.
RFA	Ranger Federation of Asia
SPSS	Statistical Package for Social Services
SRT	Save the Rhino Trust
TCCC	Tactical Combat Casualty Care
TECC	Tactical Emergency Casualty Combat Care
TGLF	Thin Green Line Foundation
U&A	Usage and Attitude
UNESCO	United Nations Educational Scientific and Cultural Organisation
USA	Unites States of America
USD	United State Dollar
WHO	World Health Organisation
WTTC	World Travel and Tourism Council
WWF	World Wildlife Fund

CHAPTER 1. INTRODUCTION

1.1 Background Information

Namibia is known to tourists as a spectacular destination with vast, remote landscapes, abundant wildlife and flora resources, friendly people, peace and tranquillity (Government of the Republic of Namibia [GRN], 2017c). With an area of about 825 000 square km (km²) and a population of 2.3 million people in 2016, Namibia is also one of the least densely populated countries worldwide, having about 2.8 people per km² (Namibia Statistics Agency [NSA], 2016). The combination of the above provides an attraction to many stressed visitors as is evident with the number of tourists that enter the country. During 2017 there were 1.6 million foreign arrivals in Namibia, of which 93.2% (close to 1.5 million) were tourists, mostly attracted by wildlife and natural landscapes (Ministry of Environment and Tourism [MET], 2010, 2018).

Travel and Tourism accounted for 13.8% of the Namibian Gross Domestic Product (GDP) in 2017, with a predicted increase of 5.5% during 2018 and total contribution to employment at 14% nationwide (World Travel and Tourism Council [WTTC], 2018). The GDP is impacted by tourism not only by direct revenue (with park fees, hotels and accommodation) but also influences various other sectors of the GDP. These sectors include wholesale and retail trades, transport and communications as well as an essential contributor to foreign exchange ratings, investments, rural development, poverty reduction and economy growth (GRN, 2004b, 2004c, 2017b; Namibia Tourism Board [NTB], 2015; Sominis Storm, 2017).

The Government of Namibia has realised that eco-tourism plays a significant part in the economic growth of the country and as a result has prioritised maintaining of biodiversity, conservation and sustainable use of natural resources in the Vision 2030 and the National Development Plan 5 (NDP 5). Protected areas (PAs) like national parks, concessions, communal conservancies (Figure 1-1) and private game reserves all contribute to Namibia's conservation to ensure sustainable utilisation of wildlife and other natural resources (MET & Namibian Association of Community Based Natural Resource Management Support Organisations [NACSO], 2018; NACSO, 2017). Conservation areas in Namibia increased from 8.2% in 1975 to 43.9% in 2017. The first communal conservancies started in 1998, which increased to 86 registered communal conservancies by 2016, covering 54% of the communal land (GRN, 2017b; NACSO, 2017). In 2017 community conservation generated over 1.3 million Namibian Dollar (N\$) returns into the communities (MET & NACSO, 2018). Additionally, 30% of workforce employment takes place in natural resource-based sectors, and 70% of the population are dependent on natural resources to sustain life (GRN, 2017b; NACSO, 2017). Indirect uses of

conservation have an even more significant impact and underpin survival. These are associated with supporting the natural ecosystem, like providing clean air, water and productive soil (GRN, 2004a).

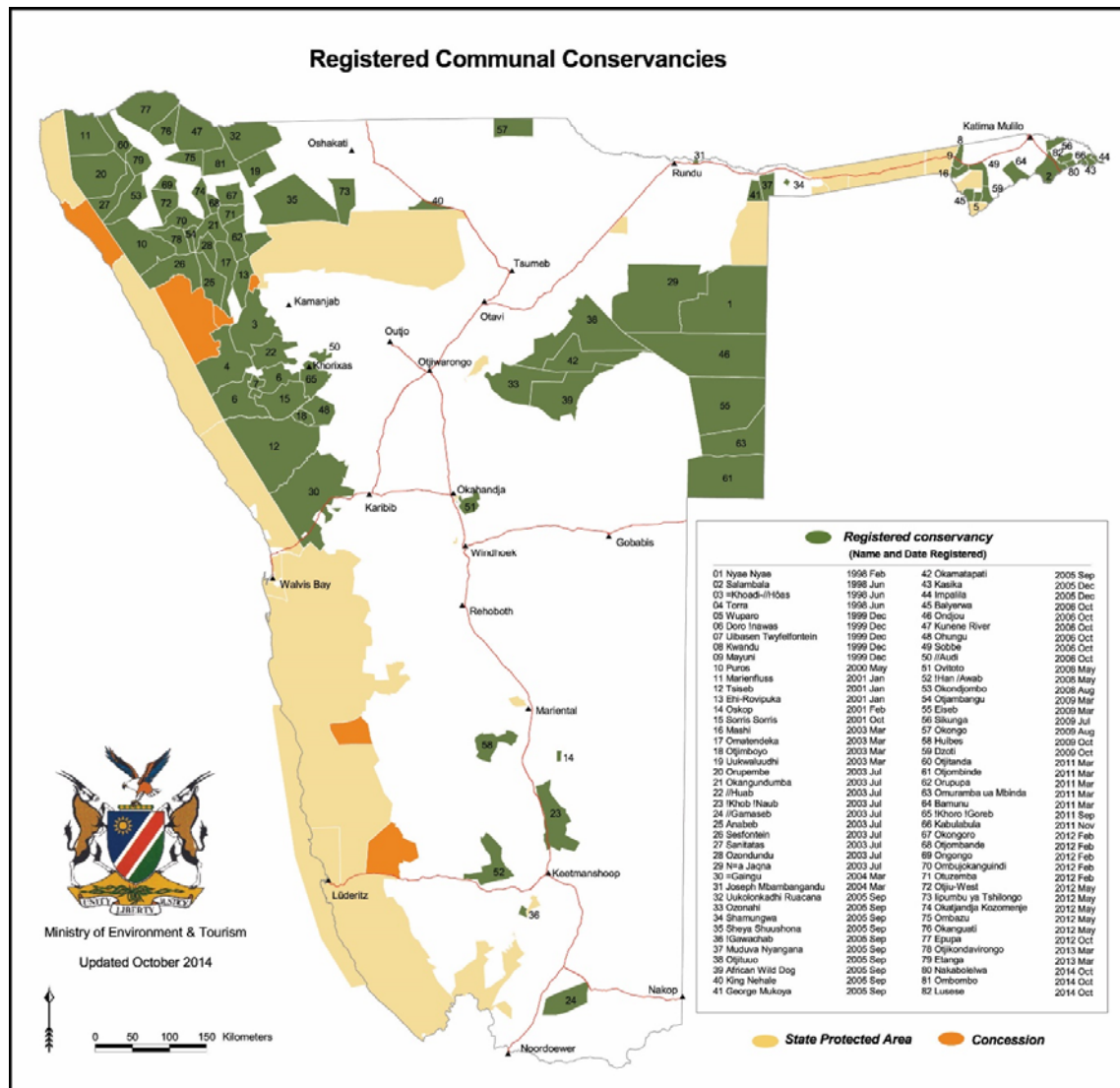


Figure 1-1: Protected areas in Namibia including communal conservancies, state protected areas (national parks) and concessions. Retrieved from <http://www.nacso.org.na/resources/map>

Namibia's biodiversity has global significance as many mammal species (including the desert adapted elephants and rhinos) are endemic to Namibia (MET, 2010). As PAs become more extensive, with game roaming freely across vast areas (Turpie, Barnes, Lange, & Martin, 2010), it becomes increasingly difficult to ensure protection for wildlife (MET, 2010). Rangers cannot monitor every portion of the PAs constantly, enabling poachers opportunities to kill wildlife. Hence, the GRN has identified poaching as one of the threats to environmental sustainability as part of the NDP 5 (pg 83). During recent years poaching has been on the rise in Namibia (GRN, 2017c; Nakale, 2018; Nyaungwa, 2017; PoachingFacts.com, n.d.; Save the Rhino, 2018), which may have severe implications through adverse impact on Namibia's biodiversity and tourism (GRN, 2017c; MET, 2014). The Plan aims at reducing

cases of poaching from 27% in 2017 to 5% in 2021/2022 with a gradual decrease of 5% per annum (GRN, 2017b). The GRN has identified challenges to obtaining these goals, which include inadequate resources to manage wildlife crime, an increase in poaching as an illegal trade of wildlife, limited human resources to enforce legislation, and poor and inadequate infrastructure and equipment (GRN, 2017b; MET, 2010). To achieve safeguarding the ecosystem, species and genetic diversity the Namibian Government envisions to improve the management of PAs by upgrading infrastructure and implementing measures to combat poaching (GRN, 2017b; MET, 2010).

Actions like the amendment of the Conservation Act in 2017 to include higher penalties for wildlife crime (GRN, 2017a; Potgieter, 2019), the inauguration of a new anti-poaching unit (APU) in Etosha (Phineas, 2017) and an approval of cabinet for the MET to set up a dedicated anti-poaching unit at the end of 2017, with the appointment of a new leader in August of that year (Nakale, 2017, 2018) all demonstrate that the Namibian Government has started implementing this plan. According to the Environment and Tourism Minister Shifeta: *“More resources have been allocated to fight poaching, more government agencies, non-governmental, private sector, international development partners, communities and the general public have come on board to support our effort to stop poaching”* (Nakale, 2018; Nyaungwa, 2017). Additionally, private sectors are also joining the fight in poaching with several organisations making anti-poaching their priority (MET, 2010; Nyaungwa, 2017). However, not only anti-poaching units are imperative in the sustainability of the Namibian wildlife diversity, but community game guards and game rangers also have a crucial function in Namibia’s conservation.

The Game Rangers Association of Africa (GRAA) describes game rangers in the following way:

In Africa, the Game Ranger goes by many different titles - Game Ranger, Game Warden, Conservation Officer, and many more, yet all are essentially the wildlife managers and the field force in Africa, working at the "coal face" of conservation. In Africa, the prime responsibility of the Game Ranger is to ensure the territorial and biological integrity of the conservation area under his/her management....Theirs is often a difficult, dangerous and thankless task for which they receive very little remuneration and recognition and seemingly minuscule support both morally and financially. For their dedication, many have in the past, and no doubt will in future, pay with their lives. (GRAA, n.d.)

With the above mentioned increased anti-poaching efforts, poacher-ranger confrontations and conflicts have increased as well, which can lead to injuries and death on both sides. In the first half of 2019, poachers killed an unknown soldier in the Bwabwata National Park in Namibia (International Ranger Federation [IRF] & Thin Green Line Foundation [TGLF], 2019b). Additionally, game rangers are often in the field for many days on patrols, where wildlife encounters and the harsh environment can

lead not only to injuries, but illnesses can quickly occur as well (Llewellyn, 2017). As more than 100 fatalities occur annually in the field worldwide (IRF & TGLF, 2019a; Lang, 2017), rangers must be able to assist themselves or their colleagues during an emergency. Becoming first responders by default, rangers need to provide the initial medical care and stabilisation until the casualty can receive qualified medical assistance. In order to be ready for a medical emergency, rangers need to have appropriate and adequate training and equipment.

1.2 Significance of Research

As rangers are in remote areas when performing their duties, the assumption is that rangers will experience a delay in accessing medical facilities should the need arise. If an injury or illness occurs in the field, the arrival of an ambulance for assistance or for the patient to be transported to a medical facility can be substantially prolonged. Considering the most common wounds encountered in tactical environments, with arterial haemorrhage leading to death in one to three minutes and airway obstructions in four to five (Eastridge et al., 2012; Field Medical Training Battalion Camp Pendleton [FMTBCP], 2010) there is a limited time for interventions to be effective. Immediate life-saving interventions are required for morbidity and mortality to decrease; it is thus imperative for the rangers as first responders to provide immediate care for the patient.

Very limited or no data was found with regards to first aid training of APUs and rangers, equipment provided to rangers and injuries or causes of death of Namibian rangers. As such, this research aimed to determine the state of medical readiness of game rangers in Namibia. Furthermore, it hopes to be able to create a guideline for requirements of game rangers in order to be ready to react when an emergency medical situation arises.

1.3 Aims and Objectives of this Study

The study aimed to determine the medical readiness of game rangers to manage emergency situations in rural Namibia through the evaluation of rangers' medical experience of medical field incidents, levels of medical training and available equipment for emergencies during field operations. The following practical objectives were set:

- Providing a descriptive analysis of the status of the locations, types and demographics of rangers in rural Namibia;
- To determine the types and frequency of medical emergencies among rangers in the field;
- To evaluate perceived barriers for effectively managing medical emergencies in the field by rangers;
- To create an emergency response equipment cache, which can be used by game rangers to deal with an emergency in the field effectively.

CHAPTER 2. LITERATURE REVIEW

2.1 Global Overview

Wildlife is an important economic asset to Namibia, both nationally and for rural communities. Thus, the illegal trade thereof is a barrier to sustainable development and economic growth (GRN, 2017c). Poaching is the act of *“illegally shooting, trapping or taking of game or fish from private or public property”* (GRN, 2017c). Globally wildlife poaching has reached alarming proportions with estimates ranging from five to twenty billion United State Dollars (USD) annually (Eastern and Southern Africa Anti-Money Laundering Group [ESAAMLG], 2016; Obour, Asare, Ankomah, & Larson, 2016; TGLF, Global Tiger Forum [GTF], IRF, World Wildlife Fund [WWF], & PAMS Foundation, 2017). Ivory trade has been prominent in illegal poaching activities, and the current number of global transactions involving ivory have more than doubled from 2007 (Obour et al., 2016). Wildlife trafficking is among the top five most profitable illegal industries in the world, worth tens of billions of dollars each year and negatively impacting legally operating businesses and tourism activities globally (ESAAMLG, 2016; Obour et al., 2016; PoachingFacts.com, n.d.; TGLF et al., 2017)

In Sub-Saharan Africa, poaching appears to fund civil wars, rebel and terrorist groups, like the Al-Shabaab (Kenya), Boko Haram (Nigeria) and the Lord Resistance Army (Central Africa and Democratic Republic of Congo [DRC]) among others (Losh, 2019; Obour et al., 2016). For this, mostly elephants and rhinos have been targeted with sophisticated weaponry and technology, leading to the slaughtering of many animals at a fast rate. Poachers often also resort to other forms of killing, like poisoning waterholes, which wipes out entire herds of elephants and other animals, and other methods like tranquillisers or crossbows in order to avoid using noisy weaponry that can be heard by law enforcement patrols (Obour et al., 2016). The weaponry and sophisticated techniques are not only used on animals, but also in defence of their operations against rangers and anti-poaching operatives.

However, it is not only the diminishing herds of elephants and rhinos that are a concern faced by wildlife conservancy projects. Other wildlife species populations have also declined including buffalo, eland, impala, redbuck, topi, warthog, waterbuck, pangolin, leopard and cheetah (Losh, 2019; Obour et al., 2016). As a result, it has assumed a significant reduction in many species and can reach very deadly and dangerous dimensions for wildlife in Sub-Saharan Africa (Losh, 2019; Obour et al., 2016). This has resulted in countries significantly increasing their anti-poaching and game ranger personnel to counter the poaching epidemic. Findings of a rangers perception survey in 2016 showed that 63% of the Asian rangers and 82% of the African rangers had faced life-threatening situations (WWF, 2016; WWF & Ranger Federation of Asia [RFA], 2016). This shows that rangers are regularly under threat,

and it is uncertain whether these rangers are adequately prepared to deal with a medical emergency in the field.

2.2 A Namibian Perspective

Namibia can be classified as low risk for poaching activities when compared to other countries, including South Africa, Kenya and Tanzania (ESAAMLG, 2016; GRN, 2017c; MET, 2010). The successful inclusion of community-based natural resource management (CBNRM) programmes, the establishment of numerous protected areas and specialised units within the Namibian Police (NamPol) Force and the National Defence Force (NDF) contribute to this (GRN, 2017c; MET, 2010; Potgieter, 2019).

There has been an increase in poaching activities over recent years in Namibia, especially in the years where poaching in neighbouring countries have somewhat declined (GRN, 2017c; Nakale, 2018; Nyaungwa, 2017; PoachingFacts.com, n.d.; Save the Rhino International, 2018). One conclusion from these observations could be that poaching gangs have shifted their area of focus to Namibia. From 2005 to 2013, Namibia had only lost 16 rhinos to poaching (GRN, 2017c). The number, however, increased steeply the years after that (GRN, 2017c; Nakale, 2017; Save the Rhino International, 2018). Elephant poaching has also increased from four in 2010, to six in 2011, and to nearly 127 between 2012 to 2015, in the Zambezi region alone (GRN, 2017c). From 2013 to 2016, a total of 216 rhinos and 266 elephants were killed by poachers (J.-M. Smith, 2017). This was followed by a significant increase in anti-poaching personnel and rangers to counteract poaching (Nakale, 2017, 2018; J.-M. Smith, 2017). Figure 2.1 depicts rhinos and elephant poaching incidents in Namibia from 2012 to 2018, as compiled from various sources (GRN, 2017c; Nakale, 2018; National Broadcasting Corporation [NBC], 2017; Nyaungwa, 2017; PoachingFacts.com, n.d.; Save the Rhino International, 2018; J.-M. Smith, 2017). As can be seen from Figure 2-1 poaching has significantly decreased from 2016 to 2017, which could be attributed to the increased anti-poaching activities.

Local communities endure economic losses each animal that is illegally killed by poachers. In the period from 2005 to 2013 economic losses from elephant tusks equalled to N\$ 1.3 million and of rhino horns nearly N\$ 600 000 (GRN, 2017c). Furthermore, the poaching of elephants in 2012 led to approximately N\$ 5.7 million fee losses and nearly N\$ 600 000 in meat loss for communal conservancies and approximately N\$ 3.8 million fee loss to national parks (GRN, 2017c). Additional revenue from trophy hunting in the Zambezi Conservancies equalled to N\$ 12 million in 2013, which can also be lost if the continuous poaching eradicates entire wildlife species. (GRN, 2017c). The above further justifies the increased efforts to prevent poaching in the country for sustainable use of our wildlife resources.

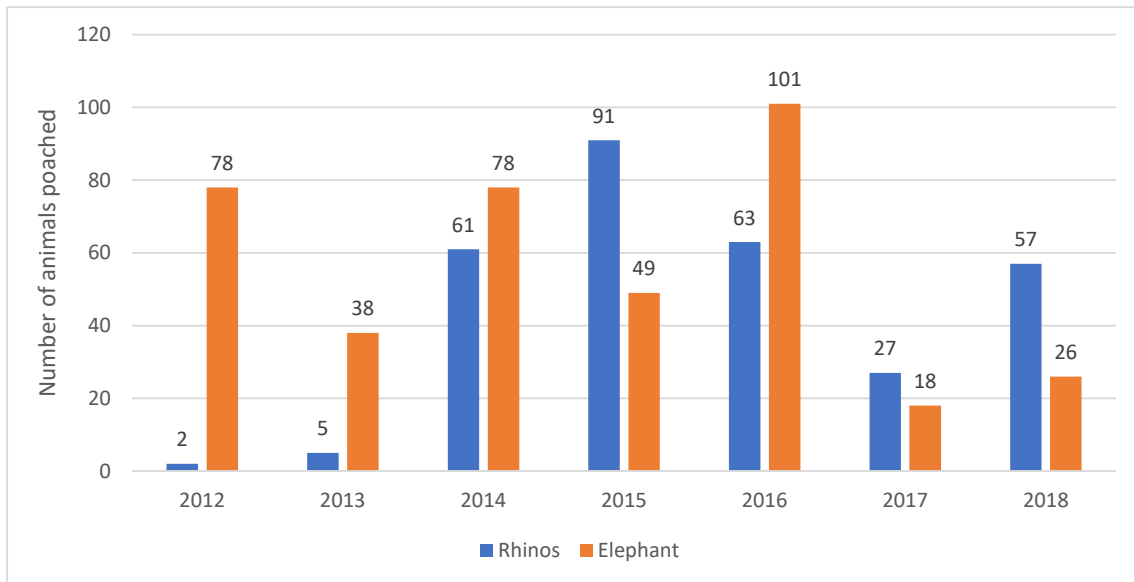


Figure 2-1: Number of rhinoceros and elephants poached per annum in Namibia from 2012 to 2018

The Government purports that conservation and sustainable use of natural resources contribute to the economic growth of the country and has made the protection of wildlife a national priority. Poaching in essence takes food from the mouths of the communities. In August 2017 the Ministry of Environment and Tourism allocated significantly increased resources to combatting poaching. Additionally, MET works with NamPol Protected Resource Unit and the NDF (GRN, 2017c; Nakale, 2017; NBC, 2017; Nyaungwa, 2017; Potgieter, 2019; J.-M. Smith, 2017) to combat poaching activities in Namibia. Apart from Government, several non-governmental organisations (NGOs) have emerged to join the fight against poaching; including privately trained APUs, Save the Rhino Trust (SRT), Intelligence Support Against Poaching (ISAP), Help our Rhinos NOW (HoRN), Namibia Wildlife Protection (NPW) and Hunters United Against Poaching (HUAP). Private game farmers have also employed more rangers for this purpose.

Currently, law enforcement for wildlife crimes is mainly carried out by MET personnel who receive specialised law-enforcement training. The focus of these rangers is to perform patrols by foot, vehicle or air in most parks and with boats in the north-eastern parks. These patrols aim to prevent the occurrence of poaching and to apprehend poachers who illegally kill or attempt to kill wildlife. Rangers also monitor the presence, health and population growth of wildlife in their areas. Patrolling teams generally consist of five to seven members. Investigations that involve species like rhinos and elephants are carried out by the Protected Resources Unit of NamPol (GRN, 2017c; MET, 2010).

Considering the decrease in poaching incidents from 2016 to 2017, it appears that APU and ranger activities are effective. In 2008 14 rhino horns were seized (MET, 2010) and between 2012 to 2015,

nearly 150 arrests were made related to poaching (GRN, 2017c). Increased activities of APUs, however, also lead to an increased risk of poacher-ranger conflict as APUs are instructed to defend themselves if they come under fire from poachers (J.-M. Smith, 2017).

The IRF has received reports that in Namibia in 2014/2015 one park ranger was killed in the line of duty and another three rangers died while on duty in 2018/2019 (IRF & TGLF, 2015, 2019b). Furthermore, in December 2016 three poachers were killed and one seriously injured by APUs and rangers in the Bwabwata National Park, in north-eastern Namibia (New Era, 2017a; J.-M. Smith, 2017), while units injured another poacher by a gunshot wound in January 2017 in the Outjo district (New Era, 2017b). In April 2018, another poacher was killed by anti-poaching units (NBC, 2018) and as recent as September 2019 a gunfight ensued between law enforcement and a suspected poacher near Otavi (Shikongo, 2019). These examples indicate that poacher-ranger conflicts are a reality in Namibia. As with the global overview, no data on first aid training of rangers and their response to medical emergencies when being first on scene could be obtained for Namibia. Additionally, the author could not find much information on the demographics of rangers in Namibia. The above identifies the need to research this niche.

2.3 Risks and Deaths of Rangers

Globally it has been recognised that poaching can lead to the extinction of many species and as a result wildlife protection is a priority. Game rangers play a vital role in this protection. Rangers are exposed to significant risks; including being attacked by rebel groups, injured, tortured and even killed by poaching groups (Losh, 2019; Neme, 2014; Our Planet, 2019). Rangers come under attack, are caught in the crossfire with poachers and endure targeted ambushes or assassinations (Global Conservation, 2016; Hardiman, 2019; Neme, 2014; TGLF et al., 2017; United Nations Educational Scientific and Cultural Organization [UNESCO], 2018).

Between 2009 to 2019, a total of 1038 park rangers have sacrificed their lives worldwide in the line of duty to protect our most valuable assets (IRF & TGLF, 2019a; Lang, 2017). This number shows that just over 100 rangers are killed annually or about two rangers per week (GRAA, 2016; Global Conservation, 2016; PoachingFacts.com, n.d.; Winter, 2017). According to the IRF & TGLF (2019) of these park rangers, the highest rate of fatalities were from Asia ($n=502$), followed by Africa ($n=380$). As not all countries report to the IRF, Sean Willmore, president of the IRF, assumed that this number is still an underestimate of the actual fatalities (Neme, 2014; PoachingFacts.com, n.d.). Furthermore, Global Conservation (2016) determined that 80% of these deaths were due to commercial poachers or armed militia groups. Kenya and the DRC are among the countries that have seen the sharpest increase in ranger deaths by poachers in recent years (Global Conservation, 2016). In April 2018, six rangers and

their driver were killed in an ambush in Virunga National Park (UNESCO, 2018), which was the third attack that year. Virunga National Park is classified as one of the most dangerous parks worldwide for rangers (Lang, 2017).

Of the 212 African rangers that died on duty between 2014 and 2019 59% ($n=125$) were killed by poachers, victims of homicides or succumbed to gunshot wounds (IRG & TGLF, 2014, 2015, 2016, 2017, 2018, 2019b). Besides violent deaths, rangers have also died on duty due to wildlife attacks and due to preventable deaths, like medical conditions, accidental shootings or drowning, often due to inadequate medical support (GRAA, 2018; IRF & TGLF, 2014, 2015, 2016, 2017, 2018, 2019b). Additionally, rangers are at risk of being injured by the wild animals they protect; they endure dehydration, as well as extreme temperatures (Neme, 2014). As previously mentioned, it has been reported to IRF that in Namibia, four rangers died in the line of duty over the last five years (IRF & TGLF, 2015, 2019b). This statistic is a minor contribution to the total ranger fatalities, but a significant one for Namibia considering the small population size.

Additionally, results of the continental ranger perception survey showed that 73% of the rangers in African and Asia had faced life-threatening situations, with the majority of these threats coming from encounters with wildlife, but also attacks from poachers and threats from poachers and communities. (WWF, 2016; WWF & RFA, 2016). Unlike military personnel, park rangers have limited legal powers to counter attacks. They are mostly only allowed to fire in self-defence, and when engaging in gunfire, leading to death, police will place the park ranger under investigation (Neme, 2014). While poachers are becoming increasingly organised with more sophisticated heavy armoury, park rangers often lack basic training and equipment (Losh, 2019; Neme, 2014; Our Planet, 2019; Winter, 2017)

2.4 Training and Equipping of Rangers

An estimated 42% of rangers in Africa and 48% of rangers in Asia feel that they are not adequately trained to perform their duties (WWF, 2016; WWF & RFA, 2016). This information is based on training with regards to day-to-day duties like tracking of animals and poachers or wildlife capture as examples, not considering first aid training or managing of emergency medical situations in the field. However, in an attempt to improve training for rangers, the IRF released a training manual in early 2017 to unify training globally (TGLF et al., 2017). This training manual includes basic first aid training with a minimum of 12 theoretical and 12 practical hours for rangers and 20 theoretical and 20 practical hours for team leaders. Concepts that should be included in the first aid training include care under fire and self-aid, conduction of primary and secondary survey, cardiopulmonary resuscitation and treatment of shock, haemorrhage, fractures, spinal injuries, burns, chest injuries, bites and stings, foreign objects in eye, ear and nose, hyper- and hypothermia, movement of patients as well as general health (IRF, 2016).

The author could also determine that the Pro Track unit in South Africa trains their rangers with a Level 3 First Aid Course, which is valid for three years (Pro Track, n.d.). No further official information was found on first aid training for rangers in South Africa or Namibia. The literature review seems to indicate that first aid training for rangers is not prioritized.

Medical situations that rangers can encounter could be comparable to warfare type Tactical Combat Casualty Care (TCCC) or Tactical Emergency Casualty Care (TECC) with conflicting patient care priorities, complex medical decision making and providing care in dangerous situations (Callaway, 2017; Keenan & Riesberg, 2017; W. R. Smith, 2017). Additionally, the lack of access to medical facilities due to the remote area and environmental factors could further influence the patient (Callaway, 2017; Keenan & Riesberg, 2017; W. R. Smith, 2017). In tactical emergencies, it has been found that most fatal incidents occur due to airway obstructions, catastrophic haemorrhage and tension pneumothorax (Chang, Eastridge, & Holcomb, 2017; W. R. Smith, 2017). From the information gathered it is apparent that gunshot wounds are a significant contributor to morbidity and mortality in poacher-ranger conflicts which often lead to the injuries as mentioned above. Furthermore, care should be taken to treat hypothermia from developing, especially when prolonged field care is required (Bennett & Holcomb, 2017). During TCCC and TECC, several recommendations have been made to treat these fatal injuries in the field quickly, which includes tourniquet applications for catastrophic limb haemorrhage, nasopharyngeal airway to secure the airway and needle thoracentesis to relieve a tension pneumothorax (Chang et al., 2017; W. R. Smith, 2017; Springer & Verbillion, 2017). As rangers may be faced with similar medical situations, some of these principals should be adopted; others may not be feasible in the setting or part of the scope of practice of a first aider. There is however a great need to establish which injuries specifically rangers face and which treatment options are available.

Casualty care in any tactical environment is classified into three distinct phases including care under fire (direct threat care), tactical field care (indirect threat care) and tactical evacuation (evacuation care), which aims to keep the provider safe in risky situations while providing adequate care to the patient (Russell et al., 2014; W. R. Smith, 2017). Rangers often come under threat by poachers, and thus their situation then becomes tactical, where the success of the mission, but also care of the injured become a priority. Additional similarities between military units and APUs include the remoteness of their sites, lack of medical support and challenging access to the area that they operate in (Callaway, 2017). Thus, the author inferred that rangers face similar situations and therefore, would need similar training using guidelines from TCCC or TECC to provide effectiveness in casualty care. However, adjustments need to be made for their specific requirements and primary functions. The principles of first aid (as stipulated in the Rangers Manual) and TCCC / TECC will serve as a foundation

of determining what would be needed for rangers to be prepared to deal with a medical emergency in the field and can then be evaluated with current preparedness based on the findings of this study.

The global ranger perception surveys by the WWF furthermore found that the majority of rangers (59% in Africa and 74% in Asia) are not provided with adequate equipment and amenities to ensure their safety (WWF, 2016; WWF & RFA, 2016). These results indicate that rangers often lack even basic equipment like boots, socks and weapons to defend themselves (GRAA, 2016; Winter, 2017), let alone having medical equipment with them to treat any injuries that they may incur. Appendix 6 of the field ranger manual provides a list with standard issues for a first aid field kit (IRF, 2016, p. 89). In addition, various recommended equipment lists for an individual first aid kit (IFAK) have been found in the literature for tactical and wilderness casualty care (Callaway, 2017; National Park Service [NPS], 2011; Shertz, 2019; Springer & Verbillion, 2017). These lists, together with a standard first aid kit (FAK) list, served as a baseline to determine the equipment needed for rangers during this study. The author will consider additional equipment as recommended in the TCCC and TECC guidelines as part of this equipment lists, which can then be evaluated for practicality and applicability for rangers in the field in Namibia.

2.5 Namibia's Healthcare Infrastructure

The Health System in Namibia has a three-tiered hierarchy, including central, regional and district levels in providing healthcare (Ministry of Health and Social Services [MoHSS], 2010; The Namibia MoHSS & ICF International, 2014; World Health Organization [WHO], 2015; WHO Regional Office for Africa, 2010). Healthcare facilities across Namibia in 2010 were 265 clinics, 44 health centres and 30 district hospitals at regional and district levels (MoHSS, 2010; The Namibia MoHSS & ICF International, 2014; WHO, 2015; WHO Regional Office for Africa, 2010). Clinics are small facilities that provide preventative, promotive and basic curative care (MoHSS, 2015), patients are not admitted to these facilities, and their main function is providing primary health care. Health centres are slightly larger facilities which can admit patients for up to 72 hours and provide preventative, promotive, rehabilitation and primary curative care (MoHSS, 2015). Clinics and health centres provide the first tier in the health system structure and are often staffed only by nurses or reliant on volunteer healthcare workers in rural areas (MoHSS, 2010). In some communities, there is a lack of healthcare due to staffing and infrastructure, which is a result of the remoteness and small population size of the community. In order to ensure access to healthcare in these areas 1150 outreach points have been established where mobile clinics get conducted (MoHSS, 2010; The Namibia MoHSS & ICF International, 2014; WHO, 2015). This, however, does not provide permanent access to the community as the clinics are moving throughout the areas they serve.

Patients that cannot be managed by clinics and health centres will be referred to district hospitals for further management. These are staffed with medical officers and nurses to provide secondary and primary health care services (MoHSS, 2015). If at the district level patients cannot be assisted they will be referred to one of the three intermediate hospitals, located in Rundu, Oshakati and the Katutura State Hospital in Windhoek or to Windhoek Central Hospital which is the national referral hospital with the most specialised care (MoHSS, 2010, 2015; The Namibia MoHSS & ICF International, 2014; WHO, 2015; WHO Regional Office for Africa, 2010). Statistics from 2010 show that there is a physician density of 0.375 per 1000 population and a nursing and midwifery density of 3.51 per 1000 population in Namibia (MoHSS, 2010; WHO, 2015). There is however an unequal distribution of healthcare workers as most are concentrated in urban areas or found in the private sector (MoHSS, 2010), leaving many of the remote areas without sufficient access to medical facilities.

CHAPTER 3. METHODOLOGY

3.1 Medical Readiness of Game Rangers

3.1.1 Design

The research was conducted following a descriptive non-experimental design relying on questionnaires of ranger perceptions and experiences. Survey questions were based on the WWF Ranger Perception Surveys in Asia and Africa (WWF, 2016; WWF & RFA, 2016).

Two surveys were created using the Survey Monkey (www.surveymonkey.com) platform. Survey Monkey is a popular tool for creating surveys for online data collection, offering ease of use and ability to present questions in various formats (Dudovskiy, 2018). The first survey was designed for organisations that employ or support rangers such as game lodges, wildlife protection services, anti-poaching, NGOs and government institutions. The second survey was created for game rangers. Before distributing the surveys, a pilot survey was undertaken. The surveys were sent to various organisations and relevant stakeholders for review and appropriateness of the questions and response options. Surveys were developed and tested from November 2018 until January 2019. Comments from the test groups were included and surveys were amended.

The surveys were similar in content to compare the perception of ranger managers and the situation experienced by rangers on the ground. The questions contained a mixture of open-ended, multiple-choice and dichotomous questions to allow for a variety of inputs for data collection (Dudovskiy, 2018). Areas evaluated included distribution of rangers within the country, distance and time to medical facilities, incidents that occurred in the field (including injuries, illnesses and deaths), types and causes of injuries, ability to deal with emergency in the field, level of medical training of rangers, and availability of first aid equipment carried. The surveys contained 37 questions for the organisational (Appendix A) and 40 questions for the ranger survey (Appendix B).

3.1.2 Population and Sampling

Evaluating the 2017 annual conservancy reports from NACSO (2018), the author estimated that the population of community game guards (CGG) in the conservancies are over 400 (Figure 3-1). Regions that are not presented on the graph either do not have community conservancies or do not have CGG in their employment.

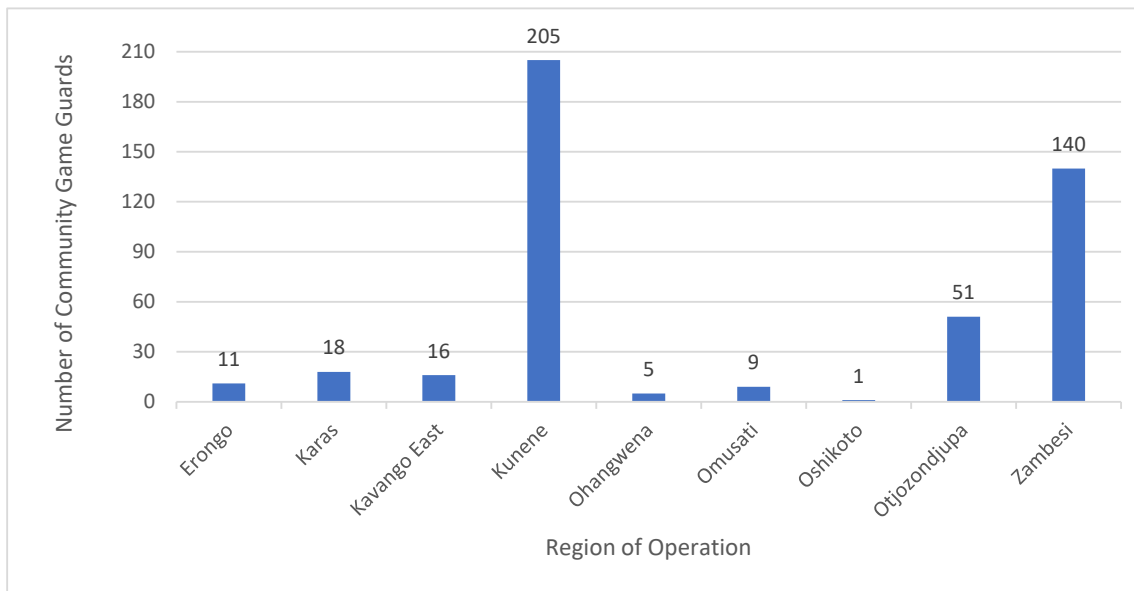


Figure 3-1: Number of CGG per region in Namibia. Adapted from NACSO, 2018

From a report presented in 2004 on Strengthening the System of National Protected Area Project, the author established that the staff complement of game rangers for the Directorate of Parks and Wildlife Management (DPWM) was 235 (Booth, Martin, & Wilson, 2004). Included in this number were Chief Control Wardens, Chief Wardens, Wardens and Rangers. The report further mentioned that provision is made for a total staff complement of 255 rangers with MET (Booth et al., 2004). It could, however, not be established how these complements have increased or decreased over the last 15 years as no current information was found. Furthermore, the report stated that 260 ex-combatants were active in the MET; they had however not been formally incorporated into the structures at the time (Booth et al., 2004). The author could not determine how many rangers are employed in the private sector. Considering the above stated it was estimated that the population in Namibia for this study would be around 1000, including game rangers in the private sector.

Overall a total of 113 responses were received during the study period from the various data collection methods (Table 3-1 and Table 3-2). For the organisational survey (for managers and support organisations) on ranger medical readiness, there were 34 responses (Table 3-1), 91% ($n=31$) were responses from Namibia and the remaining 9% ($n=3$) were received from outside Namibia. One of these responses was from South Africa and two were from Ghana. Two respondents did not consent, ten were not involved with rangers, and six respondents gave incomplete answers. Therefore, these entries were excluded from the analysis.

Table 3-1: Type of responses for the organisational survey on ranger medical readiness

	Frequency (f)
Email request	11
Social Media	18
Manual Surveys	3
Ghana	2
Total (n)	34

For the ranger surveys (Table 3-2), there were 79 responses, 67% ($n=53$) of the responses were from Namibia. The remaining 33% included 25 responses from Ghana and one response from South Africa. The South African response was included in the total responses but excluded from the comparative analysis between Namibia and Ghana. One person did not consent, and 24 respondents only answered the survey minimally. These were excluded from the analysis. Some partial responses ($n=11$) were included as information provided still added value to the data set.

Table 3-2: Type of responses for the ranger medical readiness survey

	Frequency (f)
Email Request	10
Social Media	29
Manual Surveys	15
Ghana	25
Total (n)	79

3.1.2.1 Namibian Respondents

Convenience sampling was employed to conduct the surveys. Due to the remoteness and accessibility of game rangers, this sampling method was considered as the most appropriate (Brink, van der Walt, & van Rensbury, 2018; Dudovskiy, 2018). This sampling method allows to obtain participants with no requirements, and it has a high level of simplicity and ease (Dudovskiy, 2018). It does however, produce considerable sampling error and selection bias (Dudovskiy, 2018). In order to limit bias, some criteria were employed for the eligibility of participants. For the organisational survey, the organisations were required to be involved with game rangers. The author defines game rangers for this study in the following way: Rangers can include but are not limited to game/field rangers, wardens, guides, nature conservationists, or anyone that is involved in the safekeeping of wildlife.

Furthermore, the surveys were distributed via various platforms, including email requests, manual copies and social media links. The sample population included targeted organisations (including game lodges, community conservancies, game reserves, wildlife protection services, district watches, anti-poaching and government organisations) as well as individual rangers operating within these organisations. The Namibian Chamber of Environment (NEC) which represents 46 conservation NGOs

in Namibia and the Namibia Professional Hunting Association (NAPHA) distributed the surveys to their members. Additionally, hardcopy surveys were sent or taken to rangers that could be reached within the limited resources of this study.

Online surveys were the selected data collection method, as already discussed in 3.1.1. The advantages of this method included the anonymity of the surveys, time-efficiency and respondents could complete them as they had time, which allows for more accurate and thoughtful answers (Dudovski, 2018). Respondents, however, need access to a computer or at least internet access and a smartphone to complete the surveys; which is another limitation in reaching field rangers. All manual surveys received were entered into the online platform by the researcher.

The data collection process commenced in February 2019 by sending out email requests to various organisations with links to the survey, as well as distributing hard copies of the surveys. After three months (May 2019) a decision was made to send out a link to the survey on social media to receive a greater number of responses since limited responses (eight for the organisational surveys and ten for the ranger surveys) were received to that point. Using social media is a popular way of receiving feedback and is often used successfully in customer satisfaction or feedback surveys (Dudovski, 2018). This approach elicited a good response. Data collection ensued from February until October 2019.

3.1.2.2 Ghanaian Respondents

A collaborative project between the Namibia University of Science and Technology (NUST) and Ghana's Mole National Park provided an opportunity to compare the Namibian situation to that of one of the largest West African National Parks, where 25 rangers and two managers completed the organisational surveys. The rangers in Ghana all completed the survey on hard copies, which the author then entered online to form part of the overall data set. Data collection ensued from February to October 2019. These surveys were completed in March and April 2019.

3.1.3 Data Analysis

Once data was collected, it was exported from Survey Monkey into Microsoft Excel (Office 365). Here the data was coded and cleaned. Data coding was done by assigning numerical values for each response. Responses entered as written replies were arranged into categories and then given a numerical value. The author then imported the data into the Statistical Package for Social Sciences (SPSS) version 25. In SPSS, frequencies and cross-tabulations were run and exported. Further analysis and graph creation were then performed in Microsoft Excel.

The results are shown in tables demonstrating and comparing the data sets and are mainly descriptive. These tables include the various categories of responses which include overall responses, Namibian

responses and responses from outside Namibia. Missing values shown in the tables indicate partial responses and incomplete surveys.

3.1.3.1 Demographic Information

The 34 organisational and 79 ranger responses were assessed to provide a descriptive analysis of the demographic information. As previously mentioned, the South African response was excluded from the comparative analysis between Namibia and Ghana in the ranger surveys, as it would have obscured the results. Responses to questions that appeared both in the organisational and the ranger survey were compared with each other. For questions that were different in the two surveys comparisons between Namibian and outside responses were done. Some cross-tabulations were run in order to evaluate and compare variables in relation to each other.

3.1.3.2 Access to Medical Facilities

The surveys were appraised to determine access to medical facilities. Frequencies and cross-tabulations were mainly used for the analyses. Responses between the organisational and ranger surveys, as well as Namibian versus Non-Namibian responses, were compared with each other. Additionally, data from the Geographical Information System (GIS) was used to determine the location of various medical facilities within Namibia in relation to PAs and communal conservancy offices. The author used Euclidean distances to provide an overview of distances to medical facilities.

3.1.3.3 Emergencies

The data received from the organisations and ranger surveys were analysed to establish the frequency of occurrence of injuries, illnesses and deaths amongst rangers from all responses. Additionally, literature was reviewed to establish a baseline of common illnesses and injury patterns that occur in remote areas (Ela, 2004; Heggie & Heggie, 2004; J. Johnson et al., 1991; Young et al., 2018).

Table 3-3: Countries as allocated into regions of Africa

Region of Africa	Countries in Region
Southern Africa	South Africa, Namibia, Zambia, Zimbabwe, Malawi, Mozambique
Central Africa	Republic of Congo, Democratic Republic of Congo, Central African Republic
Eastern Africa	Tanzania, Kenya, Uganda, South Sudan
Western Africa	Cameroon, Nigeria, Ghana, Chad, Niger, Benin, Burkina Faso, Cote d'Ivoire, Liberia, Guinea, Mali, Senegal
Northern Africa	Tunisia

To evaluate previously collected death rates and causes of mortality of African rangers, the Ranger Roll of Honour from 2015 to 2019 (IRF & TGLF, 2015, 2016, 2017, 2018, 2019b) was reviewed. The reported deaths were categorised into five regions of Africa as portrayed in Table 3-3. Countries that are not

listed had no reports of ranger fatalities. This might either be due to them not reporting to IRF or conservation not being prevalent in those areas. The numbers of rangers killed are likely to be even higher than indicated as not all countries report deaths to the IRF (Neme, 2014). The cases were then further categorised into cause and year of death. Data was analysed using frequencies and cross-tabulations in SPSS.

3.1.3.4 Training

The data received from the organisations and ranger surveys were analysed comparing and combining responses to obtain an overview of frequencies of first aid training received by rangers, as well as which level of training has been completed. Additionally, the author evaluated which training organisations provide for rangers and if the organisations include first aid as part of the training. Rangers' perceptions of their preparedness for a medical emergency and further training requirements were evaluated by posing open-ended questions in the survey on additional training requirements. The author then categorised the answers received into topics and frequencies were analysed in SPSS. Furthermore, the author appraised the data with information from the literature review.

3.1.3.5 First Aid Equipment

The data received from the organisational and ranger surveys were analysed to obtain frequencies of FAKs being available to rangers, either on patrols or as part of the standard everyday equipment they carry with them. Where FAKs are available to rangers, the contents of these kits were captured and reported. Rangers' perceptions on the adequacy of equipment they carry for medical emergencies has been determined by including an open-ended question to allow input on additional equipment requirements. The answers gathered were then categorised into sections and frequencies evaluated. The information gained from this section of the ranger medical readiness survey was evaluated together with the responses gathered from the personal first aid field kit (PFAFK) surveys and relevant literature.

3.2 Personal First Aid Field Kit

3.2.1 Design

This part of the study followed an exploratory approach (Dudovskiy, 2018). A Usage and Attitude (U&A) survey was conducted to determine the participants' perceptions of what should be in a PFAFK (Yessis, Kost, Lee, Coller, & Henderson, 2012). U&A surveys are frequently used in businesses to understand a market and include data collection on components like usage frequency, general category understanding and target information (Ipsos Encyclopedia, 2016; Navarro-Rivera & Kosmin, 2013). This approach gauged perception in items that are essential to be included in a PFAFK, which quantities to include thereof, as well as importance ranking.

The survey (Appendix C) was once again developed in Survey Monkey as with the previous surveys. It included 29 questions; a variety of multiple-choice (using pictures to select items), dichotomous and scaling questions using the Likert scale principle (Dudovskiy, 2018; Navarro-Rivera & Kosmin, 2013). Additionally, some open-ended questions were asked where respondents could provide suggested quantities and additional items. Participants were requested to rank the importance of each item for inclusion in a PFAFK. Items were ranked from one to five using a Likert-scale, with one being *not at all important* and five being *extremely important*. Similarly, respondents were asked to rank how likely they would use each item, using a scale from one to five.

The baseline for the equipment list was taken from the suggested IFAKs from the training guidelines for rangers manual (IRF, 2016). Additionally, items from the medical readiness survey, as well as some recommended TECC / TECC first aid items (FMTBCP, 2010; NPS, 2011; Shertz, 2019) were added to the list. The survey was tested by sending it to a variety of participants to complete and provide feedback. The feedback was incorporated, and the survey adjusted accordingly prior to distribution.

3.2.2 Population and Sampling for Personal First Aid Kit Contents

Once again, convenience sampling was used and anyone was invited to participate in the survey, but aspects of purposive and snowball sampling were also included (Brink et al., 2018; Dudovskiy, 2018). The researcher sent out requests to participants that were assumed to have a fair understanding of the background and knowledge of either first aid supplies or necessities in a remote area. Additionally, these respondents were requested to share the survey with other relevant parties for completion.

3.2.3 Data Collection

Distributing the online survey via WhatsApp, Facebook and email were the selected data collection method for this survey. The survey was run during October and received good responses, mostly from the WhatsApp link (Table 3-4). A total of 69 responses were included for analysis. Thirteen responses were excluded, as one did not consent to the survey, seven only consented and five respondents only provided demographic information, which was not the focus of the survey. Some partial responses ($n=12$) were included as the information provided added value to the data set.

Table 3-4: Number of responses from different collection points

	Frequency (f)
Email Request	3
WhatsApp Link	63
Facebook Link	3
Total (n)	69

3.2.4 Data analysis

Data was collected in Survey Monkey and then exported into Microsoft Excel (Office 365). In Excel, the data was coded and cleaned and then imported into SPSS (version 25) to run frequencies, which were exported to Microsoft Excel again. The data was then further analysed and graphed. Data was analysed from the Microsoft Excel spreadsheet to determine consensus on the various equipment items that should form part of the recommended FAK. Summations were made between importance and usage ranking of each first aid item and medication to indicate the probability for inclusion in a PFAFK (probability ranking). For extra items nominated by respondents, the same method was used. Here only items that more than three individuals indicated were used for analysis.

Several sources were consulted that recommended IFAKs in a remote, wilderness or tactical environment (FMTBCP, 2010; IRF, 2016; NPS, n.d.; Shertz, 2019; W. R. Smith, 2017; Welch, 1997). Ten different lists were evaluated, and prevailing trends identified. Only items that form part of a first aider's scope of practice were included in these tables. Furthermore, the four lists that pertained to the wilderness setting were analysed separately. In order to compile a recommended list of items that should be included in a PFAFK, data from the survey and the lists from literature were combined and evaluated. A total of 74 data sets for stock items (64 valid responses from surveys and ten from lists), 68 for medications (57 valid responses from surveys and ten from lists) and 48 for extra items (38 valid responses and ten from lists) were consolidated to recommend items for the PFAFK. The combined quantities from these two were divided by total responses to calculate a percentage for items requested.

3.3 Challenges and Limitations

It was found that using the term anti-poaching in any way often resulted in reluctance of respondents to provide information, due to the sensitivity of the topic and confidentiality required to perform their tasks effectively. As a result, the research topic was broadened slightly to focus on rangers rather than APUs. This resulted in more responses to the surveys and a broader viewpoint on the research area. Limiting the research to APUs would have elicited an even smaller sample size.

Reaching rangers in the field to conduct surveys was challenging due to the vastness of Namibia and the remote locations of these rangers. Internet access in these remote locations was generally poor; thus, manual surveys have been the preferred method of data collection if the study could have been longer and better funded. Additionally, as rangers are often on patrols in the field, their availability at specific times was low. Although the above constraints led to a lower response rate than initially hoped for, the study still provides the first data of its kind. Furthermore, it is a starting point for further expansion of the topic in Namibia, as highlighted in the recommendations of this study report.

Another limitation to this study is the data collection method, introducing a high selection bias, as only rangers that could be reached remotely and through limited field trips participated in the study. The study made every effort to ensure a wide variety of collection points and areas for collection to gain a broader overview of the Namibian ranger population. These included setting meetings, sending emails and phoning organisations often in the hope that any possibility would present itself to gain another data collection point or send out manual surveys to rangers in the field. The sampled variety is however considered to represent a sufficiently broad proportion of the wildlife ranger and anti-poaching community.

3.4 Ethical Considerations of the Research

Ethical clearance was received from the NUST Faculty Research Publication Committee (Ethical Screening Application number: FHAS 02/2018). The principles of respect for persons, beneficence and justice were adhered to (Brink et al., 2018). Each survey included a description of the survey and the participants were prompted to a consent to complete the survey. Participation was voluntary; each participant was free to stop at any stage during the process and individuals were invited to contact the researcher after the process to discuss any issues. No personal identifying data was captured as the surveys were anonymous. There was no risk involved to the participants, as no interventions were performed.

CHAPTER 4. RESULTS

4.1 Demographic Information

4.1.1 Organisational Data

The organisational survey targeted managers of conservation-related institutions, looking at the strategic and management approach to medical emergencies and risks. There were an encouraging 34 organisations that responded. The various categories of organisations that responded to the survey are described below (Table 4-1 and Table 4-2). From the overall responses, the majority were from private organisations (70.6%, $n=24$) and more specifically from private game reserves (23.5%, $n=8$). The least responses were received from non-profit and community-based organisations (8.8% each, $n=3$) and tourism concession as well as district/neighbourhood anti-poaching groups (2.9% each, $n=1$). The majority of the Namibian responses were received from private entities (74.2%, $n=23$) with the least amount of responses from government organisations (6.5%, $n=2$). On the other hand, responses from outside Namibia were mostly (66.6%, $n=2$) from government organisations, specifically from national parks.

Table 4-1: Type of organisation of respondents as per the organisational survey

	Overall responses Frequency ¹ (<i>f</i>)	Namibian responses Frequency (<i>f</i>)	Non-Namibian responses Frequency (<i>f</i>)
Government	4	2	2
Private	24	23	1
Non-profit Organisation	3	3	0
Community-Based Organisation	3	3	0
Total (<i>n</i>)	34	31	3

Table 4-2: Category of Organisation of respondents as per the organisational survey

	Overall responses Frequency (<i>f</i>)	Namibian responses Frequency (<i>f</i>)	Non-Namibian responses Frequency (<i>f</i>)
National Park	4	2	2
Private Game Reserve	8	8	0
Game Farm	6	6	0
Communal Conservancy	6	6	0
Tourism Concession Area	1	1	0
District Watch / Neighbourhood anti-poaching group or watch	1	1	0
Other - related to conservation / environment ²	8	7	1
Total (<i>n</i>)	34	31	3

¹ Frequencies represent number of respondents

² Including hunting outfitters, hunting and tour guide operators, veterinary practice and freehold conservancy

Figure 4-1 presents the percentage of organisations per region. Most Namibian responses were received from the Khomas region ($n=8$), followed by the Kunene ($n=5$) and Otjozondjupa ($n=5$) region. Three respondents were received from the Erongo region, and another three indicated that they operate in several or all regions of Namibia. The Kavango region had two respondents and the Hardap, Omaheke, Oshikoto, Oshona and Zambezi region elicited one response each. No responses were received from the Karas, Onhangwena and Omusati regions. Three responses were received from outside of Namibia, of which one was from South Africa and two were from Ghana. Reasons for including these surveys are presented in the methods section of this study.

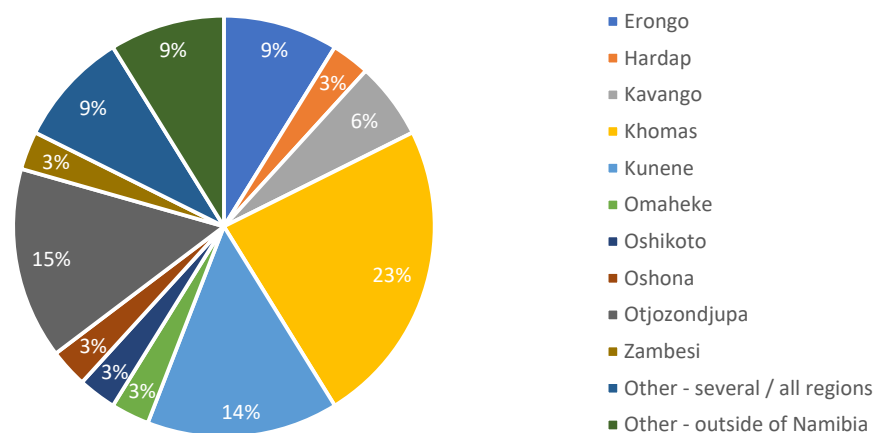


Figure 4-1: Percentage of respondents as per organisational survey in relation to region of operation

All respondents were involved with, or employed game rangers, anti-poaching operatives or conservation guards. This involvement was either through training (8.8%, $n=3$), employment or volunteer programmes (52.9%, $n=18$) or a combination of the above (38.2%, $n=13$). In Namibia 17 organisations who responded to the survey had rangers in their employment or volunteer programmes, three organisations provided training only to rangers, and the remaining 11 organisations trained and employed rangers. Nearly half (45.2%, $n=14$) of the Namibian organisations incorporated training as part of their involvement with rangers. This indicates that training is seen as an important component of ranger management. Less than half ($n=5$) incorporated first aid training in this though. Outside of Namibia, there was one organisation that employed rangers, whereas the other two organisations provided employment as well as training to rangers. Of the 29 organisations that provided employment 84.4% ($n=27$) have between one and 50 rangers in their employment, of which 26 were Namibian organisations and the remaining one was from outside Namibia. The other two organisations outside of Namibia employed between 50 and 100 and more than 300 rangers respectively.

Of the organisations that provided employment or a volunteer programme, most (65.6%, $n=21$) provided permanent employment, 15.6% ($n=5$) used volunteers and 12.5% ($n=4$) provided temporary employment to rangers. Respondents could select several options, two organisations in Namibia and two organisations from outside Namibia selected more than one employment option. Respondents from outside Namibia did not have any volunteer rangers. The remaining either did not provide an answer, or it was not applicable to them as they only provide training.

Overall, 86.7% ($n=26$) of the organisations confirmed that anti-poaching activities formed part of the ranger's duties. Only four organisations indicated that this was not part of the ranger's duties, all from Namibia. Anti-poaching activities were defined for this study as any activity including but not limited to patrolling an area, ensuring safety for wildlife and possibly engaging poachers when intercepting them. As discussed in chapter 2, anti-poaching activities carry particularly severe safety and medical risks.

In Namibia, almost half of the anti-poaching units (48.1%, $n=13$) consisted of one to five members, with 22.2% ($n=6$) having five to 10 members and 11.1% ($n=3$) having between 10 and 20 rangers per unit at the time. Outside Namibia, on the other hand, 66.7% ($n=2$) of the anti-poaching units consisted of five to ten members. The other 33.3% ($n=1$) indicated that members per unit are more than 20. The frequencies for these are shown in Table 4-3.

Table 4-3: Number of rangers in APU as indicated by the organisational survey

	Overall responses Frequency (f)	Namibian responses Frequency (f)	Non-Namibian responses Frequency (f)
1-5	13	13	0
5-10	8	6	2
10-20	3	3	0
>20	1	0	1
Not applicable	4	4	0
No answer	1	1	0
Missing	4	4	0
Total (n)	34	31	3

During anti-poaching patrols, most teams consisted of three to five members as indicated by 37% ($n=10$) of the Namibian responses and 67% ($n=2$) of the responses from outside Namibia (shown in Table 4-4). However, a third (33%, $n=9$) of Namibian patrolling teams often only had one to two members. Some teams, on the other hand, had five to ten members, which was indicated by 11% ($n=3$) of the Namibian responses and 33% ($n=1$) of the responses outside Namibia.

Table 4-4: Average number of members in a patrolling team as stated by the organisational survey

	Overall responses Frequency (f)	Namibian responses Frequency (f)	Non-Namibian responses Frequency (f)
1 - 2	9	9	0
3 - 5	12	10	2
5 - 10	4	3	1
10 - 20	0	0	0
>20	0	0	0
Not applicable	4	4	0
No answer	1	1	0
Missing	4	4	0
Total (n)	34	31	3

Most (41.5%, $n=22$) of the respondents indicated that patrols were conducted on foot, followed by patrols being done in vehicles (30.2%, $n=16$) and on a motorbike, quadbike or bicycle (11.3%, $n=6$). Both the Namibian and outside Namibian responses correlated with this overall trend. Very few patrols were conducted by plane (2.2%, $n=1$). Table 4-5 shows the frequencies of the mode of patrols.

Table 4-5: Common modes of patrols as per the organisational survey

	Overall responses Frequency (n)	Namibian responses Frequency (n)	Non-Namibian responses Frequency (f)
By foot	22	19	3
By vehicle	16	14	2
By motorbike / quadbike / bicycle	6	4	2
By boat	0	0	0
By air	1	1	0
By horseback	2	2	0
Observational post / joint patrol	2	2	0
Not applicable	4	4	0

Table 4-6: Size of the patrolled area as per the organisational survey

	Overall responses Frequency (f)	Namibian responses Frequency (f)	Non-Namibian responses Frequency (f)
0-2500 ha	0	0	0
2501-5000 ha	3	2	1
5001-10 000 ha	10	9	1
10 001-50 000 ha	7	7	0
>50 000 ha	6	5	1
Not applicable	4	4	0
Missing	4	4	0
Total (n)	34	31	3

The areas being patrolled most commonly were in the 5 000 to 10 000 hectares (ha) ranges (33.3%, $n=10$) as shown in Table 4-6. However, 23.3% ($n=7$) of the respondents indicated that the patrolled areas were between 10 001 and 50 000 ha and another 20% ($n=6$) indicated that patrolled areas were

more than 50 000 ha. Only 10% ($n=3$) of the respondents had a patrolled area of 2 501 to 5 000 ha, and no respondents were operating in areas less than 2500 ha.

4.1.2 Ranger Data

In contrast with the organisational surveys in 4.1.1, the ranger surveys gained “on-the-ground” information from rangers specifically. Most respondents of the survey were males, representing 79.7% ($n=63$) of the total respondents. From the Namibian respondents 68.8% ($n=37$) were male and 26.4% ($n=14$) female (Figure 4-2). Two respondents did not indicate whether they were male or female. The Namibian responses showed that 27% ($n=10$) of male respondents were from the Otjozondjupa region, 24.3% ($n=9$) from Kunene, 16.2% ($n=6$) from Karas, 13.5% ($n=5$) from Khomas, 8.1% ($n=3$) from Erongo, 5.4% ($n=2$) from Zambezi and 2.7% ($n=1$) from Omusati and Omaheke respectively. Of the female respondents, 28.6% ($n=4$) operated in the Khomas region, 21.4% ($n=3$) in Hardap, 14.3% ($n=2$) in Zambezi and from several or all regions respectively; and 7.1% ($n=1$) in Karas, Omaheke and Otjozondjupa each. All non-Namibian resident rangers were male.

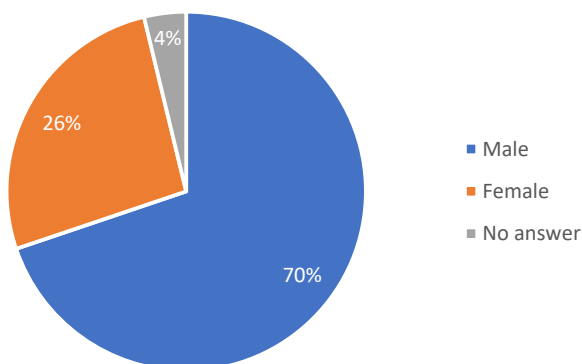


Figure 4-2: Percentage of ranger's gender from Namibian ranger responses

The age group between 30 and 39-years-old was the dominant group of rangers (36.7%, $n=29$) followed by the group between 40 and 49-year-old (24.1%, $n=19$) and above 50 (20.3%, $n=16$). Surprisingly, the least represented group was between 20 and 29-years-old (19%, $n=15$), as shown in Figure 4-3. Within the Namibian respondents, there was a relatively equal distribution of age groups across the rangers, which had the advantage that younger rangers could learn from the experience of older rangers. In the Ghanaian group, the majority (56%, $n=14$) was in the 30 to 39-year-old group, with the 20 to 29-year olds only represented by 8% ($n=2$) of the respondents. The African Ranger Perception Survey showed a higher percentage of rangers were in the age group between 21 and 30 years (37%), followed by the 31 to 40-year-old group with 33% (WWF, 2016). Overall, most rangers were between 20 and 40-years-old. This is when most people are at their prime and operate best. Thus, it is shown that the ranger workforce consists mostly of young and presumptively healthy individuals.

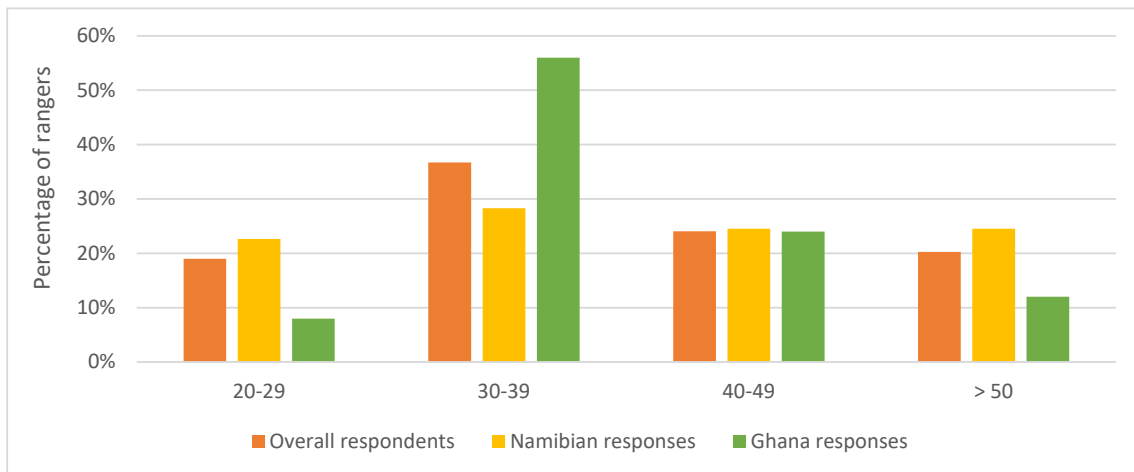


Figure 4-3: Percentage of rangers per age group overall versus Namibian versus Ghanaian ranger responses to surveys

From the overall responses, it could be seen that most rangers had served for one to five years (Figure 4-4). In Namibia 20 rangers had been in service for one to five years (37.7%), followed by 11 who had been in service five to 10 years (20.8%). Less than 10% ($n=5$) of rangers had been in service for longer than 20 years. In Ghana on the hand, 44% ($n=11$) of the rangers had served for five to 10 years followed by 24% ($n=6$) of the rangers in the one to five years group and 20% ($n=5$) of rangers had been in service for longer than 20 years. No rangers had been in service for less than one year.

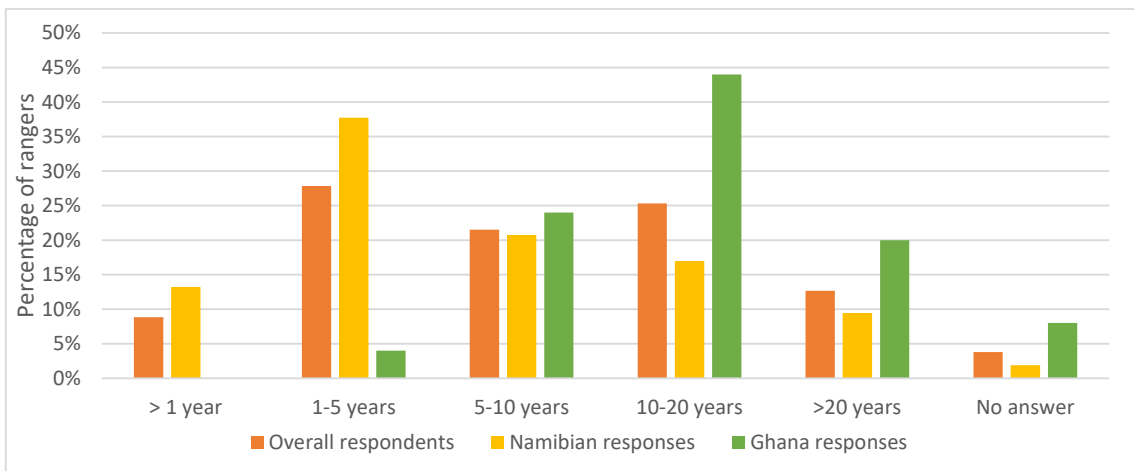


Figure 4-4: Percentage of time serving as a ranger comparing overall versus Namibian versus Ghanaian ranger responses to surveys

The majority of the respondents defined their discipline as game rangers (43.8%, $n=35$), followed by respondents in the conservation sector more generally (11.3%, $n=9$), field management positions (10%, $n=8$) and CGG (8.8%, $n=7$); which was reflected in similar proportions in the Namibian respondents. Four respondents were explicitly from APUs (7.4%). Almost all Ghanaian respondents (96%, $n=24$) were game rangers. Only one respondent was in a field management position. The frequencies of positions that respondents hold are described in Table 4-7.

Table 4-7: Position of respondents as per ranger survey

	Overall responses Frequency (f)	Namibian responses Frequency (f)	Ghanaian responses Frequency (f)
Community Game Guard	7	7	0
Game Ranger ³	35	11	24
Guide ⁴	5	4	0
Professional Hunter / Master Hunting Guide	5	5	0
Anti-poaching specific Management ⁵	4	4	0
Conservation ⁶	8	7	1
	9	9	0
Other - related to conservation ⁷	3	3	0
Other - outside conservation	4	4	0

Table 4-8: Type of organisation respondent working for as per ranger survey

	Overall responses Frequency (f)	Namibian responses Frequency (f)	Ghanaian responses Frequency (f)
National Park	30	6	24
Private Game Reserve	16	14	1
Farm - Game / Hunting / Normal	11	11	0
Communal Conservancy	8	8	0
Tourism Concession Area	1	1	0
District watch / neighbourhood anti-poaching watch	2	2	0
Other - related to conservation / environment ⁸	6	6	0
Other	4	4	0
No answer	1	1	0
Total (n)	79	53	25

From the overall responses, 38% (n=30) worked in a national park. This, however, reflected 96% (n=24) of the Ghanaian rangers and only 11.3% (n=6) of the Namibian respondents working in national parks. The remaining respondent from Ghana worked on a private game reserve. Of the Namibian respondents, 26.4% (n=14) worked for private game reserves and 20.7% (n=11) on farms. Eight

³ For this study the following responses were classified as game rangers: field and park rangers, wardens and control wardens

⁴ For this study the following responses were classified as guides: tour guides and field guides

⁵ Management in this section included farm, lodge and conservancy managers which responded in the capacity as individuals in the field management and not from the overall organisations

⁶ Include respondents like natural resource managers, environmentalists and biologists spending a proportion of their time in the field

⁷ Include respondents that perform administrative duties or are drivers in the conservation sector

⁸ Respondents that were classified into this category indicated that they work for sustainable tourism, private APUs, freelance biologist, environmental consulting, trophy hunting outfitters and independence conservation projects

respondents (15.1%) were from communal conservancies. Table 4-8 shows the numbers of respondents per organisation.

Most organisations employed the rangers permanently, as was indicated by 77.6% ($n=59$) of the respondents. Of the remaining respondents, 5.3% ($n=4$) had temporary employment, and 3.9% ($n=3$) were volunteers. Among Namibian rangers, 68% ($n=34$) were permanently employed, 6% ($n=3$) were under temporary employment and volunteers, respectively. All of the respondents from Ghana were in permanent employment ($n=25$).

Of the responses received, 67.1% ($n=53$) are from Namibia and the remaining 32.9% were received from outside Namibia (25 from Ghana and one from South Africa). From the Namibian responses, the majority responded from the Otjozondjupa ($n=11$), Kunene ($n=10$), Khomas ($n=9$) and Karas ($n=7$) regions (Figure 4-5). Four responses were received from both the Erongo and Zambezi region, three from Hardap, two from Omaheke and one from Omusati. No responses were received from the Kavango, Ohangwena, Oshikoto and Oshana region. Two respondents indicated that they operate in several or all of the regions.

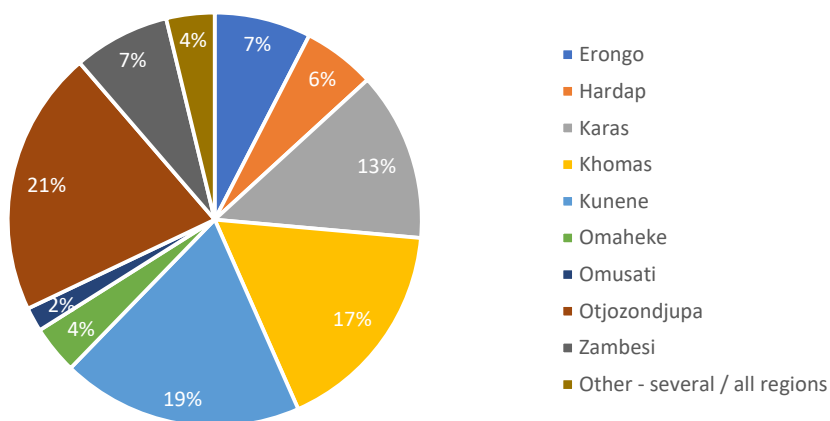


Figure 4-5: Percentage of respondents of Namibian ranger survey in relation to region of deployment

Most rangers (89%) that completed the survey performed anti-poaching activities as part of their duties ($n=70$). From the Namibian rangers 83% ($n=44$) performed anti-poaching activities and 17% ($n=9$) did not. All the respondents from Ghana ($n=25$) performed anti-poaching activities.

Field personnel perceived that there were one to ten rangers per station (50%, $n=39$), followed by 11 to 25 (14.1%, $n=11$) and over 100 (12.8%, $n=10$). Within Namibia, most commonly there were one to ten rangers per station (61.5%, $n=32$). In Ghana on the other hand, around a third (32%, $n=8$) of the

rangers indicated more than 100 rangers present per station, followed by 11 to 25 rangers (28%, $n=7$) and one to ten (24%, $n=6$). Table 4-9 shows the frequency of rangers per station.

Table 4-9: Number of rangers at a station as per ranger survey

	Overall responses Frequency (f)	Namibian responses Frequency (f)	Ghanaian responses Frequency (f)
1 - 10	39	32	6
11 - 25	11	4	7
26 - 50	3	2	1
50 - 75	1	0	1
75 - 100	2	0	2
> 100	10	2	8
Not applicable	9	9	0
No answer	3	3	0
Missing	1	1	0
Total (n)	79	53	25

The average number of members per patrolling team were three to five members (61.3%, $n=46$) which was indicated by both the Namibian (42.9%, $n=32$) and Ghanaian (100%, $n=25$) respondents. In Namibia, 22.4% ($n=11$) also had one to two members and 16.3% ($n=8$) even had an average of five to 10 members in a patrolling team. Figure 4-10 shows the frequencies of the average number of members per patrolling team.

Table 4-10: Average number of members in a patrolling team as per ranger survey

	Overall responses Frequency (f)	Namibian responses Frequency (f)	Ghanaian responses Frequency (f)
1 - 2	12	11	0
3 - 5	46	32	25
5 - 10	8	8	0
10 - 20	0	0	0
>20	0	0	0
Not applicable	9	9	0
Missing	4	4	0
Total (n)	79	53	25

The dominant primary mode of patrol was by foot (65.4%, $n=49$). This is shown by both the Ghanaian (100%, $n=25$) and Namibian (49%, $n=24$) responses. Other primary modes of patrol included by vehicle (20%, $n=15$) and some by motorbike/quadbike (1.3%, $n=1$) or air (1.3%, $n=1$) as shown in Table 4-11. Additional modes of patrol (Table 4-12) frequently used by rangers included by vehicle (46.7%, $n=35$), by motorbike/quadbike (37.3%, $n=28$), by foot (26.7%, $n=20$), by horseback or donkey (14.7%, $n=11$) and by air ($n=3$). In Namibia frequently used other modes of patrol included by vehicle (46.9%, $n=23$), by foot (34.7%, $n=17$), by horseback or donkey (22.4%, $n=11$), motorbike or quadbike (12.2%, $n=6$) and by air (6.1%, $n=3$). In Ghana, 88% ($n=22$) of field patrol respondents indicated that motorbike or

quadbike is the most common additional mode of patrolling, followed by 44% ($n=11$) with vehicles and 8% ($n=2$) by foot. For the additional modes of patrol, respondents could indicate more than one answer; hence the percentage of cases was used.

Table 4-11: Primary mode of patrols used by rangers as per ranger survey

	Overall responses Frequency (f)	Namibian responses Frequency (f)	Ghanaian responses Frequency (f)
By foot	49	24	25
By vehicle	15	15	0
By motorbike / quadbike	1	0	0
By boat	0	0	0
By air	1	1	0
By horseback	0	0	0
Not applicable	9	9	0
Missing	4	4	0
Total (n)	79	53	25

Table 4-12: Additional modes of patrol used by rangers as per ranger survey

	Overall responses Frequency (f)	Namibian responses Frequency (f)	Ghanaian responses Frequency (f)
By foot	20	17	2
By vehicle	35	23	11
By motorbike / quadbike	28	6	22
By boat	0	0	0
By air	3	3	0
By horseback / donkey	11	11	0
Not applicable	9	9	0
No answer	6	6	0

4.1.1 Collective Organisational and Ranger responses

The Namibian responses of the category of organisations combining both the ranger and organisational surveys are shown in Figure 4-6. The bulk of responses across both surveys were received from private game reserves, farms and other conservation or environment-related organisations, showing that most of the participants were from the private conservation sector. Nearly 20% ($n=6$) of the organisational and 15% ($n=8$) of the ranger respondents came from communal conservancies, which is a remarkable response considering the remoteness of the conservancies and limitations to internet access. This shows that community-based conservation is a relevant component in the management of Namibia's natural resources and wildlife.

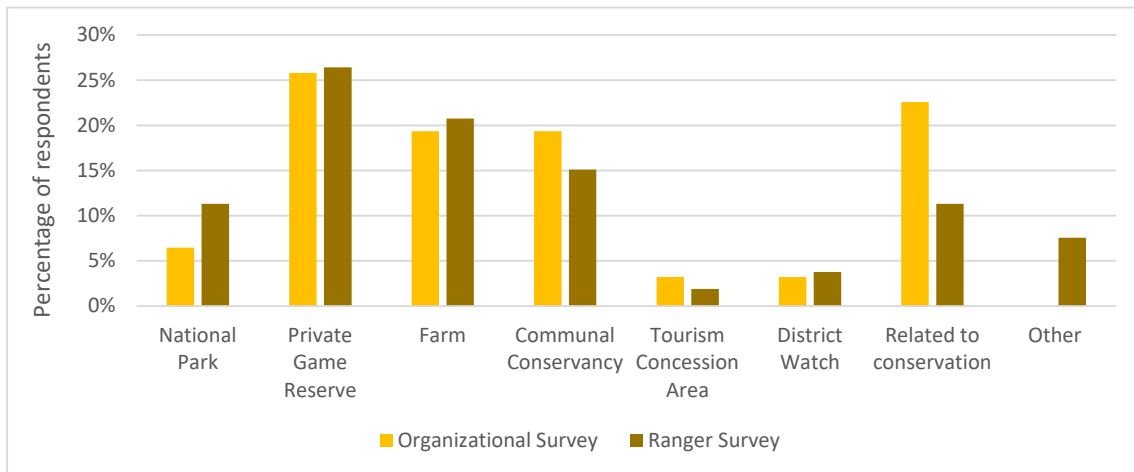


Figure 4-6: Percentage of category of organisation comparing organisational versus ranger survey responses

It can be noted that of the organisational surveys 33.3% ($n=2$) of the responses from community conservancies were received from the Erongo and Kavango regions each and 16.7% ($n=1$) each were received from the Kunene and Omaheke Region. Of the ranger surveys, 87.5% ($n=7$) of the responses of communal conservancies originated from the Kunene region and the remaining 12.5% ($n=1$) from the Zambezi region. Having the combined information of the organisational and ranger surveys gives an overview of the areas where the communal conservancies are most dominant (Figure 1-1). Participation of national parks and tourism concession areas have been low, which is unfortunate as these represent the state-owned PAs.

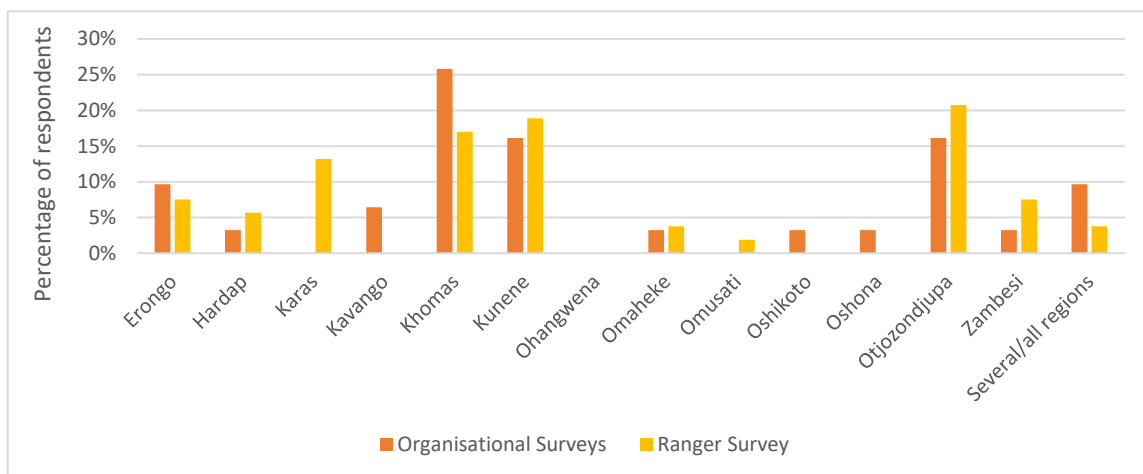


Figure 4-7: Percentage of respondents per region of operation in Namibia comparing organisational versus ranger survey responses

Most responses for both ranger and organisational Surveys were received from Khomas (25.8%, $n=8$ organisational; 17%, $n=9$ ranger), Kunene (16.1%, $n=5$ organisational; 18.9%, $n=10$ rangers) and Otjozondjupa (16.1%, $n=5$ organisational; 21%, $n=11$ ranger). This is not surprising as most of the PAs,

freehold conservancies and tourism establishments are located across these areas (MET, 2010; MET & NACSO, 2018; Turpie et al., 2010). Being able to combine the information received from both surveys all regions in Namibia, with the exception of Ohangwena, are represented in this study (Figure 4-7), providing a national overview.

Most rangers were permanently employed, which is shown dominantly across all the different categories, as shown in Figure 4-8. The total responses from the organisational surveys show that 65.6% ($n=21$) of all responses and 77.6% ($n=59$) of the total ranger responses were in permanent employment. This is concurrent with both the Africa and Asia Ranger Perception Surveys where 93% and 64% of the rangers are in permanent employment, respectively. Asian rangers (36%) and rangers from outside of Namibia (40%, $n=2$) have the highest percentage of temporary employment. It appears that only Namibia works with volunteer rangers as well, which was shown by both the organisational (18%, $n=17$) and ranger (6%, $n=3$) responses. This was only a small portion, but it enables added capacity. The high amount of permanently employed rangers once again shows the commitment to conservation within Namibia, Africa as a whole and Asia as well.

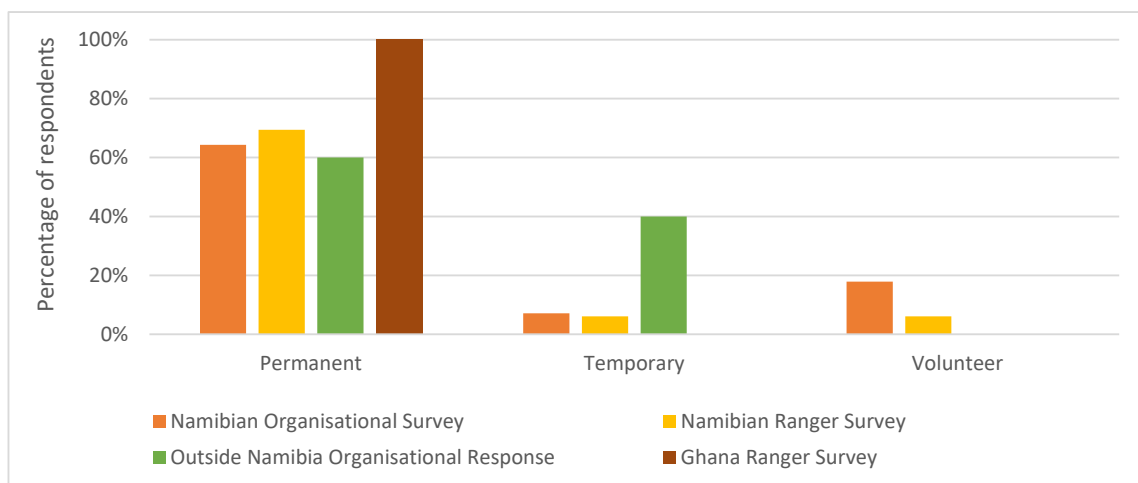


Figure 4-8: Percentage of type of employment comparing organisational and ranger survey responses

Organisational responses mainly reflected that all APUs in Namibia had less than 20 members, with the most dominant group indicating one to five members. Organisations outside Namibia, on the other hand, had larger units with the most common size being five to 10 members per unit and one organisation having more than 20 members in a unit. Rangers have indicated that mainly there are one to 10 rangers stationed together, followed by 11 to 25 rangers per station. In Namibia, most of the rangers are one to ten members per station, whereas rangers from Ghana frequently have 11 to 25 or even more than 100 rangers per station.

The average number of members in a patrolling team are typically three to five members (Figure 4-9) as was indicated by most respondents from all groups. In Namibia, some teams only have one to two members. The organisations and rangers that indicated their patrolling teams consist of one to two members originate from game or hunting farms (organisation = 55.6%, $n=5$; rangers = 54.5%, $n=6$), private game reserves (organisations = 33.3%, $n=3$; rangers = 36.4%, $n=6$) or are relating to conservation/ environment (organisation = 11.1%, $n=1$) and district watches (rangers = 9.1%, $n=1$).

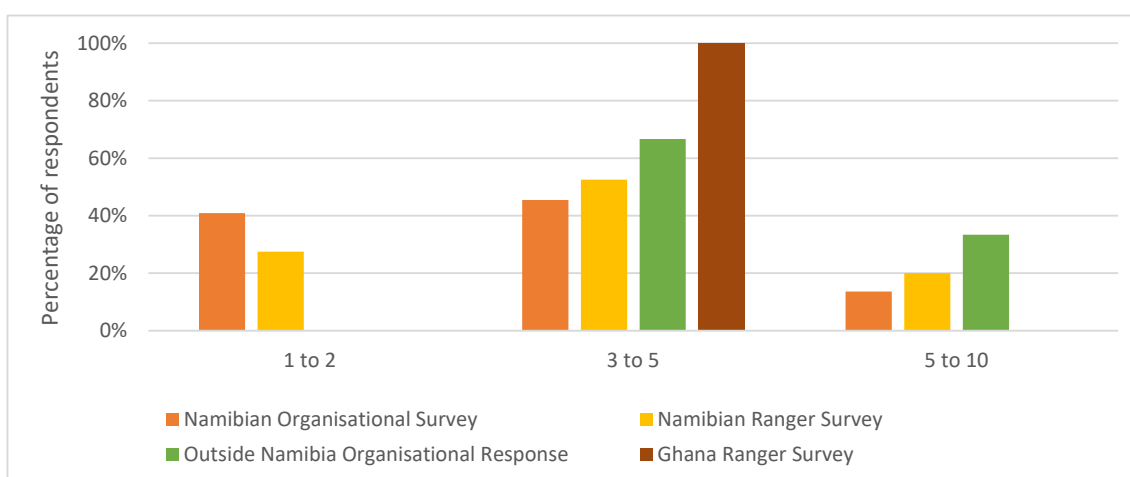


Figure 4-9: Average number of members in a patrolling team comparing organisational and ranger survey responses

4.2 Access to Healthcare Facilities

4.2.1 Organisational Data

Most of the organisational management respondents indicated that the nearest medical facility to their location was a clinic (66.7%, $n=20$), with less than one third (26.7%, $n=8$) reporting a hospital as the closest facility. Less than 10% (6.7%, $n=2$) only had a doctor's office nearby. The distance from the site to the nearest medical facility was 11 to 50 kilometres (km) in 40% ($n=12$) of the respondents, with 33.3% ($n=10$) reporting 51 to 100 km, 13.3% ($n=4$) 101 to 200 km and 6.7% ($n=2$) needed to cover either less than ten or more than 200 km to reach a medical facility. These numbers also reflected responses from the Namibian organisations closely, whereas the responses from outside Namibia indicated that their distances to the nearest medical facility are between 51 and 200 km. Table 4-13 shows the frequencies of responses for distance to the nearest medical facility. The time it takes to reach the nearest medical facility was generally less than three hours for 72.4% ($n=21$) of the respondents, 17.2% ($n=5$) will reach a facility within three to five hours, and 10.3% will take longer than five hours. Once again, the responses from Namibia similarly reflected these proportions and responses from outside Namibia would reach a medical facility within one to five hours. Table 4-14 shows the frequencies of responses for the time it takes to reach a medical facility.

Table 4-13: Distance to nearest medical facility as per organisational responses

	Overall responses Frequency (f)	Namibian responses Frequency (f)	Non-Namibian responses Frequency (f)
0-10 km	2	2	0
11-50 km	12	12	0
51-100 km	10	8	2
101-200 km	4	3	1
201-300 km	2	2	0
Above 300 km	0	0	0
Missing	4	4	0
Total (n)	34	31	3

Table 4-14: Time required to reach the nearest medical facility as per organisational responses

	Overall responses Frequency (f)	Namibian responses Frequency (f)	Non-Namibian responses Frequency (f)
<1 hour	10	10	0
1-3 hours	11	9	2
3-5 hours	5	4	1
>5 hours	3	3	0
Missing	5	5	0
Total (n)	34	31	3

The distance to a hospital was less than 100 km from the site of operation in 63.3% ($n=19$) of the overall respondents and in 73.3% ($n=22$) of the cases the hospital would be reached in less than three hours. This is however from their operational base and not necessarily from their patrol area. There is a slight variation in Namibian responses, but the proportions are similar to the overall responses. The responses from outside Namibia showed that 33.3% ($n=1$) needed to cover between 201 and 500 km and it would take between three to five hours to reach a hospital. Table 4-15 shows the frequencies for the distance to the nearest hospital and Table 4-16 for the time to reach the nearest hospital.

Table 4-15: Distance from site to the nearest hospital as per organisational responses

	Overall responses Frequency (f)	Namibian responses Frequency (f)	Non-Namibian responses Frequency (f)
0-50 km	9	9	0
51-100 km	10	8	2
101-200 km	6	6	0
201-500 km	4	3	1
501-750 km	1	1	0
Above 750km	0	0	0
Missing	4	4	0
Total (n)	34	31	3

Table 4-16: Time to reach the nearest hospital as per organisational responses

	Overall responses Frequency (f)	Namibian responses Frequency (f)	Non-Namibian responses Frequency (f)
<1 hour	9	9	0
1-3 hours	13	11	2
3-5 hours	3	2	1
>5 hours	5	5	0
Missing	4	4	0
Total (n)	34	31	3

In case of an emergency occurring, almost half (47.8%, $n=22$) of the respondents indicated that vehicles were readily available to transport a patient to the medical facility, 19.6% ($n=9$) indicated that employees would provide transport. A minimal number of respondents would use an ambulance (15.2%, $n=7$) or air evacuation (8.7%, $n=4$) to reach a medical facility. Some respondents indicated that oxen or donkey carts would be used and that transport was challenging to find (4.3%, $n=2$ each). As can be seen in Table 4-17 most of the proportions for the mode of transport between the overall responses and the Namibian responses were similar. Responses from outside Namibia showed that all have vehicles readily available for transportation. Participants were requested to indicate all modes of transport applicable to their setting.

Table 4-17: Common modes of transport to a medical facility as per Organisational responses

	Overall responses Frequency (f)	Namibian responses Frequency (f)	Non-Namibian responses Frequency (f)
Ambulance	7	7	0
Vehicles readily available	22	19	3
Provided by employee	9	9	0
Air evacuation	4	4	0
Donkey / oxen cart	2	2	0
Transport difficult to find	2	2	0

4.2.2 Ranger Data

Most rangers (62.7%, $n=47$) indicated that a clinic was the nearest medical facility to them. This was followed by 28% ($n=21$) of the rangers stating that a hospital was closest, while 8% ($n=6$) had a doctor's office close by. Another 1.3% ($n=1$) of the respondents were unsure what the closest medical facility was. In the Namibian Ranger group, 44.9% ($n=22$) stated that a clinic and 40.8% ($n=20$) that a hospital was closest. The Ghanaian group, on the other hand, only reported clinics.

The majority (73.3%, $n=55$) of respondents mentioned that the nearest medical facility is less than 50 km away, 18.7% ($n=14$) needed to travel 51 to 100 km and 8% ($n=6$) were between 101 and 200 km from a health facility as shown in Table 4-18. In Namibia, 38.8% ($n=19$) of the rangers had 11 to 50 km

to travel to a health facility where in Ghana, only 24% ($n=6$) were within this range. The remaining rangers from Ghana were less than ten km away from a facility, with only 22.4% ($n=11$) of their Namibian counterparts being in that range. Nearly thirty-nine per cent ($n=19$) of Namibian rangers needed to travel between 50 and 200 km to a medical facility.

Table 4-18: Distance from site to the nearest medical facility as per ranger surveys

	Overall responses Frequency (f)	Namibian responses Frequency (f)	Ghanaian responses Frequency (f)
0-10 km	30	11	19
11-50 km	25	19	6
51-100 km	14	13	0
101-200 km	6	6	0
201 – 300 km	0	0	0
Above 300 km	0	0	0
Missing	4	4	0
Total (n)	79	53	25

Most rangers (56%, $n=42$) could reach a medical facility within one hour, 36% ($n=27$) would take one to five hours and 8% ($n=6$) would require more than five hours (Figure 4-19). Close to half ($n=23$) of the Namibian rangers would be able to get to a facility within one hour, where 76% ($n=19$) of their Ghanaian counterparts would reach a facility within the same time frame. The remaining rangers would take between one to five hours in Ghana. In Namibia, 40.8% ($n=20$) would take one to five hours and 12.2% ($n=6$) would take longer than five hours to reach the nearest medical facility.

Table 4-19: Time to reach the nearest medical facility as per ranger surveys

	Overall responses Frequency (f)	Namibian responses Frequency (f)	Ghanaian responses Frequency (f)
<1 hour	42	23	19
1-5 hours	27	20	6
>5 hours	6	6	0
Missing	4	4	0
Total (n)	79	53	25

The nearest hospital was less than 50 km away in 37.3% ($n=28$) of the overall responses, 34.7% ($n=26$) were in a range of between 51 and 100 km, 22.7% ($n=17$) were 101 to 200 km away and 8% ($n=4$) had between 201 and 500 km to travel to a hospital (frequencies are shown in Table 4-20). For Namibian rangers the nearest hospital was less than 50 km away in 34.7% ($n=17$) of the respondents, 32.7% ($n=16$) needed to travel 101 to 200 km, 24.5% ($n=12$) were in a range of between 51 and 100 km and 8.2% ($n=4$) between 201 and 500 km away. Over half of the responses ($n=13$) from Ghana showed that the distance to the nearest hospital was 51 to 100 km, 44% ($n=11$) reported less than 50 km and only 4% ($n=1$) were between 101 and 200 km away from a hospital.

Table 4-20: Distance to nearest Hospital as per ranger surveys

	Overall responses Frequency (f)	Namibian responses Frequency (f)	Ghanaian responses Frequency (f)
0-50 km	28	17	11
51-100 km	26	12	13
101-200 km	17	16	1
201-500 km	4	4	0
Above 500 km	0	0	0
Missing	4	4	0
Total (n)	79	53	25

The time to reach the nearest hospital was reported to be between one and two hours in 37.3% ($n=24$) of the overall responses, 32% ($n=28$) said they would take less than one hour to reach the hospital, 21.3% ($n=16$) between three and five hours and 6.7% ($n=5$) would take longer than five hours to get to the hospital (Table 4-21). The Namibian rangers reported that 44.9% ($n=22$) would reach a hospital within one to two hours, 28.6% ($n=14$) in less than one hour, 12.2% ($n=6$) in three to five hours, 10.2% ($n=5$) in more than five hours and 4.1% ($n=2$) were unsure how long it would take them. The Ghanaian rangers indicated that 40% ($n=10$) would be at a hospital in less than one hour, another 40% ($n=10$) would take three to five hours and the remaining 20% ($n=5$) one to two hours.

Table 4-21: Time to reach the nearest Hospital as per Ranger surveys

	Overall responses Frequency (f)	Namibian responses Frequency (f)	Ghanaian responses Frequency (f)
<1 hour	24	14	10
1-2 hours	28	22	5
3-5 hours	16	6	10
>5 hours	5	5	0
Unknown / Unsure	2	2	0
Missing	4	4	0
Total (n)	79	53	25

In order to reach the hospital in the case of an emergency, 42.9% ($n=48$) of the respondents would need to provide transport themselves, 23.2% ($n=26$) would have vehicles readily available and would have transport provided by their employer respectively. Ambulance (6.3%, $n=7$) and air evacuation (4.5%, $n=5$) would be used in the fewest cases. These numbers correlated with the Namibian responses proportionally. Frequencies of respondents in the various categories are shown in Table 4-22; all modes of transport that apply to the setting had been requested. In Ghana, 60.6% ($n=20$) of the rangers would need to provide transport themselves, 21.2% ($n=7$) reported that transport would be provided by the employer and 18.2% ($n=6$) reported that vehicles were readily available.

Table 4-22: Common mode of transport to the facility as per Ranger surveys

	Overall responses Frequency (f)	Namibian responses Frequency (f)	Ghanaian responses Frequency (f)
Ambulance	7	7	0
Self-provided	48	27	20
Provided by employer	26	19	7
Vehicles readily available	26	20	6
Air evacuation	5	5	0

4.2.1 Collective Organisational and Ranger responses

Access to medical facilities for Namibian rangers is often more than 10 km away, as 44.4% ($n=12$) of the organisations and 38.8% ($n=19$) of the rangers indicated that the nearest healthcare facility is between 11 and 50 km from where they are based. Rangers in the Erongo, Hardap, Kavango, Omaheke, Oshikoto and Zambezi regions mainly fall into this category as confirmed by over half of the ranger and organisation responses. The next most common distance to a medical facility was 51 to 100 km which is confirmed by 26.5% ($n=13$) of the rangers and 29.6% ($n=8$) of the organisations. This was frequent in the Erongo, Karas, Kunene and Otjozondjupa regions. Rangers that are within 10 km from a medical facility were confirmed in 22.4% ($n=11$) of the ranger and in only 7.4% ($n=2$) of the organisational responses. This was dominant for the Omaheke, Oshona, Khomas and Zambesi regions. Some rangers and organisations in the Karas, Khomas, Kunene, Otjozondjupa and Erongo regions were between 101 and 300 km from the nearest medical facility. In the Ghanaian subgroup, all rangers had access to a medical facility within 50 km. The organisations from outside Namibia mostly had access to a medical facility within 51 to 100 km and 33.3% ($n=1$) being within 101 to 200km from the nearest facility.

Of the rangers, 34.7% ($n=17$) and the of the organisations, 33.3% ($n=9$) have indicated that the nearest hospital was less than 50 km away from where they are stationed. Where the nearest medical facility was a hospital, 55% ($n=11$) of the rangers and 25% ($n=3$) of the organisations indicated that this was within 50 km. Of the rangers that indicated the hospital was their nearest medical facility, 35% ($n=7$) were within 51 to 100 km and the last 10% ($n=2$) were within 101 to 200 km. Some Namibian organisations further indicated that 11.1% ($n=3$) were between 201 and 500 km and 3.7% ($n=1$) were as far as 501 to 750 km away from the nearest hospital.

A 50 km radius to the medical facility should take less than 30 minutes to reach, and if the facility is within 100 km it should not take longer than 1 hour to get there (Iskam, 2015). Most rangers that are less than 50 km away from the nearest facility indicated that it would take them less than one hour to get there, as shown in Figure 4-10. It is notable though that 35.4% ($n=20$) will take one to five hours and 15.8% ($n=6$) would take longer than five hours to reach the nearest medical facility. The rangers that would need longer than five hours to reach a medical facility are all from the Kunene region, with distances needing to be covered being as small as 11 km to the nearest facility. Rangers from Ghana

would reach the medical facility that is less than 10 km in one hour, facilities that are up to 50 km from the site would take one to five hours to reach.

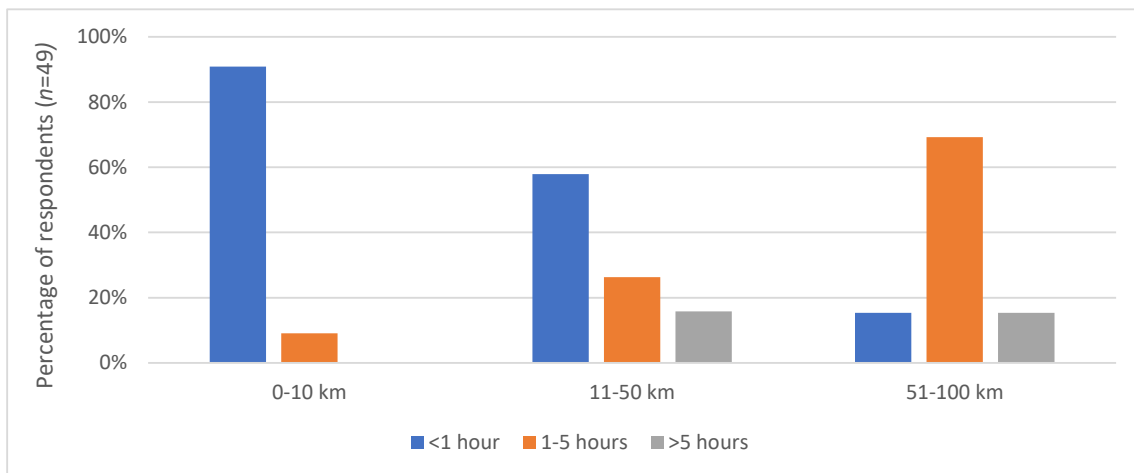


Figure 4-10: Time it takes to reach nearest healthcare facility considering distance to facility as per Namibian ranger responses

The organisational responses showed that within 10 km of a medical facility, all organisations would be there in less than one hour (Figure 4-11). From 51 to 200 km most organisations would reach a medical facility within one to five hours and about 40% ($n=5$) would be at the facility within one hour if the distance is between 11 and 50 km. About 31% ($n=3$) would reach a medical facility less than 100 km away in more than five hours. This was from the Kavango, Kunene and Erongo regions. Overall, less than 40% ($n=9$) of the organisations would reach a medical facility within one hour, irrespective of the distance to the facility. About half ($n=13$) would reach a facility within one to five hours and just over 10% ($n=5$) would take longer than five hours. Organisations from outside Namibia had indicated that a range of 51 to 100 km would mostly be reached in one to three hours, whereas 101 to 200 km would take three to five hours.

Overall, most Namibian rangers would take one to two hours to reach a hospital, irrespective of the distance that needs to be covered. Figure 4-12 shows that all rangers who are within 50 km from a hospital would be there in two hours. If the hospital is 51 to 100 km away 75% ($n=9$) of the rangers would reach the hospital within two hours and 25% ($n=3$) would take three to five hours. The time taken to reach a hospital within 101 to 200 km would mainly be one to two hours, 6.3% ($n=1$) would have three to five hours, about 20% ($n=3$) would take longer than five hours and just over 10% ($n=2$) were unsure how long they would need. To reach a hospital that is more than 200 km away, it would take at least three hours. Once again, the rangers in the Kunene region would need more than five hours to reach a hospital. All the rangers in Ghana would reach a hospital within five hours, with 40% ($n=10$) being able to get there in less than one hour.

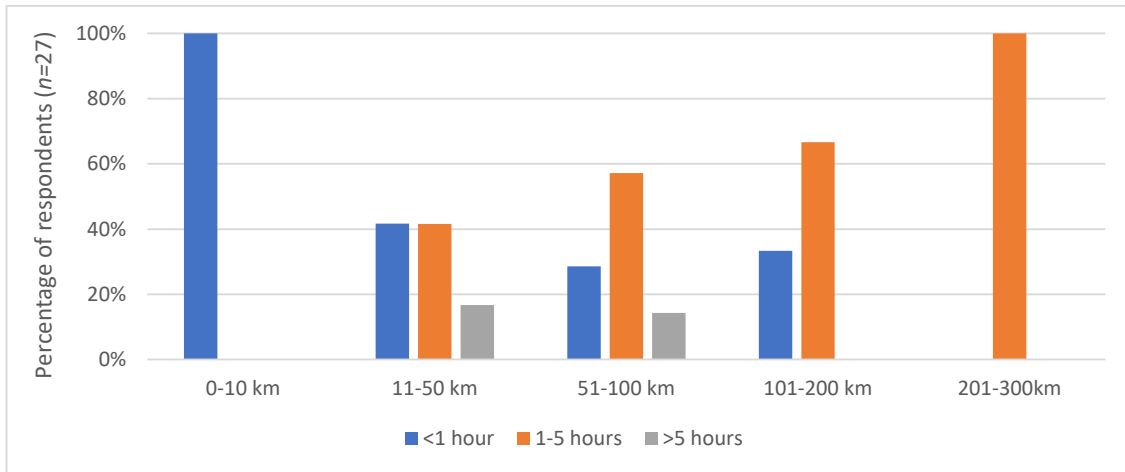


Figure 4-11: Time it takes to reach nearest healthcare facility considering distance to facility as per Namibian organisational responses

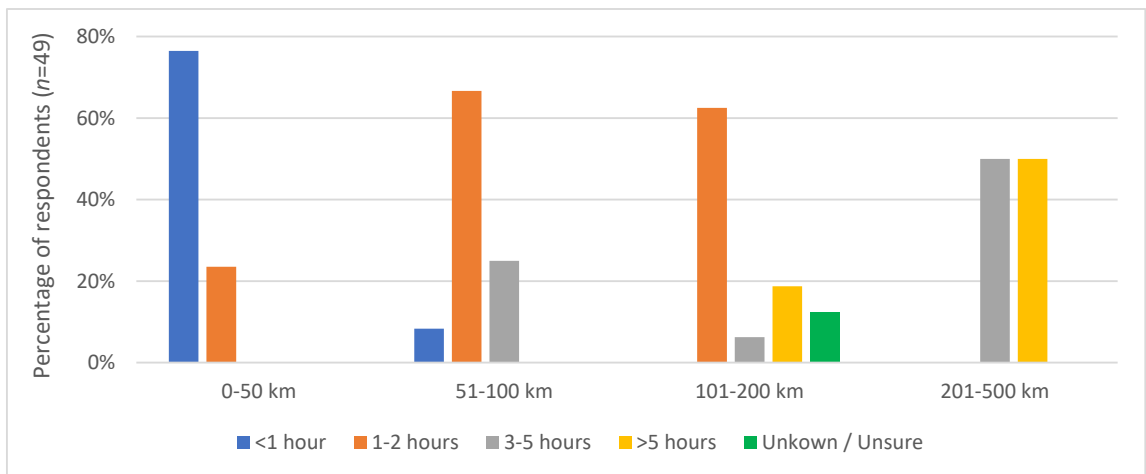


Figure 4-12: Time in relation to distance to the nearest hospital as per Namibian ranger responses

Most of the Namibian organisations would reach the hospital within three hours, with over 30% ($n=9$) doing so within one hour, irrespective of the distance to the hospital. There were 18.5% of the organisations that would take longer than five hours to reach the hospital. Relating this to the distances that organisations have to cover if the hospital is within 50 km most would reach it within one hour, but just over 10% ($n=1$) would require more than five hours to reach the hospital (Figure 4-13). When the hospital is 51 to 100 km away less than 40% ($n=3$) would reach it within one hour, 50% ($n=4$) would get there in one to two hours and over 10% ($n=1$) would need more than five hours. If the hospital is more than 100 km away, most organisations would take longer than five hours to reach there. Organisations that will take longer than five hours to reach a hospital are located in the Kunene and Kavango regions. The organisation that operates throughout Namibia also has an average of five hours to the nearest hospital. Outside of Namibia, the organisations will take between one and five hours to reach the nearest hospital.

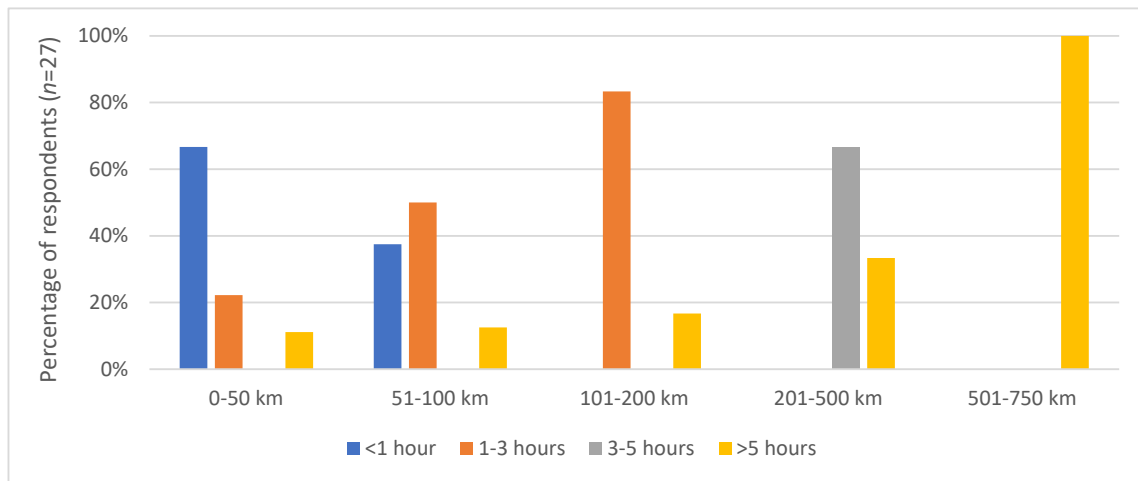


Figure 4-13: Time needed in relation to distance covered to reach a hospital as per Namibian organisational responses

Only a few participants of this study would use ambulances or air evacuation if an emergency occurred. Organisations would use both services more frequently than rangers themselves. Outside Namibia no emergency medical services (EMS) would be used, all patients would be transported privately, and vehicles are readily available. In the case of an emergency, less than half of the organisations stated that vehicles would be readily available to provide transport to the rangers. This is confirmed by the rangers, where about one-fourth indicates that vehicles would be readily available, and transport would be provided by the employer. Of the rangers, about a third said that they would provide their transport, which is supported by the one-fifth of the responses of the organisations that showed the employee should provide their own transport. Some organisations also indicated that transport is difficult to find and that a donkey or oxen cart will be used to transport a patient to a medical facility.

4.3 Emergencies

4.3.1 Organisational Data

Of the organisations, 47.8% ($n=11$) indicated that rangers have been injured on duty. In Namibian organisations, injuries of rangers on duty occurred in 42.9% ($n=9$), whereas all organisations from outside Namibia confirmed that injuries have occurred. The leading cause for injuries was trauma incidents (21.4%, $n=6$), followed by wildlife and poacher encounters (10.7%, $n=3$ each) and by snakebite and conflict with communities (7.1%, $n=2$), as indicated by Table 4-23. In Namibia, the leading causes were trauma incidents, followed by wildlife encounters, snakebites and poacher encounters equally and conflict with communities the least. Outside Namibia, injuries are caused by poacher and community involvements.

Table 4-23: Cause of injuries on duty as per organisational survey responses

	Overall responses Frequency (f)	Namibian responses Frequency (f)	Non-Namibian responses Frequency (f)
Wildlife encounters	3	3	0
Snakebite	2	2	0
Poacher involvement	3	2	1
Community conflict	2	1	1
Other trauma incidents ⁹	6	5	0
Not applicable	12	12	0
Total (n)	28	26	2

Soft tissue injuries and central nervous system injuries were the most common in both subgroups (Table 4-24). Furthermore, most injuries occurred within the last five years (Table 4-25), which may be attributable to the fact that these injuries are more easily remembered.

Table 4-24: Type of injuries occurring on duty per organisational survey responses

	Overall responses Frequency (f)	Namibian responses Frequency (f)	Non-Namibian responses Frequency (f)
Skeletal injuries ¹⁰	4	4	0
Soft-tissue injuries ¹¹	8	7	1
Central nervous system injuries ¹²	3	2	1
Not applicable	12	12	0

Table 4-25: Year of injuries occurring as per organisational survey responses

	Overall responses Frequency (f)	Namibian responses Frequency (f)	Non-Namibian responses Frequency (f)
2019-2015	5	4	1
2014-2010	2	1	1
2009-2005	0	0	0
2004-2000	0	0	0
1999-1995	0	0	0
Frequently / regularly	1	1	0
Not applicable	12	12	0
No answer	3	3	0
Missing	11	10	1

Illnesses occurred more frequently with 56.5% ($n=13$) of the organisations confirming that rangers had been ill on duty. This was reported from both subgroups. Gastrointestinal illnesses, general cold and flu and fever/headaches are the most common illnesses that occurred on duty (Table 4-26). Outside Namibia, environmental factors are most prevalent, of which malaria dominated.

⁹ Including shooting incidents, motor vehicle accidents, cuts, bites and falls

¹⁰ Including fractured bones (finger, legs), shoulder dislocation, knee injury

¹¹ Including lacerations, abrasions, snakebites, thorns and splinters, contusions, blisters, sprains

¹² Including head, neck and spinal injuries, disk lesion

Table 4-26: Type of illnesses occurring as reported by organisational responses

	Overall responses Frequency (f)	Namibian responses Frequency (f)	Non-Namibian responses Frequency (f)
General cold and flu	6	6	0
Gastrointestinal ¹³	7	7	0
Environmental factors ¹⁴	4	2	2
Fever / headaches	5	5	0
Dehydration	3	3	0
Other ¹⁵	1	1	0
Not applicable	10	10	0
No answer	1	1	0
Total (n)	37	35	2

Thirteen per cent of the organisations reported that there had been ranger fatalities while on duty. In Namibia, less than 10% ($n=2$) confirmed deaths of rangers, whereas one organisation outside Namibia indicated that deaths have occurred. Of the three organisations confirming ranger deaths, two (one from Namibia and the other one from outside Namibia) reported between one and two deaths. The third organisation reports three to five deaths of rangers within Namibia. The main cause of death was gunshot wounds, but medical illnesses, mainly acute myocardial infarctions and environmental factors like drowning, snakebites and trampling, were also stated. Few respondents presented a year of death, but of the three reported years of deaths, two were in the last five years and one was between 2005 and 2009.

4.3.2 Ranger Data

Overall, 64.9% ($n=48$) of the rangers reported that they had experienced a life-threatening encounter. This was experienced by 58.3% ($n=28$) of the Namibian rangers and 76% ($n=19$) of the rangers from Ghana. Table 4-27 shows the frequencies for types of life-threatening encounters.

Most rangers in Namibia have not been injured on duty, with only 11 out of 47 respondents (23.4%) confirming they have been injured. This number can still be seen as a high risk for occupational injuries compared to other professions. In Ghana, on the other hand, nearly half of the rangers reported that they have been injured. The principal causes of injuries overall have been wildlife encounters, community and poacher conflicts. Table 4-28 shows the frequencies of injury causes across the various categories.

¹³ Including diarrhea, nausea and vomiting, acid reflux, stomach cramps, food poisoning, gastroenteritis

¹⁴ Including malaria, tick bite fever, snakebites, heat stroke

¹⁵ Including renal calculi, acute myocardial infarctions (AMI)

Table 4-27: Types of life-threatening encounter as per ranger survey responses

	Overall responses Frequency (f)	Namibian responses Frequency (f)	Ghanaian responses Frequency (f)
Wildlife encounter	22	13	8
Attacked by poachers	19	7	12
Threatened by poachers	20	12	8
Threatened by community	15	4	11
Medical illness	6	6	0
Weather-related ¹⁶	3	2	1
Other trauma incidents ⁸	3	3	1
Not applicable	26	20	6
No answer	1	1	0
Total (n)	115	68	46

Table 4-28: Cause of injury as per ranger survey responses

	Overall responses Frequency (f)	Namibian responses Frequency (f)	Ghanaian responses Frequency (f)
Wildlife encounters	11	6	5
Snakebite	4	2	2
Poacher involvement	6	2	4
Community conflict	7	3	4
Other trauma incidents ⁸	2	1	1
Not applicable	50	36	13
No answer	1	1	0
Total (n)	81	51	29

Soft-tissue injuries¹⁰ were the most commonly endured injuries across both subgroups, followed by skeletal injuries⁹. Central nervous system¹¹ and eye injuries have also been experienced in the Namibian group. Most injuries reported by the rangers occurred in the last five years and between 2005 and 2009, in both subgroups. Two of the Namibian rangers reported that injuries occurred regularly. One stated the injury occurred between 2010 and 2014 and another two have been injured between 1995 and 1999.

Over half of the rangers reported that they have been ill on duty. This is more frequent among Ghanaian rangers where 76% ($n=19$) confirmed they have been ill as opposed to 44.4% ($n=20$) of the Namibian rangers. The most common causes of illness in both subgroups were gastrointestinal and environmental problems, as shown in Table 4-29.

About 25% ($n=27$) of the total respondents have experienced colleagues dying on duty. In Namibia, 13.6% ($n=6$) of the rangers have experienced the death of a colleague, as opposed to 45.8% ($n=11$) of the rangers in Ghana having gone through this experience. The majority of rangers ($n=11$) had one to

¹⁶ Including rain and thunderstorms, drowning, tornado-type wind

two colleagues dying, three respondents (one from Namibia and the other two from Ghana) experiences three to five colleagues' deaths and one respondent mentioned that 15 colleagues had died. Of the 16 responses where the cause of death was given 62.5% ($n=10$) died by gunshot wounds, 31.2% ($n=5$) died from snakebites or drowning and one person succumbed to an AMI. More than half of the cases ($n=6$) where the year of death was indicated occurred in the last five years, followed by 18.2% ($n=2$) between 2000 and 2004 and between 2005 and 2014 respectively. One fatality was reported between 1995 and 1999.

Table 4-29: Type of illness occurred on duty as per ranger survey responses

	Overall responses Frequency (f)	Namibian responses Frequency (f)	Ghanaian responses Frequency (f)
General cold and flu	6	5	1
Gastrointestinal ¹²	16	7	8
Environmental factors ¹³	10	5	5
Fever / headaches	7	4	3
Other ¹⁷	3	3	0
Not applicable	27	21	6
No answer	7	1	6
Total (n)	76	46	29

4.3.3 Collective Organisational and Ranger responses

Close to half of the organisations and about a third of the rangers that participated in the survey indicated that injuries had occurred on duty. This was more prevalent in organisations and rangers outside Namibia. Figure 4-14 shows that amongst the rangers, wildlife encounters were the most frequent causes of injuries (38%, $n=6$ in Namibian rangers; 31%, $n=5$ in Ghanaian rangers). Within Namibia wildlife encounters and other trauma-related are the most common causes.

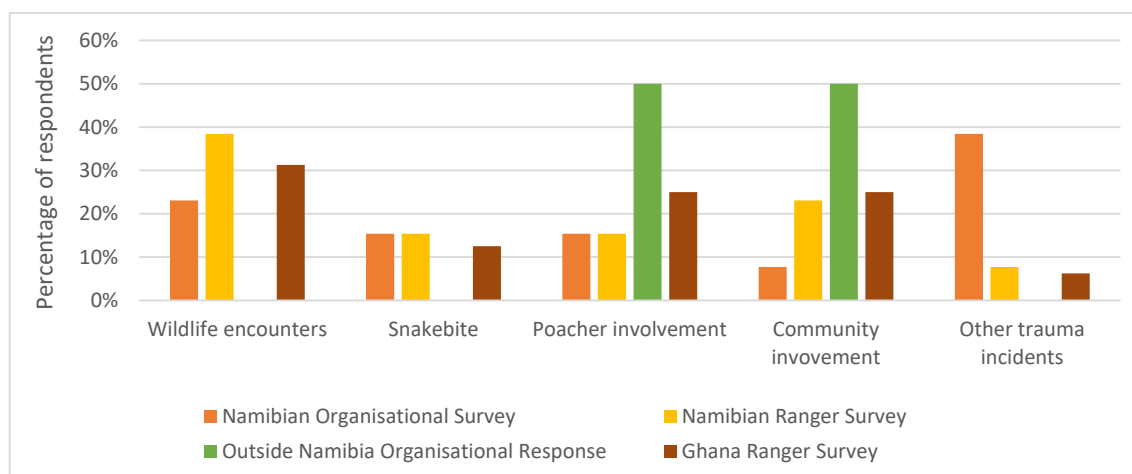


Figure 4-14: Causes of injuries comparing organisational and ranger responses

¹⁷ Including chest infections, eye infections, swollen and painful leg

Other trauma-related causes include falls, cuts and injuries caused by inadequate equipment (for example no proper boots in the field). Snakebites and poacher involvement within Namibia each account for 15% ($n=2$) of the injuries. Community conflict, resulting in injuries occur in 23% ($n=3$) of the rangers in Namibia. Outside of Namibia poacher and community conflicts causing injuries to rangers are more common. This shows that communities do not just threaten rangers (WWF, 2016; WWF & RFA, 2016), but also cause injuries to them.

Soft-tissue injuries were the most common type of injury occurring across all four categories, as can be seen in Figure 4-15. Soft-tissue injuries included abrasions, lacerations, puncture wounds, blisters, scratches and splinters. These injuries were caused by falls (including falls of a vehicle), gunshot wounds, machete wounds, trampling or bumping by game and cytotoxic snakebites

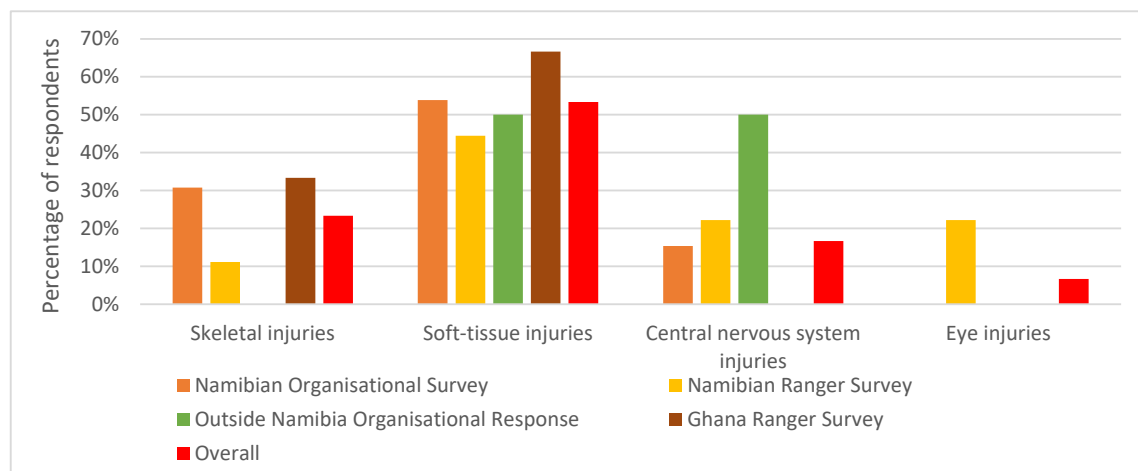


Figure 4-15: Types of injuries occurred comparing organisational and ranger responses

Where a third of all rangers reported the occurrence of injuries, more than half confirmed illnesses on duty. In Namibian rangers, the frequency of illnesses was double that of injuries. For the organisations, more than half confirmed that rangers had been ill on duty, which is also more than the occurrence of injuries. This variance is less though comparing it to the ranger responses.

Figure 4-16 shows the common illnesses that had been experienced while on duty. Gastrointestinal problems were most frequently experienced. Amongst these were gastroenteritis, food poisoning, stomach cramps, diarrhoea and vomiting, as well as heartburn have been reported. Dehydration, which was reported in 5% ($n=3$) of the overall cases can be as a result of a gastrointestinal problem, or it could be caused by fluid loss and exertions in hot weather. Environmental factors were reported in 23% ($n=14$) of the cases including malaria and tick bite fever. Malaria mainly occurred in the Ghanaian subgroup; however, one case was also reported from Namibia. The organisational group from outside of Namibia was not included in the graph as both respondents indicated that malaria was the chief

cause for illness. They have been included in the overall percentage though. A total of 18% ($n=12$) of the respondents reported that fevers and headaches, as well as common cold and flu, had occurred. Other illnesses that were reported include AMI, renal calculi, heatstroke, general body pains and weakness and swollen legs. This occurred in 7% ($n=4$) of the overall respondents.

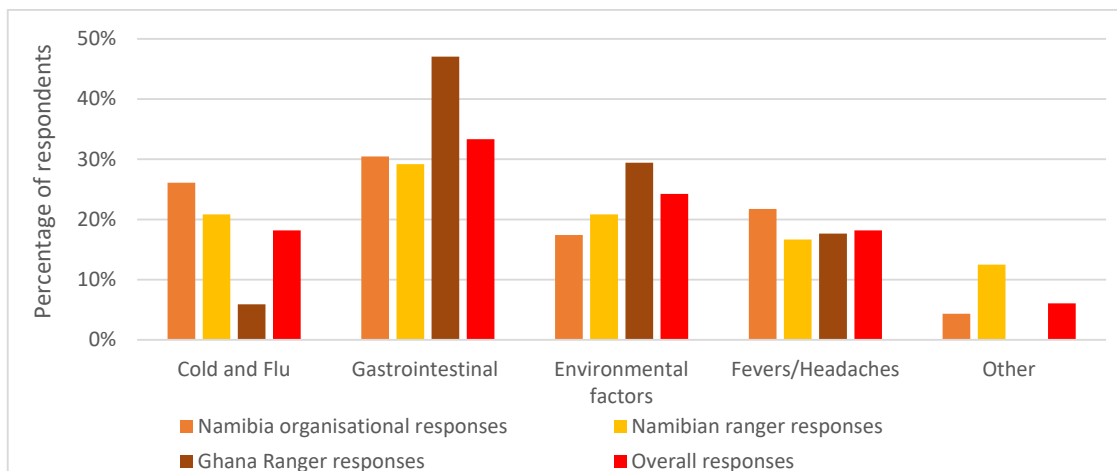


Figure 4-16: Common illnesses occurred comparing organisational and ranger responses

Not only injuries and illnesses are a risk to rangers, but many have experienced life-threatening situations (Figure 4-17). The most common cause of life-threatening encounters is through wildlife. In the Namibian ranger group, wildlife encounters were followed by threatened and attacked by poachers and medical illnesses. In Ghana, on the other hand, being attacked by poachers was the main life-threatening situation, followed by threatened by communities and then wildlife encounters and threatened by poachers. Weather-related causes were through rainfalls, flooding and tornado-like winds. Other trauma-related causes included falls and motor vehicle accidents.

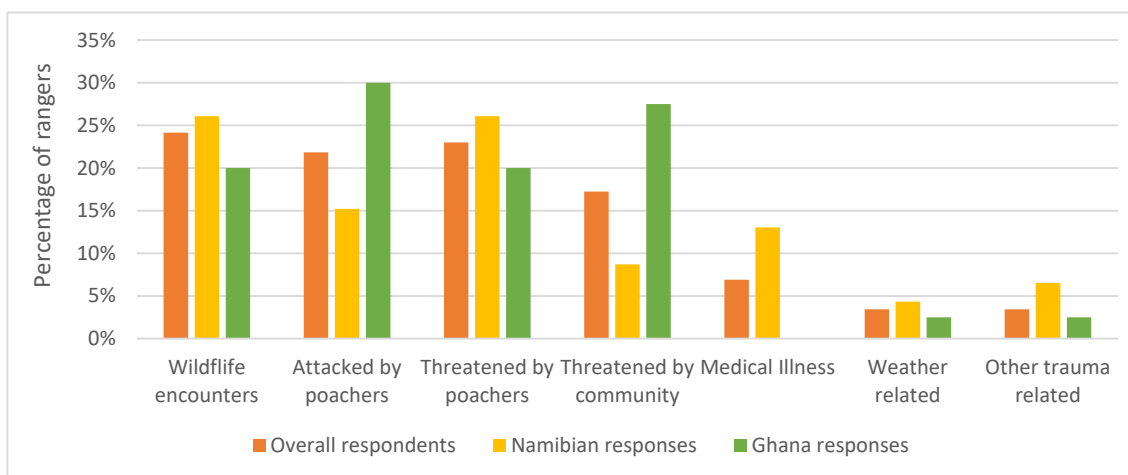


Figure 4-17: Cause of life-threatening encounters of game rangers

In Ghana, a significantly higher number of rangers had experienced colleagues dying on duty as compared to the Namibian rangers. Half of the organisations from outside Namibia had indicated the death of rangers, as opposed to less than 10% of the Namibian organisations. Of the 19 responses that were received for the cause of death across all categories, 61% ($n=12$) showed that gunshot wounds were the primary cause (Figure 4-18). Gunshot wounds in Namibia accounted for one third ($n=3$) of deaths of rangers. Of the gunshot cases that killed rangers in Namibia half were caused by poacher interaction. In Ghana, on the other hand, most deaths caused by gunshot wounds were inflicted by poachers (76.9%, $n=10$). Most ranger fatalities in Namibia reported by rangers (60%, $n=3$) were caused by drowning, mainly as a result of flash floods. One Namibian organisation reported one ranger being trampled to death by animals. Environmental factors in Ghana included drowning and snakebites. The rangers who died from a medical cause succumbed to acute myocardial infarctions.

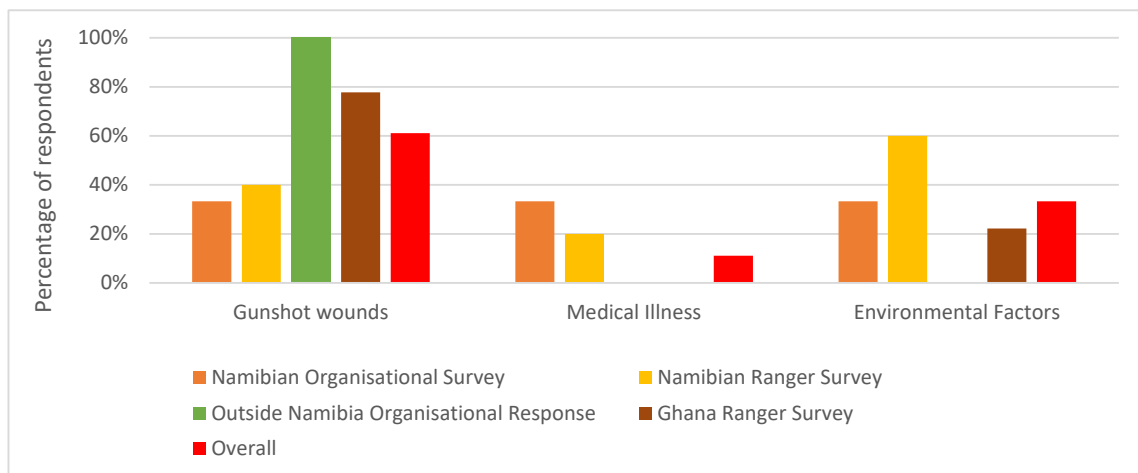


Figure 4-18: Cause of death of rangers comparing organisational and ranger survey responses

4.4 Training

4.4.1 Organisational Data

Of the Namibian organisations, 47.3% ($n=10$) reported that some of the rangers received first aid training, 38.1% ($n=8$) said none of the rangers and 14.3% ($n=3$) indicated that all rangers have first aid training (Figure 4-19). Outside Namibia, it was reported by both respondents that some rangers have first aid training.

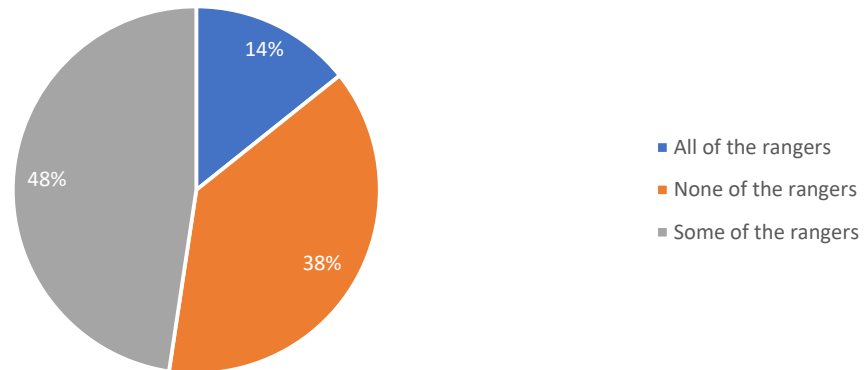


Figure 4-19: Percentage of rangers receiving first aid training as per Namibian organisational responses

First aid training was categorised in the survey into three levels: Basic First Aid, a one-day course, Class A First Aid, a three-day course and Advanced First Aid, a course longer than three days. Figure 4-20 describes the various levels of first aid training that rangers receive from both the organisational and ranger responses.

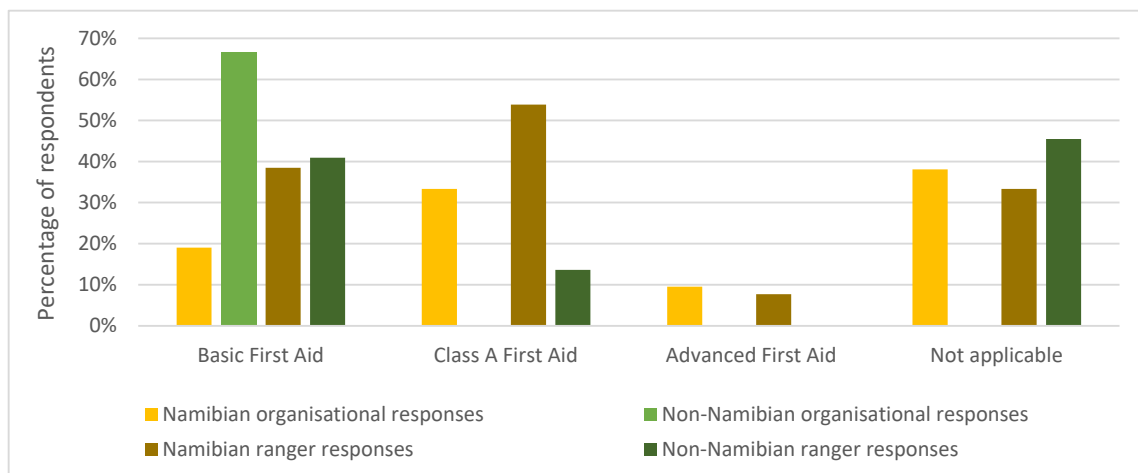


Figure 4-20: Percentage of rangers having the various first aid levels from organisational and ranger responses

Table 4-30 describes the competencies for the various levels of first aid training. Here it needs to be noted that within Namibia the Class B First Aid (Advanced First Aid) course can currently not be offered as the MoHSS does not allow service providers to register for this qualification (personal experience). For this study, any first aid training that was longer than 3-days was seen as an Advanced First Aid course. The Namibian organisations indicated that of the rangers that received first aid training, 53.8% ($n=7$) had a Class A, 30.8% ($n=4$) had a Basic First Aid and 15.4% ($n=2$) had an Advanced First Aid course (Figure 4-20). For the two organisations that indicated that rangers receive Advanced First Aid training these could be tailor-made for the rangers to be more extensive for their setting. Rangers outside of

Namibia only had Basic First Aid as per organisational responses. Courses were renewed every two to three years in 61.5% ($n=7$) of the cases in Namibia. Outside of Namibia, the courses are not renewed.

Table 4-30: Comparison of the competencies for the various first aid courses

	Basic First Aid	Class A First Aid	Advanced First Aid (Class B First Aid)
Safety and emergency scene management	X	X	X
Principles of First Aid	X	X	X
Different phases of Emergency Medical Care			X
Medico-Legal Aspect of First Aid		X	X
Choking	X	X	X
CPR Adult and Child	X	X	X
CPR Infant		X	X
Automated External Defibrillator	X	X	X
Wounds and Bleeding	X	X	X
Bandaging Practice	X	X	X
Shock	X	X	X
Different Types of Shock		X	X
Unconsciousness and Fainting	X	X	X
Burns	X	X	X
Fractures & Splinting	X	X	X
Standard Splinting Practice	X	X	X
Head and Spinal Injuries	X	X	X
Poisons	X	X	X
Eye Injuries		X	X
Soft Tissue Injuries	X	X	X
Joint Injuries and Sprains	X	X	X
Hand and Spinal injuries		X	X
Amputations		X	X
Impaled Objects	X	X	X
Chest Injuries		X	X
Pelvic and Abdominal Injuries		X	X
Seizures and Fits	X	X	X
Diabetes		X	X
Heart Attack	X	X	X
Stroke	X	X	X
Bites and Stings	X	X	X
Environmental illnesses and injuries	X	X	X
Behavioural Problems		X	X
Emergency Childbirth			X
Basic Anatomy and Physiology		X	X
Primary and Secondary Assessment		X	X
Communicable Diseases			X
Triage			X
Basic vital signs and monitoring		X	X
Airway Techniques			X
Movement of Casualties		X	X

Just over half ($n=11$) of the Namibian organisations trained rangers on site. None of the organisations from outside Namibia provided training; hence the results below are for the Namibian organisations only. Most of the training provided to rangers (53.8%, $n=7$) is field training. The competencies for this included tracking, situational awareness, environmental knowledge, wildlife behaviour and monitoring, human-wildlife conflict training, event book data recording, game counts as well as anti-poaching activities and awareness of unusual activities relating to poaching. Law enforcement training constituted 30.8% ($n=4$) of the training, which included military small group tactics, crime scene investigations, rifle handling and basic law enforcement methods. Emergency procedures depending on the situation were covered by 15.4% ($n=2$) of the organisations. First aid training was incorporated in less than half ($n=5$) of the organisations' training. If first aid training was included, 40% ($n=2$) offer Basic First Aid and the remaining 60% ($n=3$) offer Class A First Aid training to the rangers. Sixty per cent ($n=3$) of the organisations renew the first aid courses every two to three years.

4.4.2 Ranger Data

Most rangers among both subgroups had received first aid training (65.2%, $n=45$). Of the Namibian rangers just under half (46.7%, $n=14$) that had received first aid training had a Class A qualification, 36.7% ($n=10$) had a Basic First Aid course, 6.7% ($n=2$) had an Advanced course or some other medical training each (shown in Figure 4-21). Of the Ghanaian rangers, 25% ($n=3$) had a Class A course and 75% ($n=9$) had a Basic First Aid course. One person was unsure what first aid training was received. In Namibia, 60% ($n=18$) of the rangers refresh their first aid training every two to three years, whereas in Ghana, less than half ($n=7$) receive refresher training. Overall, over half of the rangers (54.4%, $n=37$) stated that not all game rangers receive first aid training.

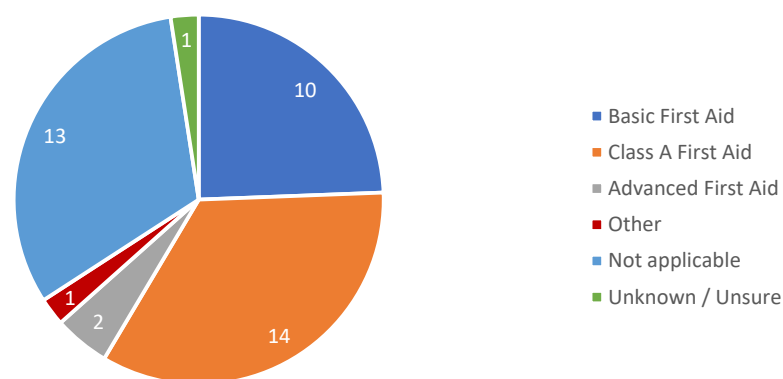


Figure 4-21: Number of Namibian rangers that have completed the different first aid levels

Most rangers did not feel adequately trained for a medical emergency or were unsure if they were, with 58.1% ($n=25$) of the Namibian and 70.8% ($n=17$) of the Ghanaian rangers reporting this. Table 4-31 shows the frequencies of perceived training needs of rangers to be prepared for a medical

emergency. Of the respondents that felt inadequately prepared for an emergency in Namibia, 21.7% ($n=5$) each required a Basic First Aid course and training on medical conditions or medication. Treating injuries from wildlife encounters and advanced first aid were mentioned by 17.4% ($n=4$) each, and 4.4% ($n=1$) identified training on emergencies specific to their discipline of work. Thirteen per cent ($n=3$) needed training at regular intervals and 4.4% ($n=1$) were unsure of what they would need. Of the Ghanaian rangers that require additional training 63.5% ($n=7$) requested a basic first aid course, 18.2% ($n=2$) need training on specific medical conditions or medication (including the uses of medicinal plants that can be found in the bush) and 9.1% ($n=1$) each needed training on emergencies specific to their field of work and injuries caused by wildlife encounters.

Table 4-31: Additional training requirements to be adequately trained for an emergency as per Ranger survey responses

	Overall responses Frequency (f)	Namibian responses Frequency (f)	Ghanaian responses Frequency (f)
Basic First Aid	12	5	7
Advanced First Aid	4	4	0
Medical conditions / medication	7	5	2
Specific to field of work	2	1	1
Injuries caused by wildlife encounters	5	4	1
Training at regular intervals	3	3	0
Not applicable	25	18	6
Unknown / Unsure	1	1	0
No answer	8	1	7
Missing	12	11	1
Total (n)	79	53	25

4.5 First Aid Equipment

4.5.1 Organisational Data

More than half (55.2%, $n=16$) of the organisations provided rangers with FAKs as part of their standard everyday equipment, 17.2% ($n=5$) provide FAKs to some of the rangers, and 27.6% ($n=8$) do not provide FAKs to their rangers at all. Close to 70% ($n=18$) of the Namibian organisations issued all or some of their rangers with FAKs as part of their standard equipment ($n=18$), whereas about 30% ($n=8$) of the Namibian organisations did not. Outside Namibia, either all or some of the rangers ($n=3$) had FAKs as part of their standard everyday equipment provided by the organisation. Figure 4-22 shows the proportions of items that are carried in a FAK as indicated by the organisations. Gloves, scissors, first aid dressing size 3, conforming bandages 100 millimetres (mm) and safety pins are the five most commonly carried items. Very few FAKs contain haemostatic agents, antihistamine ointment or tablets and anti-inflammatory ointment. In the Namibian organisations, items that formed part of a FAK are quite extensive, whereas the items in FAKs outside Namibia are much more limited.

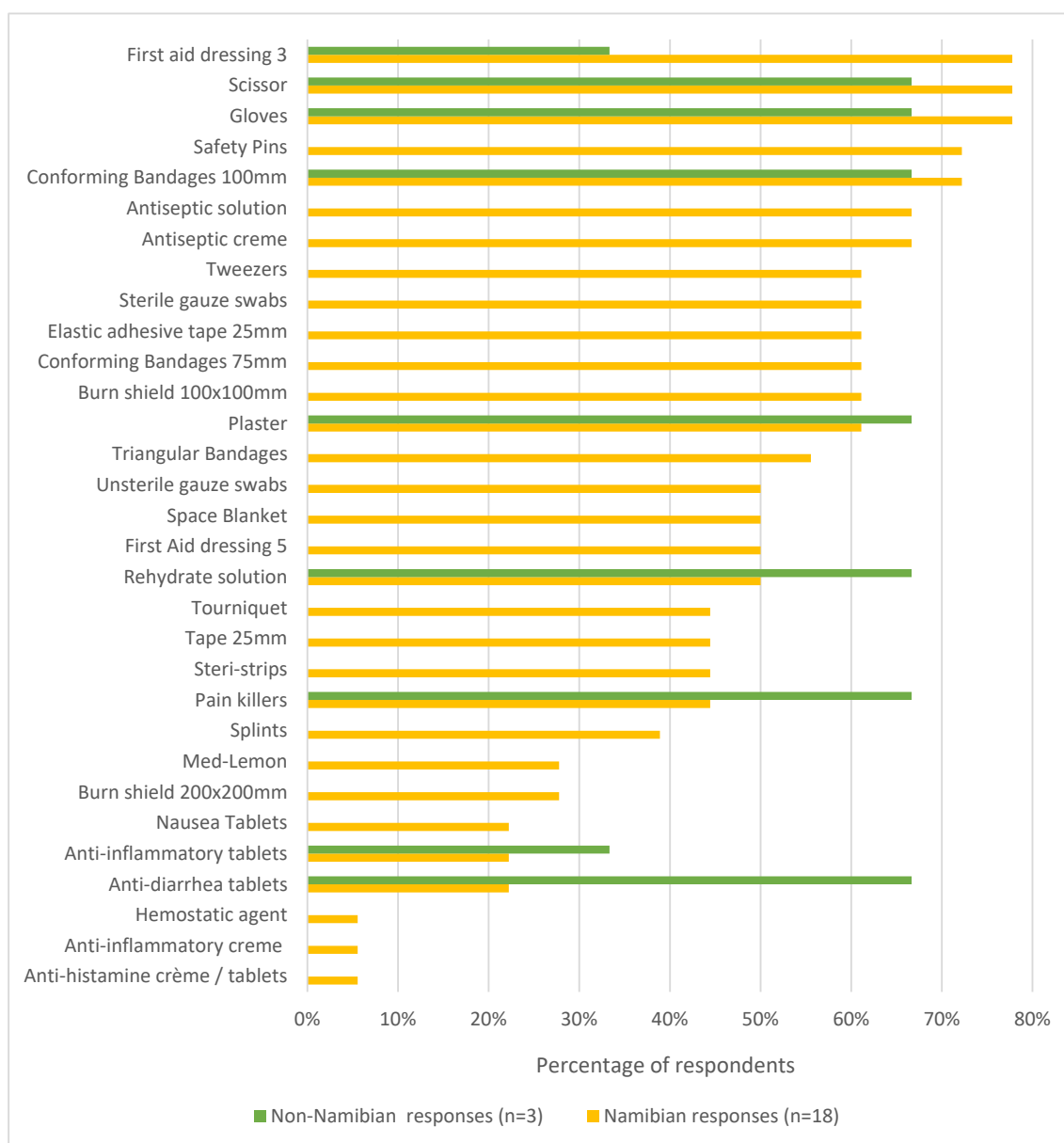


Figure 4-22: First aid items carried as part of first aid kit by organisational responses

4.5.2 Ranger Data

Half of the rangers ($n=35$) reported not having at least one FAK per patrolling team and over 60% ($n=46$) did not carry a FAK as part of their standard everyday equipment. Just over 10% ($n=8$) of the patrolling teams had a FAK available sometimes. In Namibia, rangers had at least one FAK in a patrolling team, nearly 60% ($n=26$) of the time and nearly 40% ($n=17$) did not have a FAK available. FAKs as part of their standard everyday equipment were carried by 55% ($n=27$) of the rangers. In Ghana on the other hand, only 4% ($n=1$) carried a FAK and 24% ($n=6$) had a FAK available on some patrols. Figure 4-23 shows the items that formed part of a FAK that rangers have accessible. Gloves, plaster, scissors, antiseptic ointment, burn shield 100x100mm and first aid dressings size 3 are the most commonly carried items. Ghanaian rangers once again had much less stock in their FAKs.

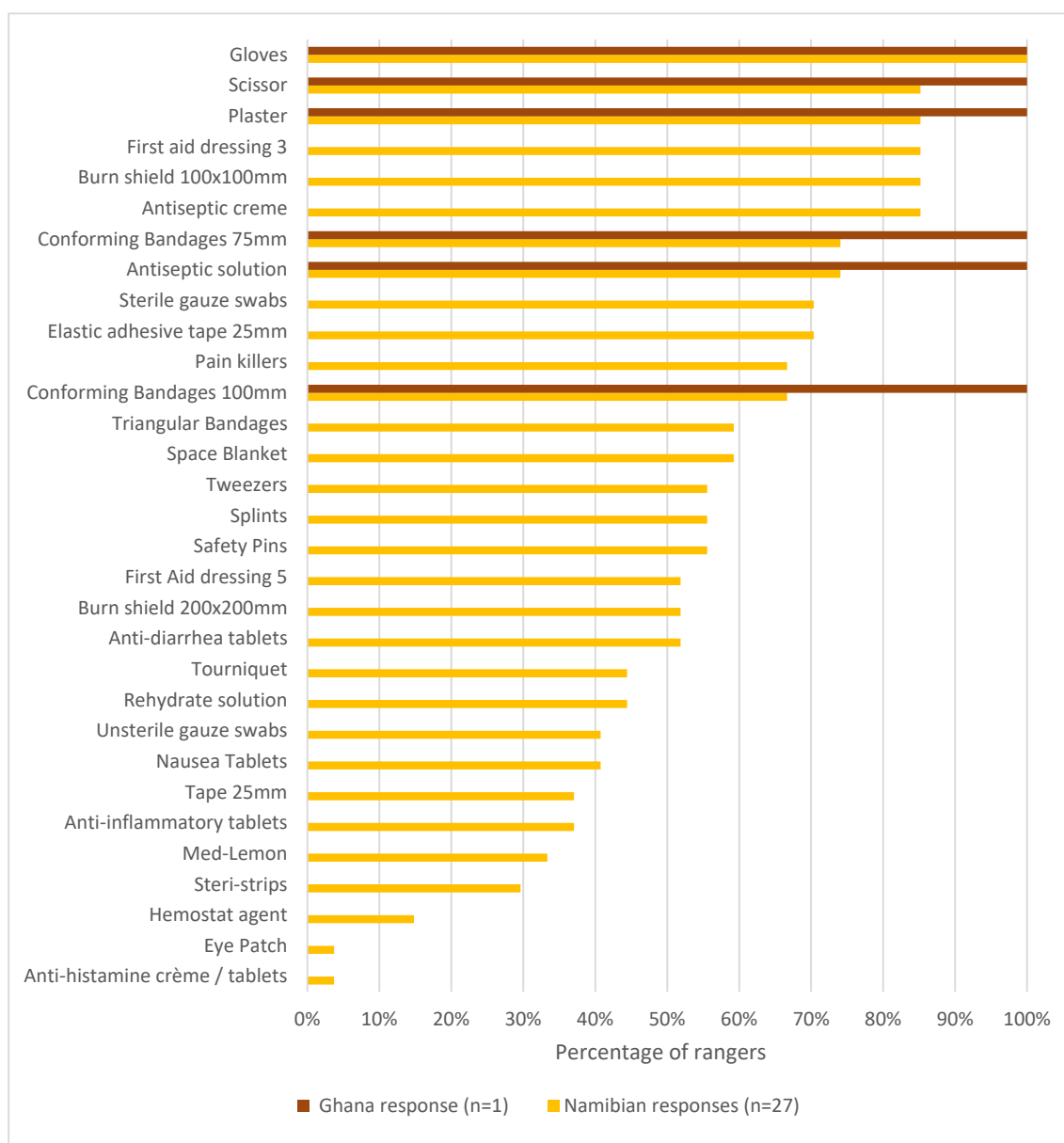


Figure 4-23: First aid items carried as part of standard first aid kit by rangers

Nearly two-thirds of the rangers felt that they were not adequately equipped to deal with a medical emergency. A FAK and stock are needed in 71.1% ($n=32$) of the cases, with medical equipment including backboards and vehicles (ambulances) requested in 22.2% ($n=10$), as presented in Table 4-32. About seven per cent ($n=3$) of the rangers also indicated that they need essential equipment, including tents, basic uniform and protective clothing, torches, radio communication, water containers, binoculars and backpacks.

Table 4-32: Additional equipment required to deal with a medical emergency as per Ranger survey responses

	Overall responses Frequency (f)	Namibian responses Frequency (f)	Ghanaian responses Frequency (f)
First aid kit and stock	32	20	11
Medial equipment	10	6	4
Basic equipment	3	2	1
Not applicable	23	19	4
No answer	9	4	5

4.6 Personal First Aid Field Kit

4.6.1 Demographic Information of Respondents

The results of the targeted survey regarding personal first aid equipment are provided below. Sixty-nine responses were analysed for this survey. Most respondents were male (58%, $n=37$) between 30 and 49-years-old (53.6%, $n=37$) with a tertiary education (76.8%, $n=53$). As can be seen in Figure 4-24, most of the respondents were pre-hospital providers ($n=20$), but rangers ($n=5$), security ($n=3$) and nature-related sectors ($n=15$) were also well represented. This provides input from a broad array of experience towards what should form part of a PFAFK. Most Namibian regions are represented, with the Khomas ($n=25$), Erongo ($n=14$) and Otjozondjupa ($n=10$) regions being the most dominant. Nearly 70% ($n=47$) of the respondents are within 50 km from a hospital, but 20% ($n=14$) reported between 101 and 300 km distance to the nearest hospital. About 40% ($n=28$) of the respondents had some association with game rangers, which provided a good understanding of what rangers would need in the field.

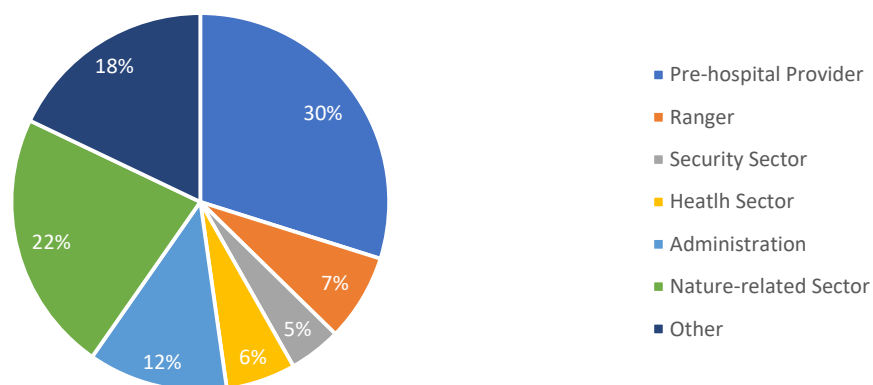


Figure 4-24: Occupation categories of respondents for PFAFK survey

4.6.2 Recommended Items and Quantities for a Personal First Aid Field Kit

Figure 4-25 shows that most respondents would prefer either a backpack or smaller pouch type as a carrying case for PFAFKs. Figure 4-26 shows which items participants selected to be part of a FAK. More than 80% of the cases agreed that gloves, rescue blankets, conforming bandages, cardiopulmonary resuscitation (CPR) mouthpieces, Elastoplast, tweezers, burn shield, rehydrate, sterile gauze and crepe bandages should form part of a PFAFK. Less than 50% thought that an eye bath, deep freeze spray, cotton wool roll and buds are necessary for a FAK.

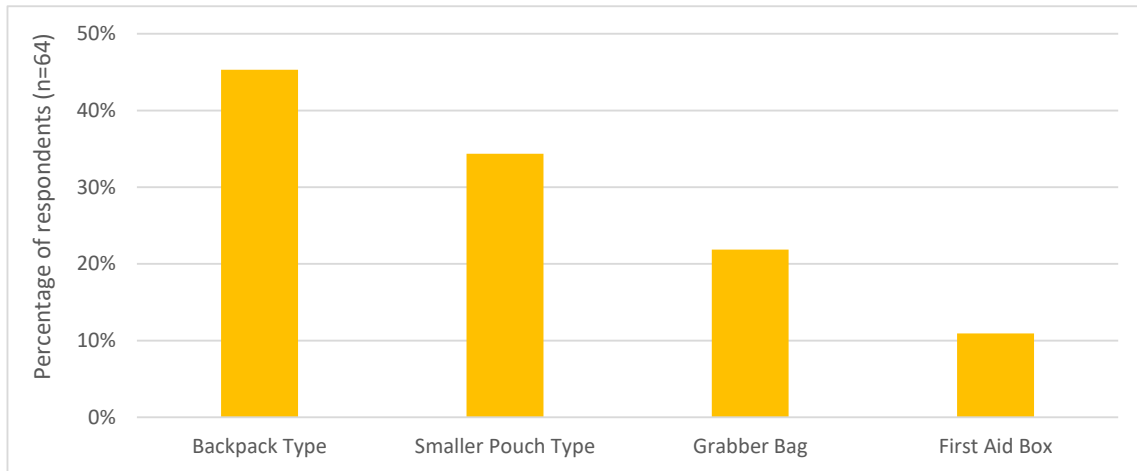


Figure 4-25: Percentage of respondents for type of casing of the first aid kit

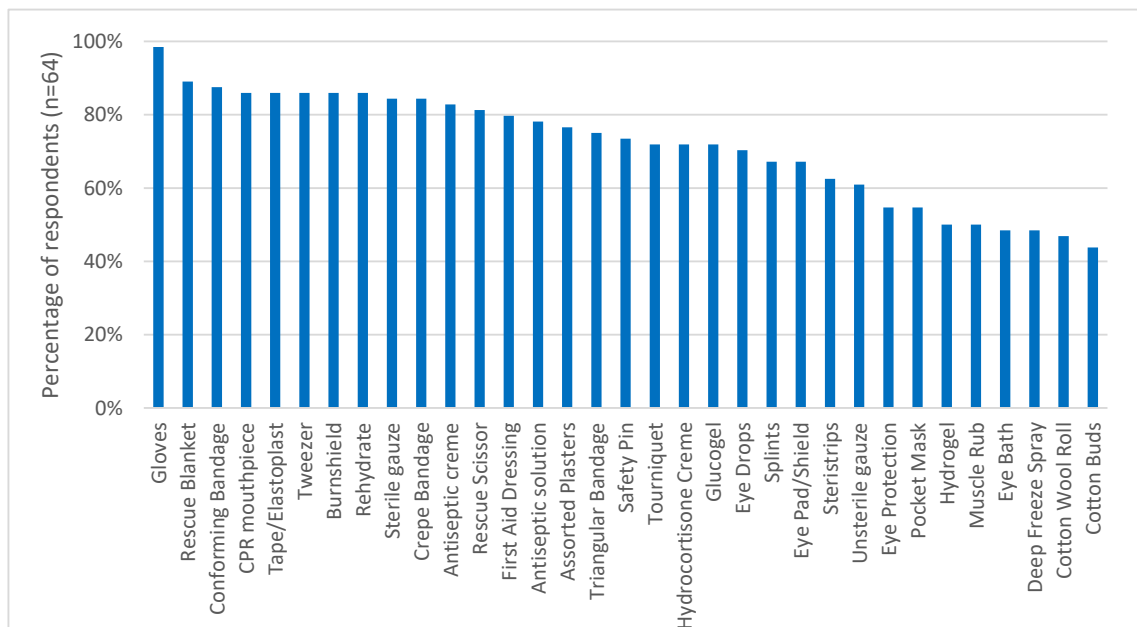


Figure 4-26: Percentage of respondents recommending various first aid disposable items for first aid kit

Medications that participants perceived should be in a FAK are displayed in Figure 4-27. Here, more than 50% of the respondents indicated that anti-diarrhoea, anti-spasmodic, anti-emetic and antihistamine medication, as well as Allergex and pain medication like paracetamol and ibuprofen/paracetamol combination should be included. Less than 30% indicated that multi-vitamins and other headache tablets (e.g. Compral) should form part of the kit.

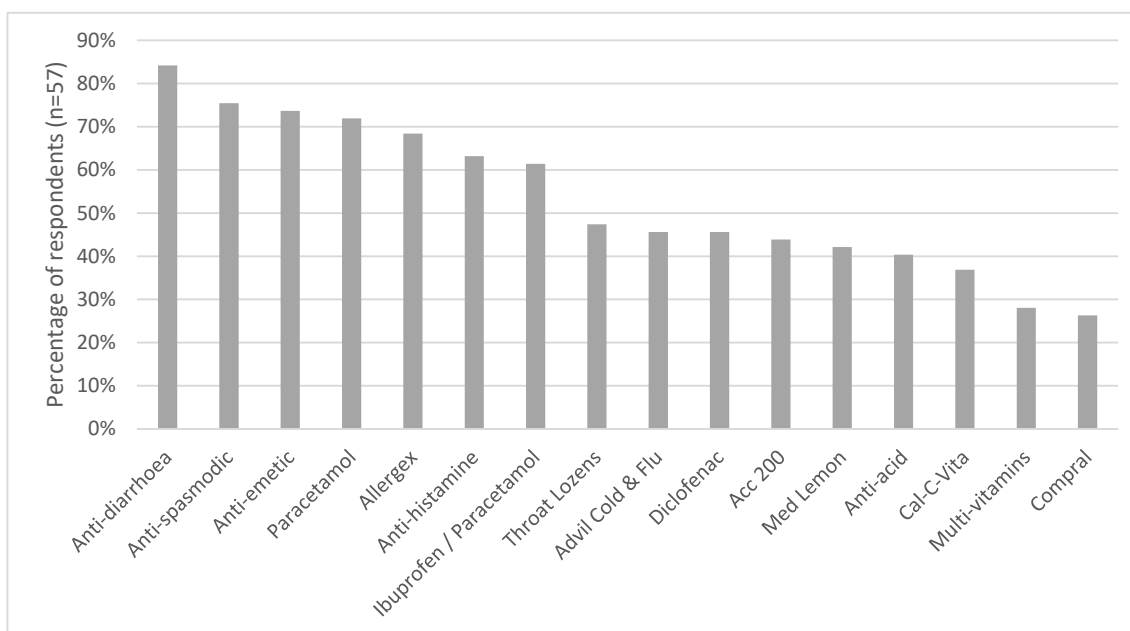


Figure 4-27: Percentage of respondents selecting various medication to be part of first aid kit

Participants were requested to indicate quantities of items they selected that they would keep in a PFAFK. Table 4-33 shows the frequencies for quantities in different range categories. The most selected range for each item is highlighted in light green for ease of overview. Most participants indicated items should be in quantities of between one and six.

Table 4-33: Recommended quantities of first aid items and medication

	Suggested quantity of items that should be included in PFAFK						
	1	2 to 3	4 to 6	7 to 10	11 to 20	>20	No answer
Gloves (pairs)	0	18	25	17	3	3	2
Eye Protection	22	10	1	1	0	0	2
CPR Mouthpiece	15	30	9	0	0	0	3
Pocket Mask	14	21	2	0	0	0	2
Conforming Bandage 75mm	4	24	22	6	1	0	2
Conforming Bandage 100mm	7	23	21	3	0	1	4
FAD No 3	2	25	20	4	0	1	4
FAD No 5	1	26	21	2	1	1	2
Sterile Gauze	4	10	20	11	8	1	3

Unsterile Gauze	15	12	4	5	1	1	4
Triangular Bandage	8	24	13	0	0	0	4
Tourniquet	26	14	3	0	0	0	6
Assorted Plasters	10	9	7	14	6	2	4
Elastic Adhesive Tape 25mm	23	21	9	0	1	0	3
Transpore Tape 25mm	24	15	6	1	0	0	3
Steristrips	7	13	7	8	3	0	3
Safety Pins	11	4	16	13	4	0	2
Rescue Scissor	45	9	0	0	0	0	3
Rescue Blanket	20	30	6	1	0	0	5
Splints	5	20	15	0	0	0	8
Crepe Bandage 75mm	7	27	17	1	0	0	6
Crepe Bandage 100mm	12	22	15	1	0	0	7
Cotton Buds	7	2	5	6	5	3	4
Cotton Wool	23	5	0	1	0	0	1
Eye Bath	15	11	4	1	0	0	2
Eye pad/shield	11	18	10	3	1	0	2
Antiseptic Solution	45	2	0	0	0	0	6
Hydrocortisone Crème	41	3	0	0	1	0	3
Antiseptic Crème	50	4	0	0	0	0	4
Burnshield 100x100mm	16	24	9	3	0	0	5
Burnshield 200x200mm	21	18	8	0	0	0	5
Deep Freeze Spray	25	3	1	0	0	0	3
Eye Drops	39	3	2	0	0	0	3
Glucogel	11	20	16	0	0	0	3
Hydrogel	24	3	2	0	0	0	5
Rehydrate Packets	5	11	28	6	3	0	5
Multi-Vitamins	11	2	1	0	0	0	3
Cal-C-Vita	13	2	0	2	0	0	5
Cold&Flu Tablets	16	2	4	1	2	0	3
Med-Lemon	17	3	2	2	0	0	2
Throat Lozenge	18	4	1	2	3	0	4
ACC 200	19	2	0	1	0	0	6
Anti-spasmodic	30	4	3	1	1	0	9
Anti-emetic	27	8	1	2	0	0	7
Anti-diarrhea	32	10	2	2	0	0	6
Antacid	13	4	2	1	0	0	5
Allergex	29	5	2	1	0	0	6
Anti-histamine	24	9	2	1	0	0	6
Paracetamol	22	10	2	2	0	0	7
Compral	8	1	2	0	0	0	5
Diclofenac	15	5	1	1	0	0	4
Ibuprofen/Paracetamol	26	5	1	2	0	0	4

4.6.3 Importance and Usage Ranking of Items

Participants were requested to rank the importance of each item for being included in a PFAFK. Table 4-34 shows the frequencies with which the respondents ranked each item. The most responses for each item are highlighted in light green for ease of identification. Similarly, respondents were asked to rank how often they would use each item. Table 4-35 shows the answers per item.

Table 4-34: Importance ranking of items in a first aid kit

	Not at all important	Slightly important	Moderately important	Very important	Extremely important	No answer	Missing
Gloves	1	1	4	17	36	1	9
Eye Protection	7	21	16	10	5	1	9
CPR Mouthpiece	3	3	11	22	19	2	9
Pocket Mask	6	12	21	8	9	4	9
Conforming Bandages	0	0	8	33	17	2	9
First Aid Dressing	0	4	5	31	19	1	9
Sterile Gauze	0	4	7	29	18	2	9
Unsterile Gauze	1	10	18	22	5	4	9
Triangular Bandage	2	14	10	19	13	2	9
Tourniquet	1	9	8	13	23	6	9
Assorted Plasters	2	13	19	15	10	1	9
Tape/Elastoplast	0	10	19	19	8	4	9
Steristrips	2	13	21	13	8	3	9
Safety Pins	14	9	23	8	1	5	9
Tweezer	5	10	18	20	3	4	9
Rescue Scissor	1	8	14	23	12	2	9
Rescue Blanket	1	3	10	25	17	4	9
Splints	2	14	18	11	11	4	9
Crepe Bandage	9	15	23	8	5	5	9
Cotton Buds	15	21	11	6	7	7	9
Cotton Wool	17	14	13	10	1	5	9
Eye Bath	8	16	11	13	3	9	9
Eye pad/shield	4	18	14	13	4	7	9
Antiseptic Solution	3	6	10	24	14	3	9
Hydrocortisone Crème	2	6	20	19	6	7	9
Antiseptic Ointment	2	3	13	25	12	5	9
Burnshield	1	2	15	20	15	7	9
Deep Freeze Spray	9	14	19	9	1	8	9
Eye Drops	5	9	19	16	6	5	9
Glucogel	2	3	22	16	11	6	9
Hydrogel	5	7	17	11	12	8	9
Rehydrate Packets	0	3	12	22	17	6	9
Muscle Rub	10	14	18	8	3	7	9
Multi-Vitamins	27	11	9	5	0	8	9
Cal-C-Vita	22	13	9	6	0	10	9
Cold&Flu Tablets	14	16	10	9	1	10	9
Med-Lemon	9	16	18	7	0	10	9
Throat Lozenge	14	16	14	7	0	9	9

ACC 200	12	16	15	7	0	10	9
Anti-spasmodic	2	9	16	18	7	8	9
Anti-emetic	3	7	18	17	7	8	9
Anti-diarrhea	2	4	16	18	14	6	9
Antacid	15	10	14	9	2	10	9
Allergex	4	8	15	18	9	6	9
Anti-histamine	1	5	13	23	12	6	9
Paracetamol	4	11	17	14	10	4	9
Compral	10	7	21	6	4	12	9
Diclofenac	7	8	13	18	4	10	9
Ibuprofen/Paracetamol	4	7	9	23	4	13	9

Table 4-35: Usage ranking of items of first aid kit

	Never	Rarely	Sometimes	Often	Always	No answer	Missing
Gloves	0	1	5	17	32	0	14
Eye Protection	12	15	13	12	2	1	14
CPR Mouthpiece	7	17	12	9	9	1	14
Pocket Mask	16	8	15	8	5	3	14
Conforming Bandages	0	3	12	26	12	2	14
First Aid Dressing	0	4	12	28	10	1	14
Sterile Gauze	0	2	14	27	10	2	14
Unsterile Gauze	2	5	13	22	9	4	14
Triangular Bandage	3	8	15	22	6	1	14
Tourniquet	8	14	13	7	8	5	14
Assorted Plasters	0	4	10	23	16	2	14
Tape/Elastoplast	0	2	15	21	15	2	14
Steristrips	2	15	12	13	8	5	14
Safety Pins	8	17	13	13	1	3	14
Tweezer	1	19	13	15	3	4	14
Rescue Scissor	1	10	11	15	16	2	14
Rescue Blanket	5	9	15	18	5	3	14
Splints	7	15	14	11	4	4	14
Crepe Bandage	1	7	16	22	6	3	14
Cotton Buds	14	18	10	5	2	6	14
Cotton Wool	16	14	9	11	1	4	14
Eye Bath	9	18	15	3	2	8	14
Eye pad/shield	5	23	14	5	1	7	14
Antiseptic Solution	1	7	12	20	12	3	14
Hydrocortisone Crème	0	7	20	17	6	5	14
Antiseptic Ointment	2	3	15	25	7	3	14
Burnshield	0	9	20	18	3	5	14
Deep Freeze Spray	12	11	17	6	3	6	14
Eye Drops	4	10	20	12	5	4	14
Glucogel	6	8	21	13	3	4	14
Hydrogel	6	9	19	12	2	7	14
Rehydrate Packets	1	4	15	19	11	5	14
Muscle Rub	6	9	24	6	4	6	14
Multi-Vitamins	19	13	14	5	0	4	14

Cal-C-Vita	13	15	14	7	0	6	14
Cold&Flu Tablets	8	16	19	6	1	5	14
Med-Lemon	6	10	24	10	1	4	14
Throat Lozenge	6	12	21	10	1	5	14
ACC 200	4	11	26	8	1	5	14
Anti-spasmodic	2	7	21	16	5	4	14
Anti-emetic	5	8	21	14	4	3	14
Anti-diarrhea	2	3	24	16	7	3	14
Antacid	12	13	16	7	1	6	14
Allergex	4	6	23	11	9	2	14
Anti-histamine	2	5	21	15	8	4	14
Paracetamol	6	7	23	13	5	1	14
Compral	13	7	20	4	4	7	14
Diclofenac	7	11	17	11	4	5	14
Ibuprofen/Paracetamol	1	9	16	17	4	8	14

4.6.4 Extra Items Suggested

The last part of the survey included a section where respondents could suggest extra items that should be part of a PFAFK. Figure 4-28 shows the items that were suggested and the frequency with which respondents indicated this. For further analysis of the extra items, only items that were suggested by three or more people were considered.

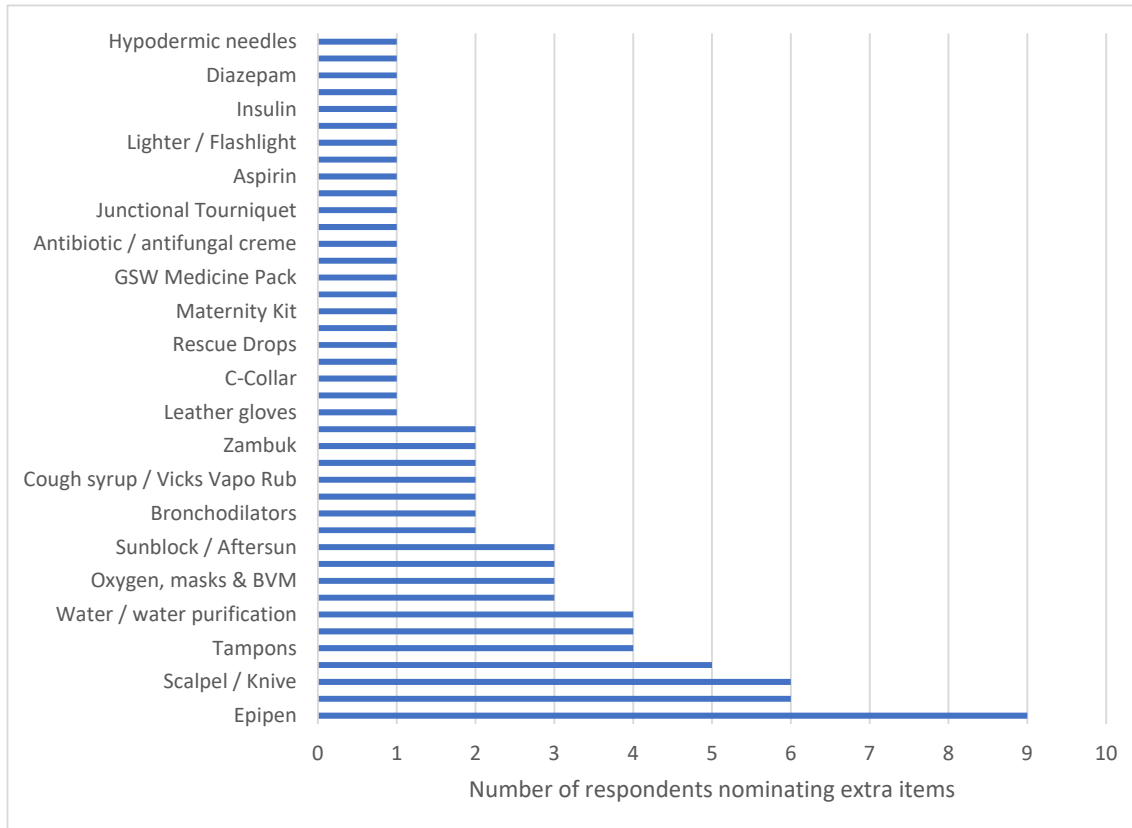


Figure 4-28: Extra items suggested by respondents to be included in a personal first aid field kit

Respondents were asked to indicate the number of items they suggested, which is displayed in Table 4-36. The most common amount is highlighted in light green to identify most recommended quantities as per participants easily. Only respondents that nominated extra items provided information on suggested quantities, importance and usage ranking and even though 56 respondents named extra items, very few items were chosen more than three times and included in the presented results.

Table 4-36: Suggested quantity of extra items for PFAFK

	Suggested quantity of items that should be included in PFAFK					
	1	2 to 3	4 to 6	7 to 10	11 to 20	>20
Wound drops	3	0	0	0	0	0
Tampons	0	1	2	1	0	0
Oxygen, Masks & BVM	3	0	0	0	0	0
EpiPen	8	1	0	0	0	0
IV & accessories	3	0	0	0	0	0
Snake Kit	6	0	0	0	0	0
Wound closure	2	2	0	0	0	0
Scalpel / Knife	3	2	1	0	0	0
Sunblock / Aftersun	3	0	0	0	0	0
Water / Water purification	3	0	0	0	0	2
Hemostatic Agent	2	3	0	0	0	0

Importance ranking for each item is shown in Table 4-37, with the highest ranking indicated in light green. Usage ranking for the extra items is indicated in Table 4-38.

Table 4-37: Importance ranking of extra items for PFAFK

	Not at all important	Slightly important	Moderately important	Very important	Extremely important	No answer
Wound drops	0	1	1	0	0	1
Tampons	0	1	1	0	2	0
Oxygen, Masks & BVM	0	0	0	3	0	0
EpiPen	0	1	2	3	4	0
IV & accessories	0	1	1	1	0	0
Snake Kit	0	0	0	3	3	0
Wound closure	0	1	0	3	0	0
Scalpel / Knife	0	1	2	2	1	0
Sunblock / Aftersun	1	1	0	1	0	0
Water / Water purification	0	0	1	1	1	0
Hemostatic Agent	0	0	0	4	1	0

Table 4-38: Usage ranking of extra items for PFAFK

	Never	Rarely	Sometimes	Often	Always	No answer
Wound drops	0	0	1	1	1	0
Tampons	2	1	1	0	0	0
Oxygen, Masks & BVM	0	0	2	1	0	0
Epipen	0	5	2	1	0	2
IV & accessories	0	0	2	1	0	0
Snake Kit	1	1	3	1	0	0
Wound closure	1	0	2	1	0	0
Scalpel / Knife	0	0	4	1	1	0
Sunblock / Aftersun	0	0	1	2	0	0
Water / Water purification	0	1	0	0	2	0
Hemostatic Agent	0	2	2	1	0	0

CHAPTER 5. DISCUSSION

5.1 Overall impression

Conservation areas in Namibia have increased significantly over the last four decades, from 8.2% in 1975 to 43.9% by the end of 2017. These PAs include national parks, communal conservancies, community forests, tourism concessions, freehold conservancies and nature reserves (MET & NACSO, 2018; NACSO, 2017). About half of all communal land is managed under communal conservancies (MET & NACSO, 2018) which contributes economically to the country by providing a source of income, creating job opportunities and encouraging capacity building for the communities. Most importantly, this model encourages sustainability for wildlife diversity and protection as well as community livelihoods (Hauenstein, Kshatriya, Blanc, Dormann, & Beale, 2019; MET & NACSO, 2018; 't Sass-Rolfes, 2019; Turpie et al., 2010; Potgieter, 2019).

Wildlife crime and poaching are a threat to the above-mentioned biodiversity and increased efforts have been made from the Namibian Government and various other stakeholders to protect it (GRN, 2017c; Nakale, 2017; NBC, 2017; Nyaungwa, 2017; Potgieter, 2019; J.-M. Smith, 2017). Game rangers *“are essentially the wildlife managers and the field force in Africa”* who *“ensure the territorial and biological integrity of the conservation area under his/her management”* (GRAA, n.d.). Game rangers also have a crucial role in the protection and maintenance of Namibia's wildlife diversity. The WWF has conducted Ranger Perception Surveys in Africa and Asia to understand work conditions of rangers better. However, neither Namibia nor Ghana was involved in the African Ranger Perception Survey, only rangers from Cameroon, Central African Republic, Republic of Congo, Gabon, Kenya, Madagascar, Mozambique, South Africa, Tanzania, Uganda, Zambia and Zimbabwe participated with a total of 570 responses received (WWF, 2016). The Asian Ranger perception survey received 530 responses (WWF & RFA, 2016). The surveys looked at overall work conditions and safety threats, but they did not specifically focus on medical emergencies.

Mostly, the impressions of organisations and rangers correspond regarding emergency occurrences in the conservation sector. The most common occurrences of emergencies included soft-tissue injuries and gastrointestinal illnesses, which correlates with similar studies evaluating emergencies in USA national parks (Declerck, Atterton, Seibert, & Cushing, 2013; Young et al., 2018). Typically it would take between one and three hours to reach the nearest hospital which is as an accepted norm (Ouma et al., 2018; Tansley, Schuurman, Amram, & Yanchar, 2015). It is, however concerning that between 10 and 20% of the respondents will reach a hospital only after five hours or more. This places tremendous pressure on rangers that need to provide first aid treatment in the case of an emergency.

Training and first aid equipment are clearly inadequate to deal with medical emergencies. Findings on first aid training were similar to a study conducted in 2015 that evaluated emergency services in Namibia (Iskam, 2015). Though training of rangers was frequently conducted by organisations very few offered first aid training as part of this. Rangers that did receive first aid training often reported that the courses are refreshed every two to three years, which is a good practice. This was not the case in the Ghanaian rangers, who only trained in first aid once if at all. Rangers commonly did not carry FAKs as part of their standard everyday equipment or at least one FAK per patrolling team. Organisations, on the other hand, stated in most responses that FAKs were issued. It is necessary for rangers to have regular first aid courses and carry FAKs with them to be adequately prepared for medical emergencies in the field.

5.2 Demographic Information

Overall, the surveys in this study were answered by a wide range of conservation-related organisations and rangers from nearly all regions of Namibia. Although Non-Namibian responses were limited to Ghana, responses were useful to compare. All age groups from 20-years upwards were covered adequately to represent a wide range of workplace experience. Respondents, however, were mostly male. This is consistent with the findings of both of the previous Ranger Perception Surveys which showed that 97% of the Asian and 81% of the African rangers were male, indicating that this line of work is vastly male-dominated (Nuwer, 2019; WWF, 2016; WWF & RFA, 2016). The rangers from Ghana were only male, also confirming that this is a male-dominated profession in that country, as in many other African countries. This mainly stems from a cultural belief that the man assumes the role of the protector (Nuwer, 2019).

The Namibian responses to the surveys, on the other hand, showed a higher number of female rangers (Figure 4-2) as compared to the responses from the Ranger Perception Surveys. This can indicate that in Namibia, females are encouraged to become, are willing to be rangers or both. In other parts of the world, it is common to have female rangers serving in protecting the wildlife (Nuwer, 2019). There are several all-female units like the Black Mamba Guards in South Africa and the Akashinga APU in Zimbabwe that have demonstrated that females can be effective and efficient in preventing and dealing with wildlife crime in Africa, often in less violent ways than their male counterparts (Goyanes, 2017; Nuwer, 2019; L. N. Smith, 2019). The World Ranger Congress in Nepal in November 2019 also emphasised the importance and inclusion of female rangers globally (IRF, 2019).

Results from this study (Figure 4-4) are comparable to the African Ranger Perception survey where 29% of rangers reported to be in service for six to ten years, followed by 24% between 10 to 20 years and 20% between two and five years (WWF, 2016). A study looking at staff experience of rangers

employed by the DPWM in MET in 2004 revealed that of the 146 staff members surveyed 30% had six to 10 years' experience, 27% were employed for longer than 10 years and the remaining participants were for less than five years (22%) or between 11 and 15 years (21%) in service (Booth et al., 2004). There is a shift in experience compared to the 2004 results as the current trend in Namibia shows that 51% of the Namibian rangers are in service less than five years, which is more than double of the previous study, which is followed by 21% of the respondents being in service for five to ten years. There is a significant decrease in rangers that have more than ten years' experience, with only 26% being in service for longer than ten years as opposed to the 48% from the 2004 study (Booth et al., 2004; MET, 2010). This may be partially attributable to rangers either retiring or moving out of active fieldwork, as rangers that had served for more than ten years in 2004 had joined MET before 1994 and would now have been active for more than 35 years. Of the rangers that currently have served more than 20 years, 80% (4 out of 5) are above 50-years-old. It is a positive development that young rangers are entering the field, with 83.3% (10 out of 12) of the respondents in the age group between 20 and 29-years-old and 60% (9 out of 15) of 30 to 39-year-old having less than five years' experience. This clearly shows an interest and development in the conservation efforts of Namibia.

5.2.1 Anti-poaching Activities

A significant part of a game rangers' duties includes anti-poaching activities, which can incorporate but are not limited to patrolling an area, ensuring safety for wildlife and possibly engaging poachers when intercepting or attempting to arrest them (GRAA, n.d.; GRN, 2017c; MET, 2010). The main focus for anti-poaching activities is to prevent wildlife crime from taking place but also apprehending poachers (MET, 2010). Namibia has placed great emphasis on increasing anti-poaching efforts in the last years (ESAAMLG, 2016; MET, n.d., 2010). However, there are still challenges with limited resources, infrastructure and equipment to effectively combat wildlife crime (GRN, 2017b). Collaboration between MET, CGG, the Protected Resource Division of NamPol, the NDF and various other stakeholders, including counterparts from neighbouring countries like Botswana and Zambia have shown to be effective in reducing poaching incidents in the country, particularly in the north-eastern and north-western regions (ESAAMLG, 2016; GRN, 2017c; MET & NACSO, 2018; Potgieter, 2019).

Both of the groups surveyed in this study confirm that anti-poaching efforts are emphasised amongst the game rangers; 86.7% of the organisational and 88.6% of the rangers' surveys confirmed that anti-poaching activities form part of their duties. The four organisations in Namibia that indicated that anti-poaching activities do not form part of their rangers' duties were from the private sector. Only nine Namibian rangers reported that they are not involved in anti-poaching activities. The occupational risks that game rangers face, particularly during anti-poaching activities, can be life-threatening (Hardiman, 2019). In many parts of Africa anti-poaching activities have become a form of warfare with poaching

gangs, armed militia or terrorist groups which have become sophisticated and better resourced (Baines, 2019; Goyanes, 2017; Hardiman, 2019; Losh, 2019; Nuwer, 2019; L. N. Smith, 2019; TGLF et al., 2017)

In Namibia APUs characteristically have less than 20 members per unit, with most units being one to five members. Larger units or more rangers at a station can ensure better coverage of an area and more safety for the team. However, resource constraints (GRN, 2017b; MET, 2010) may be a contributing factor in Namibia to having small units. During field patrols, the average number of members in a team is typically three to five members (Figure 4-9) as was indicated by most respondents from all groups. This is concurrent with information that could be attained from various sources (Losh, 2019; van Rooyen, 2019). Rarely, teams are bigger than five members. MET, however, has stated that most of their patrolling teams contain five to seven members (MET, 2010). In Namibia, some teams have only one to two members when patrolling. Some CGG have been specially trained to operate in teams of two when conducting patrols (Community Contributor, 2018). Rangers that responded from the communal conservancies reported that half operate in teams of three to five members, the other half operate with five to ten members. It is reassuring that in the communal conservancies CGG are not placed at risk by patrolling in small teams. The organisations and rangers that indicated their patrolling teams consist of one to two members originate from game or hunting farms, private game reserves, are related to conservation/environment or from a district watch.

The size of the patrolled area was commonly 5 000 to 10 000 ha within Namibia, but some areas reached over 50 000 ha. Most of the Namibian national parks are more than 50 000 ha as well, with four of the parks exceeding even 100 000 ha (Turpie et al., 2010). Hence, large areas need to be covered during patrols which can pose additional challenges as patrolling teams cannot be everywhere at the same time and covering these areas requires enough human resources as well as infrastructure. Considering the size of the areas that are being patrolled, it is concerning that most patrols are conducted by foot (Table 4-5, Table 4-11 and Table 4-12), which limits the distance that can be covered in a day. It, however, does provide the advantage of conducting thorough inspections of the area, being able to inspect tracts and also move along paths that are not accessible via vehicle. The second most common mode for conducting patrols is using a vehicle, and in Ghana, quadbikes are also frequently used. In Namibia, patrols are additionally conducted on quadbikes, motorbikes or even bicycles and horseback or donkey. The use of planes or observational posts / joint patrols is limited. In some areas, like in the north-east regions, where rivers line the conservation areas boats may also be used for patrols (MET, 2010), even though none of the respondents indicated this as one of their modes of patrol.

In some conservancies, electrical bicycles (e-bikes) have been successfully introduced as a mode of transport. These are solar-powered, ruggedly built, easily maintainable, silent and relatively inexpensive, they are thus well designed for the Namibian rural settings (van Rooyen, 2019) and suitable for conducting patrols. The use of e-bikes has enabled the CGG to cover more distance in a day and being able to conduct patrols or reaching crime scenes more quickly, without the physical exhaustion caused by cycling through the terrain (van Rooyen, 2019). Considering budget constraints, this may be a sustainable solution to ease patrolling for rangers and making them more effective.

5.3 Access to Healthcare Facilities

Remoteness in a medical context can be defined as: *“a location that is geographically, professionally and personally isolating with limited sophistication of medical and logistical support, limited access to peers and/or in extreme climatic, political or cross-cultural environments”* (Greiner, 2016, p. 334). Namibia is a sparsely populated country (NSA, 2013, 2016; The Namibia MoHSS & ICF International, 2014). Regional populations vary greatly with two-thirds of the population being located in the north of Namibia and less than 10% in the south (MoHSS, 2010; The Namibia MoHSS & ICF International, 2014). A little over half of the population live in rural areas with close to 50% living in the urban areas, which increased from 28% over the last two and a half decades (NSA, 2016; The Namibia MoHSS & ICF International, 2014). This provides challenges in terms of providing medical access to rural communities, and game rangers are not excluded from these. Barriers to providing health care or the population being able to access healthcare in remote areas can include distances to medical facilities, adequate medical staffing and infrastructure, road conditions and emergency medical service infrastructure (Greiner, 2016; Iskam, 2015).

5.3.1 Types of Healthcare facilities

For most game rangers, the nearest healthcare facility is either a doctor's office or clinic. Within Namibia, 40.8% of the rangers indicated that a hospital is the closest facility and 2% were unsure of what is nearest. From the Namibian organisational responses, 26.7% stated that a hospital was the closest facility. Doctor offices, clinics and healthcare centres may not be adequately equipped to deal with an emergency should a ranger be severely injured or become ill in the field. It would, however, be able to provide the first contact point with a medical facility in most cases and treatment can be started.

As can be seen in Figure 5-1 the most health facilities are located where population density is highest (Oshana, Omusati, Ohangwena regions specifically) in Namibia (NSA, 2013, 2016) and along the national roads, ensuring ease of access. In most areas where the national parks, communal and private conservancies are located, there are only a few health facilities, mainly clinics. There are also only few health centres and district hospitals in those regions. Most of these regions are also the least densely

populated, specifically the Kunene and Otjozondjupa regions (NSA, 2013, 2016). All of these factors can delay access to medical care in the case of an emergency. Once a medical facility is reached the treatment received may not be sufficient in a life-threatening situation.

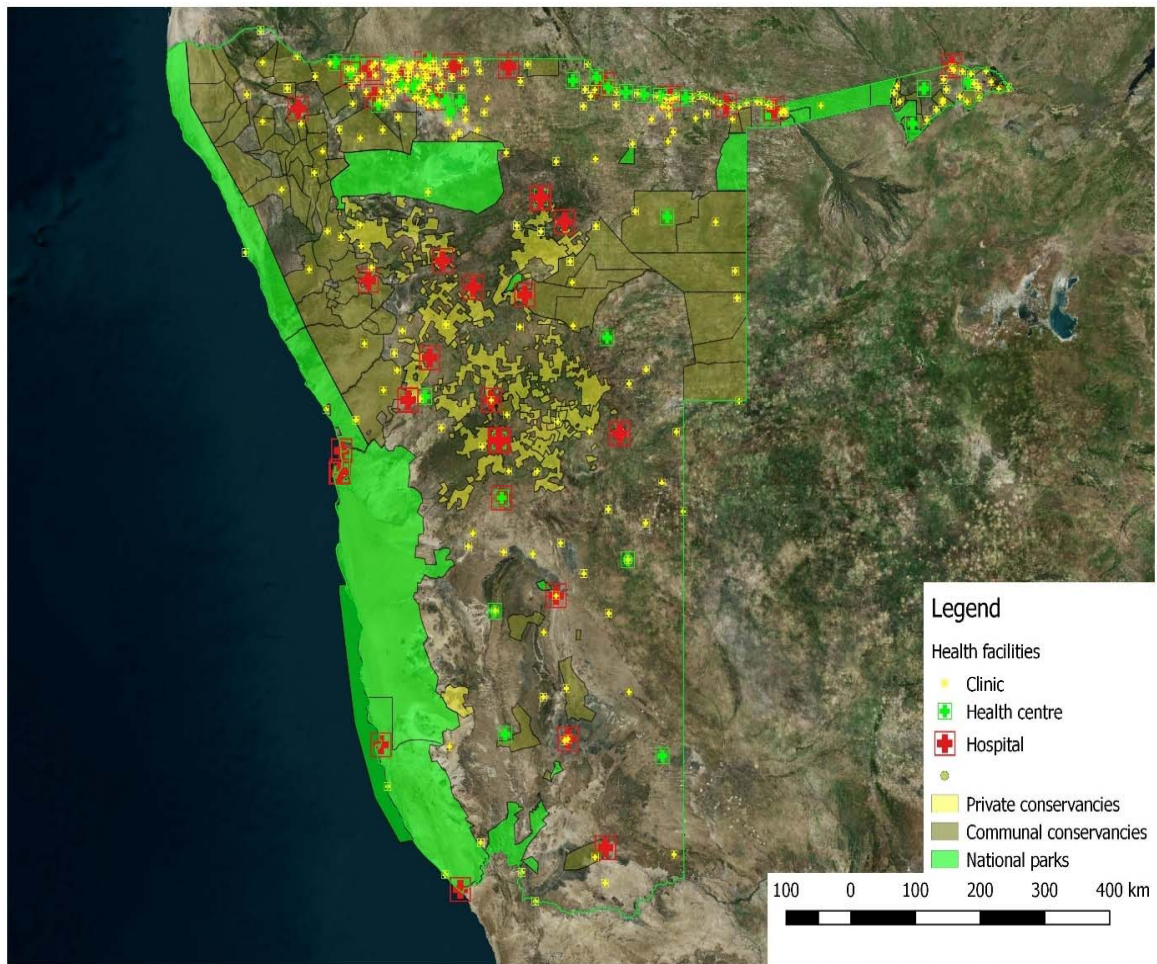


Figure 5-1: Location of health facilities in relation to national parks, communal and private conservancies.

A study conducted in 2013 established that 88% out of 410 analysed health facilities were not capable of providing even basic emergency care to the population and were not accessible for 24 hours a day (Tansley et al., 2015). These results leave a majority of the Namibian population without adequate medical care during critical situations, especially in trauma-related instances. However, Namibia is not alone as six other Sub-Saharan African countries were also found to have a similar lack of facilities to provide emergency care in most parts of the countries (Hsia, Mbembati, MacFarlane, & Kruk, 2012; Tansley et al., 2015). Obermeyer et al. (2015) furthermore found that emergency departments in low- and middle-income countries (LMICs), such as Namibia mostly do not have specially trained physician in emergency care. Hence, even if the facilities are available adequate care may still not be provided.

Definitive care for a severe emergency in rangers, be it medical or injury-related, would probably require access to a district hospital at the very least. It may even be warranted that an intermediate hospital may be required, depending on the situation, which is even further away. Reaching an intermediate hospital would mean the patient would need to get to Windhoek, Oshakati or Rundu, depending on their location.

5.3.2 Distances to Healthcare Facilities

Not only the type of medical facility may pose a challenge in the rural areas, but also the distance to these facilities. About 40% of the Namibian population live more than five km away from a health facility, with 21% needing to travel more than 10 km to the nearest facility (MoHSS, 2010; WHO, 2015; WHO Regional Office for Africa, 2010). The nearest hospital may be more than 300 km away (WHO, 2015; WHO Regional Office for Africa, 2010). In most of the northern Namibian regions, rural populations are more than 50%, with regions like Kavango West, Oshana, Oshana and Oshana having a rural population of more than 80% (NSA, 2013, 2016). Combining the fact that, for example, in the Kunene region 68% of the population live in rural areas, with a population density of 0.8 km² it becomes evident that distances between places are vast (Table 5-1). Distances for this study were estimated from the operational base of each conservation area, which represents the best-case scenario. However, most emergencies are expected to occur in the field, and since rangers are mostly on foot, distances to healthcare facilities are larger and the time taken to get to them there are likely far longer.

Table 5-1: Percentage of the rural population in relation to population density per region in Namibia

Region of Namibia	% of the rural population	Population density per km ²
Erongo	8	2.9
Hardap	28	0.8
Karas	39	0.5
Kavango East	43	6.2
Kavango West	88	3.5
Khomas	5	11.3
Kunene	68	0.8
Oshana	94	23.9
Oshana	58	0.9
Oshana	95	9.4
Oshana	54	21.9
Oshikoto	84	5.0
Otjozondjupa	34	1.5
Zambezi	71	6.7

Note. Table adapted from "Namibia Inter-censal Demographic Survey 2016 Report" by NSA, 2016.

This study confirms that medical facilities are almost always more than 10 km away, particularly in the Erongo, Hardap, Omaheke, Kavango, Khomas, Oshikoto and Zambezi regions. The next most common distance to a medical facility is 51 to 100 km, specifically in the Erongo, Karas, Kunene and Otjozondjupa regions. Rangers that are within 10 km from a medical facility are generally in the Omaheke, Oshona, Khomas and Zambezi region, which is relatable as most of these regions have large population densities (Table 5-1) and many medical facilities in the area (Figure 5-1). Even though the Omaheke region is sparsely populated and has few facilities available, it was mentioned from the organisation and the two rangers that distance to medical facilities is not more than 50 km. Some rangers and organisations in the Karas, Khomas, Kunene, Otjozondjupa and Erongo regions are between 101 and 300 km from the nearest medical facility. These long distances result in delays to medical treatment in an emergency and patients would need to be cared for over an extended period prior to reaching a medical facility.

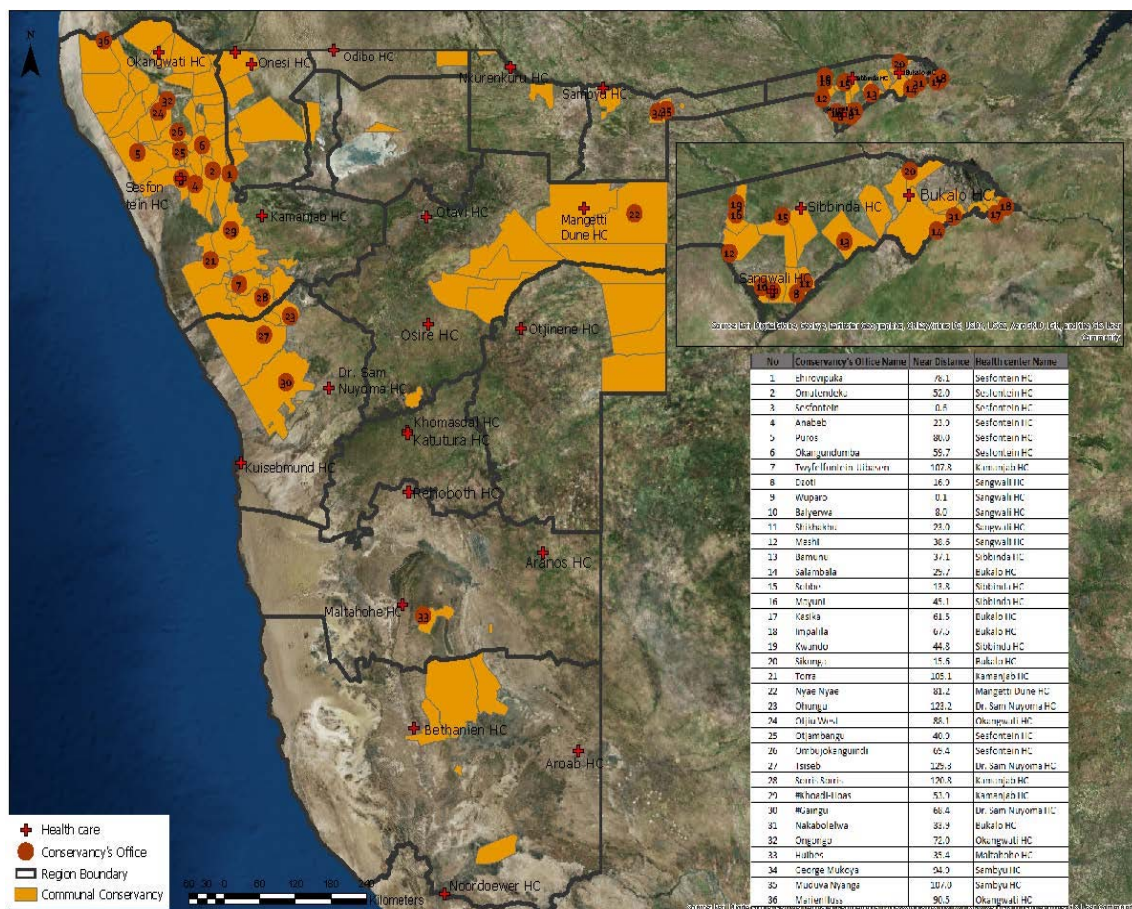


Figure 5-2: Location communal conservancy offices in relation to health centres

For CGG, it is assumed that the communal conservancy office, where available, serves as a base station for their activities. Out of the 86 conservancies, only 36 have offices (NACSO, 2017), which have been evaluated with regards to distance to health centres (Figure 5-2) and clinics (Figure 5-3). Of the offices

55.6% are within 10 km from a clinic or health centre, 36.1% are within 11 to 50 km and 8.3% between 51 and 100 km. Since rangers are mostly on patrol in the field, these distances represent the best-case scenario. Furthermore, digitised road networks would have been a more accurate measurement (Tansley et al., 2015) to determine the distances from the conservancy offices to the medical facilities as roads never follow a straight-line distance. Hence, in the case of an emergency, the rangers are likely to be even further away from the medical facilities as determined in available maps. For the remaining conservancies, it could not be determined how far rangers would need to travel to reach a primary health facility, but it can be seen from Figures 5-2 and 5-3 that large parts of the conservancies do not even have clinics or health centres in their proximity.

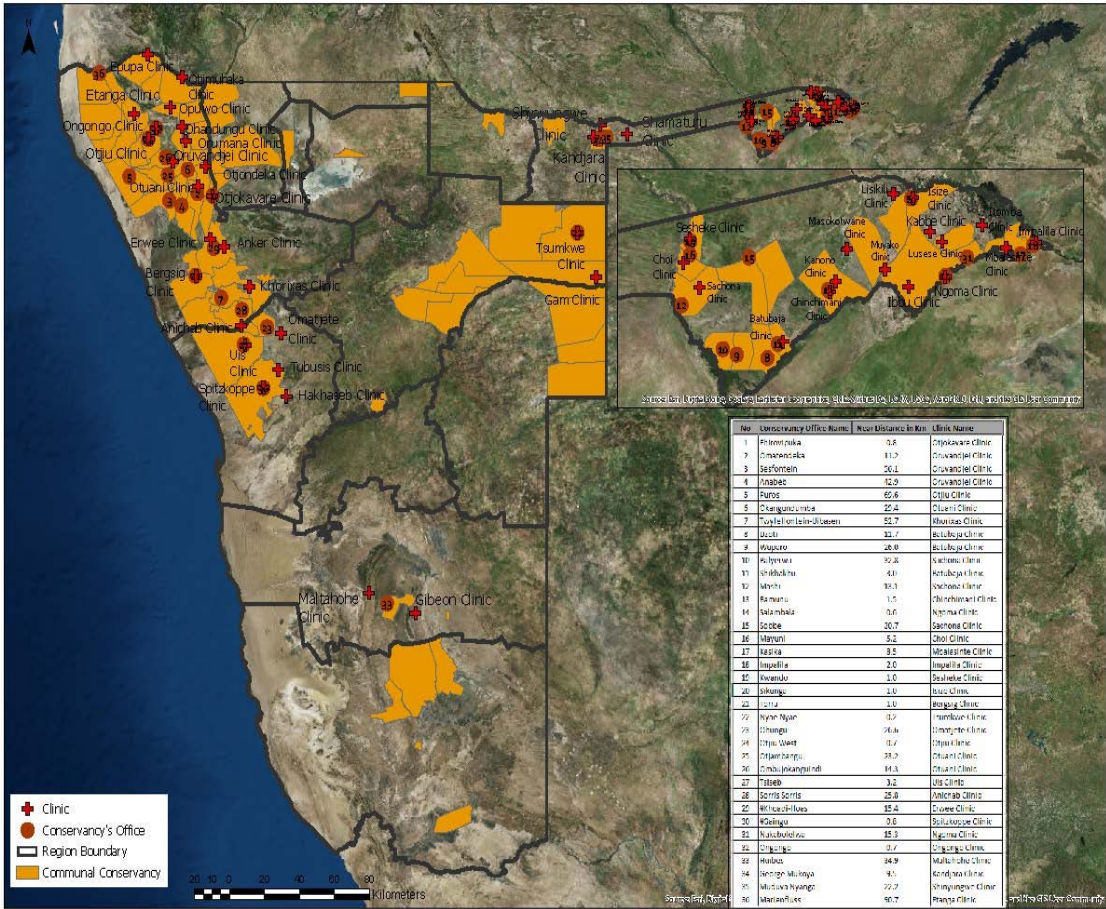


Figure 5-3: Location of communal conservancy offices in relation to clinics

Tansley et al. (2015) found that more than 50% of the Namibian population does not have access to a 24-hour emergency healthcare facility within 50 km. In the Haiti population, in comparison, only 24.9% do not have access to a 24-hour emergency facility (Tansley et al., 2015). Tertiary facilities that can provide adequate emergency medical care have more than 50 inpatient beds and can perform surgeries around the clock (Tansley et al., 2015), are mainly the three intermediate hospitals and the national referral hospital in Namibia. Only 27.7% of the Namibian population, whereas nearly double

of the Haiti population have access to a tertiary facility within a 50km radius (Tansley et al., 2015). The majority of the tertiary facilities are located in urban areas, leaving the rural populations disadvantaged and at an elevated risk of poorer outcome following severe trauma (Tansley et al., 2015).

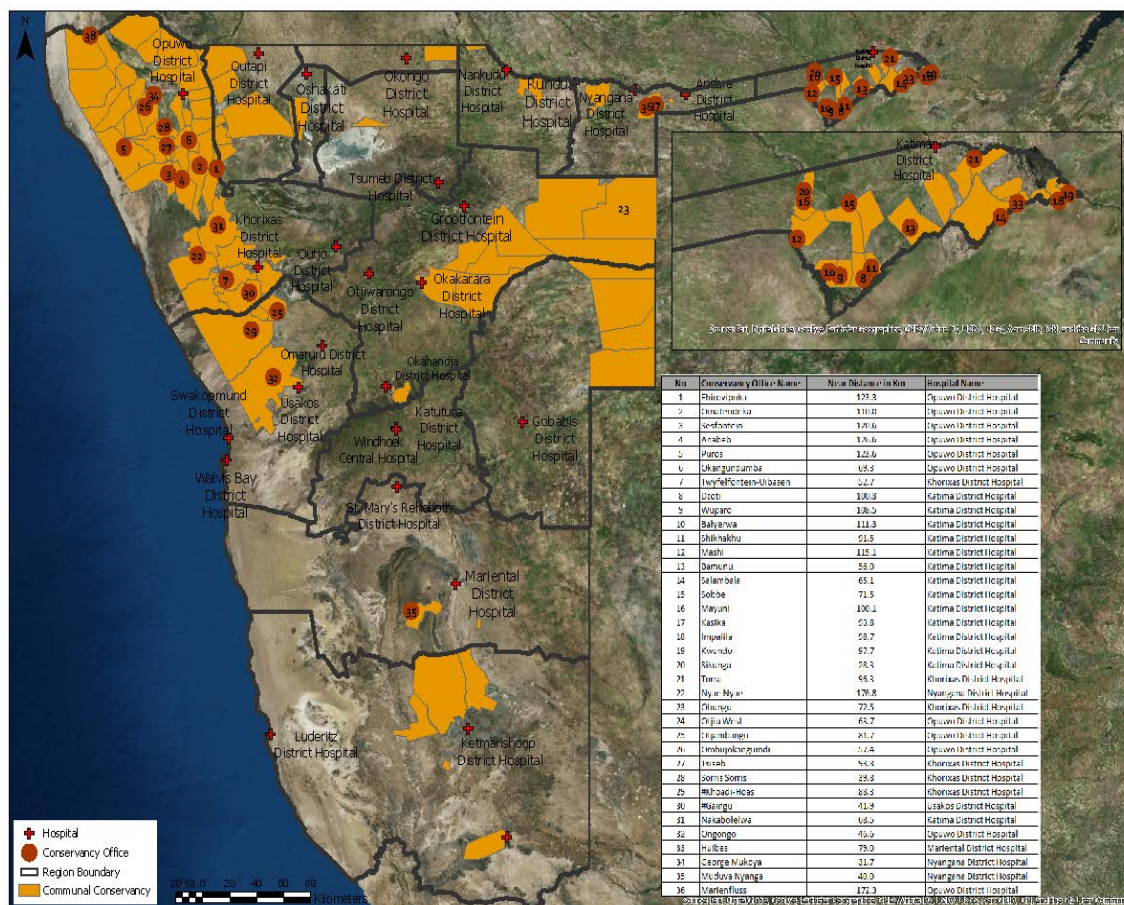


Figure 5-4: Location of communal conservancy offices in relation to district hospitals

As the nearest healthcare facility is likely not the best-suited facility, the distance to the nearest hospital was also evaluated in the study to determine how far rangers would need to travel to reach more definitive medical care. Rangers that have the most distance to travel to a hospital are in the Hardap, Khomas, Kunene, Omaheke, Otjozondjupa, and Zambezi regions. Most noticeably rangers of the Kunene, Karas and Hardap have between 201 and 500 km distance to the nearest hospital, which makes these regions the most remote. Others to note are the Omaheke and Otjozondjupa regions where more than half of the rangers have 101 to 200 km to the nearest hospital. Organisations in the Erongo, Khomas, Kunene and Zambezi region are more than 100 km away from a hospital. Once again, the Kunene region has the highest distance with all organisations responding from that region being between 101 and 500 km away. Furthermore, 61.8% of the organisations from the Khomas region have the same distance to a hospital. One organisation that operates throughout Namibia has an average

of 501 to 750 km to the nearest Hospital. Taking the conservancy offices into consideration 58.3% are 51 to 100 km away from the district hospitals, only 13.9% are within 50 km from a hospital and 27.8% are 101 to 200 km away (Figure 5-4). It can be observed that there are very few district hospitals within the range of rangers and hefty distances will need to be covered in order to reach more definitive care.

5.3.3 Time to Healthcare Facilities

In the context of a medical emergency, it is aimed to have the patient reaching a hospital within one hour after the emergency occurring, this is known as the golden hour and it is commonly agreed upon internationally that this ensures the best survival chances for a patient (Iskam, 2015; Tansley et al., 2015). Remote areas have increased rates of morbidity and mortality, which can be linked to delays between the time of the incident and the initiation of first medical care (Greiner, 2016; Klein, Lefering, Jungbluth, Lendemans, & Hussmann, 2019). It is thus not only important to evaluate how long it would take to reach a medical facility, but also to ensure that treatment can be initiated early by first responders. This will be evaluated as part of the training section later in this document.

Increased length of time to reach a medical facility is already challenging by the physical distance from site to the facility, making the achievement of the golden hour impossible (Greiner, 2016; Iskam, 2015). However, this is further complicated by poor access from the sites, including the terrain that needs to be covered, road conditions along the route and even weather conditions play a role (Greiner, 2016). In Namibia, distances are often challenging due to bad road conditions (Iskam, 2015), especially in the remote areas where small gravel roads are the norm. As 86% of the roads in Namibia are gravel roads travel times take longer as on tarred roads and need to be considered (Tansley et al., 2015). During the rainy season from November to April these road conditions can be worsened even more through erosion of the roads from the rain. Furthermore, flash floods in dry rivers can provide challenges in getting to medical facilities.

Considering the golden hour (Iskam, 2015; Tansley et al., 2015), a patient should be at a tertiary hospital within one hour after the incident occurred. Americans and Canadians mostly achieve these targets (Tansley et al., 2015). In Namibia, on the other hand, 72.3% of the population would not reach a tertiary medical facility within that time frame, neither would most of the population in Haiti (Tansley et al., 2015). Only half of the Namibian population would reach a 24-hour healthcare facility within this time (Tansley et al., 2015). The African Federation of Emergency Medicine has proposed that at least 80% of any country's population should have a maximum of two hours travel time to access emergency services (Ouma et al., 2018). In Namibia, 76.8% of the population has access to healthcare within the specified two hours (Ouma et al., 2018), which is just outside of the recommended percentage. In Africa, about 29% of the population live more than two hours away from the nearest medical facility

(Ouma et al., 2018) and Namibia shows similar percentages. However, the level of care provided in the healthcare facilities was not analysed as part of the study and thus, the results should be absorbed with caution. Some countries like Nigeria, Kenya and South Africa have 90% of their population living within the recommended standards (Ouma et al., 2018). On the other end of the spectrum, seven countries have less than 50% of their population living within two hours from a medical facility (Ouma et al., 2018).

Overall in some cases, the golden hour may be achieved following an emergency incident, considering the time it will take rangers to reach a primary medical facility (Figure 4-10Figure 4-12). Most often, it will take one to five hours to get to a medical facility which means that the patient will need to be cared for during this time. In the Kunene region, the time taken to reach any medical facility is more than five hours, this is likely as a result of the poor road infrastructure, the terrain that rangers operate in as well as a lack of medical facilities in that area. Rangers will need to be prepared to look after a patient for more than one hour at best.

5.3.4 Mode of Transport to Healthcare Facilities

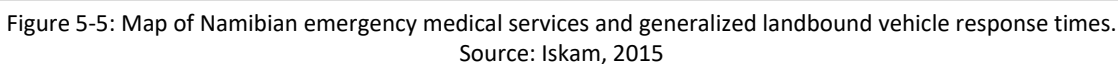
Often developing countries do not have well established emergency medical system (Greiner, 2016; Tansley et al., 2015). In Namibia, emergency medical services only started developing in 1993 (Iskam, 2015), mainly with the development of private ambulance services. These are, however often located in the urban areas (Iskam, 2015). The MoHSS has the most distribution of ambulances throughout Namibia, but no coordinated system is currently in place to ensure effective services to the rural population during emergencies (MoHSS, 2010). Most of the MoHSS ambulances are manned only by drivers and nurses, rarely is there a Basic Life Support Provider (Iskam, 2015; MoHSS, 2010) which does not provide adequate capacity to serve the communities. The ability to transport patients is also severely hampered by unserviceable or old vehicles, with down rates of ambulances being as high as 90% in some regions and nationally an overall of 42% (Iskam, 2015; WHO Regional Office for Africa, 2010). Figure 5-5 outlines the location of emergency vehicles in Namibia, with the white blocks representing state vehicles. As can be seen, these are located throughout Namibia, but as previously stated may not be functional or adequately staffed. The colour circles around the vehicle locations represent response times to the areas, where green represents up to one hour and the orange shading and darker indicates response times longer than two hours. It can be observed that various areas will take more than two hours to get to, especially in the Kunene and some parts of the Zambezi region.

A study published in 2015 found that 22% of the respondents would transport a patient themselves rather than activating an ambulance in Namibia (Iskam, 2015). Main reasons provided for this was the remoteness of the incident and lack of finances to pay the ambulances (Iskam, 2015). Rural populations

often need to manage emergencies themselves or do not perceive them as urgent enough to warrant an ambulance or a doctor visit (Iskam, 2015). As a result, the rural population would mostly only call an ambulance when the patient presents as critical, and they cannot manage the situation, for example after a leopard attack with massive bleeding from the neck, as opposed to the urban population who activate EMS for headaches already (Iskam, 2015). Additionally, some rural populations rely more on traditional medicine and are not informed about emergencies and the treatment thereof (Iskam, 2015). Further delays in activating EMS may be caused by lack of cellphone coverage (especially in rural areas), callers not knowing the emergency numbers or the nearest service not having a dedicated number to call (Iskam, 2015).

The remoteness of the areas that game rangers operate in may be one of the main reasons why only a few of the participants would use an ambulance or air evacuation if an emergency would occur (Table 4-17 and Table 4-22). It just does not seem a realistic possibility in their experience. In the case of an emergency, respondents confirmed that vehicles are readily available to provide transport to the rangers. Vehicles provided by the employer to transport a patient should an emergency occur cuts down on times to reach a medical facility significantly. Additionally, rangers would provide their transport. The study conducted by Iskam (2015) suggested that people often use own transport due to a lack of ambulance services or functioning ambulances in the area, service providers informing them that the distance is too far or that services often first want to secure the financial aspect of responding to an incident. As this has been prevalent for a long time, the rural areas rely more on private transport to get to a medical facility (Iskam, 2015), which can be confirmed by the results received from both the ranger and organisational data.

Some organisations also indicated that transport is difficult to find and that a donkey or oxen cart will be used to transport a patient to a medical facility, especially in rural areas. This is likely more prevalent than what the surveys indicated. Having transport difficulties or using oxen/donkey carts will delay reaching a medical facility severely as this is a slow mode of transport. Some remote areas may require a combination of various modes of transport and rangers should use what they have available and is practical for the situation. A study conducted in a national park in the United States of America (USA) showed that of the patients that were transported various methods were used including ambulances, helicopters, available vehicles and horseback or a combination of these modes (J. Johnson et al., 1991). A more recent study in the same national park showed that 46% of the patients were transported by EMS, which is a significant increase from the previous study (Young et al., 2018). There were also 18% of the patients that used their own transport to hospital following the treatment from rangers (Young et al., 2018).



5.4 Emergencies

Remote and wilderness areas expose people to injuries and illnesses that can occur in the field, often far away from any medical assistance (Heggie & Heggie, 2004; J. Johnson et al., 1991). Game rangers can face many perils while on duty, ranging from extreme weather and temperature conditions, altercations with poachers and communities and danger from the animals they protect, but also dehydration and diseases can become risk factors while on duty (Hardiman, 2019; Neme, 2014; Springer & Verbillion, 2017). Game rangers are often on patrols in remote areas over an extended period. During this time, they have only minimal equipment and operate only in small teams (Losh, 2019; MET, 2010; van Rooyen, 2019). Few studies could be found evaluating rural or wilderness prehospital care (J. Johnson et al., 1991), let alone injuries and illnesses that game rangers face while on duty. There are several studies that were conducted to establish injury and illness pattern in park visitors in the USA, which serve as an indication of emergencies occurring in remote areas (Ela, 2004; Heggie & Heggie, 2004; J. Johnson et al., 1991; Young et al., 2018). Life-threatening encounters and deaths of rangers are concerning and have been documented over the years (IRF & TGLF, 2019a; WWF, 2016; WWF & RFA, 2016) and were analysed in conjunction with the responses from this study. The data of this study, as well as the IRF statistics, indicate death on duty to be quite likely.

5.4.1 Injuries

The high frequency of injuries frequently found in this study supports a study by the Game Ranger Association of Africa (GRAA, 2016) due to risks associated with their duties and area of operation. Studies conducted in NPS in the USA have shown that in remote national parks injuries are prevalent, with lower extremity injuries being the most frequently occurring throughout all studies (Ela, 2004; Heggie & Heggie, 2004; J. Johnson et al., 1991; Young et al., 2018). These studies did not evaluate injuries to rangers, but visitors to the parks. As no studies have been conducted in injuries that rangers experience the above-mentioned studies give an indication of commonly occurring injuries in remote areas, which rangers can also be exposed to. Additionally, game rangers are facing more hostile and inhospitable environments than park visitors, which expose them to possible injuries even more.

The findings (Figure 4-15) of this study correlate with finding from the NPS in that cuts, abrasions, blisters, scrapes and bruises were commonly found, but also muscle strains and sprains or sunburns were frequently reported (Ela, 2004; Heggie & Heggie, 2004; J. Johnson et al., 1991; Welch, 1997; Young et al., 2018). As rangers conduct patrols mainly on foot over rough terrain, walking long distances in the heat, strains and sprains, as well as sunburns, can occur frequently. Most of these wounds appear minor, but there are some that can rapidly become life-threatening if not treated correctly (Eastridge et al., 2012). Lacerations and puncture wounds, for example, can cause profound haemorrhage or chest injuries. Exsanguination has often been shown as a major cause of both civilian

and military mortalities within one to five minutes after occurring, with rapid action this is often preventable (Chang et al., 2017; FMTBCP, 2010; Springer & Verbillion, 2017).

Skeletal injuries are the next most common injury that occurred, including various fractures, dislocations or knee injuries. In the NPS studies, fractures and extremity trauma also contributed to a significant portion of the injuries (Ela, 2004; Heggie & Heggie, 2004; J. Johnson et al., 1991; Young et al., 2018). Head injuries were also observed by a previous study, showing 16% of the patients had head trauma (J. Johnson et al., 1991). Once again there is a correlation between the study of J. Johnson et al., (1991) and this study as central nervous system injuries, including head and neck injuries as well as a disk lesion have been reported. In a tactical environment, as could occur if poachers are engaged, chest, head and neck injuries could be common occurrences and cause for fatalities (Springer & Verbillion, 2017). In most severe cases haemorrhage control, simple airway management and rapid evacuation should be prioritized in such a situation (Springer & Verbillion, 2017).

5.4.2 Illnesses

Rangers are not only at risk for injuries, but illnesses may also be a concern. The studies in the NPS showed that medical patients also needed attending. Of these allergic reactions, dehydration, heat strokes, headaches and migraines, insect stings, dizziness and respiratory problems were most common (Anderson, DeClerck, Neessen, & Cushing, 2013; Declerck et al., 2013; Heggie & Heggie, 2004; J. Johnson et al., 1991; Welch, 1997). There are similar results seen in this study (Figure 4-16). Another aspect that need to be taken into consideration are the psychological challenges of the work rangers do: seeing dead, slaughtered and tortured animals as well as seeing colleagues and friends being tortured or killed (Lang, 2017; Neme, 2014; UNESCO, 2018; Winter, 2017) can be a psychological burden on rangers. The South African National Parks thus encourage their rangers to consult a psychologist after each encounter with poachers (Neme, 2014). This is a practice that should be considered and encouraged for all game rangers.

5.4.3 Life-threatening Encounters and Deaths

Rangers in Africa and Asia are often faced with life-threatening encounters. About two-thirds of Namibian rangers and three-quarter of Ghanaian rangers have faced a life-threatening situation already during their career. The ranger perception surveys reported similar results, where 82% of the rangers in Africa and 63% of the Asian rangers have also had life-threatening encounters (WWF, 2016; WWF & RFA, 2016). Rangers in Ghana have faced life-threatening encounters more often than their Namibian counterparts. These results can also be related to deaths that occur in the various regions of the continent, where 26.4% of the 212 African ranger deaths were in western Africa and 18.9% in southern Africa, reported over the last five years (IRF & TGLF, 2015, 2016, 2017, 2018, 2019b). Given

the above rangers in western Africa face more dangers, but southern African rangers also are at risks with more than 50% having encountered life-threatening situations.

The most common cause of life-threatening encounter is through wildlife, followed by being threatened by poachers, attacked by poachers and threatened by communities (Figure 4-17), which was shown in both the African and Asian Ranger Perception surveys as well (WWF, 2016; WWF & RFA, 2016). In Ghana, a significantly higher number of rangers and organisations have reported deaths of rangers, compared to the Namibian responses.

Central Africa, where militia and rebel groups roam and control the national parks (Global Conservation, 2016; Lang, 2017; Neme, 2014), has the highest ranger fatalities over the last five years (IRF & TGLF, 2015, 2016, 2017, 2018, 2019b). Furthermore, of the ranger fatalities, 26.4% are from the western, 23.1% from the eastern and 18.9% from the southern African regions. The least fatalities have been reported from northern Africa, with only one ranger being killed in that region (IRF & TGLF, 2015, 2016, 2017, 2018, 2019b).

Gunshot wounds were found to be the most common cause of death according to this study (Figure 4-18), mainly due to poacher interactions. Most ranger fatalities in Namibia reported by rangers were caused by drowning, primarily as a result of flash floods, but also trampling by animals and AMIs have occurred. One report was given that the ranger died following an AMI due to improper treatment received. The studies from the NPS have also found that drowning is a noteworthy cause of fatalities (Declerck et al., 2013; Ela, 2004; J. Johnson et al., 1991). Additionally, cardiovascular problems and blunt trauma have been causes of fatalities in the parks (Declerck et al., 2013; Ela, 2004; J. Johnson et al., 1991).

Analysing African ranger fatalities it can be determined that over the last five years nearly 60% were killed either by poachers, through gunshot wounds or by homicide, implicating that rangers experience a high rate of violence. In central, eastern and western Africa, a high percentage of rangers are killed by poachers, through homicide and gunshot wounds (Figure 5-6). The one fatality in north Africa was caused by homicide as well. In southern Africa, the most common causes of death are weather-related or caused by wildlife encounters. Weather-related deaths were mainly drowning, whereas deaths from wildlife encounters ensued after attacks by rhino, elephant, buffalo, hippopotamus and lion (IRF & TGLF, 2015, 2016, 2017, 2018, 2019b). Furthermore, 25% of rangers' fatalities in southern Africa were by poachers or gunshot wounds. Ranger fatalities increased annually, starting with 17 African rangers that were killed in 2015 and spiking at 62 rangers that were killed in 2018. This could possibly be due to increased reporting occurring to the IRF or increased anti-poaching activities leading to more conflict

in conservation. In 2019 a decrease in ranger fatalities can be noted, with 42 rangers having died that year. Four ranger fatalities have been reported to the IRF from Namibia in the last five years.

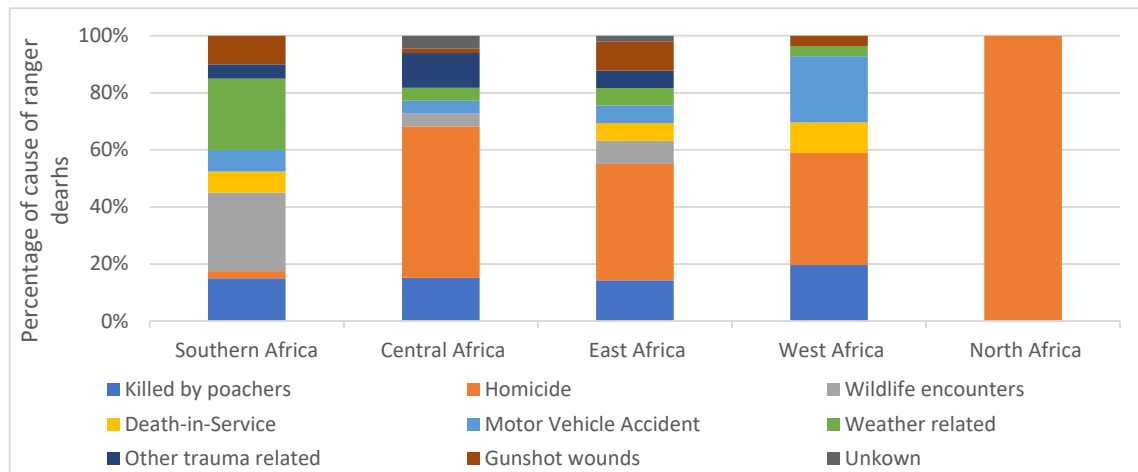


Figure 5-6: Percentage of cause of death per African Region. Adapted from IRF & TGLF, 2015, 2016, 2017b, 2018b, 2019b

It becomes clear by this that rangers are often faced with tactical warfare situations, where they either come into crossfire with poachers, endure ambushes from rebel groups or precision attacks from poachers as revenge (Lang, 2017; Neme, 2014; Winter, 2017). Added to that, poachers and rebel groups are gearing up with more and more sophisticated weaponry, while many rangers are not provided with proper essential equipment and old weapons (Global Conservation, 2016; Lang, 2017; Neme, 2014; Winter, 2017). This can be further complicated by lack of resources, widely varied evacuations times, complex wounds as well as temperature and weather extremes (Springer & Verbillion, 2017). This calls for training that is more specific to the environment of rangers.

5.5 Training

Both injuries and illnesses were found to be a concern for rangers in the field. Remote areas further provided challenges to treat these emergencies when they occur, including only a limited amount of equipment at the disposal of the treating ranger, the terrain they operate in, extreme weather conditions and long durations of time that the patient will remain in the care of the treating person prior to the arrival at or of a medical practitioner (Greiner, 2016; Keenan & Riesberg, 2017; Warden, Millin, Hawkins, & Bradley, 2012). First aid training in these areas needs to incorporate the unique environment that rangers operate in and prepare them adequately to ensure that treatment they provide can be applied with what they have available, to treat the most common ailments or injuries they encounter.

The majority of the rangers (65.2%) in the study had some form of first aid training, with 50 to 60% of the time refresher training being taken every two to three years. Most rangers, however, did not feel

adequately prepared for a medical emergency, with 35.3% indicating that basic first aid training would be needed. They also requested training on how to use medication and advanced first aid training. Training at regular intervals had also been recommended. About 20% of the respondents required first aid training that is specific for their field of work and injuries caused by wildlife. Considering that wildlife encounters are a major cause of injuries and fatalities in rangers, this should certainly be addressed in first aid training for rangers. Frequent refresher training to ensure that knowledge and skills can be used when the need arises is highly recommended. It has been shown that knowledge and skill retention deteriorates quickly, even as short as four months after initial training if regular practice and review is not done (Schumann, Schimelpfenig, Sibthorp, & Collins, 2012). Some recommendations have been made to have refresher training every two years, with specific skill assessment reviews (most critical skills) conducted every six months (W. R. Smith, 2017). In the remote areas of Namibia, it may not be possible to access the rangers every six months, but they should be encouraged to review skills and knowledge amongst each other regularly. This will enable them to exchange ideas and remain current. It would be good practice to annually run some scenarios with the rangers to ensure that the practical aspect of treating emergencies is understood and maintained.

More than half of the participants reported that not all rangers in their unit have first aid training. Additionally, rangers from the most remote regions like Kunene and Zambezi, do not have any first aid training. The majority of rangers that responded from these two regions have not received any first aid training, yet the most frequent occurrences of illnesses and injuries were reported from these two regions. First aid training is not a priority in terms of training for rangers as less than half of the organisations that provide training to rangers include first aid training. Training is mainly focused on fieldwork and law enforcement. In 2013 a game guard certification process was developed to strengthen the position of CGG within the conservancy governance structure (MET & NACSO, 2018). Eight core competencies have been identified as a basis of evaluating game guards (MET & NACSO, 2018). First aid training does not appear to form part of these competencies (<http://www.nacso.org.na/resources/training-manual>), which should be a strong consideration for the CGG though, as only one out of eight rangers from communal conservancies responded that a basic first aid course was completed.

Basic First Aid is the most common course received by rangers, followed by a Class A course and only a small number of rangers having Advanced First Aid training (Figure 4-20). In Namibia, half of the rangers have Class A, as opposed to only 21% of rangers outside of Namibia having this qualification. The other 79% only have a Basic First Aid course, which in Namibia amount to 36% of the rangers having this course. Ten per cent of the rangers in Namibia have completed an Advanced First Aid course. A Basic First Aid course is conducted over one day and covers the main illnesses and injuries

that can occur. The Class A course is a three-day course which entails more detailed knowledge of conditions, as well as additional injuries and illnesses that can be seen (Table 4-30). These are generic courses that are offered and are mostly based on the assumption that medical care is close by and easily accessible. Often, they do not take into consideration remote locations and specific emergencies that may occur in the field of work that rangers perform. It would thus be needed to develop a course that is more focused on game rangers operating in remote areas.

The IRF released a training guideline for rangers in 2016, which includes First Aid Training for rangers and team leaders (IRF, 2016; TGLF et al., 2017). These guidelines recommend that rangers should have first aid training for a minimum of 12 theoretical and 12 practical hours. IRF stipulates the following core competencies to be included in the first aid training of ranger:

- *The concept of providing care under fire and self-aid*
- *To conduct a primary survey (level of consciousness, airway, breathing, circulation)*
- *To conduct a secondary survey (head-to-toe examination)*
- *Treatment of:*
 - *Shock*
 - *Wounds and severe bleeding*
 - *Fractures*
 - *Spinal injuries*
 - *Burns*
 - *Foreign objects in the eye, ear and nose*
 - *Chest injuries*
 - *Bites and stings, including snake bites*
 - *Hyperthermia, heat injuries and dehydration*
 - *Hypothermia and frostbite*
- *Movement of a patient*
- *General health, including foot care and hygiene in the field*
- *The causes, spread, prevention and control of HIV/AIDS and other sexually transmitted diseases*
- *The importance and management of antiretrovirals (ARVs) (IRF, 2016)*

The list illustrates that some aspects of TCCC as well as wilderness medicine have been included in the training. Earlier in 2019, a Nyathi APU ranger in South Africa was shot in the arm by a poacher, narrowly missing an artery in his upper arm. The ranger was successfully treated with a tourniquet and recovered well, due to a tactical first aid course the unit had received in the previous year (<https://www.facebook.com/groups/GRAANAM/permalink/1116570938515329/>). Additionally, first aid guidelines for a course in the wilderness setting recommend a minimum of 16-hours training and should include a basic physical examination to identify injuries and abnormalities, prevention of medical problems anticipated by activity and environment and decision-making principles in terms of evacuation of the patient (D. E. Johnson et al., 2013).

As can be seen from the injuries and fatalities that occur in game rangers, tactical situations are encountered frequently and TCCC should be included into first aid training to ensure the safety of the team, but also initiate treatment for injured members early to prevent fatalities. Some concepts and

successes noted in TCCC in the military setting have gained acceptance in civilian trauma care systems, and as many challenges in war zones and austere environment are similar, these concepts should be included in training for rangers (Butler, Bennett, & Wedmore, 2017; Butler & Blackbourne, 2012; Keenan & Riesberg, 2017; Shertz, 2019). Key concepts that should be included into training for rangers are the phases of care, including direct threat and indirect threat phases, as well as adopting the MARCH (Massive Haemorrhage, Airway, Respiration, Circulation, Hypothermia Management) approach rather than the ABC (Airway, Breathing, Circulation) approach to identify and treat most common causes of fatalities (Bennett, 2017; Bennett & Holcomb, 2017; Butler et al., 2017; Chang et al., 2017; FMTBCP, 2010; Llewellyn, 2017; Shertz, 2019; W. R. Smith, 2017).

As illnesses were found to be an extremely common occurrence in the field, the treatment thereof should be included these in the training of rangers as well, so that they can initiate early treatment for themselves or their colleagues and prevent simple conditions from worsening (Llewellyn, 2017). Operating in a wilderness or remote setting, rangers will need a broad knowledge base on common injuries and illnesses to care for themselves or those that are in distress, but they will also need to be able to depend only on the equipment they carry with them (Greiner, 2016; D. E. Johnson et al., 2013). For rangers, a standard first aid programme does not meet the particular circumstances that they operate in and training programmes should be developed accordingly. These courses should best be taught by skilled educators that have experience in the environment rangers are located in and should be focused on a hands-on practice approach, including case studies and simulations (D. E. Johnson et al., 2013).

5.6 First Aid Equipment

Rangers are seemingly not adequately supported by their employers in terms of training, equipment and facilities, a finding supported by Hardiman (2019). Global ranger perception surveys have indicated that between 60 and 75% of rangers across Africa and Asia feel they are not adequately equipped to perform their duties (GRAA, 2016; TGLF et al., 2017; WWF, 2016; WWF & RFA, 2016) with many rangers lacking even the most basic equipment, including uniforms, boots and tents (Neme, 2014; Winter, 2017). Rangers in this study also confirmed that basic equipment is needed, including tents, basic uniform and protective clothing, torches, radio communication devices, water containers, binoculars and backpacks, which would help reduce risk of injury and illness. Lacking essential equipment does also not seem to prioritize having first aid equipment available.

Two-thirds of the rangers in this study indicated that they are not adequately equipped to deal with a medical emergency, with the majority describing FAKs and stock as being needed to prepare them better. Just over half of the Namibian rangers and only four per cent of the rangers in Ghana have FAKs

as part of their standard everyday equipment. Regions where most of the rangers do not have FAKs readily available are Kunene (88.9%), Zambezi (75%) and Hardap (66.7%). Once again, particularly the Kunene and Zambezi regions are the most remote with access to healthcare facilities taking longest to reach. About 40% of the Namibian and 72% of the Ghanaian patrolling teams do not have any FAKs with them. This exposes the rangers to deterioration if injuries or illnesses occur, without being able to have the right equipment to treat the ailments. NPS rangers each carry an IFAK to treat immediate life-threatening situations on themselves, or their colleagues should an emergency arise (W. R. Smith, 2017). It needs to be considered though that IFAKs need to include the most required equipment but need to be kept lightweight as it will be carried by each person (W. R. Smith, 2017).

There are many FAKs (<https://firstaidshop.co.za/products/government-regulation-7-first-aid-kit>) on the market including various stock items, but some items may not be relevant for the environment that rangers operate in or may be impractical to carry. Results of this study and literature on endorsed IFAKs were used to create a recommended list of first aid items and medication that can be considered to place in a PFAFK and field kits (Appendix D).

In terms of first aid stock that should be used in a FAK, Figure 5-7 shows the items that have been suggested by more than 50% of the data analysed. Gloves, sterile gauze, conforming bandages, first aid dressings, rehydrate and an antiseptic/antibiotic ointment, as well as antiseptic solutions, are clearly indicated to be in the FAK as shown by both the percentage of respondents that would include this, as well as a probability ranking over 60% as determined by the author. Items that have a high percentage of respondents that would include these and a probability ranking over 40% also have been included and entail tape/Elastoplast, rescue scissors, rescue blanket, CPR mouthpieces, burn shield, triangular bandages, assorted plasters, hydrocortisone/antihistamine ointment, tourniquets and unsterile gauze. Several items showed a high percentage of respondents selecting them but the probability ranking was between 30 and 40%. These items will be individually discussed. Items that are excluded based on their probability ranking were safety pins and eye pad/shield. All other items were excluded based on both the selection and probability ranking.

Tweezers have been indicated by half of the FAK lists that focus on remote settings (IRF, 2016; Welch, 1997) and splinters were shown to occur frequently, plus they have an additional use in removing ticks. Crepe bandages have also been recommended by half of the remote setting FAK list (IRF, 2016; Welch, 1997) and sprains and strains are also common injuries that occur in the field. Thus, these two items have been included in the list of items. Glucogel, eye drops, splints and steristrips have not been recommended by either of these lists; they have thus not been included in the recommended list.

However, depending on the area and requirements of the rangers, these items may be considered for inclusion in a FAK.

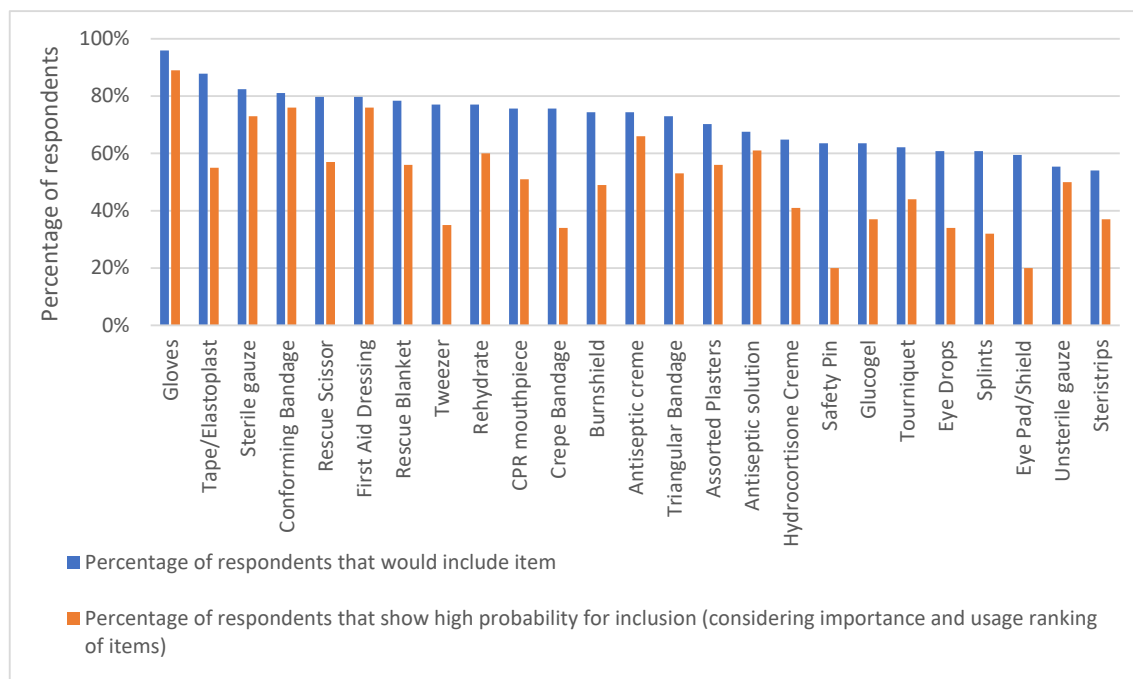


Figure 5-7: Stock items that more than 50% of respondents suggested correlated with probability ranking percentages

Medication does not form part of a commercial FAK due to associated adverse events, such as possible allergic reactions. In terms of a field kit that would be used by specific people, it is warranted that some basic medication should form part of the kit to treat common ailments in the field. It should be clear though that the medication is only for personal use. The most common illnesses occurring in the field include gastrointestinal disturbances and headaches. Medication that can be in a FAK should thus be related to pain management, gastrointestinal disturbances and inflammations. For allergic reactions and insect bites, antihistamines are useful as well. Figure 5-8 shows the medication that is recommended from this study to be included. As cold and flu have also been shown to occur frequently, some form of cold medication can be included in the FAK, like Med Lemon or Advil Cold and Flu tablets, for example.

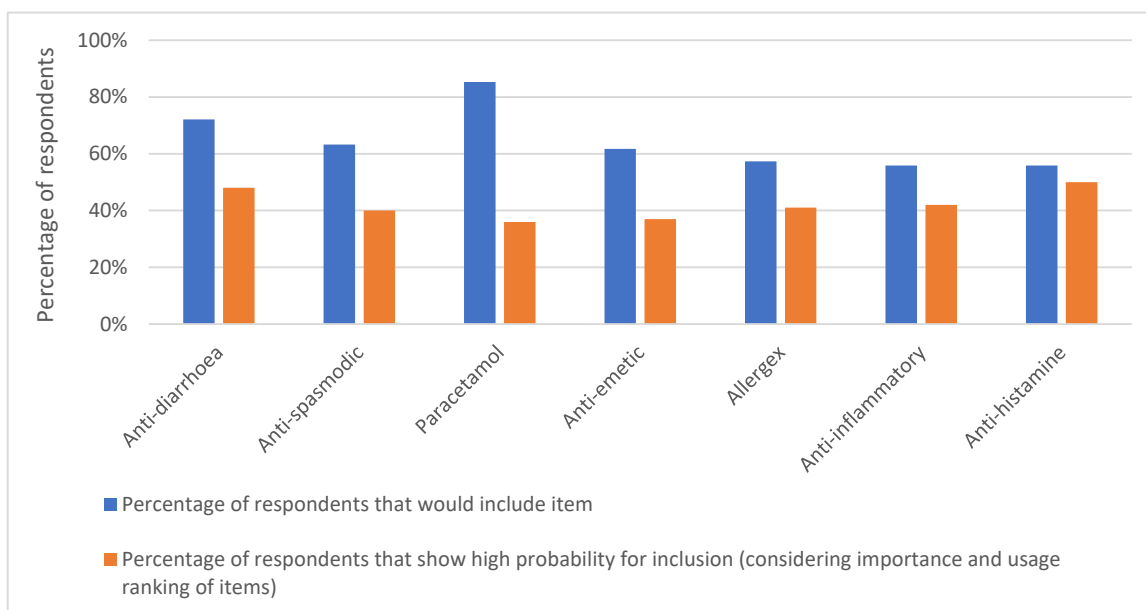


Figure 5-8: Medication that more than 50% of respondents suggested correlated with probability ranking percentages

Extra items that were suggested and included in the FAK based on percentages of people suggesting these and the probability ranking (Figure 5-9) are haemostatic dressings and water or water purification methods. Haemostatic agents have been incorporated for the use of first aid in the civilian and wilderness setting, especially during prolonged care in the austere environments (Bennett, 2017). Haemostatic agents have been recommended over the use of plain gauze only to control severe haemorrhage, as well as in circumstances where the bleeding cannot be controlled by a tourniquet (Bennett, 2017). However, effective training needs to be ensured in the use of haemostatic agents in conjunction with other proven methods (Bennett, 2017). For water purification, either tablets can be added, or it may be worthwhile to look at LifeStraw filter products (<https://www.lifestraw.com/>). Contaminated water is one of the main causes of gastrointestinal disturbances and using water purification methods that can prevent these from occurring.

Wound closure methods should only be performed if haemostasis cannot be controlled; then, tissue glue would be the wound closure method of choice in a wilderness setting (Spano & Dimock, 2014). However, wounds need to be adequately irrigated before closure, and it is recommended to control wounds with wet-to-dry dressing and delayed wound closure if controlled haemostasis is present (Spano & Dimock, 2014). Tissue glue can thus be considered for inclusion in a FAK.

An Epinephrine Pen (EpiPen), a snake bite kit or Aspi venom, scalpel or knife and wound closure methods have been suggested but the probability ranking shows that these items may not be used very often in the field. EpiPen and Aspi venom kits are quite expensive and the infrequent use may not justify

placing these items into a FAK. EpiPens, containing Adrenaline have shown to prevent fatal anaphylactic reactions with clinical improvement in patients within 25 minutes after administration (Fortenberry, Laine, & Shalit, 1995). However, the short shelf life also speaks against carrying an EpiPen in a FAK. As the administration of an EpiPen may improve chances of survival further research would need to be undertaken to determine the frequency of which anaphylaxis occurs within Namibia and whether the benefit would warrant the cost and short half-life. A knife can be useful in many situations but should preferably be carried on a person and not stored in a FAK.

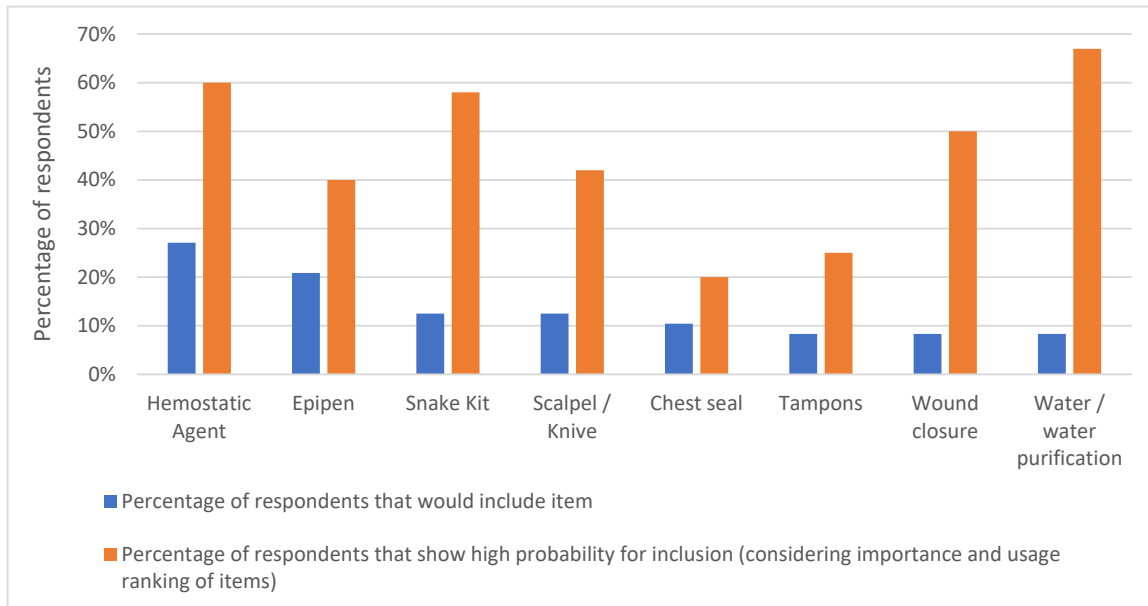


Figure 5-9: Extra Items that more than 8% of respondents suggested correlated with probability ranking percentages

Quantities of items were determined by correlating information from the participants' responses as well as item quantities suggested by the sanctioned lists (Bennett, 2017; IRF, 2016; NPS, n.d.; Shertz, 2019; W. R. Smith, 2017; Welch, 1997). Furthermore, the environment that rangers operate in was considered and quantities selected based on keeping the kit as light as possible since it will need to be carried with the person. Additionally, the carrying case for the FAKs should either be a backpack type or a smaller pouch (Figure 4-25). As many rangers patrol on foot and event books are frequently used, it would be recommended to have a carrying case for the FAK that could include some basic equipment, the event book and water.

CHAPTER 6. CONCLUSION

The main aim of this study was to determine the medical readiness of game rangers and anti-poaching operatives in the Namibian austere environment. The literature review revealed that the medical readiness of rangers had not been researched previously in Namibia. Rangers are faced with many perils ranging from being attacked by communities and poachers, the wildlife they protect as well as exposure to the harsh environment that they operate in, which can lead to injuries, illnesses and death. This study demonstrates that game rangers are not ready to deal with medical emergencies in the austere Namibian environment. This has become evident especially through the lack of first aid training and FAKs that are available to most patrol teams, as well as the harsh and inhospitable environment they operate in.

Most of the wildlife protected areas in Namibia are located where the land is sparsely populated and healthcare facilities are far away. It was found that most rangers in these remote areas lack first aid training and equipment to deal with a medical emergency, yet the occurrence of injuries and illnesses are alarmingly frequent amongst these rangers. The nearest healthcare facilities are often far away and may not be equipped or even functional enough to provide definitive management to a ranger that became injured or ill in the field. Furthermore, EMS in those areas is not existent and rangers rely on own transport, sometimes using donkey carts, to reach a medical facility. This entails that rangers need to treat their colleagues in an emergency for at least an hour if not more. In the field, colleagues need to save lives, and it is thus important that teams train together and are all comfortable with emergency management of common injuries and illnesses that may occur while out on patrol.

Through this study, it became clear that rangers are often faced with paramilitary tactical situations, though crossfire with poachers, ambushes from rebel groups or precision attacks from poachers for revenge. This can be further complicated by lack of resources, widely varied evacuations times, complex wounds as well as temperature and weather extremes, calling for training that is specific to the environment that rangers operate in. This could also be seen from the injuries and fatalities that occur in game rangers. For rangers, a standard first aid programme does not meet the unique circumstances that they operate in.

CHAPTER 7. RECOMMENDATIONS

This study provides results and insights which inform some useful recommendations. These are listed below:

- Based on the inadequate training and equipment that rangers have available to the most critical and urgent recommendation would be to uplift the first aid training as well as have rangers equipped with appropriate FAK. Initially, game rangers should at least have a Basic or Class A First Aid course to start with capacity development. The training should include how to use the equipment from FAKs, so that rangers know exactly how to use the kit. Regular refresher courses should be conducted at a minimum of every two years to improve the capabilities and confidence of rangers to use them. It would further be recommended to have scenario-based skills sessions annually or biannually to ensure skills retention in game rangers.
- CGG in the Kunene and Zambesi regions are the most remote with travel distances to the nearest medical facility longer than five hours, yet they have the least development in terms of first aid training or access to FAK. It has also been shown that injuries and illnesses occur commonly in this population group. Thus, it is recommended to develop this area specifically in terms of first aid training and providing first aid equipment.
- Additionally, a specific first aid manual for rangers in the Namibian setting should be developed based on the information gathered from this study, ensuring that rangers are adequately prepared for the most common ailments that they may encounter in their specific environment. A training course should be designed together with the manual to ensure the training provided is in line with these guidelines, but also provided adequate training in practical scenarios to apply the skills learned.
- TCCC should be included in first aid training to ensure the safety of the team, but also initiate treatment for injured members early to prevent fatalities. Key concepts that should be included into training for rangers are the phases of care, including direct threat and indirect threat phases, as well as adopting the MARCH approach rather than the ABC approach to identify and treat most common causes of fatalities. As illnesses are also a common occurrence in the field, it will be needed to include these into the training of rangers as well, so that they can initiate early treatment for themselves or their colleagues and prevent simple conditions from worsening. Operating in a wilderness or remote setting rangers will need a comprehensive knowledge base of common injuries and illnesses to care for themselves or those that are in distress, but they will also need to be able to depend only on the equipment they carry with them.
- After the development of a manual and course, a pilot study should be conducted among some of the park rangers or CGG to determine the impact that first aid training has on their work environment. As part of this study skills retention can be evaluated over a period.
- Commercially available FAKs are often developed for use in an office environment and do not take into consideration the environment that a ranger may be faced with as this is not the main aim of the FAK. A FAK for rangers should be lightweight and contain items that will be used to treat common ailments found in the field. Anecdotally, there is a vast number of emergencies that can occur in the field. However, common injuries and illnesses, as well as the main life-threatening injuries, have been

identified and FAK suggestions have been based on this information together with data gathered from an additional survey and literature. Two FAKs have been recommended as a result from this study (Annexure D). The PFAFK should be carried by each ranger to start treatment immediately following a life-threatening emergency, mainly including massive haemorrhage whereas the field kit should be one kit per team or station to be able to treat the most common ailments that may occur while in the field.

- Further investigation is needed to include state services and protected areas as they make up the majority of rangers and anti-poaching personnel, to improve on the data set for the Namibian austere environment. The study does, however, take cognisance of the possibility of unintentionally disclosing sensitive anti-poaching intelligence information by doing so. Additional studies can be conducted to investigate specific responses to medical emergencies and evacuation methods.

REFERENCES

- Anderson, J. D., DeClerck, M. P., Neessen, K., & Cushing, T. A. (2013). Realigning Educational Curriculum and the Realities of Clinical Practice in Wilderness Rangers. *Wilderness & Environmental Medicine*, 24(1), 80. <https://doi.org/10.1016/j.wem.2012.07.007>
- Baines, J. (2019). *Extinct: The war on poaching*. Retrieved from <https://www.ladbible.com/extinct>
- Bennett, B. L. (2017). Bleeding Control Using Hemostatic Dressings: Lessons Learned. *Wilderness and Environmental Medicine*, 28(2), S39–S49. <https://doi.org/10.1016/j.wem.2016.12.005>
- Bennett, B. L., & Holcomb, J. B. (2017). Battlefield Trauma-Induced Hypothermia: Transitioning the Preferred Method of Casualty Rewarming. *Wilderness and Environmental Medicine*, 28(2), S82–S89. <https://doi.org/10.1016/j.wem.2017.03.010>
- Booth, V., Martin, R., & Wilson, E. (2004). *Strengthening the System of National Protected Areas Project*. Retrieved from <https://www.cbd.int/doc/pa/tools/Strengthening the capacity of PAs in Namibia.pdf>
- Brink, H., van der Walt, C., & van Rensbury, G. (2018). *Fundamentals of Research Methodology for Healthcare Professionals* (Fourth). Cape Town: Juta & Co.
- Butler, F. K., Bennett, B., & Wedmore, C. I. (2017). Tactical Combat Casualty Care and Wilderness Medicine: Advancing Trauma Care in Austere Environments. *Emergency Medicine Clinics of North America*, 35(2), 391–407. <https://doi.org/10.1016/j.emc.2016.12.005>
- Butler, F. K., & Blackbourne, L. H. (2012). Battlefield trauma care then and now: A decade of Tactical Combat Casualty Care. *Journal of Trauma and Acute Care Surgery*, 73(6 SUPPL. 5). <https://doi.org/10.1097/TA.0b013e3182754850>
- Callaway, D. W. (2017). Translating Tactical Combat Casualty Care Lessons Learned to the High-Threat Civilian Setting: Tactical Emergency Casualty Care and the Hartford Consensus. *Wilderness and Environmental Medicine*, 28(2), S140–S145. <https://doi.org/10.1016/j.wem.2016.11.008>
- Chang, R., Eastridge, B. J., & Holcomb, J. B. (2017). Remote Damage Control Resuscitation in Austere Environments. *Wilderness and Environmental Medicine*, 28(2), S124–S134. <https://doi.org/10.1016/j.wem.2017.02.002>
- Community Contributor. (2018). Intensive Training turns Communal Game Guards into special Wildlife Rangers. *Namibia Economist*. Retrieved from <https://economist.com.na/38199/environment/intensive-training-turns-communal-game-guards-into-special-wildlife-rangers/>
- DeClerck, M. P., Atterton, L. M., Seibert, T., & Cushing, T. A. (2013). A review of emergency medical services events in us national parks from 2007 to 2011. *Wilderness and Environmental Medicine*, 24(3), 195–202. <https://doi.org/10.1016/j.wem.2013.01.009>
- Dudovskiy, J. (2018). An Ultimate Guide to Writing A Dissertation in Business Studies A Step-by-Step Assistance. In *Research Methodology* (January 20). Retrieved from <https://research-methodology.net>
- Eastern and Southern Africa Anti-Money Laundering Group. (2016). *A special typologies project report on poaching, illegal trade in wildlife and wildlife products and associated money laundering in the ESAAMLG region*.

- Eastridge, B. J., Mabry, R. L., Seguin, P., Cantrell, J., Tops, T., Uribe, P., ... Blackburne, L. H. (2012). Death on the battlefield (2001-2011): Implications for the future of combat casualty care. *Journal of Trauma and Acute Care Surgery*, 73(6 SUPPL. 5). <https://doi.org/10.1097/TA.0b013e3182755dcc>
- Ela, G. K. (2004). Epidemiology of Wilderness Search and Rescue in New Hampshire, 1999-2001. *Wilderness and Environmental Medicine*, 15(1), 11-17. [https://doi.org/10.1580/1080-6032\(2004\)015\[0018:VASOAA\]2.0.CO;2](https://doi.org/10.1580/1080-6032(2004)015[0018:VASOAA]2.0.CO;2)
- Field Medical Training Battalion Camp Pendleton. (2010). *Combat Lifesaver / Tactical Combat Casualty Care Student Handout*.
- Fortenberry, J. E., Laine, J., & Shalit, M. (1995). Use of Epinephrine for Anaphylaxis by Emergency Medical Technicians in a Wilderness Setting. *Annals of Emergency Medicine*, 25(6), 785-787. [https://doi.org/10.1016/S0196-0644\(95\)70208-3](https://doi.org/10.1016/S0196-0644(95)70208-3)
- Game Rangers Association of Africa. (n.d.). What is a Game Ranger. Retrieved January 20, 2020, from <http://www.gameranger.org/who-we-are/what-is-a-game-ranger.html>
- Game Rangers Association of Africa. (2016). MEDIA STATEMENT: WORLD RANGER DAY 2016 - HONORING AFRICA'S CONSERVATION HEROES. Retrieved April 16, 2018, from 154 website: <http://www.gameranger.org/news-views/media-releases/154-media-statement-world-ranger-day-2016-honoring-africa's-conservation-heroes.html>
- Game Rangers Association of Africa. (2018, July 31). World Ranger Day 2018: Mobilising Support for Africas Rangers. *Press Release*. Retrieved from <http://www.gameranger.org/news-views/media-releases/178-wrd-2018.html>
- Global Conservation. (2016). Park Rangers on the frontline being killed at an astonishing rate from India to Thailand to Afrika. Retrieved April 16, 2018, from 31 March website: <http://globalconservation.org/news/park-rangers-frontline-being-killed-astonishing-rate-new-solutio/>
- Government of the Republic of Namibia. (2004a). *Namibia Vision 2030: Policy Framework for Long-term National Development (Summary)*. Windhoek.
- Government of the Republic of Namibia. (2004b). Namibia Vision 2030 - Chapter 5: Sustainable Resource Base. In *National Planing Commision*. Windhoek.
- Government of the Republic of Namibia. (2004c). *Namibia Vision 2030 - Chapter 6: Creating the Enabling Environment*. Windhoek.
- Government of the Republic of Namibia. (2017a). *Government Gazette No 3 of 2017: Nature Conservation Amendment Act*.
- Government of the Republic of Namibia. (2017b). *Namibia's 5th National Development Plan (NDP5)*. 1-134. Retrieved from https://www.npc.gov.na/?wpfb_dl=294
- Government of the Republic of Namibia. (2017c). *Trends and Typology Report No 1 of 2017: Rhino and Elephant Poaching , Illegal Trade in Related Wildlife Products and Associated Money Laundering in Namibia*.
- Goyanes, C. (2017). This All-Female Anti-poaching Unit in South Africa is Saving Rhinos and Wildlife. *National Geographic*.

- Greiner, A. L. (2016). Medical care in remote areas. In *Ciottonone's Disaster Medicine* (2nd ed.). <https://doi.org/10.1016/B978-0-323-28665-7.00053-4>
- Hardiman, J. (2019). The Heroes who risk their lives to protect endangered African Wildlife from Poachers. *LAD Bible, NEWS*. Retrieved from <https://www.ladbible.com/news/animals-the-heroes-who-risk-their-lives-to-protect-endangered-wildlife-20190516?fbclid=IwAR26meW5d8n7JDfvRuNT1rAXIqliN3wTBOWKkpUqG3BrvNzH2TtCxcwQ7hjc>
- Hauenstein, S., Kshatriya, M., Blanc, J., Dormann, C. F., & Beale, C. M. (2019). African elephant poaching rates correlate with local poverty, national corruption and global ivory price. *Nature Communications*, 10(1). <https://doi.org/10.1038/s41467-019-09993-2>
- Heggie, T. W., & Heggie, T. M. (2004). Viewing lava safely: An epidemiology of hiker injury and illness in Hawaii Volcanoes National Park. *Wilderness and Environmental Medicine*, 15(2), 77–81. [https://doi.org/10.1580/1080-6032\(2004\)015\[0077:VLSAEO\]2.0.CO;2](https://doi.org/10.1580/1080-6032(2004)015[0077:VLSAEO]2.0.CO;2)
- Hsia, R. Y., Mbembati, N. A., MacFarlane, S., & Kruk, M. E. (2012). Access to emergency and surgical care in sub-Saharan Africa: The infrastructure gap. *Health Policy and Planning*, 27(3), 234–244. <https://doi.org/10.1093/heapol/czr023>
- International Ranger Federation. (2016). *Anti-poaching in and around protected areas: Training guidelines for Field Ranger*.
- International Ranger Federation. (2019). *Chitwan Declaration*, 2019.
- International Ranger Federation, & Thin Green Line Foundation. (2014). *World Ranger Day 2014 - Ranger Roll of Honour*. <https://doi.org/10.1002/zoo.21186>
- International Ranger Federation, & Thin Green Line Foundation. (2015). *World Ranger Day 2015 - Ranger Roll of Honour*. 52(2). <https://doi.org/10.1177/0300985814565134>
- International Ranger Federation, & Thin Green Line Foundation. (2016). *World Ranger Day 2016 - Ranger Roll of Honour*.
- International Ranger Federation, & Thin Green Line Foundation. (2017). *World Ranger Day 2017 - Ranger Roll of Honour*. 2017.
- International Ranger Federation, & Thin Green Line Foundation. (2018). *World Ranger Day 2018 - Roll of Honour*. 2018.
- International Ranger Federation, & Thin Green Line Foundation. (2019a). *2009 - 2019: Ranger Roll of Honour*.
- International Ranger Federation, & Thin Green Line Foundation. (2019b). *World Ranger Day 2019 - Ranger Roll of Honour*. 12.
- Ipsos Encyclopedia. (2016). Usage & Attitudes Surveys (U&A). Retrieved October 30, 2019, from <https://www.ipsos.com/en/ipsos-encyclopedia-usage-attitude-surveys-ua>
- Iskam, A. (2015). *Notfallversorgung durch private und öffentliche Rettungsdienste in Namibia* (1.). Göttingen, Deutschland: Optimus Verlag.
- Johnson, D. E., Schimelpfenig, T., Hubbell, F., Frizzell, L., Nicolazzo, P., McEvoy, D., ... Kimmel, N. (2013). Minimum Guidelines and Scope of Practice for Wilderness First Aid. *Wilderness and Environmental*

Medicine, (24), 456–462.

- Johnson, J., Maertins, M., Shalit, M., Bierbaum, T. J., Goldman, D. E., & Lowe, R. A. (1991). Wilderness emergency medical services: The experiences at Sequoia and Kings Canyon National Parks. *American Journal of Emergency Medicine*, 9(3), 211–216. [https://doi.org/10.1016/0735-6757\(91\)90078-X](https://doi.org/10.1016/0735-6757(91)90078-X)
- Keenan, S., & Riesberg, J. C. (2017). Prolonged Field Care: Beyond the “Golden Hour.” *Wilderness and Environmental Medicine*, 28(2), S135–S139. <https://doi.org/10.1016/j.wem.2017.02.001>
- Klein, K., Lefering, R., Jungbluth, P., Lendemanns, S., & Hussmann, B. (2019). Is prehospital time important for the treatment of severely injured patients? A matched-triplet analysis of 13,851 patients from the traumaRegister DGU®. *BioMed Research International*, 2019. <https://doi.org/10.1155/2019/5936345>
- Lang, C. (2017). More than 100 rangers every year in conservation war. Retrieved April 16, 2018, from Conservation Watch website: <http://www.conservation-watch.org/2017/03/07/more-than-100-rangers-die-every-year-in-the-conservation-war/>
- Llewellyn, C. H. (2017). The Symbiotic Relationship Between Operational Military Medicine, Tactical Medicine, and Wilderness Medicine: A View Through a Personal Lens. *Wilderness and Environmental Medicine*, 28(2), S6–S11. <https://doi.org/10.1016/j.wem.2016.12.008>
- Losh, J. (2019, October). Central Africa’s Rangers are as threatened as the animal they guard. *Foreign Policy*. Retrieved from https://foreignpolicy.com/2019/10/06/central-africas-rangers-are-as-endangered-as-the-animals-they-guard/?fbclid=IwAR25YLGxXwPTXIMkrAXc_Rwj94CAxy4WdtoS_Pxauh0p1oIKO5eWvGq-60w#
- Ministry of Environment and Tourism. (n.d.). *Strategic Plan for 2017/2018 until 2021/2022.pdf*. Retrieved from http://www.met.gov.na/files/downloads/71f_MET Strategic Plan 2017 2018 2021 2022.pdf
- Ministry of Environment and Tourism. (2010). *State of Protected Areas in Namibia: A Review of Progress and Challenges*. Retrieved from <http://www.met.gov.na/files/files/State of the Parks Report.pdf>
- Ministry of Environment and Tourism. *Press Release: Poaching Activities.*, (2014).
- Ministry of Environment and Tourism. (2018). Tourist Statistical Report 2017. In *Forest Research*. Retrieved from http://www.met.gov.na/files/downloads/e9d_MET Tourist Statistical Report 2017.pdf
- Ministry of Environment and Tourism, & Namibian Association of Community Based Natural Resource Management Support Organisations. (2018). *The State of Community Conservation in Namibia - a review of communal conservancies, community forests and other CBNRM activities (Annual Report 2017)*. Windhoek.
- Ministry of Health and Social Services. (2010). National Health Policy Framework 2010 - 2020. *MoHSS*, (July 2010).
- Ministry of Health and Social Services. (2015). *Guidelines for the Implementation of the National Referral Policy*. (March). Retrieved from <http://www.mhss.gov.na/documents/119527/364677/Referral+Guidelines-March+2015.pdf/144b3624-1599-4cde-93fc-1287710b9e8b>

- Nakale, A. (2017, August). Kashiakumwa to head new anti-poaching unit. *New Era*.
- Nakale, A. (2018, February). Namibia aims at reducing poaching by 50 percent. *New Era*.
- Namibia Statistics Agency. (2013). *Namibia 2011 Population & Housing Census - Main Report*. 214. Retrieved from [http://www.nsa.org.na/files/downloads/Namibia 2011 Population and Housing Census Main Report.pdf](http://www.nsa.org.na/files/downloads/Namibia%2011%20Population%20and%20Housing%20Census%20Main%20Report.pdf)
- Namibia Statistics Agency. (2016). *Namibia Inter-censal Demographic Survey 2016 Report*. 1–136.
- Namibia Tourism Board. (2015). *Namibia Tourism Satellite Account - 5th edition*.
- Namibian Association of Community Based Natural Resource Management Support Organisations. (2017). *Latest statistics on Conservation areas in Namibia 2017*. Retrieved from <http://www.nacso.org.na/resources/latest-statistics-on-conservation-areas-in-namibia-2017>
- Namibian Association of Community Based Natural Resource Management Support Organisations. (2018). Resources & Publications: NR and Governance Posters - Annual Conservation Reports 2017. Retrieved July 30, 2019, from <http://www.nacso.org.na/resources/nr-and-governance-posters>
- National Broadcasting Corporation. (2017). *Rhino and elephant poaching on decrease in 2017*. Retrieved from <http://www.nbc.na/news/rhino-and-elephant-poaching-decrease-2017.10197>
- National Broadcasting Corporation. (2018). *Poacher shot dead in Bwabwata National Park*. Retrieved from <http://www.nbc.na/news/poacher-shot-dead-bwabwata-national-park.17055>
- National Park Service. (n.d.). *Reference Manual 51 - Emergency Medical Services*.
- National Park Service. (2011). *National Park Service TEMS - Field Manual*. (May).
- Navarro-Rivera, J., & Kosmin, B. A. (2013). Surveys and questionnaires. *The Routledge Handbook of Research Methods in the Study of Religion*, 395–420. <https://doi.org/10.4324/9780203154281-35>
- Neme, L. (2014). For Rangers on the Front Lines of Anti-Poaching Wars, Daily Trauma. *National Geographic*, (February). Retrieved from <http://news.nationalgeographic.com>
- New Era. (2017a, January 4). *Anti-poaching unit gun down three*. Retrieved from <https://www.newera.com.na/2017/01/04/anti-poaching-unit-gun-down-three/>
- New Era. (2017b, January 5). *Suspected poacher shot and wounded*. Retrieved from <https://www.newera.com.na/2017/01/05/suspected-poacher-shot-and-wounded/>
- Nuwer, R. (2019, September). Meet the “Brave Ones”: The women saving Africa’s Wildlife. *BBC Future*. Retrieved from <https://www.bbc.com/future/article/20180926-akashinga-all-women-rangers-in-africa-fighting-poaching>
- Nyaungwa, N. (2017). Rhino, elephant poaching declines in Namibia.
- Obermeyer, Z., Abujaber, S., Makar, M., Stoll, S., Kayden, S. R., Wallis, L. A., & Reynolds, T. A. (2015). Emergency care in 59 low- and middle-income countries: a systematic review. *Bulletin of the World Health Organization*, 93(8), 577-586G. <https://doi.org/10.2471/blt.14.148338>

- Obour, R., Asare, R., Ankomah, P., & Larson, T. (2016). Poaching and its Potential to Impact Wildlife Tourism : An Assessment of Poaching Trends in the Mole National Park in Ghana. *Athens Journal of Tourism*, 3(3), 169–192.
- Ouma, P. O., Maina, J., Thurania, P. N., Macharia, P. M., Alegana, V. A., English, M., ... Snow, R. W. (2018). Access to emergency hospital care provided by the public sector in sub-Saharan Africa in 2015: a geocoded inventory and spatial analysis. *The Lancet Global Health*, 6(3), e342–e350. [https://doi.org/10.1016/S2214-109X\(17\)30488-6](https://doi.org/10.1016/S2214-109X(17)30488-6)
- Our Planet. (2019). *E51 Supporting our wildlife rangers*.
- Phineas, T. (2017, November 8). New anti-poaching station opens at Etosha. *The Namibian*. Retrieved from <https://www.namibian.com.na/171389/archive-read/New-anti-poaching-station-opens-at-Etosha>
- PoachingFacts.com. (n.d.). Poaching Statistics Overview. Retrieved April 16, 2018, from <http://www.poachingfacts.com/poaching-statistics/>
- Potgieter, G. C. (2019). How Namibia is outsmarting criminals involved in the illegal wildlife trade. *Conservation and the Environment in Namibia*, pp. 15–17. Windhoek, Namibia: Venture Medica.
- Pro Track. (n.d.). Anti-poaching Courses. Retrieved April 15, 2018, from <https://protrackapu.co.za/anti-poaching-training-courses/>
- Russell, K. W., Scaife, C. L., Weber, D. C., Windsor, J. S., Wheeler, A. R., Smith, W. R., ... Lieberman, J. R. (2014). Wilderness medical society practice guidelines for the treatment of acute pain in remote environments: 2014 update. *Wilderness and Environmental Medicine*, 25(4), S96–S104. <https://doi.org/10.1016/j.wem.2014.07.016>
- Save the Rhino International. (2018). Poaching Statistics. Retrieved April 16, 2018, from https://www.savetherhino.org/rhino_info/poaching_statistics
- Schumann, S. A., Schimelpfenig, T., Sibthorp, J., & Collins, R. H. (2012). An Examination of Wilderness First Aid Knowledge, Self-efficacy, and Skill Retention. *Wilderness and Environmental Medicine*, 23, 281–287. <https://doi.org/https://doi.org/10.1016/j.wem.2012.04.005>
- Shertz, M. (2019). *Complete Tactical Casualty Care - Student Manual*.
- Shikongo, A. (2019, September 10). Police, suspected poacher exchange gunfire. *The Namibian*. Retrieved from <https://www.namibian.com.na/192872/archive-read/Police-suspected-poacher-exchange-gunfire>
- Smith, J.-M. (2017). Elephant poaching up, rhino down (Namibia). Retrieved April 21, 2017, from Namibian Sun website: <https://conservationaction.co.za/recent-news/elephant-poaching-rhino-namibia/>
- Smith, L. N. (2019). Why Zimbabwe's female rangers are better at stopping poaching. *National Geographic*, 2–4. Retrieved from <https://www.nationalgeographic.com/magazine/2019/06/akashinga-women-rangers-fight-poaching-in-zimbabwe-phundundu-wildlife-area/>
- Smith, W. R. (2017). Integration of Tactical EMS in the National Park Service. *Wilderness and Environmental Medicine*, 28(2), S146–S153. <https://doi.org/10.1016/j.wem.2017.03.002>

- Sominis Storm. (2017). *Namibian Economic Outlook 2017: "Storm's arrived...What's next?"* (18 January).
- Spano, S. J., & Dimock, B. (2014). They had me in stitches: A Grand Canyon River Guide's case report and a review of wilderness wound management literature. *Wilderness and Environmental Medicine*, 25(2), 182–189. <https://doi.org/10.1016/j.wem.2013.10.007>
- Springer, B. L., & Verbillion, M. (2017). Tactical emergency medicine. *Trauma Reports*, 18(2), 490–490. <https://doi.org/10.1136/emj.2009.073510>
- Tansley, G., Schuurman, N., Amram, O., & Yanchar, N. (2015). Spatial access to emergency services in low- and middle-income countries: A GIS-based analysis. *PLoS ONE*, 10(11), 1–13. <https://doi.org/10.1371/journal.pone.0141113>
- The Namibia Ministry of Health and Social Services, & ICF International. (2014). *Namibia Demographic and Health Survey 2013*. Retrieved from <https://dhsprogram.com/pubs/pdf/fr298/fr298.pdf>
- Thin Green Line Foundation, Global Tiger Forum, International Ranger Federation, World Wildlife Fund, & PAMS Foundation. (2017). *New field ranger training guidelines , could save the lives of those on the front line of the poaching battle*. (February).
- 't Sass-Rolfes, M. (2019). The bigger picture. *Wildlife Ranching*, pp. 15–19. South Africa: MPL Media (Pty) Ltd.
- Turpie, J., Barnes, J., Lange, G.-M., & Martin, R. (2010). The Economic Value of Namibia's Protected Area System: In *Ministry of Environment and Tourism. Directorate of Wildlife and Parks Management*. Retrieved from <http://www.the-eis.com/data/literature/The Economic Value of Namibias Protected Area System.pdf>
- United Nations Educational Scientific and Cultural Organization. (2018). UNESCO condemns killing of six guards in Virunga National Park. Retrieved April 16, 2018, from 10 April website: <http://whc.unesco.org/en/news/1807>
- van Rooyen, M. (2019). Suncycles Namibia. *Conservation and the Environment in Namibia*, 20–23.
- Warden, C. R., Millin, M. G., Hawkins, S. C., & Bradley, R. N. (2012). Medical direction of wilderness and other operational emergency medical services programs. *Wilderness and Environmental Medicine*, 23(1), 37–43. <https://doi.org/10.1016/j.wem.2011.09.007>
- Welch, T. P. (1997). Data-based selection of medical supplies for wilderness travel. *Wilderness and Environmental Medicine*, 8(3), 148–151. [https://doi.org/10.1580/1080-6032\(1997\)008\[0148:DBSOMS\]2.3.CO;2](https://doi.org/10.1580/1080-6032(1997)008[0148:DBSOMS]2.3.CO;2)
- Winter, S. (2017). Battle against poachers: 740 rangers have been killed protecting elephants and rhinos. Retrieved April 16, 2018, from 31 July website: <https://www.express.co.uk/news/nature/835165/battle-poachers-rangers-killed-protecting-animals>
- World Health Organization. (2015). Health situation. *WHO Country Cooperation Strategy*, 570(April), 0–1. Retrieved from http://www.who.int/countryfocus/cooperation_strategy/ccsbrief_uga_en.pdf
- World Health Organization Regional Office for Africa. (2010). *Second Generation, WHO Country Cooperation Strategy, 2010-2015, Namibia*. Retrieved from http://apps.who.int/iris/bitstream/10665/136066/5/ccs_nam.pdf

World Travel and Tourism Council. (2018). *Economic Impact 2018 Namibia*.

World Wildlife Fund. (2016). *Ranger Perceptions Africa*.

World Wildlife Fund, & Ranger Federation of Asia. (2016). *Ranger Perceptions Asia*.

Yessis, J. L., Kost, R. G., Lee, L. M., Collier, B. S., & Henderson, D. K. (2012). Development of a Research Participants' Perception Survey to Improve Clinical Research. *Clinical and Translational Science*, 5(6), 452–460. <https://doi.org/10.1111/j.1752-8062.2012.00443.x>

Young, M., Kim, T., Lessard, E., Campagne, D., Spano, S., Farshidpour, L., & Stroh, G. (2018). Emergency Medical Services and Remote Medical Oversight in Sequoia and Kings Canyon National Parks, 2011–2013. *Wilderness and Environmental Medicine*, 29(4), 453–462. <https://doi.org/10.1016/j.wem.2018.06.009>

APPENDICES

Appendix A – Organisational Survey on Medical Readiness

Welcome to the Survey for Organisations on Medical Readiness for Rangers

Good day dear Participant

My name is Cornelia Bauer. I am an advanced life support paramedic, as well as a junior lecturer at the Namibia University of Science and Technology (NUST) in the Emergency Medical Care Programme. I am also currently enrolled for the Masters of Health Sciences degree at NUST. The research topic is: "Determining and evaluating the medical readiness of game/field rangers in the Namibian austere environment."

The aim for the surveys is to determine which injuries and illnesses occur in the field, how far medical facilities are from area of operation and which training/equipment is available for the rangers. My hope is to have an impact to the rangers in Namibia and be able to improve medical readiness should an emergency occur in the field. In order for me to be successful with this project I would greatly appreciate your participation in this survey to collect data on medical emergencies that have been encountered in the field.

Please be ensured that no personal information will be collected in this study and special care will be take that any and all information is kept confidential.

For any further information please feel free to contact me at cbauer@nust.na or 061-207 2267.

Thank you for your time.

Kind regards,

Cornelia

Consent Form

I hereby agree to participate in research regarding *the medical readiness of game/field rangers in the Namibian austere environment*. I understand that I am participating freely and without being forced in any way to do so. I also understand that I can stop participating in this research at any time should I not want to continue, and that this decision will not in any way affect me negatively.

The purpose of the study has been explained to me, and I understand what is expected of my participation. I understand that this is a research project whose purpose is not necessarily to benefit me personally.

I have received the number of a person to contact should I need to speak about any issues that may arise.

I understand that my answers will remain confidential.

* 1. I herewith consent to participate in the survey

☐ Yes

☐ No

Demographics

2. Which of the following best describes your organization?

- ☐ Government
- ☐ Private
- ☐ Non-profit organization
- ☐ Other (please specify)

3. What type of organization are you?

- | | |
|---|--|
| <input type="checkbox"/> National Park | <input type="checkbox"/> Communal Conservancy |
| <input type="checkbox"/> Private Game Reserve | <input type="checkbox"/> Tourism Concession Area |
| <input type="checkbox"/> Game Farm | <input type="checkbox"/> District Watch / Neighborhood watch |
| <input type="checkbox"/> Other (please specify) | |

4. In which region(s) do you currently operate? (Please complete one survey per region if operating in multiple regions)

- | | |
|------------------------------------|---------------------------------------|
| <input type="checkbox"/> Erongo | <input type="checkbox"/> Omaheke |
| <input type="checkbox"/> Hardap | <input type="checkbox"/> Omusati |
| <input type="checkbox"/> Karas | <input type="checkbox"/> Oshikoto |
| <input type="checkbox"/> Kavango | <input type="checkbox"/> Oshana |
| <input type="checkbox"/> Khomas | <input type="checkbox"/> Otjozondjupa |
| <input type="checkbox"/> Kunene | <input type="checkbox"/> Zambezi |
| <input type="checkbox"/> Ohangwena | |

5. Are you involved in any way with rangers (either by training or employing {including volunteer programs} them)? (*Rangers can include, but are not limited to game / field rangers, wardens, guides, nature conservationists, anyone that is involved in the safekeeping of wildlife*)

- ☐ Yes
- ☐ No

Training or Employment

6. How are you involved with rangers?

- ☐ Training only
- ☐ Employment / Volunteer Program
- ☐ Both

Demographics - Employment (complete if answered EMPLOYMENT / BOTH to Q6)

7. How many rangers are currently in your employment?

- ☐ 1 - 50
- ☐ 51 - 100
- ☐ 101 - 300
- ☐ More than 300

8. What type of employment are they under? (Tick all applicable)

- ☐ Permanent
- ☐ Temporary
- ☐ Volunteers

APU activities

9. Are any of your rangers involved in anti-poaching activities?

(Anti-poaching activities can include, but are not limited to patrolling an area, ensuring safety for animals (including livestock and game), possibly engaging poachers when intercepting them.)

- ☐ Yes
- ☐ No

APU specific questions (complete if answered YES to Q9)

10. How many staff members form part of an anti-poaching unit?

- ☐ 1 - 5
- ☐ 5 - 10
- ☐ 10 - 20
- ☐ More than 20

11. How many members are in a patrolling team on average?

- ☐ 1 - 2 ☐ 10 - 20
- ☐ 3 - 5 ☐ More than 20
- ☐ 5 - 10

12. What is your most common mode(s) of patrol? (Select all that are applicable)

- ☐ By foot ☐ By air
- ☐ By vehicle ☐ By boat
- ☐ By motorbike / quadbike ☐ By horseback
- ☐ Other (please specify)

13. What is the size of the area being patrolled?

- | | |
|---|--|
| <input type="radio"/> 0 - 2500 hectare | <input type="radio"/> 10 001 - 50 000 |
| <input type="radio"/> 2501 - 5000 hectare | <input type="radio"/> More than 50 000 |
| <input type="radio"/> 5001 - 10 000 hectare | |

Medical Background - Facilities

14. What is the nearest medical facility to you?

- ☐ Doctor's office
- ☐ Clinic
- ☐ Hospital

15. What is the distance from site to the nearest medical facility (hospital, clinic, doctor's office)?

- | | |
|---------------------------------|-----------------------------------|
| <input type="radio"/> 0-10 km | <input type="radio"/> 101-200 km |
| <input type="radio"/> 11-50 km | <input type="radio"/> 201-300 km |
| <input type="radio"/> 51-100 km | <input type="radio"/> Above 300km |

16. How long would it take to reach the nearest medical facility?

- | | |
|--|---|
| <input type="radio"/> Less than 1 hour | <input type="radio"/> 3 - 5 hours |
| <input type="radio"/> 1 - 3 hours | <input type="radio"/> More than 5 hours |

17. What is your primary mode(s) of transport to the medical facility in case of an emergency? (Select all that are applicable)

- ☐ Ambulance
- ☐ Vehicles readily available
- ☐ Provided by employee
- ☐ Air evacuation
- ☐ Other (please specify)

18. What is the distance from site to nearest the Hospital?

- | | |
|------------------------------------|------------------------------------|
| <input type="radio"/> 0 - 50 km | <input type="radio"/> 201 - 500 km |
| <input type="radio"/> 51 - 100 km | <input type="radio"/> 501 - 750 km |
| <input type="radio"/> 101 - 200 km | <input type="radio"/> Above 750 km |

19. How long would it take to reach the nearest Hospital?

- ☐ Less than 1 hour
- ☐ 1 - 3 hours
- ☐ 3 - 5 hours
- ☐ More than 5 hours

Medical Background - First Aid Kits

20. Do you provide rangers with first aid kits as part of their everyday equipment?

☐ Yes

☐ No

☐ Some

First Aid Kit Content (complete if answered YES/SOME to Q20)

21. Please indicate **all items** that form part of the first aid kit:

☐ Anti-diarrhea tablets

☐ Plaster

☐ Anti-inflammatory tablets

☐ Rehydrate solution

☐ Antiseptic creme

☐ Safety pins

☐ Burnshield 100x100mm

☐ Scissor

☐ Burnshield 200x200mm

☐ Space Blanket

☐ Conforming Bandages 100mm

☐ Splints

☐ Conforming Bandages 75mm

☐ Sterile Gauze swab

☐ Elastic adhesive tape 25mm

☐ Steri-strips

☐ First Aid Dressing 3

☐ Tape 25mm

☐ First Aid Dressing 5

☐ Tourniquet

☐ Gloves

☐ Triangular Bandages

☐ Hemostat agent

☐ Tweezers

☐ Med-Lemon

☐ Unsterile Gauze swab

☐ Nausea Tablets

☐ Wound cleaner (antiseptic solution)

☐ Pain killers

☐ Other (please specify)

Medical Background - Injuries

22. Have any injuries your rangers ever occurred on duty?

☒ Yes

☐ No

Injuries on duty (complete if answered YES to Q22)

23. What were these injuries caused by? (Select all that are applicable)

☐ Wildlife encounter (attacked by an animal, i.e. lion, hippo, etc)

☐ Snakebite

☐ Poacher involvement

☐ Community involvement

☐ Other (please specify)

24. What type of injuries occurred and in which year / how long ago? (Please specify)

Medical Background - Illnesses

25. Have any rangers ever become ill on duty / in the field?

☒ Yes

☐ No

Illness on duty (complete if answered YES to Q25)

26. What type of illnesses? (Please specify)

Medical Background - Death

27. Have any rangers ever died on duty?

☒ Yes

☐ No

Death statistics (complete if answered YES to Q27)

28. How many of your rangers have died in the line of duty?

0 50 100



29. What was the cause of death and in which year did it occur? (Please specify)

First Aid Training

30. Do all your rangers have some form of first aid training?

☐ Yes (all of the rangers)

☐ No (none of the rangers)

☐ Some of the rangers

Type of First Aid Training (complete if answered YES / SOME to Q30)

Herewith find a brief description of the different first aid training levels:

Basic: *one day course (can be formal or informal training)*

Class A: *three day course (formal)*

Advanced: *longer than three days training (formal)*

31. Which level of first aid training do the rangers receive?

☐ Basic

☐ Class A

☐ Advanced

32. Are the first aid courses renewed every 2-3 years?

☐ Yes

☐ No

Training Background

33. Do you offer any training for rangers at your organization?

☐ Yes

☐ No

Training provided (complete if answered YES to Q33)

34. Which training do you provide to rangers? (Please specify)

35. Does first aid training form part of this?

☐ Yes

☐ No

Type of First Aid Training (complete if answered YES to Q35)

Herewith find a brief description of the different first aid training levels:

Basic: *one day course (formal or informal)*

Class A: *three day course (formal)*

Advanced: *longer than three days training (formal)*

36. Which level of first aid training do the rangers receive?

☐ Basic

☐ Class A

☐ Advanced

Are the first aid courses renewed every 2-3 years?

☐ Yes

☐ No

Appendix B - Ranger Medical Readiness Survey

Welcome to the Ranger Medical Readiness Survey

Good day dear Ranger

My name is Cornelia Bauer. I am an advanced life support paramedic, as well as a junior lecturer at the Namibia University of Science and Technology (NUST) in the Emergency Medical Care Programme. I am currently enrolled for the Masters of Health Sciences degree at NUST. The research topic is: "Determining and evaluating the medical readiness of game/field rangers in the Namibian austere environment."

The aim for the surveys is to determine which injuries and illnesses occur in the field, how far medical facilities are from area of operation and which training/equipment is available for the rangers. My hope is to make an impact to the game rangers in Namibia and be able to improve medical readiness should an emergency occur in the field. In order for me to be successful with this project I would greatly appreciate your participation in this survey to collect data on medical emergencies that have been encountered in the field.

Please be ensured that no personal information will be collected in this study and special care will be take that any and all information is kept confidential. For any further information please feel free to contact me at cbauer@nust.na or 061-207 2267.

Thank you for your time.

Kind regards,

Cornelia

Consent Form

I hereby agree to participate in research regarding *the medical readiness of game/field rangers in the Namibian austere environment*. I understand that I am participating freely and without being forced in any way to do so. I also understand that I can stop participating in this research at any time should I not want to continue, and that this decision will not in any way affect me negatively.

The purpose of the study has been explained to me, and I understand what is expected of my participation. I understand that this is a research project whose purpose is not necessarily to benefit me personally. I have received the number of a person to contact should I need to speak about any issues that may arise.

I understand that my answers will remain confidential.

* 1. I herewith consent to participating in this survey

☐ Yes

☐ No

Demographics

2. What is your gender?

☐ Male

☐ Female

3. In which age group are you?

☐ Under 20

☐ 40 - 49

☐ 20 - 29

☐ Above 50

☐ 30 - 39

4. What position do you hold? Please specify

5. What type of organisation are you working for?

☐ National Park

☐ Communal Conservancy

☐ Private Game Reserve

☐ Tourism Concession Area

☐ Game Farm

☐ District Watch / Neighbourhood Watch

☐ Other (please specify)

6. How long have you served as a ranger?

☐ Less than 1 year

☐ 10 - 20 years

☐ 1 - 5 years

☐ More than 20 years

☐ 5 - 10 years

7. In which region of Namibia are you deployed / working?

☐ Erongo

☐ Omaheke

☐ Hardap

☐ Omusati

☐ Karas

☐ Oshikoto

☐ Kavango

☐ Oshana

☐ Khomas

☐ Otjozondjupa

☐ Kunene

☐ Zambezi

☐ Ohangwena

8. Are anti-poaching activities part of your duties?

(Anti-poaching activities can include, but are not limited to patrolling an area, ensuring safety for animals (including livestock and game), possibly engaging poachers when intercepting them.)

☐ Yes

☐ No

APU specific questions (complete if answered YES to Q8)

9. How many rangers are at your station / workplace

- ☐ 1 – 10 ☐ 50 - 75
☐ 11 - 25 ☐ 75 – 100
☐ 26 - 50 ☐ Above 100

10. What type of employment are you under?

- ☐ Temporary
☐ Permanent
☐ Volunteer
☐ Other (please specify)

11. How many members are in a patrolling team on average?

- ☐ 1 - 2 ☐ 10 - 20
☐ 3 - 5 ☐ More than 20
☐ 5 - 10

12. What is your primary mode of patrol? (Select one)

- ☐ By foot ☐ By air
☐ By vehicle ☐ By boat
☐ By motorbike / quadbike ☐ By horseback
☐ Other (please specify)

13. What other modes of patrol do you use? (Select all that are applicable)

- ☐ By foot ☐ By air
☐ By vehicle ☐ By boat
☐ By motorbike / quadbike ☐ By horseback
☐ Other (please specify)

Medical Background - Facilities

14. What is the nearest medical facility to you?

- ☐ Clinic
☐ Doctor
☐ Hospital
☐ Do not know / Unsure

15. What is the distance from your site of employment to the nearest medical facility (hospital, clinic, doctor's office)?

- | | |
|----------------------------------|--|
| <input type="radio"/> 0-10 km | <input type="radio"/> 201-300 km |
| <input type="radio"/> 11-50 km | <input type="radio"/> Above 300km |
| <input type="radio"/> 51-100 km | <input type="radio"/> Do not know / unsure |
| <input type="radio"/> 101-200 km | |

16. How long would it take to reach the nearest medical facility?

- ☐ Less than 1 hour
- ☐ 1 - 5 hours
- ☐ More than 5 hours
- ☐ Do not know / unsure

17. What is your most common mode of transport to the medical facility in case of an emergency? (Select all that are applicable)

- | | |
|---|--|
| <input type="checkbox"/> Ambulance | <input type="checkbox"/> Vehicle readily available |
| <input type="checkbox"/> Self-provided | <input type="checkbox"/> Air evacuation |
| <input type="checkbox"/> Provided by employer | <input type="checkbox"/> Do not know / unsure |

18. What is the distance from your site of employment to the nearest Hospital?

- | | |
|------------------------------------|--|
| <input type="radio"/> 0 - 50 km | <input type="radio"/> 501 - 750 km |
| <input type="radio"/> 51 - 100 km | <input type="radio"/> Above 750 km |
| <input type="radio"/> 101 - 200 km | <input type="radio"/> Do not know / unsure |
| <input type="radio"/> 201 - 500 km | |

19. How long would it take to reach the nearest Hospital?

- | | |
|--|--|
| <input type="radio"/> Less than 1 hour | <input type="radio"/> More than 5 hours |
| <input type="radio"/> 1 - 2 hours | <input type="radio"/> Do not know / unsure |
| <input type="radio"/> 3 - 5 hours | |

20. Do you have at least one first aid kit in each patrolling team in the field?

- ☐ Yes
- ☐ No
- ☐ Sometimes

21 Do you carry a first aid kit as part of your standard equipment?

- ☐ Yes
- ☐ No

First Aid Kit Content (complete if answered YES to Q21)

22. Please indicate **all items** that form part of your first aid kit.

- | | |
|---|--|
| <input type="checkbox"/> Anti-diarrhea tablets | <input type="checkbox"/> Plaster |
| <input type="checkbox"/> Anti-inflammatory tablets | <input type="checkbox"/> Rehydrate solution |
| <input type="checkbox"/> Antiseptic creme | <input type="checkbox"/> Safety Pins |
| <input type="checkbox"/> Burn shield 100x100mm | <input type="checkbox"/> Scissor |
| <input type="checkbox"/> Burn shield 200x200mm | <input type="checkbox"/> Space Blanket |
| <input type="checkbox"/> Conforming Bandages 100mm | <input type="checkbox"/> Splints |
| <input type="checkbox"/> Conforming Bandages 75mm | <input type="checkbox"/> Sterile gauze swabs |
| <input type="checkbox"/> Elastic adhesive tape 25mm | <input type="checkbox"/> Steri-strips |
| <input type="checkbox"/> First aid dressing 3 | <input type="checkbox"/> Tape 25mm |
| <input type="checkbox"/> First Aid dressing 5 | <input type="checkbox"/> Tourniquet |
| <input type="checkbox"/> Gloves | <input type="checkbox"/> Triangular Bandages |
| <input type="checkbox"/> Hemostat agent | <input type="checkbox"/> Tweezers |
| <input type="checkbox"/> Med-Lemon | <input type="checkbox"/> Unsterile gauze swabs |
| <input type="checkbox"/> Nausea Tablets | <input type="checkbox"/> Wound cleaner (antiseptic solution) |
| <input type="checkbox"/> Pain killers | |
| <input type="checkbox"/> Other (please specify) | |

Medical Background - Life-threatening situations

23. Have you ever encountered a life-threatening situation while on duty?

☐ Yes

☒ No

Life-threatening encounters (complete if answered YES to Q23)

24. What caused this life-threatening encounter? (Select all that are applicable)

- ☐ Wildlife encounters (attacked by animal, i.e. lion, hippo, etc / snakebite)
- ☐ Attacked by poachers
- ☐ Threatened by poachers
- ☐ Threatened by communities
- ☐ Other (please specify)

Medical Background - Injuries

25. Have you ever been injured in the line of duty?

☒ Yes

☐ No

Injuries on duty (complete if answered YES to Q25)

26. Who / what inflicted these injuries? (Select all that are applicable)

☐ Wildlife encounters

☐ Snakebite

☐ Poacher involvement

☐ Community involvement

☐ Other (please specify)

27. What type of injuries did occur and in which year / how long ago? (Please specify)

Medical Background - Illnesses

28. Have you ever been ill on duty (in the field)?

☒ Yes

☐ No

Illness on duty (complete if answered YES to Q28)

29. What type of illnesses did you experience? (Please specify)

Medical Background - Death

30. Have you experienced colleagues dying on duty?

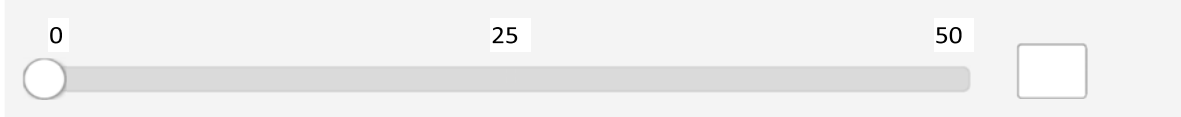
☐ Yes

☒ No

Death statistics (complete if answered YES to Q30)

31. How many of your colleagues have died in the line of duty?

0 25 50



32. What was the cause of death and in which year did it occur? (Please specify)

First Aid Training Background

33. Have you received any first aid training?

☐ Yes

☒ No

Type of First Aid Training (complete if answered YES to Q33)

To answer the next question herewith a basic description of term used:

Basic: one day course (includes formal and informal training)

Class A: three day course (formal)

Advanced: longer than a three day training course (formal)

34. What type of first aid training did you receive?

☐ Basic

☒ Class A

☐ Advanced

☒ Other (please specify)

35. Do you receive updates in training every 2-3 years?

☒ Yes

☐ No

First Aid Training Background - Training Improvements

36. Do all rangers receive first aid training?

☐ Yes

☒ No

37. Do you feel adequately trained to deal with a medical situation?

☐ Yes

☒ No

☐ Do not know / unsure

Training improvements (complete if answered NO / UNSURE to Q37)

38. What additional training would you require to be adequately prepared for a medical situation?

First aid training Background - Equipment Improvements

39. Do you feel adequately equipped to deal with a medical situation?

☐ Yes

☒ No

☐ Do not know / unsure

Equipment improvements (complete if answered NO / UNSURE to Q39)

40. What equipment requirements do you suggest to be adequately equipped for a medical emergency?

Appendix C – Personal First Aid Field Kit Survey

Good day dear participant

My name is Cornelia Bauer. I am an advanced life support paramedic, as well as a junior lecturer at the Namibia University of Science and Technology (NUST) in the Emergency Medical Care Programme. I am currently enrolled for the Masters of Health Sciences degree at NUST. My research topic is: "Determining the medical readiness of game rangers in the Namibian austere environment"

As part of my study I am trying to establish what should form part of a personal first aid field kit for anyone that is often in remote areas and may be patrolling on foot. The background to this is to determine what would be most needed in a first aid kit that can be carried in the field on a daily basis in the remote areas of Namibia. With this background in mind, I request you to participate in this short survey.

Please be ensured that no personal information will be collected in this study and special care will be taken that any and all information is kept confidential. The survey is anonymous. For any further information please feel free to contact me at cbauer@nust.na or 061-207 2267. Thank you for your time and participation.

Kind regards, Cornelia

Consent Form

I hereby agree to participate in the survey on requirements for a field first aid kit. I understand that I am participating freely and without being forced in any way to do so. I also understand that I can stop participating in this research at any time should I not want to continue, and that this decision will not in any way affect me negatively.

The purpose of the study has been explained to me, and I understand what is expected of my participation. I understand that this is a research project whose purpose is not necessarily to benefit me personally.

I have received the number of a person to contact should I need to speak about any issues that may arise. I understand that my answers will remain confidential.

1. I herewith consent to participate in this survey

☐ Yes

☐ No

Basic Demographics

2. What is your gender?

☐ Male

☐ Female

3. In which age group are you?

☐ Under 20

☐ 40-49

☐ 20-29

☐ 50-59

☐ 30-39

☐ 60+

4. What is your highest educational background?

- ☐ Primary School
- ☐ Secondary School
- ☐ Tertiary Education
- ☐ Vocational Training
- ☐ Other (please specify)

5. What is your occupation?

6. In which region of Namibia are you located?

- | | |
|---|---------------------------------------|
| <input type="checkbox"/> Erongo | <input type="checkbox"/> Ohangwena |
| <input type="checkbox"/> Hardap | <input type="checkbox"/> Omaheke |
| <input type="checkbox"/> Karas | <input type="checkbox"/> Omusati |
| <input type="checkbox"/> Kavango | <input type="checkbox"/> Oshikoto |
| <input type="checkbox"/> Khomas | <input type="checkbox"/> Oshana |
| <input type="checkbox"/> Kunene | <input type="checkbox"/> Otjozondjupa |
| <input type="checkbox"/> Other (please specify) | <input type="checkbox"/> Zambesi |

7. What is your average distance to the nearest Hospital?

- ☐ 0-10 km
- ☐ 11-50 km
- ☐ 51-100 km
- ☐ 101-300 km
- ☐ 301-500 km
- ☐ Above 500 km

8. Are you a ranger or involved / associated in any way with rangers?

(Rangers can include, but are not limited to game / field rangers, wardens, community game guards, guides, hunting guides, nature conservationists, anyone that is involved in the safekeeping of wildlife)

- ☐ Yes
- ☐ No

9. Indicate what would be best suited for a personal field first aid kit



Backpack Type



Smaller Pouch Type



First Aid Box



Grabber Bag

Personal Protection Equipment

Please select all items that you consider would be necessary to have in a personal first aid field kit. It should be considered that this first aid kit should be used in remote areas and be carried on a person at all times.

10. Indicate all items that are suitable for a personal first aid field kit: Personal Protective Equipment



Gloves



Safety Glasses



CPR mouthpiece



Pocket mask

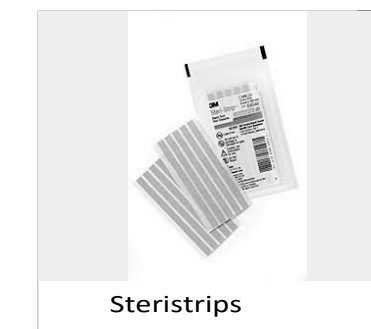
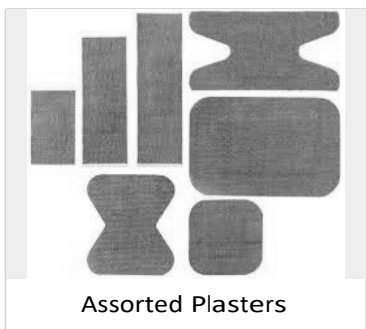
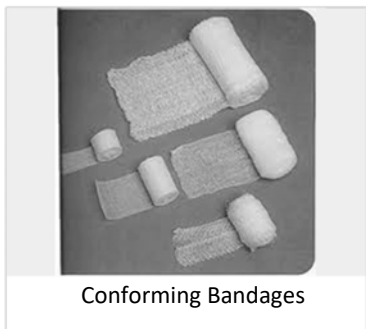
11. Of these items how many would you deem necessary to have in the first aid kit? Only place a quantity next to the items that you selected above.

Gloves (pairs)	<input type="text"/>
Eye Protection	<input type="text"/>
CPR mouthpiece	<input type="text"/>
Pocket Mask	<input type="text"/>

Hemorrhage Control

Please select all items that you consider would be necessary to have in a personal first aid field kit. It should be considered that this first aid kit should be used in remote areas and be carried on a person at all times.

12. Indicate all items that would be best suited for a personal first aid field kit



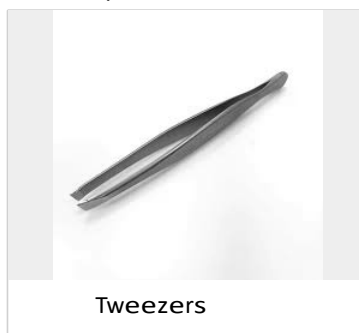
13. Of these items how many would you deem necessary to have in the first aid kit? Only place a quantity next to the items that you selected above.

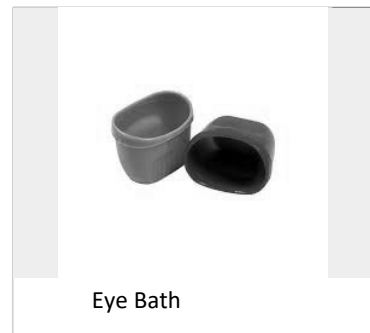
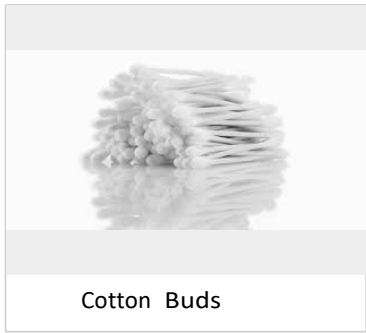
Conforming Bandage 75mm	
Conforming Bandage 100mm	
First Aid dressing no 3	
First Aid dressing no 5	
Sterile gauze	
Unsterile gauze (packets)	
Triangular Bandages	
Tourniquet	
Assorted Plasters	
Elastic adhesive tape 25mm	
Transpore Tape 25mm	
Steristrips	

Miscellaneous

Please select all items that you consider would be necessary to have in a personal first aid field kit. It should be considered that this first aid kit should be used in remote areas and be carried on a person at all times.

14. Indicate all items that would be suitable in a personal first aid field kit





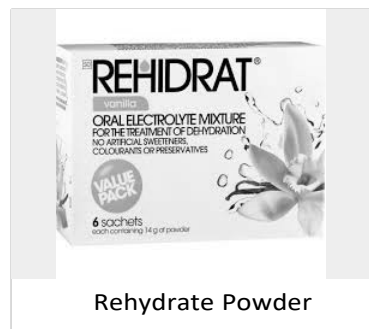
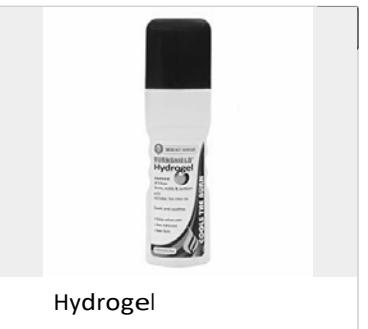
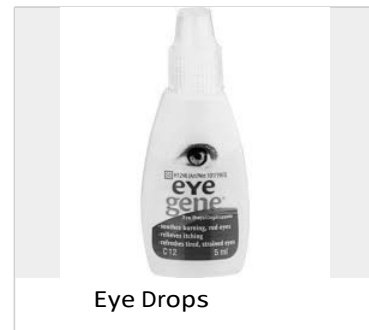
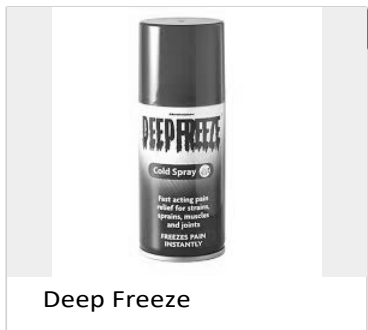
15. Of these items how many would you deem necessary to have in the first aid kit? Only place a quantity next to the items that you selected above.

Crepe Bandage 75mm	<input type="text"/>
Crepe Bandage 100mm	<input type="text"/>
Safety Pins	<input type="text"/>
Rescue Scissor	<input type="text"/>
Rescue Blanket	<input type="text"/>
Splints	<input type="text"/>
Crepe Bandage 75 mm	<input type="text"/>
Crepe Bandage 100 mm	<input type="text"/>
Cotton Buds	<input type="text"/>
Cotton Wool Roll	<input type="text"/>
Eye Bath	<input type="text"/>
Eye Pad / Shield	<input type="text"/>

Topical

Please select all items that are you consider would be necessary to have in a personal first aid field kit. It should be considered that this first aid kit should be used in remote areas and be carried on a person at all times.

16. Indicate all items that would be suitable in a personal first aid field kit



17. Of these items how many would you deem necessary to have in the first aid kit? Only place a quantity next to the items that you selected above.

Antiseptic solution	<input type="text"/>
Hydrocortisone Creme / Anthisan	<input type="text"/>
Betadine / AntisepticCreme	<input type="text"/>
Burnshield 100x100mm	<input type="text"/>
Burnshield 200x200mm	<input type="text"/>
Deep Freeze Spray	<input type="text"/>
Eye Drops	<input type="text"/>
Glucogel 25g packets	<input type="text"/>
Hydrogel 50ml	<input type="text"/>
Rehydrate packets	<input type="text"/>

Medication in First Aid Kits

As a general practice first aid boxes do not contain any medication. Considering the vastness of our country it may be beneficial if personal first aid field kits contain medication.

18. Indicate which medication you would consider essential in a personal first aid kit.

- | | |
|---|---|
| <input type="checkbox"/> Berroca (Vitamins) | <input type="checkbox"/> Immodium (Diarrhea) |
| <input type="checkbox"/> Cal-C-Vita (Cold & Flu) | <input type="checkbox"/> Gavison (Heartburn) |
| <input type="checkbox"/> Advil Cold and Flu Tablets | <input type="checkbox"/> Allergex (Allergies) |
| <input type="checkbox"/> Med Lemon (Cold & Flu) | <input type="checkbox"/> Antihistamines (Allergies) |
| <input type="checkbox"/> Strepsils / Halls lozengs | <input type="checkbox"/> Panado (Pain) |
| <input type="checkbox"/> Acc 200 (Cold & Flu - drying fluids) | <input type="checkbox"/> Compral (Pain) |
| <input type="checkbox"/> Buscopan (Stomach Cramps) | <input type="checkbox"/> Cataflam (Anti-Inflammatory) |
| <input type="checkbox"/> Valoid (Nausea & Vomiting) | <input type="checkbox"/> Ibupain (Anti-inflammatory) |

19. Of these medications how many of each would you deem necessary to have in the personal first aid field kit? Only place a quantity next to the items that you specified above.

Berroca tube	<input type="text"/>
Cal-C-Vita tube	<input type="text"/>
Advil Cold and Flu packet	<input type="text"/>
Med Lemon (Packet of 8)	<input type="text"/>
Strepsils / Halls Lozenges	<input type="text"/>
ACC 200 tube	<input type="text"/>
Buscopan packet	<input type="text"/>
Valoid packet	<input type="text"/>
Immodium packet	<input type="text"/>
Gaviscon packet	<input type="text"/>
Allergex packet	<input type="text"/>
Antihistamines packet	<input type="text"/>
Panado packet	<input type="text"/>
Compral packet	<input type="text"/>
Cataflam packet	<input type="text"/>
Ibupain packet	<input type="text"/>

Extra Suggestions

20. Are there any other items oder medication that should be in a field first aid kit?

Item 1	<input type="text"/>
Item 2	<input type="text"/>
Item 3	<input type="text"/>
Item 4	<input type="text"/>
Item 5	<input type="text"/>

21. Of these items how many would you deem necessary to have in the first aid kit? Only place a quantity next to the items that you specified above.

Item 1	<input type="text"/>
Item 2	<input type="text"/>
Item 3	<input type="text"/>
Item 4	<input type="text"/>
Item 5	<input type="text"/>

22. Rank the importance of extra item mentioned above for a personal first aid field kit

	Not at all important	Slightly important	Moderately important	Very important	Extremely important	N/A
Item 1	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Item 2	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>
Item 3	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Item 4	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>
Item 5	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

23. Rank how often you have / would use the items you specified above

	Never	Rarely	Sometimes	Often	Always	N/A
Item 1	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Item 2	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>
Item 3	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Item 4	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>
Item 5	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Importance of items

24. Rank the importance of each item for a personal first aid field kit

	Not at all important	Slightly important	Moderately important	Very important	Extremely important
Gloves	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Eye Protection	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
CPR mouthpieces	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Pocket Mask	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Conforming Bandages (Bleeding)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
First Aid Dressings (Bleeding)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sterile Gauze (Bleeding)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Unsterile Gauze (Bleeding)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Triangular Bandage (Slings, Bandages, etc)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Tourniquet (Bleeding)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Assorted Plasters	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Tape / Elastoplast	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Steristrips (Wound closure)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Safety Pins	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Tweezers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Rescue Scissors	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Rescue Blanket	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Splints	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Crepe Bandages (Strains & Sprains)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cotton Buds	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cotton Wool Roll	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Eye Bath	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Eye Pad / Shield	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Antiseptic solution	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Hydrocortisone creme / Anthisan (Stings, insect bites & itchy skin)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Betadine / Antiseptic creme	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Burnshield	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Deep Freeze (Muscle sprains)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Eye Drops	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Glucogel (Glucose)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Hydrogel (Burns)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Rehydrate	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Voltaren / Muscle Rub	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Importance of items: Medication

25. Indicate the importance of the different medication considering a personal field first aid kit.

	Not at all important	Slightly important	Moderately important	Very important	Extremely important
Berroca (Vitamins)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cal-C-Vita (Cold & Flu)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Advil Cold and Flu Tablets	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Med Lemon (Cold & Flu)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Strepsils / Halls lozenges	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Acc 200 (Cold & Flu - drying mucous)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Buscopan (Stomach Cramps)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Valoid (Anti-nausea)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Immodium (Anti-diarrhea)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Gaviscon (Heart-burn)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Allergex (Allergies)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Antihistamines (Allergies)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Panado (Pain)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Compral (Pain)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cataflam (Anti-inflammatory)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ibupain (Anti-inflammatory)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Use of items

26. How often have / would you use the item?

	Never	Rarely	Sometimes	Often	Always
Gloves	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Eye Protection	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
CPR mouthpieces	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Pocket Mask	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Conforming Bandages (Bleeding)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
First Aid Dressings (Bleeding)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sterile Gauze (Bleeding)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Unsterile Gauze (Bleeding)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Triangular Bandage (Slings, Bandages, etc)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Tourniquet (Bleeding)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Assorted Plasters	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Tape / Elastoplast	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Steristrips (Wound closure)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Safety Pins	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Tweezers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Rescue Scissors	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Rescue Blanket	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Splints	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Crepe Bandages (Strains & Sprains)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cotton Buds	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cotton Wool Roll	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Eye Bath	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Eye Pad / Shield	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Antiseptic solution	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Hydrocortisone creme / Anthisan (Stings & itchy skin)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Betadine / Antiseptic creme	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Burnshield	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Deep Freeze (Muscle sprains)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Eye Drops	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Glucogel (Glucose)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Hydrogel (Burns)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Rehydrate	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Voltaren / Muscle Rub	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Use of medication

27. How often have / would you use the medication?

	Never	Rarely	Sometimes	Often	Always
Berroca (Vitamins)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cal-C-Vita (Cold & Flu)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Advil Cold and Flu Tablets	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Med Lemon (Cold & Flu)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Strepsils / Halls lozenges	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Acc 200 (Cold & Flu - drying mucous)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Buscopan (Stomach Cramps)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Valoid (Anti-nausea)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Immodium (Anti-diarrhea)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Gaviscon (Heart-burn)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Allergex (Allergies)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Antihistamines (Allergies)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Panado (Pain)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Compral (Pain)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cataflam (Anti-inflammatory)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ibupain (Anti-inflammatory)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Appendix D – Recommended Personal First Aid Field Kit

The first list shows recommended items that should form part of the Personal First Aid Field Kit which ideally each ranger should always carry with him as part of his standard equipment.

Personal First Aid Field Kit	
Quantity	Item
2	Pairs of Gloves (Medium or Large)
1	Roll Tape or Elastoplast (can also be Duct Tape)
1	Sterile Gauze 100x100mm
1	Conforming Bandage 100mm
1	First Aid Dressing no 3 / Emergency Trauma Dressing
2	Rehydrate Packets
1	Rescue Scissor
1	Rescue Blanket
2	Triangular Bandages
1	Tourniquet
2	Haemostatic Dressing / Roll of Gauze
1	Water purification (tablets/filter)

The second list shows recommended items that from a bigger pack to treat common ailments in a unit. This should be packed in a backpack type carry case to take with into the field.

Field Kit for Unit	
Quantity	Item
5	Pairs of Gloves (Medium or Large)
1	Roll Tape or Elastoplast (can also be Duct Tape)
4	Sterile Gauze 100x100mm
2	Conforming Bandage 100mm
2	Conforming Bandage 75mm
2	First Aid Dressing no 3 / Emergency Trauma Dressing
1	First Aid Dressing no 5
5	Rehydrate Packets
1	Rescue Scissor
2	Rescue Blanket

5	Triangular Bandages
2	Tourniquet
2	Haemostatic Dressing / Roll of Gauze
1	Antiseptic Solution
1	Antiseptic / antibiotic crème
2	CPR mouthpiece
1	Burnshield 100x100mm
20	Assorted Plasters Waterproof
1	Hydrocortisone/ Antihistamine Crème
1	Unsterile gauze pack 100x100
1	Tweezers
2	Crepe Bandage 100mm
1	Packet of Anti-diarrhoea tablets
1	Packet of Anti-spasmodic tablets
1	Packet of Anti-emetic tablets
1	Packet of Paracetamol
1	Packet of Allergex/Antihistamine tablets
1	Packet of Anti-inflammatory tablets
Optional additional items	
2	Glucogel
1	SAM splint
1	Packet Med Lemon or Advil Cold & Flu
1	Tissue Glue

Appendix E – News blog publication on SCIONA webpage

The medical readiness of Game Rangers in the Kunene Region

Author: Cornelia Bauer

Published: on 5 December 2019 as a news blog at sciona.nust.na

As part of a Master of Health Sciences Research Project, the medical readiness of Game Rangers is evaluated in the Namibian austere environment. Surveys were conducted in Organizations and Game Rangers in the various regions in Namibia. SCIONA assisted with some data collection for this study. There were ten Rangers and three Organizations who responded from the Kunene Region to the surveys. A brief description of their answers is presented here.

It was found that most Rangers (89%) have experienced a life-threatening encounter (Table 1) in the field. Additionally, many have experienced injury (Table 2 and Table 3) or illness while on duty (Table 4). These range from scratches, broken bones and head injuries to stomach cramps, dehydration, headaches and fever.

Furthermore, the closest medical facilities are mostly clinics, which are between 11 and 100 km away from the site of operation. With a poor road network and rugged terrain dominating the area, time taken to travel to clinics is long, at least three hours or more. Hospitals on the other hand, which can provide more definitive treatment, are at least 100 km away and it would in most cases take more than five hours to reach. In life-threatening situations this is likely to reduce the chances of survival significantly. Starting life-saving measures and first aid treatment are thus essential skills for rangers to learn. Despite this 89% of the Rangers reported that they do not receive any first aid training, nor do they have a first aid kit available for an emergency. It is thus recommended that emphasis is being placed on providing the Game Rangers with first aid training and first aid kits.

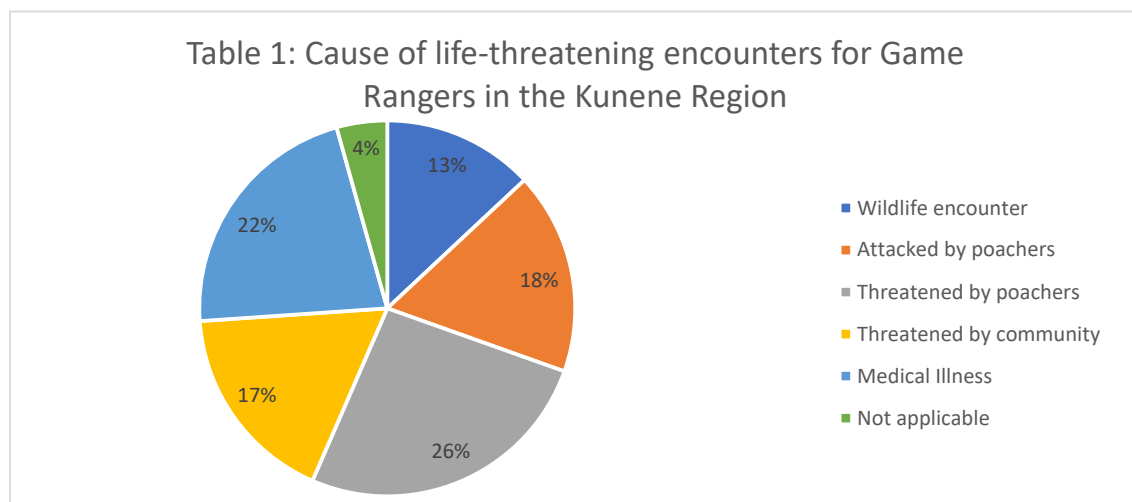


Table 2: Comparison of cause of injuries between Ranger and Organizational responses

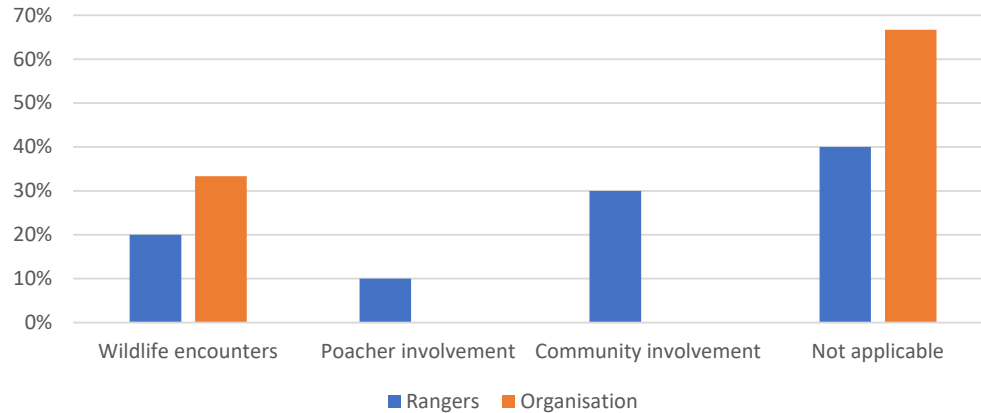


Table 3: Comparison of type of injuries occurring on duty between Ranger and Organizational Responses

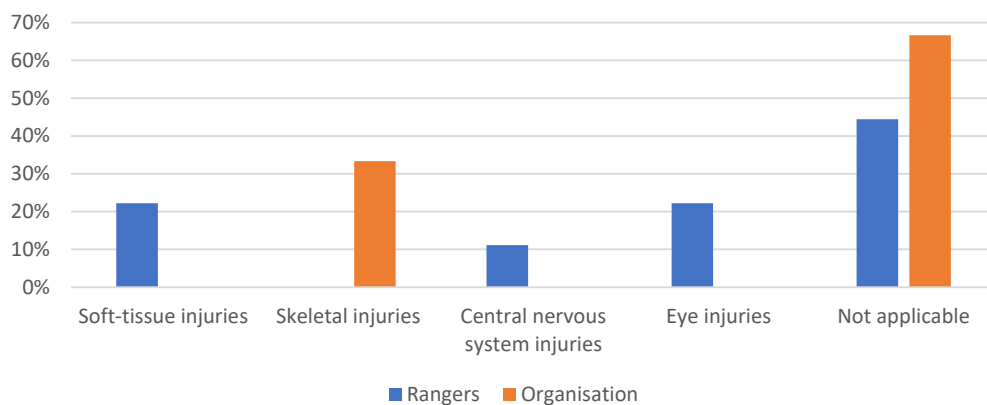


Table 4: Comparison of illnesses occurring in the field between Ranger and Organizational responses

