

**A DESCRIPTIVE OF THE FACTORS INFLUENCING THE IMPLEMENTATION OF  
RUGBY INJURY PREVENTION STRATEGIES IN NAIROBI, KENYA**



**FRANCIS BOGONKO LAMECH**

**Student No: 3169560**

**A thesis submitted in partial fulfillment of the requirements for the degree of Masters of  
Science in the Department of Physiotherapy, University of the Western Cape,**

**Cape Town, South Africa**

**Supervisor: Prof. Julie Phillips**

**Co-supervisor: Mr. Hamilton Pharaoh**

**Date: March 2013**

**DEDCLARATION**

I hereby declare that: “**A DESCRIPTIVE OF THE FACTORS INFLUENCING THE IMPLEMENTATION OF RUGBY INJURY PREVENTION STRATEGIES IN NAIROBI, KENYA**” is my own work, that it has not been submitted, or part of it, for any degree or examination in any other university, and that all the sources I have used or quoted have been indicated and acknowledged by means of complete references.

Signature: .....

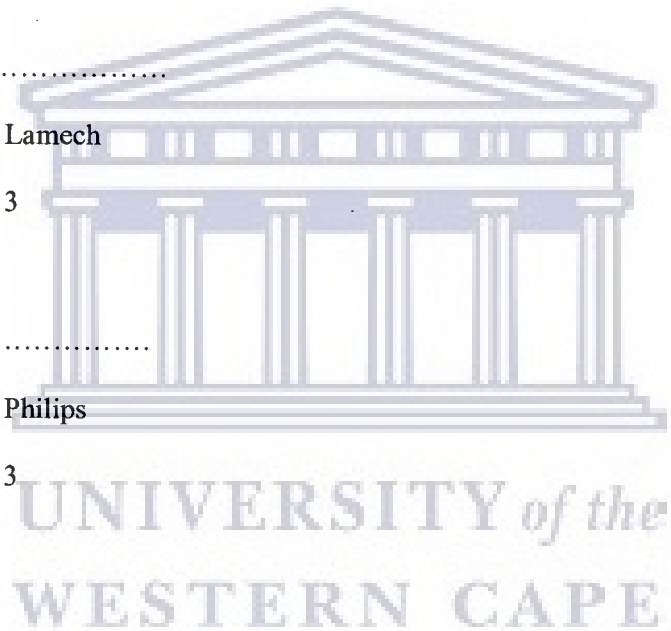
Francis B. Lamech

March 2013

Witness: .....

Prof. Julie Philips

March 2013



## DEDICATION

I dedicate this Thesis to my father **RAMESH LAMECH BOGONKO** and my mother **YUNIAH KERUBO**, for the prayers, support and encouragement they gave me throughout and making it possible for me to finish up my studies.

Secondly I dedicate this Thesis to my brothers, sisters and family members for the love and support they have shown me throughout my study period.



## ACNOWLEDGEMENT

I am grateful to God for His mercy, blessings and protection

I would like to acknowledge the following people for making this study possible

- ✚ My sincere gratitude to my supervisor, **Prof. Julie Philips**, for all guidance and advice she gave to me throughout this study period
- ✚ My sincere gratitude to my co-supervisor, **Mr. Pharaoh Hamilton**, for the contribution he made to this study

I highly recognize and appreciate the contribution protracted to me by:

- ✚ The Ministry of Higher Education, **National Council for Science and Technology**, for granting me a permission to conduct the study in Kenya
- ✚ To the Kenya rugby governing body namely **Kenya Rugby Union (KRU)**, for their facilitations during the process of data collection.
- ✚ I would like to say thank you to the **Physiotherapy Department, University of the Western Cape**, lecturers and the entire staff.
- ✚ To the Sport Skills for Life Skills Foundation ([www.ss4ls.org.za](http://www.ss4ls.org.za)) at UWC, and Nick Kock for the financial support they gave to me. Thank you again.
- ✚ To my parents **Ramesh Bogonko** and **Yuniah Kerubo**, thank you for your love, support and prayers. My sisters and brothers for your support and encouragement.
- ✚ To my colleagues and friends for your support, advice and support
- ✚ To all persons who facilitated me during the process of data collection especially the team coaches, team managers, team physiotherapists and rugby players.

## KEYWORDS

Rugby injuries

Injury prevention strategies

Implementation

Factors influencing implementation

Kenya Rugby Union

Safety Practices and policies



## ABSTRACT

**Background:** Rugby is one of the most popular sports in the world second to football. Many researchers have recommended different rugby injury prevention strategies that can drastically reduce injury incidences in rugby if practiced regularly. However rugby injuries still exist and there is minimal intervention being done in Africa and specifically in Kenya to implement these injury prevention strategies. **Aim:** To identify factors influencing the implementation of rugby injury prevention strategies in Kenya. **Objectives:** (i) To determine prevalence of rugby injuries in the Kenya Rugby Football Union (KRFU) league 2011-2012 season. (ii) To identify and describe various injury prevention strategies and sports safety practices in place among rugby clubs in Kenya. (iii) To determine the factors hindering the implementation of rugby injury prevention strategies in Kenya. **Design:** A cross-sectional, descriptive, quantitative study design was used. **Research Setting:** The study was conducted in Nairobi, Kenya. **Participants:** Seven male rugby teams participated in KRFU League 2011/2012 season; 210 rugby players, 7 team coaches, 7 team managers and 7 team medical practitioners. **Instruments:** Four self-administered questionnaires for rugby players, team coaches, team managers and team medical practitioners were used to collect data. A two week test-retest reliability pilot study was conducted to ensure validity and reliability for team coaches and rugby players' questionnaires. Team medical practitioners and managers' instruments were adapted from previously validated Sports Safety Analysis Tool (SSAT). To ensure the content and face validity of the adapted instruments it was reviewed by experienced sports safety experts, experienced coaches, referees and sports development officers working as technical advisors in KRFU, in conjunction with qualified and experienced sports Physiotherapists, and the Researcher. **Ethical clearance:** was granted by the University of the Western Cape and from the relevant authorities in Kenya. Participation was voluntary and participants had the right to withdraw from the study at any time. Written informed consent was sought from all participants and they were assured of anonymity and confidentiality of their information, and that it was intended for research purposes only. **Data analysis:** Data was analysed using the SPSS version (20.0). Descriptive statistics was conducted to obtain a profile of the study sample and prevalence of rugby injuries, injury prevention strategies, sports safety practices and factors influencing the implementation of injury prevention strategies. These were presented in terms of frequencies and percentages in tables and figures **Results:** 162 (77%) rugby players, 7 (100%) coaches, 7(100%) managers and 6 (85.7%)

team medical practitioners participated in this study. A sum of 520 injuries was reported giving a prevalence rate of 94.4%. Out of these injuries the sprains accounted for 17.5% and strains (15%) and with more than half (52.5%) were mild. Fifty-five percent (55.4%) of the injuries were sustained during matches with the majority (55.6%) of players sustaining an injury during the second half of play. The lower extremity recorded high prevalence of 48.7% while tackling and being tackled were the common cause of injury. Majority of rugby players never used headgear, mouth guard and ankle protection at both training and matches. There were deficiencies in conducting cool down, stretching, flexibility and strength training. Lack of time, lack of proper equipments, advice, fatigue, financial constraints, poor facilities and lack of qualified personnel were given as the main reasons for coaches and players not implementing the injury prevention strategies. Moreover safety practices were followed more during competitions than at training. **Conclusion:** the lower limb injuries are of great concern and training specifically targeted on injury prevention should be encouraged among coaches as it can reduce the injury incidences. Moreover a sports safety committee should be elected among rugby clubs to develop and ensure that sports safety practices and policies are implemented regularly at both training and matches. Finally the coaches and medical personnel should educate players on the importance of injury preventative measures and always encourage them to participate in warm-up, cool-down, stretching and, strength and conditioning.

UNIVERSITY *of the*  
WESTERN CAPE

## TABLE OF CONTENTS

DEDCLARATION .....	i
DEDICATION .....	ii
ACNOWLEDGEMENT .....	iii
KEYWORDS .....	iv
ABSTRACT .....	v
TABLE OF CONTENTS .....	vii
APPENDICES .....	xii
LIST OF FIGURES .....	xiii
LIST OF TABLES .....	xiv
ABBREVIATIONS .....	xv
CHAPTER ONE .....	1
1 INTRODUCTION .....	1
1.1 Introduction .....	1
1.2 Background .....	1
1.3 Problem Statement .....	6
1.4 Research Question .....	7
1.5 Aim .....	7
1.6 Objectives .....	7
1.7 Significance of the study .....	7
1.8 Definition of Key Terms .....	9
1.9 Outline of the Study .....	11
CHAPTER TWO .....	12
2 LITERATURE REVIEW .....	12
2.1 Introduction .....	12



2.2	Theoretical Framework.....	12
2.3	Rugby Football Code.....	14
2.3.1	Rugby injuries definition .....	15
2.3.2	Prevalence and incidence of rugby injuries .....	16
2.4	Classification of injuries .....	19
2.4.1	Types of injury.....	19
2.4.2	Severity of injury .....	20
2.4.3	Mechanisms of injury .....	21
2.4.4	Location of injury .....	23
2.5	Injury risk factors.....	25
2.5.1	Extrinsic risk factors .....	25
2.5.2	Intrinsic risk factors .....	28
2.6	Rugby injury prevention strategies .....	30
2.6.1	Protective equipments.....	31
2.6.2	Warm up.....	34
2.6.3	Cool down.....	35
2.6.4	Stretching.....	35
2.6.5	Strength and pre-season conditioning training .....	36
2.6.6	Flexibility training .....	37
2.6.7	Nutrition and water intake .....	37
2.6.8	Adequate player rehabilitation.....	38
2.7	Sports injuries Management .....	39
2.7.1	Role of physiotherapist in sports injuries prevention .....	39
2.7.2	Role of players, coaches and team leaders in sports injury prevention .....	40
2.8	Factors influencing implementation of rugby injury prevention strategies .....	43
2.9	Health Promotion in Sports.....	46

2.10	Summary of the Chapter .....	48
CHAPTER THREE .....		49
3	METHODOLOGY .....	49
3.1	Introduction.....	49
3.2	Research Setting.....	49
3.3	Study Design.....	50
3.4	Population and Sampling .....	51
3.5	Data Collection Methods .....	52
3.5.1	Research Instruments .....	52
3.5.2	Validity and Reliability of the research instruments.....	54
3.5.3	Procedure of Data Collection.....	57
3.6	Data analysis .....	59
3.7	Ethical considerations .....	59
3.8	Summary of the chapter .....	60
CHAPTER FOUR.....		61
4	RESULTS.....	61
4.1	Introduction.....	61
4.2	Response rate and socio-demographics of the participants .....	61
4.2.1	Socio-demographics of the Rugby Players .....	62
4.2.2	Socio-demographics of the Team Coaches.....	63
4.2.3	Socio-demographics of the Team Medical Practitioners .....	65
4.2.4	Socio-demographics of the Team Managers.....	65
4.3	Prevalence of Rugby Injuries.....	65
4.3.1	Total Number of injuries sustained during training and matches .....	65

4.3.2	Location of injury .....	67
4.3.3	Mechanism of Injury.....	68
4.3.4	Severity of Injury .....	69
4.3.5	Nature of injury.....	70
4.3.6	Time of Injury.....	71
4.3.7	Type of Playing Surface.....	71
4.4	Rugby Injury Prevention Strategies .....	72
4.4.1	Use of Protective Gear.....	72
4.4.2	Warm up.....	75
4.4.3	Cool down and stretching .....	77
4.4.4	Flexibility and strength training.....	81
4.4.5	Pre-season training.....	83
4.4.6	Hydration .....	83
4.4.7	Nutrition.....	84
4.5	Factors influencing implementation of rugby injury prevention strategies .....	86
4.5.1	Reasons for not following rugby injury prevention strategies.....	86
4.5.2	Other factors hindering the implementation of rugby injury prevention strategies .....	89
4.6	Knowledge regarding sports injury prevention.....	90
4.6.1	Source of Knowledge regarding injury prevention.....	93
4.7	Description of sports safety practices followed by clubs.....	94
4.7.1	Sports safety practices followed by team coaches and rugby players .....	94
4.7.2	Sports safety practices followed by team medical practitioners .....	96
4.7.3	Availability and use of protective equipment .....	98
4.7.4	Sports safety practices implemented by team managers.....	99
4.7.5	Other sports safety practices followed in the clubs .....	101
4.7.6	Managers' opinion on who should support clubs during implementation of injury prevention strategies .....	102
4.8	Summary of the chapter .....	103

CHAPTER FIVE .....	104
5 DISCUSSION.....	104
5.1 Introduction.....	104
5.2 Description of the study sample demographics .....	104
5.3 Prevalence of rugby injuries .....	106
5.4 Injury Prevention strategies .....	111
5.5 Factors influencing implementation of rugby injury prevention strategies .....	118
5.6 Sports Safety Practices and Policies .....	120
5.7 Summary of the Chapter .....	122
CHAPTER SIX.....	124
6 SUMMARY, CONCLUSION, RECOMMENDATION AND LIMITATIONS.....	124
6.1 Introduction.....	124
6.2 Summary.....	124
6.3 Conclusion .....	125
6.4 Recommendations.....	126
6.5 Limitation of the study.....	127
<b>REFERENCES.....</b>	<b>129</b>
<b>APPENDICES .....</b>	<b>154</b>

## APPENDICES

<b>APPENDIX A: CONSENT FORM.....</b>	<b>155</b>
<b>APPENDIX B: INFORMATION SHEET .....</b>	<b>156</b>
<b>APPENDIX C: QUESTIONNAIRE FOR RUGBY PLAYERS.....</b>	<b>159</b>
<b>APPENDIX D: QUESTIONNAIRE FOR TEAM COACHES .....</b>	<b>167</b>
<b>APPENDIX E: QUESTIONNAIRE FOR THE TEAM MANAGERS .....</b>	<b>173</b>
<b>APPENDIX F: QUESTIONNAIRE FOR TEAM MEDICAL PRACTITIONERS</b> <b>defined.79</b>	<b>Error! Bookmark not defined.79</b>
<b>APPENDIX G: APPROVAL LETTER TO CONDUCT RESEARCH FROM THE KENYA RUGBY</b> <b>UNION.....</b>	<b>182</b>
<b>APPENDIX H: APPROVAL LETTER TO CONDUCT RESEARCH FROM THE NATIONAL COUNCIL</b> <b>FOR SCIENCE AND TECHNOLOGY.....</b>	<b>183</b>
<b>APPENDIX I: APPROVAL LETTER TO CONDUCT RESEARCH FROM THE SENATE RESEARCH</b> <b>GRANTS AND STUDY LEAVE COMMITTEE OF THE UNIVERSITY OF THE WESTERN</b> <b>CAPE.....</b>	<b>184</b>

## LIST OF FIGURES

Figure 2.1 The TRIPP model of sports injury prevention which integrates Van Mechelen Framework (Finch, 2006) .13	
Figure 4.1 Percentage of players injured in the season prior to the study (n=162).....66	66
Figure 4.2 Percentage of injuries sustained during training and matches .....67	67
Figure 4.3 Time of injury during matches (n=162) .....71	71
Figure 4.4 Type of rugby playing surfaces in place in Kenya (n=162) .....72	72
Figure 4.5 Percentage of players who bounce while stretching (n=114).....80	80
Figure 4.6 Duration of holding a stretch as reported by the players (n=152) and team coaches (n=7) .....81	81
Figure 4.7 Nutritional advice given to players (Players n=162), Coaches n=7).....86	86
Figure 4.8 Frequency and percentage of team managers opinion on who should support clubs in implementation of injury prevention strategies (n=7).....103	103



UNIVERSITY *of the*  
WESTERN CAPE

## LIST OF TABLES

Table 2.1 Injury classification by body location as in Orchard Sports Injury Classification System (OSICS).....	24
Table 2.2 Three categories of sport injury prevention.....	31
Table 4.1 Socio-demographic characteristics of the rugby players (n=162) .....	63
Table 4.2 Socio-demographic characteristics of the team coaches (n=7).....	64
Table 4.3 Frequencies and percentages of injured body part .....	68
Table 4.4 Mechanisms of injury at training and matches .....	69
Table 4.5 Distribution of the frequency and percentage of severity of injuries .....	70
Table 4.6 Nature of injuries (n=520) .....	70
Table 4.7 Distribution of rugby players using protective equipment .....	74
Table 4.8 Distribution of warm up, duration and activities practiced prior to training and matches.....	76
Table 4.9 Distribution of cool down practices as reported by rugby players and coaches .....	78
Table 4.10 Stretching of major leg muscles during warm up and cool down (Rugby player n=161, Coaches n=7) .....	79
Table 4.11 Frequency of undertaking flexibility and strength training per week.....	82
Table 4.12 Pre-season kick off .....	83
Table 4.13 Percentage of water intake by players during training and matches.....	84
Table 4.14 Carbohydrate consumption by players before and after training and matches .....	85
Table 4.15 Reasons for not following rugby injury prevention strategies as reported by rugby players .....	88
Table 4.16 Reasons for not following rugby injury prevention strategies as reported by team coaches.....	88
Table 4.17 Other factors hindering the implementation of rugby injury prevention strategies (n=7) .....	89
Table 4.18 Knowledge of rugby players regarding sports injury prevention (n=162).....	91
Table 4.19 Knowledge of team coaches regarding sports injury prevention (n=7).....	92
Table 4.20 Source of knowledge regarding sports injury prevention .....	93
Table 4.21 Sport safety practices followed by coaches as reported by rugby players.....	95
Table 4.22 Sports safety practices followed by the team coaches (n=7) .....	95
Table 4.23 Sports safety practices followed by team medical practitioners (n=6) .....	97
Table 4.24 Other safety practices followed by team medical practitioners (n=6) .....	97
Table 4.25 Distribution on how players and coaches maintained and used their protective equipments.....	99
Table 4.26 Sports safety practices followed in clubs as reported by team managers (n=7) .....	100
Table 4.27 Other sports safety practices implemented in the clubs (n=7).....	102

## ABBREVIATIONS



<b>SSAT:</b>	The Sport Safety Assessment Tool's
<b>KRU:</b>	Kenya Rugby Union
<b>SARU:</b>	South African Rugby Union
<b>BMI:</b>	Body Mass Index
<b>IX'S:</b>	The first fifteen players presenting a rugby team
<b>NCST:</b>	National Council for Science and Technology
<b>PNF:</b>	Proprioceptive Neuromuscular Facilitation
<b>RE-AIM:</b>	Reach, Efficacy, Adoption, Implementation and Maintenance.
<b>ROM:</b>	Range of Motion
<b>D2E:</b>	Down to Earth
<b>NSC:</b>	National Sevens Circuit
<b>KRFU:</b>	Kenya Rugby Football Union
<b>F-MARC:</b>	FIFA Medical and Research Centre
<b>RFUEA:</b>	Rugby Football Union of East Africa
<b>CAR:</b>	Confederation of African Rugby
<b>IRB:</b>	International Rugby Board
<b>ACC:</b>	Accident Compensation Corporation
<b>SPSS:</b>	Social Package of Social Sciences
<b>OSICS:</b>	Orchard Sports Injury Classification System
<b>ACL:</b>	Anterior Cruciate Ligament
<b>ACSM:</b>	American College of Sports Medicine
<b>HSBC:</b>	Hong Kong and Shanghai Banking Corporation



## **CHAPTER ONE**

### **1 INTRODUCTION**

#### **1.1 INTRODUCTION**

This chapter provides the background information of the present study giving the reader an insight of what this study entails. Chapter one describes rugby history generally in the world, in Africa and specifically in Kenya. Thereafter rugby injury prevention strategies which have been recommended by various researchers are highlighted and the difficulties experienced in the implementation of these strategies in the real life situations are noted. The chapter also provides the problem statement, aim and objectives of the study and thereafter justifies the significance of this study. Finally it defines the study's key terms and ends with the outline of the thesis.

#### **1.2 BACKGROUND**

Rugby is a well-known sport all over the world and it is only second to soccer (Bathgate, Best, Craig & Jamieson, 2002). According to the International Rugby Board (IRB) (2008) rugby is a contact sport that is played all over the world by both children and adults, and this is due to the different roles that it gives to athletes of different sizes and physical nature. In addition, rugby involves running, tackling, passing and sprinting, and it can result in musculoskeletal injuries (Macqueen & Dexter, 2010). Moreover, rugby is one of the most dangerous contact sport (Rugby Injury Statistics, 2011) and injuries are ever increasing at both professional and non-professional levels.

Involvement in sport and physical activity has many health benefits such as disease control and decreasing the mortality rate (Warburton, Nicol & Bredin, 2006) however, it also increases the risk

of injury (Junge, Langerort & Pipe, 2006). This high injury risks associated with rugby may lead to high cost for public health and treatment (de Loes, Dahlstedt & Thomee, 2000) and thus it may lead to permanent disability/impairment to the injured player (Myklebust & Bahr, 2005). According to Gabbett (2004a) musculoskeletal injuries sustained in rugby are due to a lot of collisions and tackles made during the game. These high numbers of injuries may lead to loss of employment and income and increased treatment costs. In addition, injured sports men and women may be prone to osteoarthritis and non-participation in physical activity and sports (Larsen, Jensen & Jensen, 1999; Roos, 1998; Kujala, Kaprin & Sarna, 1994; Linderberg, Roos & Gardsell, 1993). Furthermore, Roos (1998) also reported that athletes who retire from sport are more likely to develop osteoarthritis in lower limbs. Therefore “participation in sport and exercise is a double edged sword: the profound health benefits gained versus the risk of injury and the associated morbidity and loss” (Klügl et al., 2010 p 207).

Moreover according to the Accident Compensation Corporation (ACC) Sport Smart (2009) sports injuries may in return lead to increased costs other than the obvious delayed return to play. In addition it can result to loss of working time and employment, disability, financial, pain and social problems. Therefore injury prevention in sports is significant and has greater benefits such as enjoyment and maximum performance during such sporting events. Moreover, having good knowledge regarding injury prevention strategies and their effects if implemented successfully may result to minimized risk of injury in sports. This has also been reported by Ekstrand, Gillquist and Liljedahl (1983) who showed that an injury reduction rate of 50% to 70% might be possible if injury prevention initiatives are implemented successfully. According to Drovak and Junge (2000) such a reduction reported by Ekstrand and colleagues would be significant in regard to the huge

amount of money spent on both medical costs and other costs such as loss of playing time and working days.

Rugby has been reported to have more hospitalisations and highest number of injuries than any other sport (Junge, Cheung, Edwards & Drovak, 2004; F-MARC, 2009; Gerrard, Waller & Bird, 1994; Waller, Feehan, Marshall & Chambers, 1994). The FIFA Medical and Research Centre (F-MARC) (2009) reported that rugby has more injuries than soccer. For instance rugby union was associated with a higher injury rate of 49.5 injuries per 1000 hours of play than soccer which had a rate of 27.9. Similar reports of rugby injury rate being three times that of soccer have already been reported (Injury Research, 2012). Nicholl, Coleman and Williams (1995) also reported that the chance of sustaining an injury and missing to participate in the sport of rugby is three times higher than in soccer. In addition, research has identified increased number of injuries at both professional and non-professional rugby (Kaplan, Goodwillie, Strauss & Rosen, 2008; McManus & Cross, 2004; Garraway, Lee, Hutton, Russell & Macleod, 2000). For instance, in New Zealand, injuries during club rugby competition have a rate of 8.3 compared to 1.3 of soccer players in Finland (Bird, Waller & Marshall, 1998; Luthje, Nurmi, Kataja et al., 1996). In Britain, 18% of the spinal injuries that occurred between 1985-1995 were sustained during rugby. Moreover in Britain 50% of the severe spinal injuries are sustained by young players below 26 years of age. These spinal injuries occur at school and club levels however still higher numbers of injuries are reported at professional level of the sport. Nevertheless research has showed that 20% of all rugby injuries result is concussions (Rugby Injury Statistics, 2011).

In Kenya only one study (Wekesa, Asembo & Njorirai, 1996) was found in the available literature. This study was done 16 years ago; the study recorded 47 injuries giving an injury rate of 8 per match.

In their study concussions were the most severe injuries reported and the majority of injuries were soft tissues injuries. In addition the lower extremity was the most injured with most injuries being sustained during second half of play. The results of this study might have changed; as the study was done a long time ago therefore there is a need to get more recent rugby injury prevalence.

To reduce this rampant increase of sports injuries, several researchers have recommended different strategies for sports injury prevention in different sports (Brukner & Khan, 2003). For instance, injury prevention in rugby is based on training, equipment, technique, player conditioning, environment, playing surface and officials. Moreover, prevention strategies like warm-up, stretching, use of protective equipment, cool-down and adequate rehabilitation has been found effective to minimize injury risk (Junge & Dvorac, 2004). Furthermore other studies have reported that implementation of these injury prevention strategies can drastically reduce the incidences of rugby injuries. Coaching on defensive skills, correct tackling technique and correct landing may help minimize risk of sustaining injury during tackling. (Saunders, Otago, Romiti, Donaldson, White & Finch, 2010; Carter & Muller, 2008) and promoting sports injuries awareness among players and coaches (Quarrie, Gianotti, Hopkins & Hume, 2007) have been found efficient in minimizing injuries.

However, to date very little injury prevention programmes have been widely implemented (Myklebust et al., 2003). Nevertheless, developed countries such as New Zealand have implemented successful rugby injury prevention strategies. For instance ACC Sport Smart, a 10-point action plan, has been successfully implemented in New Zealand for sports injury prevention. Even though not much has been done to implement these rugby injury prevention strategies in Africa, South Africa, one of the power house of rugby in Africa, has not been left behind in implementation of rugby injury prevention programmes. South Africa has successfully

implemented one of the best practice rugby injury prevention programme known as “Bok Smart”. BokSmart National Rugby Safety Programme provides coaches, referees and their assistants and players knowledge and skills to enable them play safe rugby in South Africa (BokSmart, 2012). In Kenya not much has been done to implement these rugby injury prevention strategies compared to other developed countries. This could be an important reason why rugby injuries still exist (personal communication).

Compliance to these injury prevention strategies has been not easy to execute as it is difficult for coaches to apply these strategies to prevent injuries unless a benefit such as improved performance is involved (Myklebust et al., 2003). In addition another reason for non-implementation of these preventative measures is because putting scientific research into practice has been proved to be challenging (Klügl et al., 2010). In addition, lack of implementation studies must have broadened the gap between knowledge of best preventative programmes and the capability to efficaciously employ these strategies (Stasinopoulos, 2004). Nevertheless, lack of well-designed, result oriented research has made it difficult to conception and execution these injury preventative measures in really life context (Bishop, 2008).

Few studies have been done in this area of implementation of rugby injury prevention strategies (Casey, Finch, Mahoney & Townsend, 2004). However the few studies conducted in this area such as the one by Casey et al. (2004) investigating the factors influencing sports safety policies and practice; lack of qualified personnel (referees, trainers and medical personnel) and financial constraints has been observed. In addition Hawkins and Fuller (1998) reported fatigue, lack of advice and time as the main factors slowing down the effort implement these preventative measures. These factors and many more others may have had an impact on the implementation of

rugby injury preventative measures in Kenya and maybe they are the hindering factors to sports injury prevention in Kenya.

### **1.3 PROBLEM STATEMENT**

Many rugby injury prevention strategies have been recommended by different researchers and the International Rugby Board. However rugby injuries still exist and are on the increase in Kenya. From the researcher's knowledge minimal intervention has been put in place in Kenya to implement rugby injury prevention strategies. Furthermore only one study has been carried out in Kenya specifically in rugby. This study was conducted more than 20 years ago among a small sample of international rugby teams participating in a world cup qualifying tournament in 1993 in Nairobi, Kenya. Even though the sample was small the study depicted a high number of rugby injuries (Wekesa et al., 1996) and did not reflect much on players of Kenyan origin as there was a scope of international teams recruited in the study. Wekesa et al. (1996) reported an increase of rugby injury prevalence among the rugby players who participated in the tournament. However in the recent years, there has been no study that has been done to determine rugby injury prevalence in Kenya therefore there is a need to investigate if the situation could have deteriorated. Finally, limited literature is available on rugby injury prevalence, injury prevention strategies and factors influencing the implementation of these strategies in the World, Africa and more so in Kenya.

Finch (2011) noted the importance of conducting implementation studies on injury prevention interventions. She found that sports injury preventative measures may not have any significance effect on health if they are not extensively put in place by different concerned sports members/clubs.

Furthermore even though it has been realised in the real world that intervention studies need to be conducted in this crucial area, still minimal research has been steered in this region of implementation.

#### **1.4 RESEARCH QUESTION**

What factors influence the implementation of rugby injury prevention strategies in Nairobi, Kenya?

#### **1.5 AIM**

To determine the factors that is influencing the implementation of rugby injury prevention strategies and sports safety practices in Nairobi, Kenya.

#### **1.6 OBJECTIVES**

- i. To determine prevalence of rugby injuries in the KFRU league 2011-2012 Season.
- ii. To identify and describe various injury prevention strategies and sports safety practices in place among rugby clubs in Kenya.
- iii. To determine the factors hindering the implementation of rugby injury prevention strategies in Kenya.

#### **1.7 SIGNIFICANCE OF THE STUDY**

Little published literature exists pertaining to the implementation of rugby injury prevention strategies globally, in Africa and specifically in Kenya. In addition very little is known about the effect that these factors might have on the implementation of the injury preventative measures. Moreover in Kenya only one study (Wekesa, Asembo & Njorirai, 1996) has been conducted. This study was done over 20 years ago and it was the only one available in the existing published literature. According to Wekesa et al. (1996) high prevalence of rugby injuries were reported hence they concluded that protective equipment should be put in place to help reduce the incidence and

severity of the rugby injuries. With this high injury rate seen by that time there's need for us to do more studies in this area to broaden and update the medical practitioners and rugby stakeholders' knowledge on issues surrounding rugby, and rugby injuries prevention strategies and factors hindering the implementation of these injury prevention strategies in Kenya. This study will therefore update rugby stakeholders' knowledge on what is happening in the world of rugby, injury prevention strategies and their implementation in the present world.

In addition, lack of literature in this field in Africa, moreover in Kenya, poses a threat to the growth of rugby in Kenya. Moreover, it is contemplated that limited knowledge exists among rugby stakeholders in Kenya as to the causes, risk factors, mechanisms, and severity as well as prevention strategies of these injuries. Therefore, the need to collect what is known about the prevention of injuries in rugby becomes highly necessary and will complement the existing literature.

For instance, Hawkins and Fuller's (1998) observed that many people at different levels in the community of soccer are not aware of different prevention strategies for reducing the risk of injury. This was further emphasized by Twizere (2004) that lack of knowledge regarding the role of injury preventative measures such as warm-up, cool-down, flexibility and strengthening exercises predisposed Rwandan soccer players to injuries.

However, there are no studies which have been carried out to assess the factors influencing implementation of rugby injury prevention strategies in the world recently. In addition, there is minimal intervention done by rugby stakeholders in Kenya to implement these injury prevention strategies. Moreover, no study has been done in Kenya to enhance the knowledge or implementation of rugby injury prevention strategies. Therefore this study will highlight if there is urgency to educate and implement injury preventative measures and interventions among rugby stakeholders in Kenya. The information from this study could be important in contributing to clubs



and rugby governing bodies in establishing primacies for injury prevention initiatives, and when gauging/assessing the impact of any initiatives instigated.

Therefore, this study will examine the factors influencing implementation of rugby injury preventative strategies among rugby stakeholders in Kenya.

## 1.8 DEFINITION OF KEY TERMS

**International Rugby Board (IRB):** It is the body that governs and make laws for the game of rugby in the world. It was founded in 1886 with headquarters based in Dublin (IRB, 2008)

**Kenya Rugby Union (KRU):** was established in 1923 and is the body that governs the game of Rugby in Kenya (History of Rugby in Kenya, 2011)

**Rugby union:** is a sport played by two opponent teams with 15 players from each team (Eight forwards and seven backs). The game comprises two halves of 40 minutes each with a 5–10 minute half time break (Potts, 1998)

**BokSmart:** Is a programme being implemented in South Africa to prevent rugby injuries. Its National Rugby Safety Programme whose aim is to provide rugby stakeholders with the correct knowledge and skills to ensure that safety is ensured in rugby (BokSmart, 2012)

**RE-AIM:** is a framework for evaluating public health programmes that evaluates five dimensions: reach, efficacy, adoption, implementation, and maintenance (Finch & Donaldson, 2009)

**Down to Earth (D2E):** is a netball landing programme that mainly targets lower-limb injury prevention. It includes skills on safe-landing techniques programme that is implemented over six week duration (Saunders, 2006).

**ACC Sport Smart:** is a 10-point action plan that is being employed in New Zealand to prevent sports injuries. It include use of screening, warm-up, cool-down and stretch, physical conditioning,

technique, fair play, protective equipment, hydration and nutrition, injury record keeping, environment and injury management (ACC Sport Smart, 2009)

**Rugby Injury Prevention Strategies:** are sports injury preventative measures specifically designed to reduce the risk of injury during matches and training in the game of rugby (Donaldson et al., 2002).

**Rugby Injury:** is any bodily complaint sustained by a player that is a consequence of participating in a match or training, irrespective of the requirement for medical treatment or loss of time from participating in sport (Fuller et al., 2006)

**Severity of injury:** Severity of the injury in this study was defined in relation to three categories, that is: mild, moderate and severe injuries. For a mild injury a player has never attended a match or training for one week. For moderate injuries the symptoms persisted for at least 2–4 weeks and the player never participated in a match or training while for severe injuries the symptoms existed for more than four weeks and the player was out of play or training for four or more weeks. The severe injuries involved injury to the musculoskeletal system (Goga & Gongal, 2003).

**Rugby IXs:** This is usually used to refer to rugby tournaments played by 15 players a side (IRB, 2008)

**Rugby Sevens:** This is usually used to refer to rugby tournaments played by 7 players a side (IRB, 2008).

**Team Medical Practitioner:** This is any health professional who is working in the field of sport to provide first aid or treatment to players or educate and train players on injury prevention strategies.

**Musculoskeletal Injuries:** These are injuries involving bodily structures such as muscles, bones and other soft tissues injuries (Gonga et al., 2003).

## **1.9 OUTLINE OF THE STUDY**

This chapter has highlighted the recommendations for rugby injury prevention strategies from other past studies and depicted the difficulties experienced to implement these strategies from all over the world, Africa and specifically in Kenya. Thereafter the history of rugby in general and in the African context has been highlighted. Nevertheless, the problem statement has been clearly stated both with the aims and objectives of this present study. Finally, the significance and justification of this study has been explained into detail. The chapter ends with the definition of the study's key terms.

The second chapter discusses various past literature review on rugby injury incidence, prevalence, prevention strategies, role of physiotherapy and factors influencing the implementation of these strategies.

Chapter three describes the research setting and research design, methods and instruments for data collection and data analysis method with ethical consideration.

Chapter four represents the results of the present study while chapter five covers the discussion of the presents' results.

Finally chapter six covers summary, conclusion, recommendations and limitations of the present study.

## CHAPTER TWO

### 2 LITERATURE REVIEW

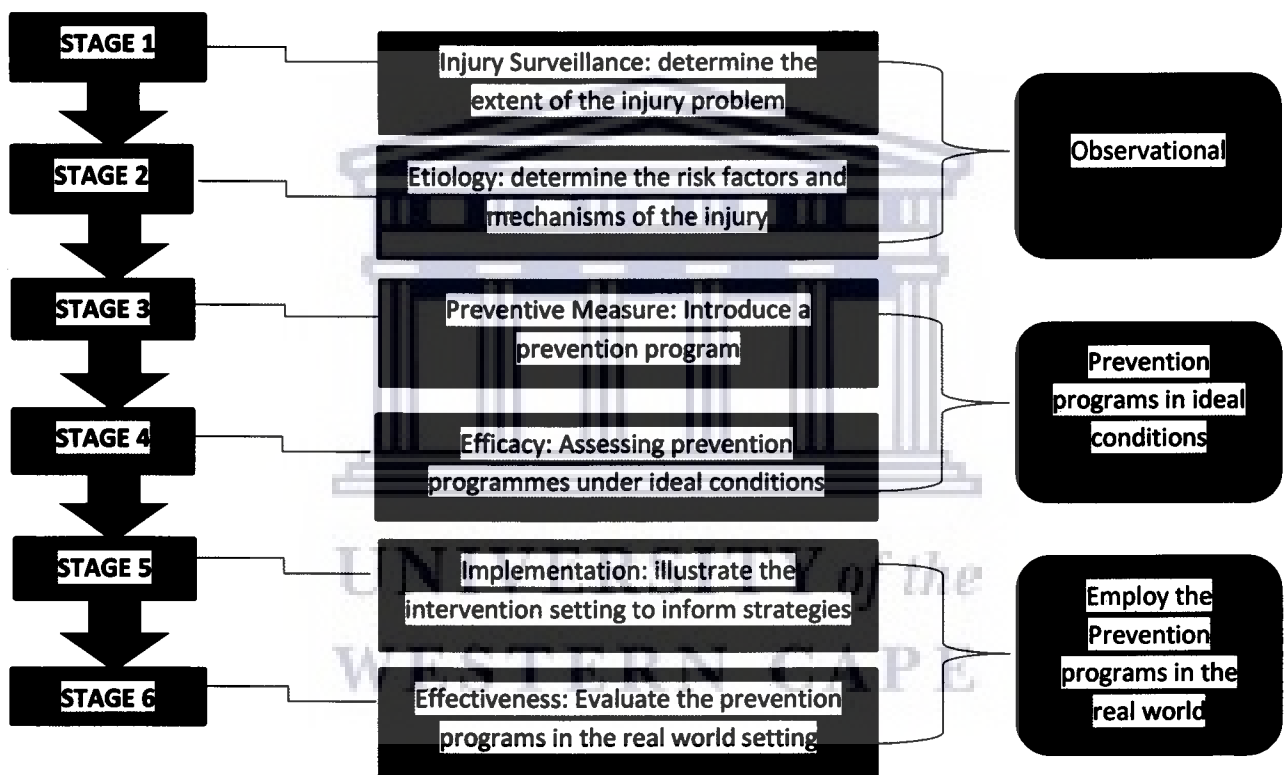
#### 2.1 INTRODUCTION

This chapter presents a narrative review of the literature on rugby as a sport, prevalence, incidences, types, location, mechanisms of injury and risk factors of rugby injuries. The chapter also highlights different rugby injury prevention strategies that have been recommended to drastically reduce rugby injuries if implemented successfully, this review has been done from previous studies in the domain of rugby injuries. The responsibilities of physiotherapists in rugby injuries prevention and management as well as that of the team managers, players and coaches will be reviewed. In addition, factors influencing implementation of rugby injury prevention strategies have been discussed. Van Mechelen's framework has been used in development of this current study. Different computer searches were conducted in MEDLINE, SPORTS Discuss, SCIENCE DIRECT, COCHRANE and EBSCOHOST databases using key terms such as \*rugby\*; \*injury\*; \*factors\* ; \*risk factors\*; \*prevention\*; \*physiotherapy\*; \*sports safety\*; \*practices\*; \*policies\* etc. This chapter ends with a conclusion and summary of this chapter.

#### 2.2 THEORETICAL FRAMEWORK

This current study is grounded on the Van Mechelen et al. (1992) theoretical framework and Finch (2006) TRIPP model. According to Van Mechelen et al. (1992), the first step towards injury prevention is (i) to determine how big the problem is, (ii) identify and have knowledge regarding risk factors (iii) develop a likely injury prevention programmes in laboratory, and (iv) try or examine the injury prevention programmes in the real world conditions. This Van Mechelen

Framework initially had four stages however Finch (2006) came up with a model with two extra stages to assess the stumbling blocks and enablers to the successful employment of these proven injury preventative strategies. This framework is widely known as “Translating Research into Injury Prevention Practice” (TRIPP) as illustrated in figure 2.1 below. This two more steps will be used in identification of our last study objectives on determining the factors that are hindering the implementation of rugby injury prevention strategies.



**Figure 2.1 The TRIPP model of sports injury prevention which integrates Van Mechelen Framework (Finch, 2006)**

For the purpose of the current study, Van Mechelen’s framework will be used to guide the study. As very limited data on rugby injuries exist in Kenya, this study will attempt to address the first two stages of injury prevention, i.e. identifying the magnitude of the problem through determining the

rugby injury prevalence in Kenya and determine the etiology of rugby injuries through establishing risk factors and mechanisms of the injury, the sports injury prevention strategies, and sports safety practices and policies in place among rugby clubs in Kenya. Moreover, factors hindering the implementation of rugby injury prevention strategies will also be determined in this second stage. These two phases will hopefully contribute in the growth of injury prevention initiatives and the formulating of the sports safety policies and practices specifically for Kenya in future.

### **2.3 RUGBY FOOTBALL CODE**

Rugby union is a game of physical contact and it involves both low and high intensity aerobic and anaerobic exercises (Brewer & Davis, 1995). It is played by two opponent teams of 15 players (8 forwards and 7 backs) each in two halves of 40 minutes each separated with a 10 minutes halftime break. According to Potts (1998) rugby is one of the largest sports watched by many as a national game in developed countries in southern hemisphere such as New Zealand and Australia. In Africa, rugby is increasingly popular in South Africa (Dunn & Spuy, 2010). Rugby was introduced by the English domination of the Dutch descendants (Known as Afrikaners) in the 1870's in Cape Town. As the British settlers expanded their regime, rugby gained popularity in South Africa. In 1889 teams such as Kimberly, Western Province, Transvaal, Griqualand and Eastern Province competed in the South African Rugby Football Board Tournament. Thereafter the Rhodes Cup now known as Currie Cup was won by the Western Province in 1892. South Africa debuted in world rugby against Britain in 1905 and competed a year later against New Zealand. In 1906 the South African rugby team named themselves "Springboks" which is the name of a small gazelle of South Africa commonly known as SPRINGBOK. Since then, the South African rugby team has gained popularity in the world, being the winners of the 1995 Rugby World Cup (Rugby Football History, 2012). In Kenya, rugby was introduced at the beginning of the 20<sup>th</sup> century by the British settlers.

The Kenya Rugby Football Union founded in 1923 governs national rugby. Rugby in Kenya before 1970 was mainly played by the players of white origin. However, in the last 2 decades there has been a growth in the number of players of Kenyan origin playing for clubs such as Mean Machine (University of Nairobi, Mwamba RFC, Impala RFC, Nondescripts RFC and Harlequins RFC. The Kenya Cup is the major trophy competed for besides Mwamba and Enterprise Cup. Since 1960, the Eric Shirley Shield has been competed for by the clubs 2<sup>nd</sup> XV's. In addition there are several Sevens Rugby Series tournaments competed by clubs throughout the year (History of Rugby in Kenya, 2011). Currently the Kenya Seven National team is a regular competitor in the IRB Sevens Series (HSBC). This might have brought about competition among players to secure a spot in the national team hence a tremendous increase of youth participating in rugby in Kenya. Similarly the ever upsurge of the rugby players in Kenya might be due to the Sevens team's International Sevens Series' success following the country's re-entry into the international sports arena. In addition, new role models are continuously presented in the media, as a result of the numerous national and international tournaments.

### **2.3.1 Rugby injuries definition**

Injury definition has been controversial for many years (Garraway & Macleod 1995; Fuller et al., 2006). According to Garraway and Macleod (1995 p 1485) *"A rugby injury is any injury sustained on the field during a competitive match, during a practice game or during other training activity directly associated with rugby football which prevents a player from training or playing rugby football from the time of injury or from the end of the match or practice in which the injury was sustained. Moreover rugby injuries sustained during training have been defined as those injuries that are sustained during practice scrums or maneuvers involving a rugby ball "not circuit training or activities undertaken to achieve fitness" For instance, injuries that necessitated a*

*player leaving the field of play or practice and missing the remainder of the match or practice, but did not cause the player to miss the subsequent matches or practice for at least a period of seven days were classified as mild*". Fuller et al. (2006) also defined an injury as any physical ailment incurred to a player during competition or training regardless of the call for medical treatment or time lost from participating in sports. Similarly Garraway and Macleod's (1995) developed a rugby injury definition that is specific to rugby injuries and explains both injuries at training and competitive matches. However to make the results of this study more comparable to other past and present studies the consensus injury definition by Fuller and colleagues even though specific to football (soccer) injuries was used. This is of great importance to use specific injury definition across different sports codes to be able to make studies comparable (Fuller et al., 2006).

### **2.3.2 Prevalence and incidence of rugby injuries**

Prevalence quantifies a disease or condition in a population at a specific period of time (Roe & Doll, 1995). Many studies have shown high prevalence of rugby injuries compared to other sports (Junge, Cheung, Edwards & Drovak, 2004; Bottini, Pottini, Luzuriaga & Secin, 2000). For instance, Garraway, Michael, Lee and Hutton (2000) demonstrated an upsurge in the number of injuries in both professional and non-professional players and observed that the rise of the number of injuries is due to the increased reliance on speed and strength and conditioning. Bottini et al. (2000) also noted that younger players playing in lower divisions sustain less number of injuries as compared to that of senior players. In United Kingdom and Wales a high number of injury rates were recorded in the rugby (Nicholl, Coleman & Williams, 1995). Similarly, Junge et al. (2004) reported a high risk of sustaining an injury during a single episode of a rugby match trailed by soccer and hockey. Furthermore, according to Junge and colleagues research has shown that hockey, soccer and rugby are the kind of sports with a higher injury risk than others. Moreover research has shown that most



injuries in rugby involve the lower extremities, upper extremities, head and neck (Bird et al., 1998; Garraway & Macleod, 1995; Clark, Roux & Noakes, 1990; Addley & Farren, 1988; Goedeke & Visser et al., 1987). In South Africa, a study by Viljoen, Saunders, Hechter, Aginsky and Millson (2009) conducted over a three year period recorded 38, 27 and 30 new injuries during the 2002, 2003 and 2004 rugby seasons respectively. Seventy four percent of the injuries sustained during this 3 year period occurred during rugby matches while 21% occurred during rugby training. It was therefore noted that most injuries occurred during pre and in season training than matches. Therefore it is the role of coaches and sports trainers to ensure that sports injury prevention protocols are always followed at both training and matches. In another study by Brown et al. (2012) among youth South African rugby players, 185 out of 1804 sustained an injury.

In Kenya a study conducted by Wekesa et al. (1996) documented a total of 47 injuries. This number of injuries dropped from 38.3% in the opening games to 23.4% in the closing games of the tournament. This reduction on injury rate may have been due to decreased motivation of teams qualifying for the World Cup resulting in teams being less competitive and therefore reduced injury risks (Wekesa et al. 1996). Rugby is increasingly gaining popularity in Kenya especially through the achievements of its Sevens team that participates in the International Rugby Boards Sevens' circuit events throughout various countries in the world, therefore rugby injuries prevalence might be increasing as no rugby injury surveillance is being done at the moment. It is therefore necessary to determine the prevalence of these injuries in Kenya since no data of rugby injuries or previous studies exist.

According to Roe and Doll (1995) incidence quantifies the amount new events of a disease or condition per year in a specific duration of time where the people originally were disease free. Moreover, in sports, according to Junge et al. (2004), incidence of injury is calculated per player

and 1000 hours of participating in training or a match per season. An injury incidence of 12-53 injuries per 1000 playing hours has been reported among senior male players (Garraway & Macleod, 1995; Roux et al., 1987) while in junior players the injury incidences have shown to increase with age. (Lee & Garraway, 1996; Roux et al., 1987) For instance a study in Argentina by Bottini, Pottini, Luzuriaga and Secin (2000) reported 924 injuries in 1296 rugby matches comprising of 38933 players. Furthermore Junge et al. (2004) compared the incidences of football and rugby injuries, in soccer and rugby teams in Auckland, New Zealand and found out that rugby was associated with a higher rate of 49.5 injuries per 1000 hours of player as compared to 27.9 in soccer. In his study the concussion injury rate was nearly five times greater in rugby than in football (0.32 vs. 1.45 concussions per 1000 hrs). Similarly in a study conducted in New Zealand by Junge et al. (2004) to compare the occurrence of soccer and rugby injuries, the study findings showed that rugby players sustain 1.5 times more overuse and training injuries relative to exposure time and 2.7 times more match injuries than soccer players. These injuries were as a result of collision injuries sustained to the head, shoulder, neck, and upper limbs. Moreover these injuries were in the form of concussions, fractures, dislocations and strains. In addition rugby has been linked with cases of serious injuries as compared to football. In South Africa a total number of 70 injuries were recorded during the 1995 Rugby World Cup resulting to one injury for every 0.8 games at the opening games which rose to one injury for every 0.6 games in the final matches (Jakoet & Noakes, 1997). In Kenya similar trends have been reported with Wekesa et al. (1996) reporting 47 injuries during the World Cup qualifiers' competition in 1993, giving an injury rate of 8 per match. Rugby in Kenya is slowly turning professional and injury trends might be changing, it is thus important that continuous injury data is kept to monitor and help in injury prevention implementation. This has also been

recommended in a previous study (Van Mechelen, Hlobil & Kemper, 1992) which suggested that determining injury prevalence is the foremost step in sports injury prevention.

## **2.4 CLASSIFICATION OF INJURIES**

Injuries can be classified in relation to its location, type, body side, severity and the mechanism of the injury (Fuller et al., 2006; Orchard, 1995; Van Mechelen et al., 1992).

### **2.4.1 Types of injury**

According to Bottini et al. (2000) muscle strains and tears to the lower extremities are the most common types of injury. Moreover older players sustain more muscle strains and tears to the lower limbs, ankle ligament enlargement, knee distress, face cuts and knee ligament distension while younger players have the greater risk of sustaining muscular or ligament injuries of the cervical vertebral.

Similarly Bathgate and colleagues (2002) reported that soft tissue injuries (55%) accounted for the majority of the injuries in their study in Australia. Of these injuries contusions/haematoma accounted for (9.8%), strains (20.3%), sprains (25.2%), lacerations (23.1%), fractures (8.4%), dislocations (6.3%) and concussions (4.9%). Similarly, Macqueen and Dexter (2010) found that head, neck and muscular injuries were common in senior rugby league players while fractures and knee injuries were common in younger players. Nevertheless, Junge and colleagues (2004) reported that shoulder and upper extremities injuries are more frequent in rugby. For instance strains, sprains and concussions have been found to be more prevalent in both rugby and soccer. However more fractures, dislocations and concussions have been reported in rugby.

In South Africa Jakoet and Noakes (1997) reported ligament injuries to account for (30%), lacerations (27%), muscle strains (14%), fractures (11%) and concussions (3%). In addition, Brown

et al. (2012) reported high rate of laceration and abrasion type of injuries followed by 2 mouth injuries, tooth loss and 2 deep head wounds during the SARU youth tournament. This is nearly similar to Kenya where Wekesa et al. (1996) reported a majority of 68.1% of injuries to be contusions seconded by lacerations (12.8%) and sprains (10.6%). From this literature it appears that laceration and abrasion type of injuries are common. However, all type of injury should be taken seriously.

#### **2.4.2 Severity of injury**

Many studies have different definitions for severity of injury (Fuller et al., 2006; Junge & Drovak, 2000; Garraway & Macleod, 1995; Van Mechelen, 1997; Van Mechelen, Hlobil & Kemper, 1992). According to Drovak and Junge (2000) the degree of severity is associated to the period a player is out of training and matches. For instance, Van Mechelen (1997) described severity of injury on the basis of 6 criteria: *(i) the type of the sports injury (ii) the time it takes to recover and type of treatment (iii) the time the player is out of sporting activities (iv) the time lost by player from employment/working (v) the permanent impairments sustained during the injury (vi) the price tag accompanied with the injury.* Similarly Fuller and Colleagues (2006) also defined injury severity in terms of the duration a player has been out since the injury was sustained until the time the player is fit enough and ready for return to play at both training and matches. For instance, in a study conducted in Australia by Stevenson, Hamer, Finch, Elliot and Kresnow (2000) most injuries (58%) were moderate, minor (40%) and only 3% were severe. In their study injury severity was categorized into three: severe injuries required hospitalization; moderate injuries required treatment by a sports medical practitioner while minor injuries needed the players to treat themselves. However in this study injury severity has been defined in terms of three categories: mild, moderate and severe. This criterion has been used in several previous studies (Goga & Gongal, 2003, Chomiak, Junge,

Peterson, & Drovak, 2000; Ekstrand & Gillquist, 1983). In the classification, a mild injury a player was never attended a match or training for one week. For moderate injuries the symptoms persisted for at least 2–4 weeks and the player never participated in a match or training while for severe injuries the symptoms existed for more than four weeks and the player was out of play or training for four or more weeks. The severe injuries involved injury to the musculoskeletal system.

In a study conducted by Oluwatoyosi and Owoeye (2010) most injuries (25-65%) were transient/minor or mild and involved soft tissues which were easily treated with ice and bandaging. In another study by Brown et al. (2012) in South Africa during the 2011 South African Rugby Union (SARU) youth tournament, 91 injuries were severe while out of the remaining 98, 87 injuries needed medical attention and 11 were unaccounted for as the players were never followed up. Moreover, majority (81%) of the injuries led to time loss of 23.1 injuries per 1000 match hours. Jakoet and Noakes (1997) similarly recorded only one severe spinal cord injury while other injuries were mild and moderate. In Kenya, Wekesa et al. (1996) reported a higher number of soft tissue injuries with the most serious injury being concussions. This literature depicts that majority of rugby injuries are always mild or moderate and comprises of soft tissues which can be managed by RICE principle by the physiotherapist or first aider. However, there are also a rising number of severe injuries to shoulder and cervical spine which should be taken into account (Gabbett, 2000a; Quarrie, Cantu & Chalmers, 2002).

### **2.4.3 Mechanisms of injury**

Research has shown that numerous injuries in rugby are as a result of tackling and being tackled (Brooks & Kemp, 2008; Brooks, Fuller, Kemp & Reddin, 2005a; Garraway, Lee, Macleod et al., 1999; Wilson, Quarrie, Milburn et al., 1999; Garraway & Macleod, 1995; Hendricks & Lambert, 1999; Hughes & Fricker, 1994). Similarly, Junge et al. (2004) reported that rugby players sustain

two thirds of their injuries during collisions with another player while less than 43% of all injuries are sustained to lower extremities. In a study conducted by Jakoet and Noakes (1997) in South Africa during the 1995 Rugby World Cup, tackling resulted to 56% of all injuries, seconded by rucks and mauls (23%), open play (11%), foul play (9%) with scrums and lineouts together accounting for 1% of all injuries. In addition Noakes, Jakoet and Baalbergen (1999) observed that tackles are responsible for majority of rugby injuries as they account for the most contact events in the game of rugby followed by ruck and mauls. However, other studies have warned that collisions are most likely to cause an injury than a tackle (Fuller, Brooks, Cancea & Kemp, 2007). Nevertheless, scrums have been reported to be dangerous as the players are positioned in a manner that potentially can compromise the spine. As a result scrums are of a higher risk than tackles (Fuller et al., 2007). Front row players in rugby have been reported to sustain more back injuries. This is because they participate in the dangerous scrum position. Moreover, lower back injuries have been reported to be more prevalent in hookers and flyhalves while the greatest severity affects the locks and flankers. In addition, lower back injuries have also been reported to affect backs as they twist and turn while tackling and being tackled (Brooks, Fuller, Kemp & Reddin, 2008). In overall there is no agreement that have been reached as to which is the most risky playing position in rugby according to Hopkins and Viljoen (2008) as each position carry different injury risks. Similar findings have been reported in a study done by Australia by Bathgate and colleagues (2002) who reported that majority of injuries are sustained during the tackling and being tackled (58.7%). Nevertheless open play results to 19.6% of injuries while rucks and mauls result to 14.7% of the injuries. In addition scrums and line outs accounted only 2.1% of the injuries with most severe injuries resulting from tackling phase (66%) with open play resulting to 19% while ruck and mauls accounted for 9% and foul play comprising of 6% of the injuries.

In Kenya not much has been reported in terms of injury mechanism. However, in a study conducted by Wekesa et al. 1996 in Kenya show most injuries to be sustained in the defensive part of the pitch (53.2%) as compared to the offensive part of the pitch (46.8%). As there is no recent study in area of rugby sport in Kenya it is therefore important to conduct this study to determine the current trends in the mechanism of injuries present in Kenya Rugby Union League.

#### **2.4.4 Location of injury**

Injury can be classified by injury site or location (Orchard, 1995) According to Orchard Sports Injury Classification System (OSICS), injuries can be classified under the following body site as illustrated in Table 2.1 below.

Numerous studies have found that ankle and knee injury are more common than others (Junge et al., 2004; Bottini et al., 2000). Contrary, Bathgate et al. (2002) reported that the head is the body part most prone to injury. In their study 75% of the head injuries were lacerations which required suturing, concussion (19.4%) and fractures (5.6%). The knee sustained 14% and thigh 13.6% while ankle accounted to 10.5% of the injuries. The thigh injuries comprised of hamstring strains (53%), contusions (37%) while the remaining 10% were quadriceps strains. In addition the shoulder, hand and fingers comprised of 31.2% of the serious injuries. Fractures in fingers comprised of 80% of injuries while 50% of the shoulder injuries were dislocations involving rotator cuff tears. Moreover the lower extremity accounted most injuries of (51.7%) while the head and neck sustained a total of 28.7% and the upper extremities comprised of 15.4% of the total injuries.

**Table 2.1 Injury classification by body location as in Orchard Sports Injury Classification System (OSICS)**

Body area	Injury category
Head & neck	Fractured facial bones
	Lacerations and other head injuries
	Neck injuries
Upper limb	Shoulder tendon injuries
	Shoulder dislocations and subluxations
	Elbow injuries
	Forearm fractures
	Arm lacerations & haematomas
	Wrist and hand injuries
	Upper limb stress fractures
	Other upper limb injuries
Trunk & back	Side and abdominal strains
	Rib fractures (traumatic and stress)
	Lumbar stress fractures
	Lumbar injuries (other than stress fractures)
Lower limb	Groin injuries
	Hamstring strain injuries
	Quadriceps strain injuries
	Knee ligament injuries
	Knee cartilage injuries
	Knee tendon injuries
	Calf muscle strain injuries
	Leg stress fractures
	Lower limb fractures (not stress fractures)
	Lower limb haematomas & lacerations
	Shin soft tissue overuse injuries
	Ankle and foot sprains
	Heel and Achilles injuries
	Foot stress fractures
Other lower limb injuries	

*Adapted from Orchard, James, Alcott et al. (2002)*



In South Africa, a study by Jakoet and Noakes (1997) showed that lower extremity injuries sustained 42% of all injuries while the upper limbs sustained for (29%), with face (17%), head and neck (9%) while the chest and torso comprised of 3% of all injuries. Similarly, in Kenya, Wekesa et al. (1996) reported the lower limbs to have sustained the highest (46.8%) number of injuries seconded by head (21.3%), trunk (17.3%), and upper extremity (12.8%) while the neck sustained the least (2.1%) number of injuries. Moreover thigh injuries comprised 21.3% of all injuries with muscles sustaining 83% while 10.6% were sustained to the ligaments. Finally from literature it is evident that in rugby the lower extremity body parts are more prone to injuries. However, when injury prevention initiatives are put in place they should also take into account head, neck and spinal injuries.

In this study site of injury was classified into two categories; *upper body parts* namely: head, neck, shoulder, back, ribs, chest, forearm, wrist, hand and fingers while the *lower body parts* included: pelvis, gluteus, hip, front thigh, groin, back thigh, knee, shin, calf, ankle, foot and toe.

## **2.5 INJURY RISK FACTORS**

Risk factors can be categorized into two, namely: intrinsic factors which are associated to the player and extrinsic factors which are associated with the environment with which any a player participates in (Van Mechelen et al., 1992). In addition Brooks, Fuller, Kemp and Reddin (2006) classified risk factors into those that can be modified and those that cannot.

### **2.5.1 Extrinsic risk factors**

The extrinsic risk factors include level of competition, exposure time, position in the team, skill level, playing surface, weather conditions, human factors, shoe type, and use of tape (Brooks et al. 2006) nature of sport environmental conditions and equipment (Taimela, Kujala & Osterman, 1990). According to Brooks et al. (2006) modifiable risk factors include factors that are athlete

related such as exhaustion, muscle strength, training intensity, flexibility, inadequate warm ups, posture, poor lumbopelvic strength and stability.

#### **2.5.1.1 Environmental factors and playing surface**

Playing surface may influence the nature of injuries (Thein, 1995) and how athletes perform (Campbell & O'Driscoll, 1995). Artificial surfaces have been associated with a high rate of sprains (Powell, 1987) while heavy slippery, firm and hard pitches has been associated with high injury rates (Lee & Garraway, 2000). Moreover, wind strength and temperature may also influence the risk of injury. For instance, matches played during heavy downpour resulting in slippery pitches have been significantly associated with high rate of upper limb and head fractures and concussions while firm or hard pitches have been linked with lower limb fractures. Furthermore, the surface of play may be a major contributor to injury risk through excessive shoe - surface traction (Brukner & Khan 2011). Improving the sporting environment, such as playing surfaces, has been found effective in injury prevention (Hergenroeder, 1998). For instance, several epidemiological studies have compared Anterior Cruciate Ligament (ACL) injury rate between wooden floors and artificial surfaces (Olsen, Myklebust & Bahr, 2003; Strand, Tvedte, Engebretsen & Tegnander, 1990). Wooden floors were reported to have a lower friction while artificial surfaces have higher friction (Olsen et al., 2003). Olsen and colleagues' study indicated that there is a higher risk of anterior cruciate ligament (ACL) on man-made surfaces than on the wooden surfaces. Similarly, Orchard and colleagues (2005) reported greater rate of ACL injuries in warmer climates. The ground hardness of the surfaces was made drier and harder due to hotter weather, according to an earlier study by Orchard (2002). On the other hand natural grass surfaces and shoe friction have also been investigated. Perennial rye grass has been linked with less shoe surface friction as compared to Kentucky blue grass or Bermuda grass since it creates a less thatch. Their study concluded that the

rye grass is much safer with in respect to ACL injuries in football as related to other grass types (McNitt, Waddington & Middour, 1997). In Kenya there are different grass types with the Kikuyu grass being the commonest (personal communication). The Kikuyu grass creates a thick thatch layer (Brukner & Khan, 2011) which has been associated with high shoe surface traction (McNitt et al., 1997). This increased shoe surface friction has been related to high rates of ACL injuries (Olsen et al., 2003) and since rugby injuries are on the increase in Kenya, this type of grass surface may have played a role on the risk of injury and may be the reason why rugby injuries still exist in Kenya ( Personal communication). To prevent possible injuries it is therefore important to consider playing surface hardness as they have been associated with overuse injuries (Brukner and Khan, 2011). For instance, the role of different types of grass playing surfaces in Kenya has never been investigated, it is therefore of great significance to conduct further research to understand the role these grass types may have played in relation to injury and how to minimize the rugby injuries using the appropriate grass type surfaces in Kenya (Personal communication). In addition it is therefore necessary to understand the effect of these environmental factors on different sporting activities, rate of injuries and how they can be managed (Thein, 1995).

#### **2.5.1.2 Position, time and place of injury**

According to Bathgate and colleagues (2002) a lock is the most injured playing position in the game of rugby seconded by both position 8 while scrumhalf is the most injured position among the backs. Nevertheless, scrumhalf is the least injured position. Furthermore, 88% of injuries occurred during the game of rugby while only 12% of the injuries occurred during training. Of the match injuries (69%) occur in second half and (31%) in first half. However when the game is subdivided into quarters most injuries occur in the third quarter (40%), followed by fourth quarter (29%), second quarter (24%) and lastly the first quarter (7%). According to Jakoet and Noakes (1997) the loose

forwards sustains 25% of all injuries while the centres and wingers sustain 20% of the injuries. Props and half backs sustain 16% each with the locks and hookers sustaining 21% of injuries together. Nevertheless full backs sustained only 3% of all injuries. Similarly a study by Bottini et al. (2000) reported that forwards have the greatest injury risk. However, the frequently injured player is the flanker and most injuries occur during open play (33%) and most of them are sustained in the second half. In Kenya, Wekesa et al. (1996) found that more injuries are sustained in the defensive part of the pitch (53.2%) than in the offensive part (66.8%). Moreover second half of play records the highest number of injuries (61.7%) as compared to first half (38.3%) of the play.

### **2.5.2 Intrinsic risk factors**

Intrinsic risk factors comprises of the age and sex of the athlete; history of previous injury, strength, fitness and the body size of the player (Bahr & Holme, 2003; Murphy, Connolly & Beynnon, 2003; Parkkari, Kujala & Kannus, 2001). Other factors include psychological traits and health of the player (Taimela, Kujala & Osterman, 1990). In addition according to Brooks et al. (2006) non modifiable risk factors include: ethnicity, Body Mass Index (BMI) and height.

#### **2.5.2.1 Age**

Old age is related to greater injury risk of the player (Kirkendall & Garrett, 1998). This is so since muscle weakness with increase in age. This has been attributed as the factor why older players are more likely to incur muscle injuries. In addition, contracted muscles have been found to resist more force than a relaxed muscle (Garrett, Safran, Seaber, et al., 1987). Similarly, a study conducted in Australia by Stevenson, Hamer, Finch, Elliot and Kresnow (2000) showed that participants with older age (26-30 years) were more prone to injury than the younger players below the age of 18 years. In addition, a highest incidence of sports injuries has been reported among athletes aged 15-25 (Myklebust et al., 1998; Arendt & Dick, 1995). Similarly in a study conducted among South

African junior rugby players during a SARU tournament in 2011, the oldest age group of 18 years had the highest number of injuries per match as compared to younger age groups (below 16 years). This might be associated to the high level of competition and aggressiveness among older junior rugby players.

#### **2.5.2.2 Sex**

In a study conducted in Australia by Stevenson, Hamer, Finch, Elliot and Kresnow (2000) male participants were more likely to sustain an injury as compared to the females. However, other studies have reported the sports injury incidence among female athletes to be 3-5 times higher than in their male counterparts (Myklebust et al., 1998; Arendt & Dick, 1995)

#### **2.5.2.3 History of previous injury**

According to Brooks et al. (2006) a history of recent injury can make an athlete to be more prone to injury again. For instance, a recent study conducted by Orchard (2001) to investigate muscle strains injury risk factors among Australian Footballers showed that a previous calf injury has high a likelihood of causing a hamstring and quadriceps injuries. This has been explained that there is a probability that after incurring a muscle injury, certain changes do occur in biomechanics of running and hence it predisposes athletes to injury in any of muscles. However other studies on the contrary have indicated that injuries may be due to low muscle strength (Orchard, Marsden, Lord et al., 1997; Yamamoto, 1993; Heiser, Weber, Sullivan, et al., 1984; Burkett, 1975; Christensen & Wiseman, 1972).

#### **2.5.2.4 Body mass index**

Research has linked higher BMI to greater risk of sustaining an injury in rugby (Lee, Myers & Garraway, 1997). According to Lee et al. (1997) players with high Body Mass Index, such as the

forward in rugby, sustain more injuries compared to the players with lesser BMI. This increased risk of injury has been explained as due to the variations in exposure in different phases of play. However use of BMI has been reported to reflect muscularity rather than obesity particularly in rugby players.

#### **2.5.2.5 Ethnicity**

Research has shown high incidences of injury among rugby players of black African and Caribbean or Aboriginal ethnic origin has been found to be just about 4 times that one of white players (Brooks et al., 2006).

## **2.6 RUGBY INJURY PREVENTION STRATEGIES**

Several researchers have recommended various prevention strategies, these include regular warm-up, cool-down, stretching, adequate rehabilitation and training, use of protective equipment, better playing field surfaces and following the laws of the sport (Junge & Dvorac, 2004; Brukner & Khan, 2003; Ekstrand & Gillquist, 1984). In addition other studies use of appropriate shoes, ankle wrapping, taping and bracing, altering playing surface and change rule (Hergenroeder, 1998) and instructing and training coaches and trainers on methods of injury prevention can help prevent sports injuries (Barker et al., 1997; Callaghan, 1997; Rifat & McKeag, 1996).

Similarly Klügl et al., (2010) classified injury prevention strategies based on Finch (2006) TRIPP model into three categories namely: Training, Equipment and Regulatory as illustrated in table 2.2 below.

**Table 2.2 Three categories of sport injury prevention**

---

**Training:** This includes all forms of physical preparation for sport and exercise

- ❖ Muscular strength
- ❖ Muscular endurance
- ❖ Agility
- ❖ Muscular power
- ❖ Balance
- ❖ Sport-specific skills

**Equipment:** This includes devices, braces, footwear and surfaces

- ❖ Protective equipment
- ❖ Footwear/orthotics
- ❖ Gymnasium floors
- ❖ Load-bearing surfaces

**Regulatory:** This includes the rules and regulations that govern sport

- ❖ Sport rules
- ❖ Association rules
- ❖ Legal rules
- ❖ Education regarding regulations

---

*Adapted from Klügl et al. (2010)*

### **2.6.1 Protective equipments**

Protective equipment is made specifically to protect specific body parts from the risk of injury while allowing the athlete to participate in different sporting activities (Brukner & Khan, 2011). They are also used on return to play after injury to prevent any further or aggravation of injury during the direct contact phases of the sport. Such protective equipment includes helmets which have been used in sports like rugby and skateboarding to prevent head injuries. Other protective equipment include mouth guards, shoulder pads, forearm and groin protectors, knee pads, wrist guards, footwear, headgear, braces and taping. Moreover, protective equipment should be fitted correctly and they may provide a psychological benefit as they increase player's confidence.

### **2.6.1.1 Head gear**

Use of headgear can minimize incidences of head injuries such as lacerations and abrasions (Wilson, 1998). Moreover, research has shown that use of headgear can dramatically decrease the severity of concussion injuries among in players who regularly use them as compared to those who do not use (Kahanov, Dusa, Wilkinson & Roberts, 2005). A study carried out in the United Kingdom by Jones et al. (2004) greatly linked use of headgear with reduced risk of injury to the head and face. In this study use of headgear by forwards reduced the bleeding head injuries significantly.

### **2.6.1.2 Protective padding**

According to Sinclair (2009) protective padding to protect against injuries has become common in recent years. The main reason for using these shoulder pads by players is because of their ability to absorb impact forces. For instance, shoulder pads can reduce minor bruising soft tissue injuries even though no evidence has been found that they can also reduce shoulder fractures and dislocations.

### **2.6.1.3 Mouth guard**

Mouth guards were first used among professional boxers in the 1920s (Knapik et al., 2007). Several studies have reported that use of mouth guards can dramatically reduce risk of minor injuries such as fractured teeth, as compared to non-use of the mouth guard (Knapik et al., 2007; Barbic, Pater, & Brison, 2005; Chalmers, 1998; Chapman, 1985). In addition, studies have also reported that the risk of sustaining Orofacial injuries when not using a mouth guard is 1.6-1.9 times higher as compared to use of the mouth guard (Knapik et al., 2007). Wearing a mouth guard is useful to every player no matter of the ages and is readily available and affordable in local stores (Sinclair, 2009).



#### **2.6.1.4 Ankle, and Knee Braces/Taping**

Bracing and taping are mostly used on ankles, knees and hands (Marshall et al., 2001). Moreover, taping or use of braces has been reported to reduce incidences of ankle sprains (Mickel et al., 2006; Barker, Beynon, Renstroöm, 1997; Callaghan, 1997). On the contrary, in a study conducted by Comstock, Fields and Knox (2005) strapping and bracing were reportedly used in protection of current or previous injuries. However there has been no evidence that has been found regarding these techniques according to Comstock and Colleagues. But the use of braces has been found to be being cheaper and saves time compared to the use of prophylactic taping methods. According to Hume and Gerrard (1998), for any external support to provide enough support to ligaments, it must exceed the strength of those particular ligaments. Even though bracing has been proved to be more effective in the reduction of injury, further research is needed to be done to determine its effectiveness (Sinclair, 2009).

#### **2.6.1.5 Appropriate footwear**

Appropriate footwear can provide protection against lower limb injuries (Milburn & Barry, 1998) while non-use of sports specific boots increases injury risk (McManus, Stevenson, Finch, Elliott, Hamer, Lower & Bulsara, 2004). However, there has been no consensus reached on the relationship among the foot, sports footwear and the playing surface. As a consequence, appropriate footwear designed to minimize the chances of athletes from being injured without affecting his/her performance has not been established. Several studies have looked at the advantages and disadvantages of athletic footwear (MCpoil, 2000; MCpoil, 1988). Footwear can protect the foot surface against hot, rough and rock surfaces. They can also provide increased traction between the footwear and the playing surface by offering sufficient grip necessary to perform sporting activities.

In addition they can also provide movement control during activity and absorb impact forces during sporting activities.

However, they also have several disadvantages, according to Robbins et al. (1998) as cited in MCpoil (2000). These disadvantages include reduced sensation perception by athletes because of using shoes for a long time. Moreover, they are expensive and they have increased secondary risk of injury as there may be increased friction on the playing surfaces. In addition, the heel counter of the shoe should be made of rigid and strong plastic in order to assist in the rear foot stability (Wilk, Fisher & Gutierrez, 2000).

### **2.6.2 Warm up**

Research has recommended warming-up and stretching prior to training and matches as an adequate injury prevention strategy (Woods, Bishop & Jones, 2007; Mjøl̄snes, Arnason, Ostagen, Raastad & Bahr, 2004; Kujala, Orava & Jarvinen, 1997; Safran, Seaber & Garrett, 1989). Warm up also prepares the body for exercise (Brukner & Khan, 2011). Moreover, warming up using certain body movement patterns may be helpful in upsurge of coordination and the later movements and thereafter, hence may reduce the risk of injury (Fletcher, Iain, Jones & Bethan, 2004). Similarly, according to Smith (1994) warm-up helps improve blood supply to the muscles and tendon, and to all body extremities. It also increases body temperature and improve the coordination of movements. Furthermore, according to McArdle, Katch & Katch (2006) good warm up and stretching before involvement in any physical activity enhances soft tissue elasticity and increased range of motion. This gain in soft tissue elasticity and range of motion decreases risk of player injury. Nevertheless, according to Woods et al. (2007), warm up improves muscle elasticity to reduce risk of injury and prepare athlete on the oncoming physical demands during the match. However, a warm up should only produce mild sweat without fatiguing the athlete. An inactive up

involves increasing body temperature using external means such as taking a hot shower and heating pads while an active warm up involves the use of physical activities (Bishop, 2003). For instance, a general warm up involve nonspecific activities like jogging, cycling and calisthenics while specific warm up includes sport specific activities for which the athlete is preparing for and stretching (Bishop, 2003; Safran et al., 1989; Shellock & Prentice, 1985). However, specific warm up has been advocated for as it utilizes the activities that the athlete will engage in later on during the competition (Faigenbaum et al., 2005; Shellock & Prentice, 1985).

### **2.6.3 Cool down**

Cool down enhances the elimination of muscle metabolism waste products and enhances the recovery time (Stamford, 1995 as cited in Pharaoh & Assuman, 2011). These authors suggested that light aerobics should be performed at the end of any sporting activity before progressing to a cool down. Jogging and low intensity cycling has been recommended for any sport and after gym training period (Blum, 2000 as cited in Pharaoh & Assuman, 2011). Moreover, flexibility and stretching exercises are important part of a cool down and can reduce risk of injury (McManus et al., 2004). Similarly, cool down should be adequate and should be for 5-10 minutes of light activity followed by stretching (Sports Medicine Australia, 2007). Furthermore, physiotherapist and team physicians should educate and supervise players on stretching during cool down and warm up (Ekstrand Gillquist & Liljedahl, 1983).

### **2.6.4 Stretching**

Stretching can increase flexibility, muscular strength and reduce injury risk if practiced adequately (McArdle, Katch & Katch, 2006; American College of Sports Medicine, 1998). Stretching can be classified into three types namely: static stretching, dynamic stretching and Proprioceptive Neuromuscular Facilitation (PNF) (Amako, Oda, Masuoka et al., 2003; American College of Sports

Medicine, 1998; Kreighbaum & Barthels, 1996). Of this, static stretching method is the easiest and most frequently used however each type has its own advantage. In addition, stretching is supposed to be maintained for about 20 seconds to enable the connective tissues to lengthen. For instance, there have been suggestions that passive stretching is more effective than dynamic stretching (Bandy, Irion & Briggler, 1998). Nevertheless, sustained stretching during warm up has been found to reduce athletes' performance while dynamic stretching has shown to increase performance (Fletcher, Iain, Jones & Bethan, 2004). This has been also been reported in a recent study by Werstein and Lund (2012) to investigate the effects of two stretching protocols on stretch-shortening cycle performance in female Division I soccer players and female club rugby players. Of the three treatments administered, warm-up which was then followed by dynamic stretching improved performance. Therefore dynamic stretching has been recommended as part of warm-up before involvement in any sporting activity. Similarly Faigenbaum, Belluci, Barnieri, Bakker and Hoorans (2005) found that dynamic stretching can increase performance and flexibility to minimize the risk of injury over the static stretching.

#### **2.6.5 Strength and pre-season conditioning training**

Pre-season conditioning significantly increases performance and prevent risk of injury (Caraffa, Gerulli, Progetti et al., 1996; Ekstrand, Gillquist, & Liljedahl, 1983). It should include strength, agility and flexibility training. For instance, high workload of anaerobic exercises similar to the playing environment has been found to reduce risk of injury (Verrall, Slavotinek & Barnes, 2005). Moreover, many studies have shown that specific muscle strengthening such as hamstring strengthening may minimize the number of muscle strains (Proske, Morgan, Brockett & Percival, 2004; Askling, Karlsson & Thorstensson, 2003; Croisier, Forthomme, Namurois, Vanderthommen & Crielaard, 2002; Heiser, Weber, Sullivan, Clare & Jacobs, 1984). Similarly, a past study by

Heiser, Weber, Sullivan et al. (1984) also reported that muscle strengthening may reduce injury incidences. Furthermore, muscular strength may improve athlete's performance and can be increased using three different resistance training techniques (Brukner & Khan, 2011). These techniques include isotonic, isokinetic and isometric strength training, Olympic type weightlifting and plyometric training.

#### **2.6.6 Flexibility training**

Good muscle flexibility reduces risk of injury (Verrall et al., 2005). For instance, stretching has been found to improve flexibility (Brukner & Khan, 2011; American college of Sports medicine, 1998). Flexibility is achieved through increased range of motion in a joint and developed muscle power around this increased range of motion (ROM) (Brukner & Khan, 2011). Furthermore according McArdle, Katch and Katch (2006) flexibility training with static stretching for at least 2-3 days per week with each stretch held to a mild discomfort for 30-60 seconds with 3-4 repetition per stretch has been found effective. Other types of flexibility training include speed training, agility training, specific skill training and cross training (Brukner & Khan, 2011).

#### **2.6.7 Nutrition and water intake**

For many past decades there has been a significant improvement to scientifically understand function of different foods in health and physical/sport performance (Brotherhood, 1984). For instance, balanced nutritional and fluid intake may play an important role in improving athletes' performance (Sallis, 1996) while inadequate hydration may result to life threatening injuries such as heatstroke (American Dietetic Association, Dieticians of Canada and American College of Sports Medicine, 2000). For instance, insufficient food intake may increase the risk of injury due to delayed athlete recovery (Brukner & Khan, 2011). Furthermore, according to Brotherhood (1984) a high power output by sports personalities require substrate energy and water with carbohydrate

specifically of muscle glycogen being recommended in athletes who require greater power output. Moreover, high sweat leads to loss of salt, potassium, magnesium, protein and amino acids.

Colombani and Mannhart (2000) recommended carbohydrate intake to amount to 2-7 grams per kilogram before and after exercise while water intake should be about 2-3 litres per day with an extra 1.2-1.5 litres to balance each litre of exercise induced sweat. Moreover, studies have reported that proper hydration is important in all environmental conditions (American Dietetic Association, Dieticians of Canada and American College of Sports Medicine, 2000). This study recommended that up to 2 litres of fluid is lost within 90 minutes of vigorous exercise. Moreover, sports played in cooler environments can lead to extreme urine production. Sparling & Millare (1999) recommended that an athlete should consume at least 400-600 ml of fluid in 20-60 minutes before exercise. However for sports lasting for 1 hour or longer, hydration fluids containing 5%-8% of carbohydrates and Sodium beverage (0.5-0.7 g/l) have been found beneficial. In addition, hydration with 500ml of carbohydrate drink 2 hours before matches has been found useful.

According to Davis and Davis (2005) any athlete who loses fluids  $\geq 3.2$  kg over 90 minutes should stop practice or participating in the match immediately. Moreover, since a wealth of information regarding sports diet and nutritional supplements that may or not have scientific basis is readily available in several publications and internet, it is therefore the responsibility of team physicians to guide the athletes in making the proper decisions in respect to diet.

#### **2.6.8 Adequate player rehabilitation**

Inadequate player treatment and rehabilitation increases risk of injury (Chomiak, Junge, Peterson & Drovak, 2000). Moreover, players with who have been injured before have been found to be in greater risk of sustaining an injury (Thacker et al., 1999, Bahr & Bahr, 1997; Glick, Gordon &

Nishimoto, 1976). For example, according to Thacker and colleagues (1999) an athlete with a sprained ankle must finish a well supervised rehabilitation programme before returning to play. This return to play should be decided carefully by the team physician or trainer. In addition, research has recommended that those players with a severe or moderate history of injury such as ankle sprains should continue to wear appropriate orthotics for at least 6 months as it has been found to be of effective up to 1 year after sustaining an injury (Bahr, Lian & Bahr, 1997).

## **2.7 SPORTS INJURIES MANAGEMENT**

According to Hackney (1994) management of sports injuries can be categorised into two stages, with the main aim of treatment being return to sport. These stages include (i) First aid measures (ii) RICE- that is resting the injured body part while making sure the athlete is active, and icing to alleviate pain, and stop bleeding and swelling through compression and elevation of the injured body part. According to Hackney (1994) the main procedures of treatment include early treatment while retaining the cardiovascular and respiratory fitness as healing takes place. Moreover, stretching and muscle strengthening and sport specific exercises with particular consideration on technique, equipment and return to play less risk of injury have been advocated. Nevertheless, rehabilitation of an athlete through all steps of the athletes' return to sport is important part of sports injury management.

### **2.7.1 Role of physiotherapist in sports injuries prevention**

Physiotherapy plays a big role in sports injuries management (Brukner & Khan, 2003; Hackney, 1994). According to Hackney (1998) physiotherapy include use of electrotherapy modalities which include ultrasound, TENS and short wave diathermy (SWD). Moreover, a Doctor Physiotherapist relationship is helpful in management of sports injuries. For instance, physicians and trainers are

important to coaches and players as they help to determine when the player can return to play after injury (Thacker et al., 1999).

The role of the sports physiotherapists has expanded markedly over the past few years, reflecting in part the explosion that has occurred within sports medicine. Moreover, physiotherapists have an important role to play in the prevention of rugby injuries. Their roles may vary greatly according to the sport, venue, country and availability of associated sports medicine practitioners (Zuluaga et al., 1995). In addition there are many therapeutic techniques used in the treatment of sports injuries by physiotherapists such as manual therapy, electrotherapy, exercises, specific soft tissue mobilization, rehabilitative exercises, taping and bracing (Brukner & Khan, 2003). Nevertheless, according to Hackney (1994) physiotherapist utilises massage, strapping, stretching and muscle strengthening with manipulation and mobilization techniques in treatment of sports injuries. For instance, a physiotherapist should play a key role in supervision of stretching. In addition, according to Tippet (1990) team physiotherapists play an important role in injury prevention. Their roles include providing education to players and coaches on risks, prevention, precautions, treatment and rehabilitation of sports injuries. In addition, team medical practitioners should be able to examine, and screen and condition players during pre-season, provide first aid, diagnose, treat, rehabilitate and advise players on return to play after injury. Therefore a team therapist should be available in all training and matches sessions however financial constraints in clubs seem to hinder their presence. This has also been recommended by several previous researchers (Kiwanuka, 2011; Ekstrand & Gillquist, 1983).

### **2.7.2 Role of players, coaches and team leaders in sports injury prevention**

According to Bergeron and Greene (1996) as cited in Pharaoh and Assuman (2011), sports injury prevention strategies can be real if the players are aware that injury prevention is part of the sport



and they need to get involved. Moreover, the authors suggested that athletes play a major role in injury prevention and they should partner with other role players. In addition, players should maintain their level of fitness; use protective equipments always, follow the rules of the game, and seek medical treatment always when injured. The authors concluded that if players understood and practised sports safety practices then injury incidences may be minimized. Also a change in the players' attitude on the use of protective equipment has been recommended (Gardiner & Ranalli, 2000). Gardiner and Ranalli reported that players did not consistently use mouth guards, giving reasons such as mouth guards interfering with their speech, breathing and their physical appearance. The authors recommended that creating awareness among players on the importance of correctly fitting mouth guards to reduce injury risk and information on injury risks should be staged to develop more positive attitudes and increased usage of mouth guards by players.

Coaches play an important role in injury prevention (Chalmers, Simpson & Depree 2004; Donaldson & Hill, 2002). Moreover, coaches can teach training programmes and other safety practices to players (Finch & McGrath, 1997). For instance, according to Weaver et al. (1996) coaches are the supervisors of athletes at both practice and training. Furthermore, according to Donaldson et al. (2002) coaches should specifically target injury prevention in their training programmes regularly and should be informed, have contact to and be encouraged or supported to attend appropriate first aid training on injury prevention. In addition, coaches should be ensured that they possess a qualification for coaching and first aid certification or knowledge as they may be required to provide care to their players. Nevertheless, coaches should provide players with adequate training and coaching for safe participation (Donaldson et al., 2002). Moreover coaches should stress on injury prevention as well as individual and team talent and skills. Coaches should also teach the athletes on the basics methods of injury prevention and condition them satisfactorily

before any competition. In addition, coaches should be aware of the consequences their players being tired and be aware that not only the performance is affected when a player is tired but also the player is at a greater risk of getting injured (Ekstrand, Gillquist, Mo" ller et al., 1993; Dirx, Bouter, & De Geus, 1992)

Coaches should know their role in health, safety and success of the athlete and they should be aware of the potential risks an athlete is faced with and should be able to develop strategies to avoid or minimize the injuries (Sharkey & Gaskill, 2006). This can be achieved through proper conditioning and planning of activities and not to predispose athletes to excessive training to avoid fatigue and injury. Nevertheless, coaches must ensure that protective equipments are of high quality, properly fitted, repaired and maintained when damaged (Arnheim & Prentice, 1993). Even though coaches do not have direct knowledge on injury prevention they do play an important role in implementation of different training schedules that can improve an athlete's performance and minimize the risk of injury (Twomey et al., 2009). Similarly, coaches can play a key responsibility in executing player development tactics that may minimize player's risk of injury at all levels of competition (Romitti, Finch & Grabbe, 2008). However, studies have identified the need for further training of coaches on injury mechanisms and early treatment of sports injuries (Carter & Muller, 2008). This education of coaches has been found to be effective in decreasing injury risks among netball and soccer players (Gianotti, Hume & Tunstall, 2010). Moreover, the effectiveness in the implementation of injury prevention initiatives may depend on five steps (i) *Reach* (ii) *Effectiveness* (iii) *Adoption* (vi) *Implementation* (v) *Maintenance*. This model used to implement injury prevention initiatives is known as RE-AIM (Finch & Donaldson, 2009; Glasgow, Vogt & Boles, 1999).

The role of club leaders according to Donaldson et al. (2002) involves planning, executing and monitoring and evaluation of wide range sport safety initiatives. In addition, they should also guarantee that playing surfaces and facilities are in good condition safe for use at both practice and competitions. Furthermore a club safety officer should be appointed and should ensure that safety issues are addressed.

Therefore it is necessary that all rugby stakeholders such as team coach, manager, sports trainer and team medical practitioners to work hand in hand as they have great responsibility in ensuring that rugby injury prevention strategies, safety practices and policies are always followed at both training and competition.

## **2.8 FACTORS INFLUENCING IMPLEMENTATION OF RUGBY INJURY**

### **PREVENTION STRATEGIES**

Several factors have been reported to hinder the implementation of rugby injury prevention strategies and sports safety practices and policies. These factors include lack of qualified personnel, health services and financial constraints (Pharaoh & Assuman, 2011; Casey et al., 2004), lack of proper sports facilities and players (Casey et al. 2004; Clarke, 1990), lack of sports safety policies and practices (Casey et al., 2004), player fatigue, lack of guidance and equipments, time and advice (Hawkins & Fuller, 1998; Saunders et al., 2010) and lack of sports injury prevention knowledge (Pharaoh & Assuman, 2011; Casey et al. 2004; McCrea et al., 2004; Clarke 1990)

For instance, insufficient numbers of medical physician, physiotherapist and other medical personnel have been reported in Rwanda (Pharaoh & Assuman, 2011). Moreover, according to Casey et al. (2004) lack of qualified referees, umpires, coaches, trainers and medical practitioners has led to the situation that the regulations of the sport not continuously implemented and some

players not receiving sufficient treatment when injured. This has been attributed to financial constraints in clubs, thereby affecting their capacity to recruit competent trainers and provide adequate club facilities. Furthermore, Clarke (1990) reported lack of qualified professionals to have increased the risk of injury as coaching or first aid provision may not be easily accessed or may not be of high quality. This may lead the injured players not to seek medical attention as the health services are not available.

According to Clarke (1990) a decline of population and sporting structure in rural areas can negatively impact on the risk of injury. It was noted by Casey and colleagues (2004) that lack of volunteers and players due to relocation of players to seek employment opportunities and the non-involvement of new comers in club sport can lead to young players being recruited to field in matches involving older, stronger and more experienced players and this increases their risk of injury.

Lack of sport safety policies and practices has been previously identified as a barrier to implementation of sports injury prevention programmes (Casey et al., 2004). For instance, studies have investigated existence of sport safety policies and practices among clubs in Australia (Casey et al., 2004; Finch & Hannessy, 2000). Finch and Hannessy (2000) reported that both urban and semi-rural clubs in Australia do not have formal safety policies. Similarly, Casey et al. (2004) reported that very few safety policies and practices existed among netball and football clubs in Australia.

According to Hawkins and Fuller (1998), soccer players reported that they were not following some of the preventive measures due to fatigue, lack of guidance, lack of time and advice. In addition they thought it was not necessary and nobody else performed some of the prevention strategies like

wearing shin guards during training. This was also noted by Saunders, Otago, Romiti, Donaldson, White and Finch (2010) where coaches felt they did not have enough concepts for training drills. Nevertheless, shortage of time and skills, and players not being taught correctly in the aspects of the game, lack of facilities, and lack of coaching skills as well as lack of training equipment have been reported to hinder successful implementation of injury prevention initiatives. Moreover, circumstances such as players not paying attention and lacking inspiration and senior players feeling that they did not need the techniques, absence of players from training and players feeling that training drills were boring made it difficult for coaches to implement the Down to Earth programme. In addition, Casey and colleagues (2004) noted that players were required to travel for long distances for “away” games and this affected their preparation as they could arrive late and prepare properly before the match kick-off.

Lack of sports safety knowledge has been attributed to probable injury risk and a barrier to successful implementation of sports injury prevention programmes (Clarke, 1990). Moreover, lack of sport injury knowledge on causes, risk factors and signs among coaches and players has been noted among many previous papers (Casey et al., 2004; McCrea et al., 2004). For example, in a study done by McCrea et al. (2004) in Milwaukee, Wisconsin to investigate the occurrence of unreported concussion among high school football players. The results showed high number of unreported injuries with only (47.3%) players reporting their injuries. The reason given for this was that many (66.4%) thought that their concussion injuries were not serious to receive medical treatment while others thought they will be not be selected for competition (41%) while 36.1% lacked awareness or knowledge on the signs of probable concussion. The authors recommended that future injury prevention programmes should target on creating awareness to increase players’ knowledge on the signs and symptoms of concussion and possible risks of associated with

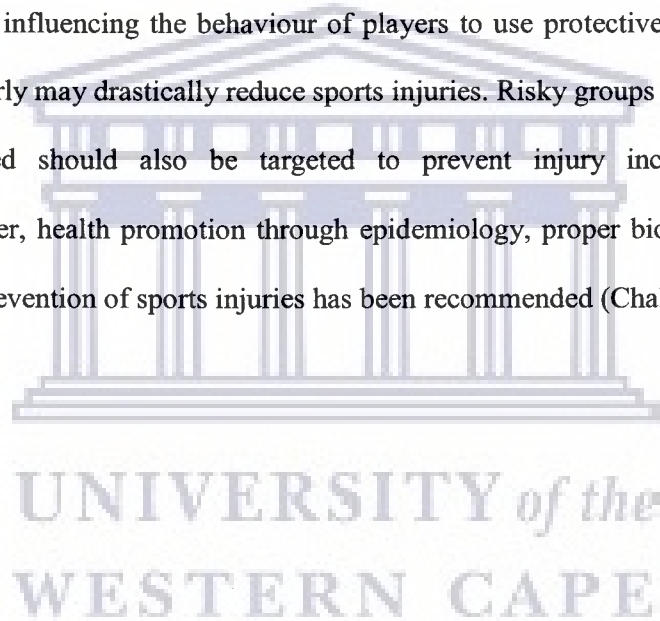
unreported injuries. Similarly, other authors have also reported low level of knowledge among coaches and players (Pharaoh & Assuman, 2011; Casey et al., 2004). However, instructing and training coaches and trainers on methods of injury prevention may help prevent sports injuries (Barker et al., 1997; Callaghan, 1997; Rifat & McKeag, 1996).

Since little is known about sports injury prevention intervention, sports safety practices and policies, and their implementation, it is therefore important to investigate whether more factors influencing implementation of rugby injury prevention strategies exists in developing countries in order to assist in the implementation of these injury prevention strategies in the future. In addition, development and implementation of these injury prevention interventions to reduce the rate and severity of injuries has been advocated for (Junge et al., 2004).

## **2.9 HEALTH PROMOTION IN SPORTS**

Health promotion is the practice of facilitating people to upsurge control over themselves and to improve, their health (Ottawa Charter, 1986). Setting and targeting approaches may be used to promote safe play among players and educate the players on injury prevention strategies (personal communication). For instance, the setting approach incorporates guidelines of health promotion, such as enablement, involvement, complete, fairness, sustainability and multi-strategy (Green et al., 2000; Mittelmark, 2008). Furthermore, the Jakarta Declaration (1997) stressed that settings can offer real-world openings for the execution of wide-ranging initiatives. Similarly, Goodstadt (2001) p.209, reported settings model offers *'an efficient and effective framework for planning and implementing health promotion initiatives and ultimately assessing their impact'*. However, implementing and evaluating setting based programmes on health is not an easy task to conduct. This is because settings have many actors who have different interests and expectations. These actors can slow the implementation process (Whitelaw et al., 2001). In addition, the targeting

approach can also be used to educate and promote safe and fair play in rugby. Targeting is one of the major strategies in health promotion. It may be done in terms of diseases, life-cycles, lifestyles, social groups or social conditions. This includes targeting risk conditions, risk groups and risky behaviours (Naidoo & Wills, 1998). For instance, settings such as universities, colleges and high schools can be used to implement use of protective equipment in rugby, educate in injury prevention strategies, fair and safe play and rules of game of rugby. Moreover, targeting approach such as targeting risk behaviours by players who foul-plays other players, like high tackles, should be punished. In addition, influencing the behaviour of players to use protective equipment, warm ups and cool down regularly may drastically reduce sports injuries. Risky groups like youth who are at risk of being injured should also be targeted to prevent injury incidences (personal communication). Moreover, health promotion through epidemiology, proper bio-mechanics, acute care, rehabilitation and prevention of sports injuries has been recommended (Chalmers, 2002).



## 2.10 SUMMARY OF THE CHAPTER

The literature review highlights rugby sport, prevalence, incidences, types, sites, mechanisms and risk factors to rugby injuries. The chapter also highlights sources of sports knowledge of sports injuries and different rugby injury prevention strategies that have been recommended to drastically reduce rugby injuries if implemented successfully, this review was done from previous studies in the domain of rugby injuries. The role of physiotherapists, players, coaches and team leaders in rugby injury prevention and treatment as well as the factors influencing the implementation of these rugby injury prevention strategies were discussed. Finally the chapter discusses the role of health promotion in prevention of sports injuries. More importantly, literature has suggested that factors that are crucial for rugby injury prevention are still not well known in developing countries and are multidimensional in nature hence recommend more studies to be done in the domain of rugby injury prevention. Moreover, *“sports at all levels are popular and healthy activities practiced by millions of persons worldwide, but they are also a leading cause of preventable injury”* (Thacker et al., 1999, p 758). Therefore research into the most adequate methods of preventing injury and implementation of these studies into practice has been advocated for (Looney & McAllister, 1989). The following chapter will outline and explain the methods used to conduct this present study.



## CHAPTER THREE

### 3 METHODOLOGY

#### 3.1 INTRODUCTION

This chapter describes the research setting where the study was conducted and the study design used in the present study. The population and sampling methods used to recruit participants in this study has also been described in detail. The instruments used to collect data and procedure of data collection and pilot study has been explained in broad. Thereafter validity and reliability of the instruments used to collect data in this study has been discussed. Finally the chapter describes data analysis methods used to analyse the results of the present study. Lastly the ethical considerations of this study are explained in detail. The chapter ends with a summary of the chapter.

#### 3.2 RESEARCH SETTING

The study was conducted in Nairobi, Kenya. Nairobi is the capital city of Kenya located in the Central South of Kenya between the cities of Kampala and Mombasa at latitude 1 16'S, Longitude 36 48' E. covering an area of 684sq.km with a population of 2,940,911 (2007) (Maps of the world, 2011). Kenya Rugby Football Union (KRFU) is the body which governs rugby in Kenya and is a member of the International Rugby Board (IRB) and is based in Nairobi. Seven first division clubs participate in Nairobi in the KRFU league and are run at a semi-professional level. All these clubs are Nairobi based province. The Kenya Rugby Union League (Kenya Cup) is played in an eight month season. Besides the Kenya Cup, the teams participate in a Sevens tournament just after the completion of Kenya Cup League. This tournament is held in various towns, starting from Kisumu (Dala Sevens), Nakuru (Prinsloo Sevens), Nairobi (Christie & Kabeberi Sevens) and the last tournament is held in Mombasa (Driftwood Sevens) (Ultimate rugby, 2012). All the Clubs Second

XV's participate in a concurrent Eric Shirley Cup League. During these competitions teams develop their young players skills before they are experienced enough to be make an appearance for their club's First XV side. Other major tournaments which the teams participate in include the Impala Floodlight Tournament which is scheduled concurrently with the Kenya Cup. There is also a major tournament famously known as the Bamburi Super Series, where the major rugby clubs join together to make teams that will feature in that tournament. This tournament also features foreign teams from other countries such as Uganda and Tanzania. Players participating in these tournaments are selected on merit; hence this has led to big competition for positions in the first XV leading to a high number of rugby injuries being reported. Besides the rugby league and tournaments, players from the entire league clubs are selected on merit and according to their performance to represent the Kenya National XV's and Sevens teams. This has led to majority of players having a longer and busy season throughout the year.

### **3.3 STUDY DESIGN**

This study employed a quantitative, descriptive retrospective study design. According to Hopkins (1998) a quantitative research measures the associations among variables. In addition, descriptive research is purely observational, since it monitors the subjects without getting involved. A retrospective study also concentrates on events/situations that had happened in the past that may affect the participants' status in a control research. Descriptive design was helpful in describing the situation in the Kenya rugby league during the 2011-2012 season involving the seven first division teams. According to Hopkins (1998) a descriptive study do not try to change the actions/characteristics or situations however it does measure the subjects in their current form. Retrospective design was employed in this study as the study tried to get information from the participants on what had happened in the previous competitive season. According to Hopkins

(1998) different research methods are different in the quality of proof they offer for a cause-and-effect association among variables. However, cleverly designed cross-sectional studies have been reported to offer excellent proof for non-existence an association. Therefore, cross-sectional or case-control studies are an excellent way to start from when deciding if it is worth to continue to better research methods. In addition, prospective studies have been reported to be harder to conduct and consume a lot of time when conducting them. However they have been found to provide very convincing inferences about cause and effect. Therefore, a quantitative retrospective study design was best suited to this study as it was easier to conduct and less time consuming. Moreover, the quantitative data analysis methods helped to analyse data as it was from a large sample.

#### **3.4 POPULATION AND SAMPLING**

All Clubs in the KRFU leagues during the 2011-2012 season constituted the study population. Of these clubs, only members of the Seven First Division teams were invited to participate in this study. Included in each First Division clubs were all the rugby players, team coaches, team medical practitioners and team managers registered with the KRFU league during the 2011-2012 Season.

The KRFU requires each team to register a total of 30 players, therefore it was anticipated that a total number of 210 players would be available for participation in total. Each team has a coach, a team medical practitioner and a team manager therefore the final sampling frame consisted of 210 rugby players, 7 team coaches, 7 team medical practitioners and 7 team managers giving a final sample total of 231. All of these that were part of the teams' activities during the 2011-2012 season were thus invited / approached to participate in the study. This sample size was enough for a quantitative study as a sample of hundreds has been found to give acceptable confidence interval for small effects (Hopkins, 1998).

### 3.5 DATA COLLECTION METHODS

This study employed a quantitative method for data collection. Four structured self-administered questionnaires for rugby players (**Appendix C**), team coaches (**Appendix D**), team managers (**Appendix E**) and team medical practitioners (**Appendix F**) respectively were used in data collection.

#### 3.5.1 Research Instruments

##### 3.5.1.1 Questionnaire for rugby players (**Appendix C**)

Players and coaches completed the same questionnaire, except for (Section 2) on history of injury that was deleted from team coaches' questionnaire. In the players' questionnaire (**Appendix C**) **Section 1:** assessed the socio-demographic data such as team name, age, weight, height, experience, BMI and playing positions of the rugby players. **Section 2:** assessed information on the history of injury, which included the number of injuries sustained, the severity of injury (time loss), body parts affected, injury mechanism and types of injury sustained (Hawkins & Fuller, 1999). **Section 3:** assessed the injury prevention strategies and safety practises in place in their current teams and the activities undertaken (Hawkins & Fuller, 1998), it focused on use of protective equipment such as headgears, ankle braces, appropriate shoes and other common injury prevention strategies such as warm-up, cool-down, stretching, flexibility and strength training **Section 4:** assessed the reasons why some of these prevention strategies and activities are not done (Hawkins & Fuller, 1998), i.e. to get information on what factors are hindering the efforts to implement rugby injury prevention strategies **Section 5:** assessed the source of information regarding sports injury prevention (Sefton, 2003) and knowledge regarding sports injury prevention (Hawkins & Fuller, 1998). This assessed the rugby players' knowledge on the occurrence, causes, types and predisposing factors to injuries, while **Section 6:** reflected on the nutrition advice given to the rugby

players in their respective teams (Hawkins & Fuller, 1998). In this section, rugby players were asked the amount of carbohydrate and quantity of water they consume before, during and after the matches and training.

### **3.5.1.2 Questionnaire for team coaches (Appendix D)**

Coaches completed the same questionnaire as players with the exception of one section that was deleted, i.e. section 2: injury sustained. Although coaches are also susceptible to injuries, this was removed as the aim of the study was mainly to investigate the injuries of rugby players. In this questionnaire, **(Appendix D) Section 1:** was adapted purposely to provide demographic data of the team coaches such as team name, age and coaching experience. **Section 2:** Focused on injury prevention strategies and safety practises in place in their current team and the activities undertaken, this was adapted from Hawkins and Fuller (1998), it focused on use of protective equipment such as headgear, ankle braces, appropriate shoes and other common injury prevention strategies such as warm-up, cool-down, stretching, flexibility and strength training **Section 3:** assessed the reasons why some of these prevention strategies and activities are not done. (Hawkins & Fuller, 1998), i.e. to get information on what factors are hindering the efforts to implement rugby injury prevention strategies **Section 4:** assessed the source of information regarding sports injury prevention (Sefton, 2003) and knowledge regarding sports injury prevention (Hawkins & Fuller, 1998). This assessed the coaches' knowledge on the occurrence, causes, types and predisposing factors to injuries while **Section 5:** reflected on the nutrition advice given to players. In this section, team coaches were asked on the amount of carbohydrate their players consume, quantity of water their players take and general nutrition advice given to their rugby players in their respective teams and a brief open ended question on what the coaches think is hindering the implementation of rugby injury prevention strategies in Kenya.

### **3.5.1.3 Questionnaire for team Managers (Appendix E)**

Team managers' questionnaire (Appendix E) comprised of two sections: Section 1 assessed the socio-demographic characteristics of the participants while Section 2 assessed the different sports safety practices and policies in place in their current clubs. This section was adapted from the validated SSAT tool (Donaldson & Hill, 2002).

### **3.5.1.4 Questionnaire for team medical practitioners (Appendix F)**

Team medical practitioners' questionnaire (Appendix F) comprised of two sections: Section 1 assessed demographic characteristics information of the participants and Section 2 identifying the actual safety practices in place at their clubs. This questionnaire was adapted from the validated SSAT tool (Donaldson & Hill, 2002)

### **3.5.2 Validity and Reliability of the research instruments**

According to Streiner (1995) as cited by Donaldson, Hill, Finch and Forero (2003), excellent reliability and validity is the normal property of any research instrument. Sarantakos (2005) defined reliability as the ability of an instrument to produce consistent results when the measurement is repeated on more than one occasion. Moreover, according to Hopkins (1998), validity shows as how satisfactory a variable quantifies what it is supposed to while reliability shows us how the measures can be reproduced if repeated. Finally, face and content validity of an instrument determines subjects to include in an instrument to improve its language and layout (Donaldson et al., 2003).

### **Coaches and Players' research instruments**

In this study instruments for rugby players and team coaches were adapted from Hawkins and Fuller (1998). In order to gain more insight into the mechanisms, site and time of injury, an additional section used by Hawkins and Fuller (1999), was included. A section used by Sefton (2003) on source of knowledge regarding injury prevention was also included for validity issues. Although both instruments had been extensively used in the UK, no reliability figures are available therefore a 2 week test-retest reliability pilot study was done on 15 players and a team coach from the lower division (Eric Shirley) team to determine how valid and reliable the instruments were. Pilot studies assist us to create and familiarize with the possible techniques, or to calculate the sample size of a study. Moreover pilot study is supposed to be conducted using the same sample size and research design that will be used in the main study (Hopkins, 1998). Pilot study in this study was employed to help determine the research instruments' reliability and, whether the participants easily comprehended the questions and the time it will take for participants to fill in the questionnaires. The pilot study was used to help design a more appropriate instrument that was to measure all the variables and help clear ambiguous questions. Most of the players and coaches during the pilot study experienced difficult while completing their questionnaires in understanding the questions on inclusion of calisthenics in cool downs and aerobic activities in warm ups therefore the players and coaches for every team before completion of the questionnaires were always explained to the meaning of those key words and if they had any difficulties, the researcher and his assistants were readily available to clarify. The section on the reasons for not undertaking strength training, flexibility, warm ups and cool downs at least once a week was found by the players and coaches to be difficult while completing it, therefore, the researcher and his assistants assisted the players and the coaches on how it should be completed. Time taken to fill the players', coaches and

managers' questionnaire was found to be roughly between 15-20 minutes while that of the team medical practitioners' only took 10 minutes to complete. This time had reduced from just above 30 minutes after nearly all the questions in the questionnaire were given corresponding values which the participants just needed to circle as their answers. Also this made it much easier for the all the participants to complete the questionnaires. During the pilot study the test retest reliability was found to be 92%, inter rater reliability ranged from 70% to 80% while the internal consistency Cronbach's alpha co-efficient ranged from 0.773 – 0.854 with an average of 0.854.

### **Team Managers and Medical Practitioner's research instruments**

The questionnaires for team managers and medical practitioners were adapted from the Sports Safety Assessment Tool (SSAT). The Sports Safety Assessment Tool (SSAT) was developed and validated during the process of development of a tool to audit the safety and practices of community sports club in Australia in 2003 (Donaldson, Hill, Finch & Forero, 2003). This tool, investigating different sports safety practices and policies in place among sports clubs (Donaldson & Hill, 2002), was used to get information from managers and team medical practitioners on sports safety practices available at their various clubs. The Sport Safety Assessment Tool's (SSAT) had a test retest reliability of 91% and the inter rater reliability ranging from 62-75% while the internal consistency Cronbach's alpha co-efficient was 0.70- 0.80 in the original study (Donaldson et al., 2003). To ensure the content and face validity of the adapted instruments, they were reviewed by experienced sports safety experts, coaches, referees and sports development officers working as technical advisors in KRFU. Although it would have added value and rigour to assess the construct validity of the instruments too, close consultations were conducted between the researcher and sports physiotherapists who had previous experience of working with sports team more so in rugby as they understood the Kenya rugby context better.



In addition, a team manager and team medical practitioners from a lower division club completed the questionnaires in order to provide information to the researcher on how long it will take to complete the questionnaires and how easily the questions were understood. Permission to use the instruments was not required. The SSAT tool questions asked respondents to report if their club or association had a sports safety on a specific safety issue, how often certain practices were undertaken or what proportion of players or coaches participated in certain safety practices. A five-point scale was used for most questions and the following definitions were applied to the questionnaire:

- All or Always = 100%
- Most or Most of the time, Very Often = 75%
- About Half or Half the time, Often = 50%
- Some or Sometimes = 25%
- None or Never = 0%

For instance a question asked, “How often, in your opinion, are your playing surfaces generally in safe playing condition?” and the participants had to give an answer from the above named choices.

Finally an open ended question was designed for Coaches and Managers in order to get additional information on barriers that they may be experiencing while implementing the injury prevention strategies.

### **3.5.3 Procedure of Data Collection**

After obtaining ethical clearance permission from the Ministry of Higher Education’s National Council for Science and Technology (NCST), and the Kenya Rugby Union (KRU). Two qualified physiotherapists with experience in the field of sports physiotherapy and with a history of working with rugby clubs in Kenya were chosen as research assistants. Physiotherapists with previous experience in sports specifically in rugby were preferred as they understood rugby players and other

stakeholders, and were familiar with the Kenyan rugby context. These physiotherapists underwent a one day training workshop in order to assist in process of data collection. The training focused on the process of data collection, ethical consideration issues and who should be included in our study. It also addressed issues that might arise during data collection period which included assuring the participants confidentiality and how those participants who encountered difficult in completing the questionnaires should be assisted. Moreover the training was meant to familiarize the assistants on the aims of the study and generally the process of data collection. Thereafter team coaches and managers were met early for introduction and to book an appointment with their teams. The study objectives as well as all ethical issues were explained to them. Once agreed, appointments were made after consulting with the coach in order to avoid any interference with their training sessions. All participants completed individual and club written informed consent forms in the presence of a researcher before completion of the questionnaire. The questionnaires were then administered during the free time of the participants during training sessions. This was similar for coaches, medical practitioners and managers. Questionnaires were distributed and collected the same day to ensure maximum response rate. Team managers and coaches were given one week to complete the questionnaires. The questionnaires were administered by the researcher and his assistants. Only players who signed the consent forms were included in the study. All information regarding the study, purpose and confidentiality was clearly explained to all participants before they were requested to participate in the study and sign the consent form. Players completed the questionnaires during a face-to-face interview with the researcher and his assistants. Respondents were encouraged to ask questions for clarification of any aspects of the questionnaire they found difficult to understand. Questionnaires were coded to ensure the anonymity of individual respondents and the clubs they represented.

### 3.6 DATA ANALYSIS

The statistical package for social science (SPSS) version 19.0 was used to capture the data. Descriptive statistics were conducted to obtain a profile of the study sample and prevalence of injuries, injury prevention, sports safety practices and factors influencing the implementation of rugby injury prevention strategies. These were expressed in terms of frequencies, percentages, means and standard deviations in the form of tables, graphs and figures. Thereafter the results were presented in form of tables and graphs in Chapter 4 of this present study. The open ended questions in the team coaches and managers questionnaires were analysed qualitatively and common themes were identified and are presented in a table.

### 3.7 ETHICAL CONSIDERATIONS

Ethical clearance was attained from the Senate Research Grants and Study Leave Committee at the University of the Western Cape (**Appendix I**). The researcher obtained permission to carry out the study in Kenya from the Ministry of Higher Education's National Council for Science and Technology (**Appendix H**) and the Kenya Rugby Football Union (**Appendix G**). Written informed consents (**Appendix A**) were sought out from all participants. An information sheet (**Appendix B**) was used by the researcher to inform all the participants that their participation was voluntary and that they were allowed to withdraw from the study at their own will at any given time. The participants were also assured of their anonymity and that their information would be handled with confidentiality and that the information was intended for study purposes only. Questionnaires used in this study were given numbers to ensure the anonymity of individual participants and their clubs. In cases of injuries, the players were referred to the appropriate health care giver for treatment and necessary help. The researcher made a commitment to present the study findings to the Kenya Rugby Football Union as well as to all the Rugby clubs who participated in this study.

### 3.8 SUMMARY OF THE CHAPTER

This chapter emphasized on the research setting, the study design and sampling methods used in this present study. Procedure of data collection and instruments used to collect data were been clearly described in detail. The procedures of pilot study and how the validity and reliability of the data collection instruments was assured was also explained. The process of data collection was also covered. Finally, the data analysis methods and ethical consideration of this study are described. The chapter ends with a summary of the chapter. The subsequent chapter presents the results of this current study.



## **CHAPTER FOUR**

### **4 RESULTS**

#### **4.1 INTRODUCTION**

This chapter presents the results of this current study. Firstly, the socio-demographic profile of the study participants is highlighted, thereafter the prevalence of rugby injuries during matches and training is provided. Injuries are described in terms of its nature, severity, location and mechanism of injury. Thereafter the injury prevention strategies employed by the rugby players and team coaches are described. Factors hindering the implementation of rugby injury prevention strategies are presented. Finally sports safety practices in place at clubs are also described.

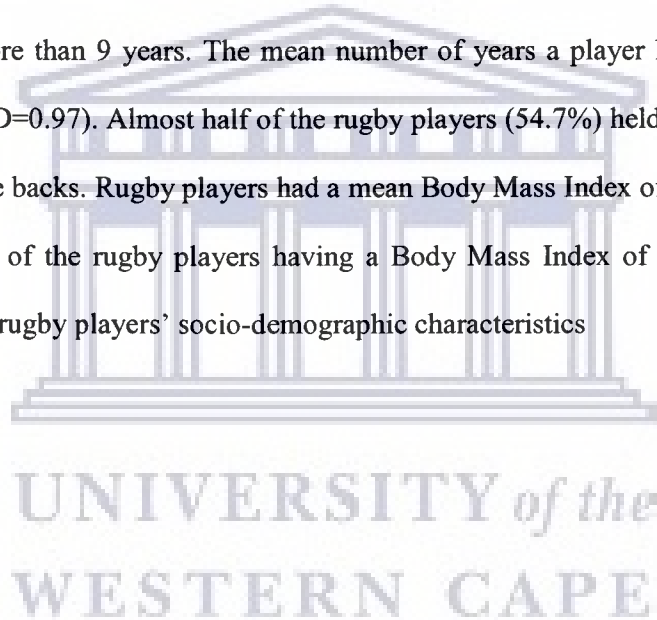
#### **4.2 RESPONSE RATE AND SOCIO-DEMOGRAPHICS OF THE PARTICIPANTS**

A total number of 210 rugby players, seven team coaches, seven team managers and seven team medical practitioners were invited to participate in this study. However a total of 162 rugby players, seven team coaches, seven team managers and six team medical practitioners agreed to participate in this present study resulting in a response rate of 77%, 100%, 100% and 85.7% respectively. Below are their socio-demographic characteristics.

#### 4.2.1 Socio-demographics of the Rugby Players

The results showed that 162 (77%) players participated in this study. The mean age of the rugby players were 22.86 (SD=0.78) with the majority of the players falling in the 20-24 years age group. More than half (62%) of the rugby players had a university education. The mean years of experience spent as a player in first division was 1.932 years (SD=1.12) with half (51.9%) of the rugby players spending at most 2 years in the first division.

Players had spent little time of 1.957 (SD=0.91) playing rugby before joining first division and only 8% had experience of more than 9 years. The mean number of years a player had spent with his current club was 1.685 (SD=0.97). Almost half of the rugby players (54.7%) held a forward playing position while 44.7% were backs. Rugby players had a mean Body Mass Index of 28.32 (SD= 1.38) with almost half (45.1%) of the rugby players having a Body Mass Index of slightly above 30. Table 4.1 summarizes the rugby players' socio-demographic characteristics



**Table 4.1 Socio-demographic characteristics of the rugby players (n=162)**

LABEL	CHARACTERISTICS	MEAN (SD)	FREQUENCY (F)	PERCENTAGE (%)
Age Group	16-19	22.86 (0.784)	25	15.4
	20-24		89	54.9
	25-29		37	22.8
	>30		11	6.8
Level of Education	Finished High School		39	24.7
	University		98	62.0
	College		21	13.3
Position of play	Forwards		88	54.7
	Backs		72	44.7
	Both Forwards and Back		1	0.6
Body Mass Index (BMI)	<18.5 (Underweight)	28.32 (1.384)	0.0	0.0
	18.5-24.9 (Normal)		30	18.5
	25-29.9 (Overweight)		59	36.4
	>30 (Obese)		73	45.1
Number of years as a player before 1 <sup>st</sup> division	<=2	1.957 (0.9079)	57	35.2
	2-4		68	42.0
	5-8		24	14.8
	>9		13	8.0
Number of years as a player in 1 <sup>st</sup> division	<2	1.932 (1.1208)	84	51.9
	2-4		28	17.3
	5-8		27	16.7
	>9		23	14.2
Number of years as player before 1 <sup>st</sup> division	<2	1.685 (0.9683)	94	58.0
	2-4		40	24.7
	5-8		13	8.0
	>9		15	9.3

#### 4.2.2 Socio-demographics of the Team Coaches

Seven team coaches (100%) participated in this study. The mean age for the team coaches was 34 years (SD=3.87) with almost all (85.7%) the team coaches falling in the 30-40 years age group as outlined in table 4.2. More than half (57.1%) of the team coaches had university education.

The mean number of years of experience as coach in first division was 3.29 years (SD=1.11) with more than half (57.1%) of the coaches spending an average of 3 years with their teams.

The mean number of years of experience as a coach before joining first division was 1.43 years (SD=0.79) with almost three thirds (71.4%) of the team coaches coaching for at most 1 year before joining first division team. The mean number of years spent by team coaches coaching their current clubs was 2.14 years (SD=1.07) with the most experienced coaches (28.6%) coaching at their current clubs for more than 10 years. The mean number of years spent by team coaches coaching another team was 1.71 (SD=0.49) with almost a third (28.6%) having no previous coaching experience.

**Table 4.2 Socio-demographic characteristics of the team coaches (n=7)**

Label	Characteristics	Mean (SD)	Frequency (n)	Percentage (%)
<b>Age group</b>	25-30	34 (3.87)	1	14.3
	30-35		3	42.9
	35-40		3	42.9
<b>Level of education</b>	University		4	57.1
	College		3	42.9
<b>No. of years as a coach in first division</b>	0	3.29 (1.11)	1	14.3
	2		2	28.6
	3		4	57.1
<b>No. of years as a coach before 1<sup>st</sup> division</b>	<1	1.43 (0.79)	5	71.4
	2-3		1	14.3
	4-7		1	14.3
<b>No. of years coaching current club</b>	1	2.14 (1.07)	2	28.6
	2		3	42.9
	11		1	14.3
	12		1	14.3
<b>No. of years coaching another club</b>	0	1.71 (0.49)	2	28.6
	1		5	71.4



#### **4.2.3 Socio-demographics of the Team Medical Practitioners**

Six (85.7%) team medical practitioners participated in this study as one team didn't have a team medical practitioner in place. Almost all (85.7%) team medical practitioners were Physiotherapists by profession while 14.3% were Red Cross Agents. In terms of qualification almost all (85.7%) team medical practitioners had a Physiotherapy qualification while 14.3% had a paramedic certificate qualification. The mean number of years of experience as a team medical practitioners was 2 years (SD=0.89) with a third (33.3%) having an experience of 1-4 years and a third (33.3%) had an experience of more than 11 years as team medical practitioners. The team medical practitioner with the least experience had 2 years while the most experienced had 14 years.

#### **4.2.4 Socio-demographics of the Team Managers**

Seven team managers (n=7) participated in this study. Almost two thirds of the team managers had a team manager position 5 (71.4%) in their respective clubs, while other a third were Chairman 1 (14.3%) and Secretary 1 (14.3%) in their respective clubs.

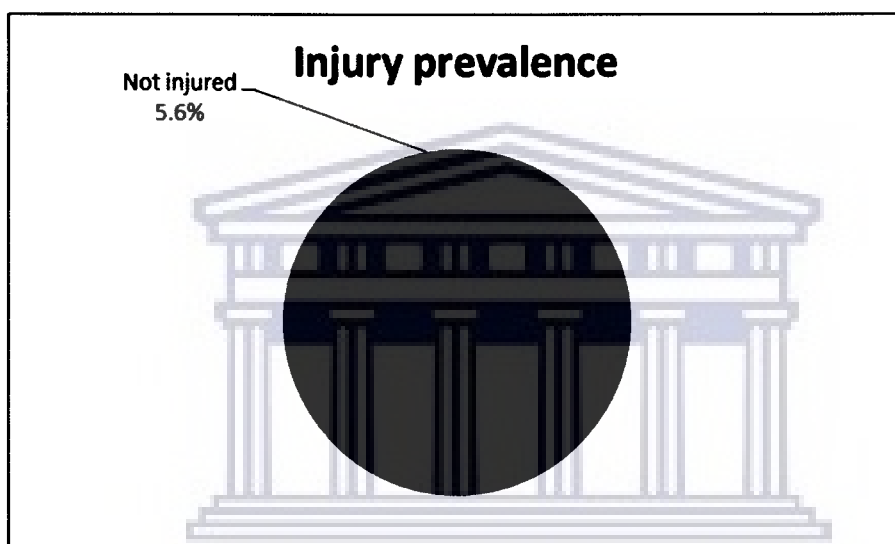
### **4.3 PREVALENCE OF RUGBY INJURIES**

Rugby players reported on injuries they had sustained at training and matches in the season prior to the study such as: time of injury; injury mechanism; injury location and severity of their injury in terms of the duration out of play after sustaining an injury. This was to determine the prevalence of the rugby injuries. The rugby players reported the following.

#### **4.3.1 Total Number of injuries sustained during training and matches**

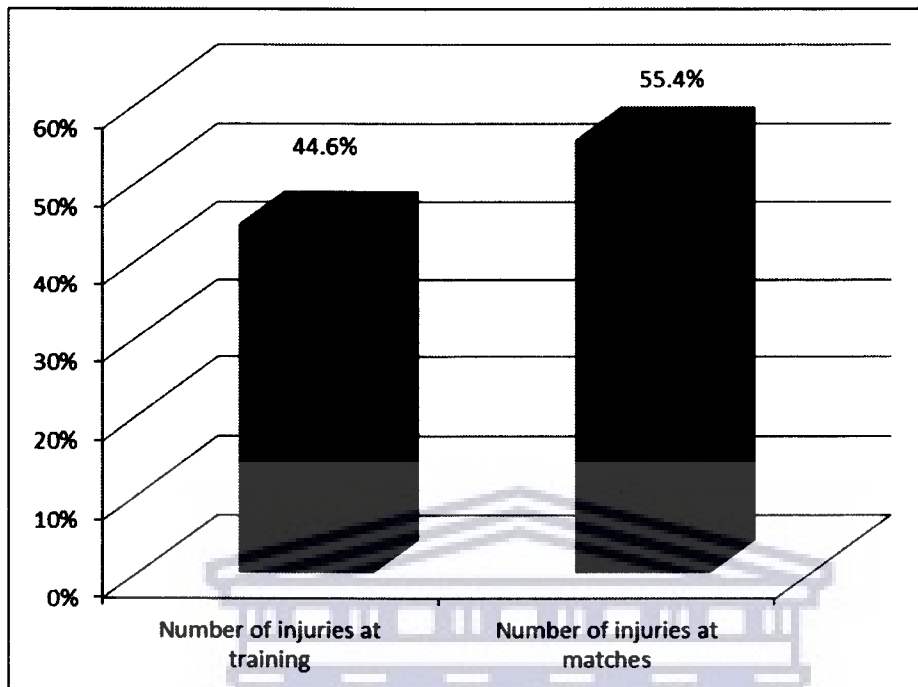
Rugby players were asked to report on the number of injuries they had sustained both at training and during matches. A rugby injury in this case was defined as any physical ailment incurred to a player during competition or training regardless of the call for medical treatment or time lost from

participating in sports events (Fuller et al., 2006). Out of the 162 rugby players who participated in this study 153 (94.4%) reported to have sustained an injury while only 9 (5.6%) had never sustained an injury as illustrated in figure 4.1. A total number of 520 injuries were reported. Of these 232 (44.6%) of the injuries were sustained during training while a total of 288 (55.4%) injuries were sustained during matches as illustrated in the figure 4.2 below.



**Figure 4.1 Percentage of players injured in the season prior to the study (n=162)**

UNIVERSITY of the  
WESTERN CAPE



**Figure 4.2 Percentage of injuries sustained during training and matches**

### 4.3.2 Location of injury

Rugby players were asked to report on the body part which sustained an injury. The injury location was classified according to Orchard Sports Injury Classification System (OSICS) (1995). The most injured body part was the ankle 58 (11.2%) followed with shoulder 57 (11%) and neck 50 (9.6%). The least injured body parts were the upper arm 6 (1.2%), buttock 6 (1.2%), shin 6 (1.2%) and pelvis 1 (0.2%) as illustrated in table 4.3 below.

**Table 4.3 Frequencies and percentages of injured body part**

<b>Injury Location</b>	<b>Frequency (n)</b>	<b>Percentage (%)</b>
Ankle	58	11.2
Shoulder	57	11
Neck	50	9.6
Back Thigh	44	8.5
Knee	43	8.3
Finger	34	6.5
Wrist	26	5
Groin	25	4.8
Calf	23	4.4
Front Thigh	22	4.2
Back	20	3.8
Head	19	3.6
Face	13	2.5
Ribs	11	2.1
Hand	10	1.9
Elbow	10	1.9
Toe	9	1.7
Hip	9	1.7
Foot	7	1.3
Fore arm	7	1.3
Chest	6	1.2
Upper arm	6	1.2
Buttock	6	1.2
Shin	6	1.2
Pelvis	1	0.2

### **4.3.3 Mechanism of Injury**

Players report the mechanism of their injuries. The players were allowed to give more than one injury mechanism. The most reported injury mechanisms by players for both training and matches were tackling, being tackled, running and collision as outlined in the table 4.4 below

**Table 4.4 Mechanisms of injury at training and matches**

<b>Injury Mechanisms</b>	<b>Training F (%)</b>	<b>Matches F (%)</b>
Tackling	51 (22.0)	61 (21.2)
Tackled	49 (21.1)	46 (16.0)
Running	31 (13.4)	32 (11.1)
Collision	24 (10.3)	48 (16.7)
Scrum	14 (6.0)	22 (7.6)
Ruck	25 (10.8)	17 (5.9)
Landing	14 (6.0)	13 (4.5)
Blocking	7 (3.0)	5 (1.7)
Turning	6 (2.6)	9 (3.1)
Overuse	7 (3.0)	21 (7.3)
Mauls	5 (2.2)	13 (4.5)

#### **4.3.4 Severity of Injury**

To determine how severe the players' injuries were, players were asked to report on how long they had been out of play after sustaining their injuries. Severity in this study was divided into three categories, i.e. mild, moderate and severe. This was according to Goga and Gongal (2003), where for a mild injury a player never attended a match or training for one week. For moderate injuries the symptoms persisted for at least 2–4 weeks and the player never participated in a match or training while for severe injuries the symptoms existed for more than four weeks and the player was out of play or training for four or more weeks. The severe injuries involved injury to the musculoskeletal system.

More than half 273 (52.5%) of the injuries reported were mild and more than a third 186 (35.8%) were moderate and only 61 (11.7%) of the injuries were severe as illustrated in table 4.5 below.

**Table 4.5 Distribution of the frequency and percentage of severity of injuries**

Severity of injury	Frequency (F)	Percentage (%)
Mild	273	52.5
Moderate	186	35.8
Severe	61	11.7
<b>Total</b>	<b>520</b>	<b>100</b>

#### 4.3.5 Nature of injury

Players reported on the nature of their injuries. Sprains 91 (17.5%) and strains 78 (15%) and contusions 60 (11.5%) were the most common injuries reported while ligament tear and grass burns 33 (3.9%), fractures 27 (5.2%) and blisters 24 (4.6%) were the least reported nature of injury as illustrated in table 4.6 below.

**Table 4.6 Nature of injuries**

Type of injury	Frequency (F)	Percentage (%)
Sprain	91	17.5
Strain	78	15.0
Contusion	60	11.5
Dislocation	54	10.4
Overuse	48	9.2
Lacerations	37	7.1
Concussion	35	6.7
Abrasion	33	6.3
Others	33	6.3
Fractures	27	5.2
Blisters	24	4.6
<b>Total</b>	<b>520</b>	<b>100</b>

**NB: Others include ligament tears and grass burns**

### 4.3.6 Time of Injury

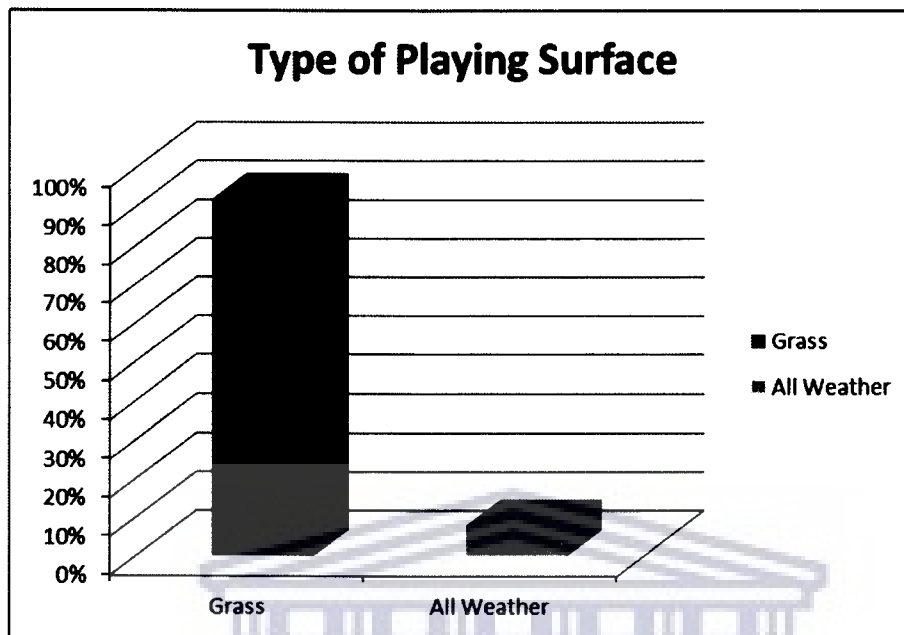
Players were asked to identify the time when they sustained their injuries during matches. The majority (45.7%) of the rugby players were injured during the second half of play as illustrated in figure 4.3 below.



Figure 4.3 Time of injury during matches (n=162)

### 4.3.7 Type of Playing Surface

Players were asked to report the type of the playing surface they played on. Almost all rugby players 149 (92%) reported that they played on grass surfaces while only 13 (8%) reported playing on all-weather playing surfaces as shown in the figure 4.4 below.



**Figure 4.4 Type of rugby playing surfaces in place in Kenya (n=162)**

#### **4.4 RUGBY INJURY PREVENTION STRATEGIES**

Strategies employed by players and coaches to avoid injuries were assessed. These include the use of protective equipment; warm up prior to matches and training and cool down after training and matches, stretching, knowledge, flexibility and strength training.

##### **4.4.1 Use of Protective Gear**

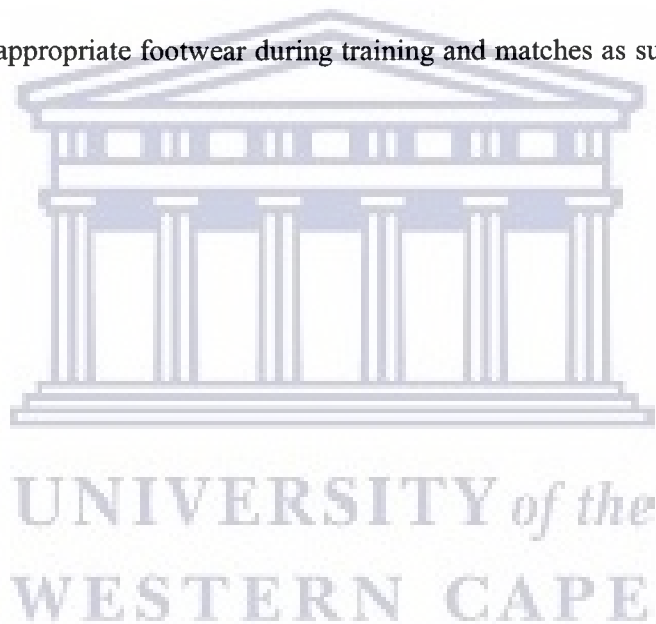
Players were asked to report how and whether they used their protective equipment such as headgear, mouth guards, ankle braces and appropriate footwear during training and competitive matches. Almost two thirds of the rugby players 109 (67.3%), reported that they never used headgear during training and 106 (65.4%) during matches. Only 11 (6.8%) always used headgear during training and 25 (15.4%) during matches. On mouth guard use, almost half 73 (45.1%), of the rugby players reported that they never used mouth guards during training and 70 (43.2%) during



matches. On use of ankle braces less than a third 41 (25.3%) of players always used ankle braces during training and 49 (30.2) during matches. Most of the players reported that they always used appropriate footwear during training 121 (74.7%) and matches 128 (79%).

Team coaches were also asked to report on their perception of their players protective gear use during training and matches. Almost three quarters 5 (71.4%) of the team coaches reported that majority of the players never used headgear, mouth guard and ankle braces during training and matches. However, almost three quarters 5 (71.4%) of the team coaches reported that majority of their players always used appropriate footwear during training and matches as summarized in table

4.7



**Table 4.7 Distribution of rugby players using protective equipment**

Protective equipment		Never	Sometimes	Often	Very often	Always
		n (%)	n (%)	n (%)	n (%)	n (%)
<b>Rugby players (n=162)</b>						
Headgear	<i>Training</i>	109 (67.3)	16 (9.9)	9 (5.6)	17 (10.5)	11 (6.8)
	<i>Matches</i>	106 (65.4)	13 (8)	12 (7.4)	6 (3.7)	25 (15.4)
Mouth guard	<i>Training</i>	73 (45.1)	20 (12.3)	17 (10.5)	11 (6.8)	41 (25.3)
	<i>Matches</i>	70 (43.2)	21 (13)	12 (7.4)	10 (6.2)	49 (30.2)
Ankle Brace	<i>Training</i>	96 (60)	35 (21.9)	8 (5)	9 (5.6)	12 (7.5)
	<i>Matches</i>	95 (59.4)	29 (18.1)	12 (7.5)	7 (4.4)	17 (10.6)
Footwear	<i>Training</i>	5 (3.1)	13 (8.0)	10 (6.2)	13 (8.0)	121 (74.7)
	<i>Matches</i>	5 (3.1)	9 (5.6)	8 (4.9)	12 (7.4)	128 (79.0)
<b>Team coaches (n=7)</b>						
Headgear	<i>Training</i>	0 (0.0)	5 (71.4)	2 (28.6)	0 (0.0)	0 (0.0)
	<i>Matches</i>	0 (0.0)	2 (28.6)	3 (42.9)	2 (28.6)	0 (0.0)
Mouth guard	<i>Training</i>	0 (0.0)	4 (57.1)	3 (42.9)	0 (0.0)	0 (0.0)
	<i>Matches</i>	0 (0.0)	2 (28.6)	4 (57.1)	1 (14.3)	0 (0.0)
Ankle Brace	<i>Training</i>	1 (14.3)	6 (85.7)	0 (0.0)	0 (0.0)	0 (0.0)
	<i>Matches</i>	0 (0.0)	4 (57.1)	2 (28.6)	1 (14.3)	0 (0.0)
Footwear	<i>Training</i>	0 (0.0)	2 (28.6)	0 (0.0)	0 (0.0)	5 (71.4)
	<i>Matches</i>	0 (0.0)	0 (0.0)	1 (14.3)	1 (14.3)	5 (71.4)

#### 4.4.2 Warm up

Both rugby players and team coaches were asked to report if they had a warm up period prior to training and matches and the duration of conducting the warm up. Furthermore, both were asked to report on the activities they included as part of the warm up. The following information was reported.

More than three quarters 121 (76.6) of the rugby players reported that they always conducted a warm up prior to training while 133 (85.7%) reported that they conducted a warm up prior to matches. However, the information obtained from the team coaches were slightly different from that of the players with over 70% of the coaches reporting that they always conducted warm up prior to both training and matches as summarized in table 4.8.

As far as the warm up duration of warm up prior to training and matches were concerned, 45 (28.5%) of the players reported that they conducted warm up for 15 minutes prior to training while 59 (38.3%) conducted warm up for a duration of more than 25 minutes prior to competitive matches. The information obtained from coaches were slightly different from that of the players, in that 3 (42.9%) of the coaches reported that they conducted warm up for 10 minutes prior to training and 15 minutes 4 (57.1%) prior to competitive matches as illustrated in table 4.8.

More than half (54.7%) of the rugby players indicated that they always warmed up their muscles before stretching. Similarly 71.4% of the coaches indicated that their players always warmed up their muscles before stretching as summarized in table 4.8.

Activities included in warm up by rugby players and coaches included light aerobics, sprinting running and short passes. Table 4.8 summarizes the responses from rugby players and coaches respectively.

**Table 4.8 Distribution of warm up, duration and activities practiced prior to training and matches**

Inclusion of warm up		Never n (%)	Sometimes n (%)	Often n (%)	Very often n (%)	Always n (%)
<b>Rugby players</b>						
	Training (n=158)	4 (2.5)	3 (1.9)	8 (5.1)	22 (13.9)	121 (76.6)
	Matches (n=155)	4 (2.6)	1 (0.6)	3 (1.9)	14 (9.0)	133 (85.8)
<b>Coaches (n=7)</b>						
	Training	0 (0.0)	2 (28.6)	0 (0.0)	0 (0.0)	5 (71.4)
	Matches	0 (0.0)	1 (14.3)	1 (14.3)	0 (0.0)	5 (71.4)
<b>Activities included in warm up</b>						
<b>Rugby players (n=158)</b>						
	Light Aerobics	3 (1.9)	12 (7.7)	23 (14.7)	34 (21.8)	84 (53.8)
	Sprinting	2 (1.3)	4 (2.5)	21 (13.2)	35 (22.2)	96 (60.8)
	Running	0 (0.0)	0 (0.0)	12 (7.6)	33 (20.9)	113 (71.5)
	Short passes	0 (0.0)	3 (1.9)	14 (8.9)	35(22.2)	106 (67.1)
<b>Coaches (n=7)</b>						
	Light Aerobics	0 (0.0)	1 (14.3)	3 (42.9)	2 (28.6)	1 (14.3)
	Sprinting	0 (0.0)	0 (0.0)	2 (28.6)	3 (42.9)	2 (28.6)
	Running	0 (0.0)	0 (0.0)	2 (28.6)	1 (14.3)	4 (57.1)
	Short passes	0 (0.0)	0 (0.0)	3 (42.9)	1 (14.3)	3 (42.9)
<b>Warming up muscles first before stretching</b>						
	Rugby players (n=159)	2 (1.3)	4 (2.5)	19 (11.9)	47 (29.6)	87 (54.7)
	Coaches (n=7)	0 (0.0)	0 (0)	0 (0)	2 (28.6)	5 (71.4)
Duration of warm up		5 Min n (%)	10 Min n (%)	15 Min n (%)	20 Min n (%)	>25 Min n (%)
<b>Rugby players</b>						
	Training (n=158)	11 (7.0)	40 (25.3)	45 (28.5)	37 (23.4)	25 (15.8)
	Matches (n=154)	1 (0.6)	21 (13.6)	39 (25.3)	34 (22.1)	59 (38.3)
<b>Team coaches (n=7)</b>						
	Training	0 (0.0)	3 (42.9)	1 (14.3)	2 (28.6)	1 (14.3)
	Matches	0 (0.0)	1 (14.3)	0 (0.0)	2 (28.6)	4 (57.1)

#### **4.4.3 Cool down and stretching**

Rugby players and team coaches were asked to report on the duration they spent on cool down after training and matches, the activities they included in their cool down session and whether the coaches supervised cool down sessions.

The highest percentage of players 57 (35.2%) indicated that they spent at least 10 minutes in cool down activities after training and 49 (30.8%) for 5 minutes after matches. Similarly 6 (85.7%) of the coaches indicated that players spent at least 10 minutes in conducting cool down after training and 5 (71.4%) after matches as summarized in table 4.9.

As far as supervision of cool down activities by coaches were concerned 56 (34.6%) of the rugby players indicated that coaches always supervised cool down activities after training and 57 (36.1%) matches. The information obtained from coaches were slightly different from that of players in that 4 (57.1%) of the coaches never always supervised their players during cool down activities after training and 2 (28.6 %) matches as illustrated in table 4.9.

Activities included in cool down by rugby players and coaches included stretching, calisthenics and jogging. Table 4.9 summarizes the responses from rugby players and coaches respectively.

**Table 4.9 Distribution of cool down practices as reported by rugby players and coaches**

		Never n (%)	Sometimes n (%)	Often n (%)	Very often n (%)	Always n (%)
<b>Supervision of cool down</b>						
<b>Rugby players</b>						
	Training (n=158)	9 (5.7)	4 (14.8)	38 (23.5)	32 (19.8)	56 (34.6)
	Matches (n=155)	10 (6.3)	27 (17.1)	30 (19)	34 (21.5)	57 (36.1)
<b>Coaches (n=7)</b>						
	Training	0 (0.0)	0 (0.0)	4 (57.1)	2 (28.6)	1 (14.3)
	Matches	0 (0.0)	2 (28.6)	2 (28.6)	1 (14.3)	2 (28.6)
<b>Activities included in cool down</b>						
<b>Rugby players (n=158)</b>						
	Jogging	5 (3.1)	11 (6.8)	16 (9.9)	41 (25.3)	89 (54.9)
	Calisthenics	7 (4.7)	8 (5.3)	21 (14.0)	39 (26)	75 (50.0)
	Stretching	2 (1.2)	1 (0.6)	13 (8.1)	28 (17.4)	117 (72.7)
<b>Coaches (n=7)</b>						
	Jogging	0 (0.0)	1 (14.3)	1 (14.3)	1 (14.3)	4 (57.1)
	Calisthenics	1 (14.3)	0 (0.0)	0 (0.0)	2 (28.6)	4 (57.1)
	Stretching	0 (0.0)	0 (0.0)	0 (0.0)	1 (14.3)	6 (85.7)
<b>Duration of cool down</b>						
		5 Min n (%)	10 Min n (%)	15 Min n (%)	20 Min n (%)	>25 Min n (%)
<b>Rugby players</b>						
	Training (N=158)	30 (18.5)	57 (35.2)	41 (25.3)	17 (10.5)	17 (10.5)
	Matches (N=154)	49 (30.8)	41 (25.8)	37 (23.3)	17 (10.7)	15 (9.4)
<b>Team coaches (n=7)</b>						
	Training	0 (0.0)	6 (85.7)	1 (14.3)	0 (0.0)	0 (0.0)
	Matches	2 (28.6)	5 (71.4)	0 (0.0)	0 (0.0)	0 (0.0)

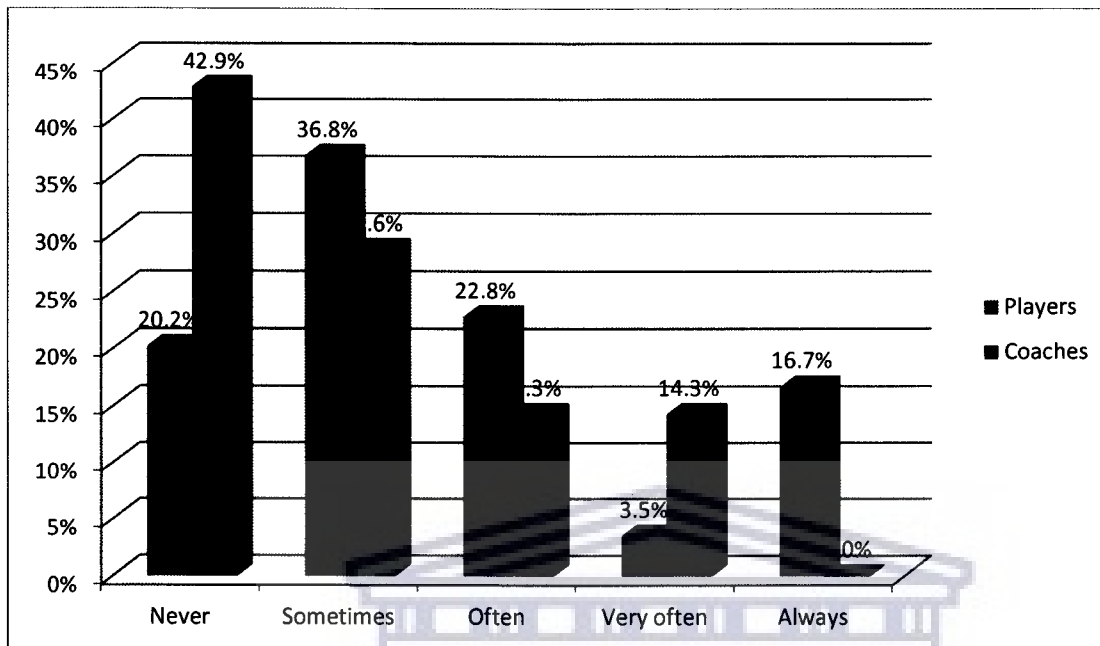
#### 4.4.3.1 Stretching major leg muscles

Players were asked whether they stretched their major leg muscles during warm up and cool down at training and matches. Almost three quarters (73.3%) and (76.6%) of players reported that they always stretched their major leg muscles during warm up prior to training and matches respectively. Similarly, when asked whether they stretched major leg muscles during cool down after training and matches, more than two thirds (67.7%) and (64.6%) indicated they always stretched their muscles during cool down after training and matches respectively.

On the other hand, when coaches were asked whether their players stretched their major leg muscles during warm up and cool down at training and matches, more than half (57.1%) of the coaches indicated that their players always stretched their major leg muscles during warm up and cool down at both training and matches as illustrated in table 4.10.

**Table 4.10 Stretching of major leg muscles during warm up and cool down (Rugby player n=161, Coaches n=7)**

Stretching during warm up and cool down	Characteristics	Training		Matches	
		Players n (%)	Coaches n (%)	Players n (%)	Coaches n (%)
Stretching major leg muscles during warm up prior to training and matches	Never	1 (0.6)	0 (0.0)	1 (0.6)	0 (0.0)
	Sometimes	1 (0.6)	0 (0.0)	1 (0.6)	0 (0.0)
	Often	10 (6.2)	1 (14.3)	7 (4.3)	1 (14.3)
	Very Often	31 (19.3)	2 (28.6)	29 (18)	2 (28.6)
	Always	118 (73.3)	4 (57.1)	123 (76.4)	4 (57.1)
Stretching major leg muscles during cool down after training and matches	Never	1 (0.6)	0 (0.0)	6 (3.7)	0 (0.0)
	Sometimes	3 (1.9)	0 (0.0)	6 (3.7)	0 (0.0)
	Often	17 (10.6)	1 (14.3)	8 (5.0)	1 (14.3)
	Very Often	31 (19.3)	2 (28.6)	37 (23)	2 (28.6)
	Always	109 (67.7)	4 (57.1)	104 (64.6)	4 (57.1)



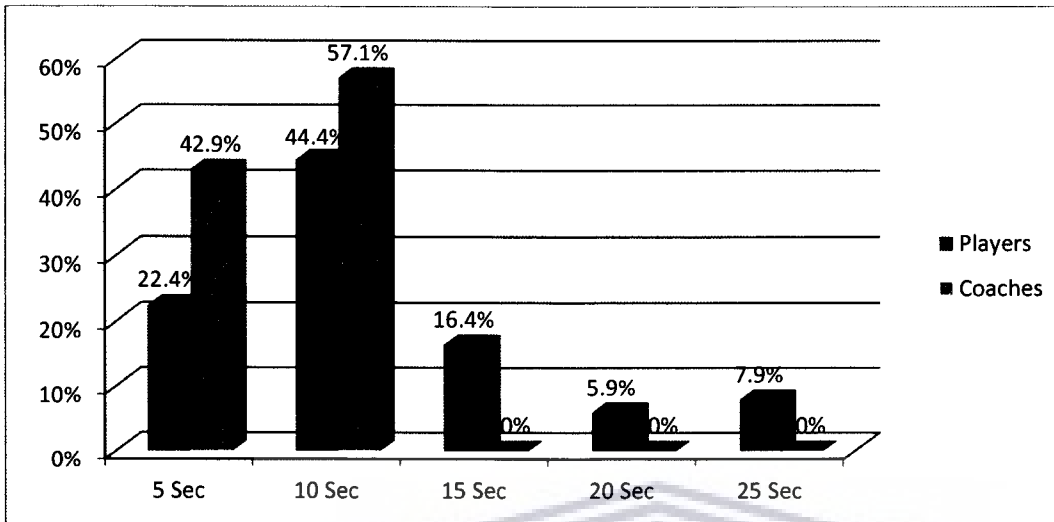
**Figure 4.5 Percentage of players who bounce while stretching (n=114)**

Players were asked whether they bounced while stretching this was to determine their knowledge on stretching technique. More than a third 36.8% of the players indicated that sometimes they bounced while stretching while (20.2%) never bounced at all while stretching. However, coaches (42.9) indicated that none of their players bounced while stretching as illustrated in figure 4.5 above.

#### **4.4.3.2 Duration of holding a stretch**

When players and coaches were asked on the duration of holding a stretch almost half of the players reported that they held the stretch for 10 seconds. This was similar with coaches, with more than half (57.1%) reporting that their players held the stretch for 10 seconds as illustrated in the figure 4.6 below.





**Figure 4.6 Duration of holding a stretch as reported by the players (n=152) and team coaches (n=7)**

#### 4.4.4 Flexibility and strength training

Players were asked whether they held flexibility training sessions as a team or individual and if so how many sessions were held per week. The following information was reported.

Both players and team coaches were asked to report on how many times they conducted flexibility training as a team session per week and less than a third 34 (22.8%) of the players reported twice while similar percentage of the players never conducted flexibility training. Similarly, 3 (42.9%) of the coaches indicated that they only conducted flexibility training as a team session once per week as outlined in table 4.11.

Further, almost a third of the players 44 (30.3%) reported that they never conducted flexibility training as an individual effort while 31 (21.4%) conducted flexibility training twice per week as outlined in table 4.11.

As far as strength training was concerned, more than a third (39.9%) of the players reported that they did not undertake strength training as a team session, while less than a third (24.8%)

sometimes conducted it once. On the other hand, almost half 3 (42.9%) of the coaches reported that they conducted strength training as a team session once a week as summarized in table 4.11.

**Table 4.11 Frequency of undertaking flexibility and strength training per week**

	<b>Players (n=149)</b>	<b>Coaches (n=7)</b>
<b>Frequency of undertaking flexibility:</b>	<b>n (%)</b>	<b>n (%)</b>
<b>As a team session per week</b>		
Never	34 (22.8)	2 (28.6)
Once a week	33 (22.1)	3 (42.9)
Twice a week	34 (22.8)	1 (14.3)
Three times a week	32 (21.5)	1 (14.6)
Four times a week	9 (6)	0 (0.0)
Five times a week	7 (4.7)	0 (0.0)
<b>As an individual effort per week</b>		
	<b>Rugby players (n=145)</b>	
Never	44 (30.3)	
Once a week	29 (20)	
Twice a week	31 (21.4)	
Three times a week	19 (13.1)	
Four times a week	9 (6.2)	
Five times a week	13 (9.0)	
<b>Frequency of undertaking strength training</b>		
	<b>Rugby Players (n=153)</b>	<b>Team Coaches (n=7)</b>
<b>As a team session per week</b>		
Never	61 (39.9)	2 (28.6)
Once a week	38 (24.8)	3 (42.9)
Twice a week	16 (10.5)	1 (14.3)
Three times a week	17 (11.1)	1 (14.3)
Four times a week	13 (8.9)	0 (0.0)
Five times a week	8 (5.2)	0 (0.0)
<b>As an individual effort per week (N=160)</b>		
Never	61 (38.1)	
Once a week	48 (30.0)	
Twice a week	14 (8.8)	
Three times a week	22 (13.8)	
Four times a week	15 (9.4)	
Five times a week	0 (0.0)	

#### 4.4.5 Pre-season training

Players and team coaches were asked when they started their pre-season training, and less than a third (29.8%) reported that they started pre-season 3 weeks before the beginning of the season. Similarly less than a half, 3 (42.9%) of the team coaches reported that their pre-season started 3 weeks to the beginning of the season as outlined in table 4.12 below.

**Table 4.12 Pre-season kick off**

Duration	Players (n=131)	Coaches (n=7)
	n (%)	n (%)
2 Weeks	28 (21.4)	1 (14.3)
3 Weeks	39 (29.8)	3 (42.9)
4 Weeks	37 (28.3)	1 (14.3)
5 Weeks	10 (7.6)	0 (0.0)
More than 5weeks	17 (13)	2 (28.6)

#### 4.4.6 Hydration

Players and team coaches were asked to report on water intake at both training and matches and less than half 62 (38.3%) of the players reported that they took very good amount of water during training and matches. Similarly, almost three quarters (71.4%) of the team coaches reported that players took adequate amounts of water during training and matches as illustrated in table 4.13.

**Table 4.13 Percentage of water intake by players during training and matches**

<b>Water intake</b>			
<b>Participants</b>	<b>Description</b>	<b>Training (n=162)</b>	<b>Matches (n=157)</b>
		<b>n (%)</b>	<b>n (%)</b>
Rugby players	Excellent	47 (29)	55 (35)
	Very good	62 (38.3)	61 (38.9)
	Good	40 (24.7)	29 (18.5)
	Fair	13 (8)	12 (7.6)
<b>Participants</b>	<b>Description</b>	<b>Training (n=7)</b>	<b>Matches (n=7)</b>
		<b>n (%)</b>	<b>n (%)</b>
Coaches	Excellent	0 (0.0)	4 (57.1)
	Very good	5 (71.4)	3 (42.9)
	Good	2 (28.4)	0 (0.0)
	Fair	0 (0.0)	0 (0.0)

#### 4.4.7 Nutrition

Players and team coaches were asked to report on their carbohydrates intake pre-training, post-training, pre-match and post-match and the following information was reported. Almost a third (27.5%) of the players reported that they often took some carbohydrates before the training and 28.6% always took some kind of carbohydrates after training. During matches less than a third (26.1%) of the players reported that they often took some kind of carbohydrates before the match, while still less than a third (28.2%) reported that they always took some kind of carbohydrates after matches. On the other hand, less than half (42.9%) of the team coaches reported that their players sometime consumed carbohydrates before training and almost three quarters of the coaches reported that players very often consumed carbohydrates after training. During matches less than half (42.9%) of the coaches still reported that their players very often consumed carbohydrates before

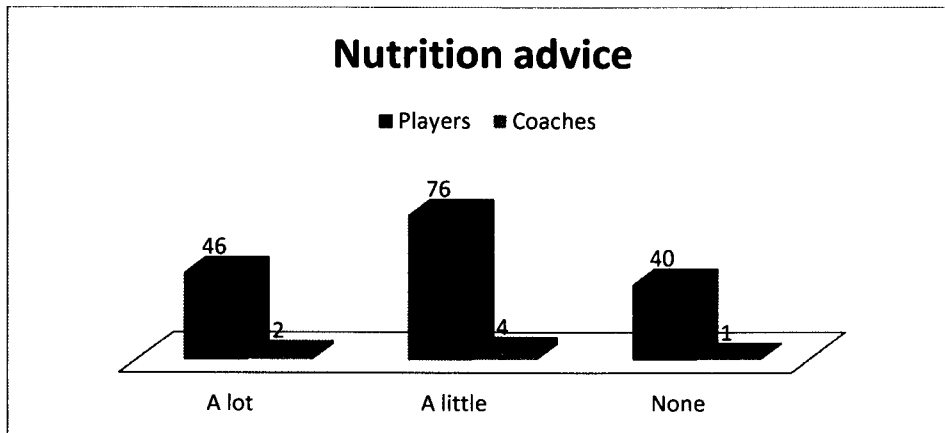
participating in matches. Similarly more than a half of the coaches (57.1%) reported that their players very often consumed carbohydrates after matches as outlined in table 4.14.

**Table 4.14 Carbohydrate consumption by players before and after training and matches**

<b>Rugby players</b>	<b>Never</b>	<b>22 (13.8)</b>	<b>11 (6.8)</b>	<b>20 (12.7)</b>	<b>15 (9.6)</b>
	<b>Sometimes</b>	<b>40 (25)</b>	<b>28 (17.4)</b>	<b>32 (20.4)</b>	<b>31 (19.9)</b>
	<b>Often</b>	<b>44 (27.5)</b>	<b>33 (20.5)</b>	<b>41 (26.1)</b>	<b>33 (21.2)</b>
	<b>Very often</b>	<b>29 (18.1)</b>	<b>43 (26.7)</b>	<b>31 (19.7)</b>	<b>33 (21.2)</b>
	<b>Always</b>	<b>25 (15.4)</b>	<b>46 (28.6)</b>	<b>33 (21)</b>	<b>44 (28.2)</b>
<b>Coaches (n=7)</b>	<b>Never</b>	<b>1 (14.3)</b>	<b>1 (14.3)</b>	<b>1 (14.3)</b>	<b>0 (0.0)</b>
	<b>Sometimes</b>	<b>3 (42.9)</b>	<b>0 (0.0)</b>	<b>2 (28.6)</b>	<b>0 (0.0)</b>
	<b>Often</b>	<b>0 (0.0)</b>	<b>0 (0.0)</b>	<b>1 (14.3)</b>	<b>0 (0.0)</b>
	<b>Very often</b>	<b>2 (28.6)</b>	<b>5 (71.4)</b>	<b>3 (42.9)</b>	<b>4 (57.1)</b>
	<b>Always</b>	<b>1 (14.3)</b>	<b>1 (14.3)</b>	<b>0 (0.0)</b>	<b>3 (42.9)</b>

#### 4.4.7.1 Advice given on nutrition

When players and coaches were asked if they were given advice on what to eat before and after training and matches, almost half (76) of the players reported that they were given little advice on what to eat before and after training and matches. Similarly more than half (4) of the team coaches reported that their players were never given advice on what to eat before and after matches and training as illustrated in figure 4.7.



**Figure 4.7 Nutritional advice given to players (Players n=162), Coaches n=7)**

#### **4.5 FACTORS INFLUENCING IMPLEMENTATION OF RUGBY INJURY PREVENTION STRATEGIES**

Both rugby players and team coaches were asked to report factors that were hindering them from following some of the injury prevention strategies such as undertaking activities like strength and flexibility training at least once per week and warm up and cool down always prior and after training and matches. They were given reasons to choose from. These reasons included not enough time, too tired, not given enough advice on technique, do not believe it is necessary, nobody else does it and lack of proper equipment. Rugby players and team coaches were allowed to choose more than one reason. Thereafter, coaches and managers were asked to report any other factor that made it difficult for them to implement rugby injury prevention strategies. The following reasons and factors were reported.

##### **4.5.1 Reasons for not following rugby injury prevention strategies**

Almost half (44.9% and 44.1%) of the players gave lack of enough time and lack of proper equipment as reasons for not undertaking strength training at least once a week respectively. On flexibility more than a third (39.8%) and less than a third (22.9%) and (17.8%) gave lack of enough

time, not given advice on technique and lack of proper equipments as the reasons for not undertaking flexibility training at least once per week respectively. On warm up prior to training and matches more than a third of the players gave lack of enough time (40.7% and 44.9%) as the reason for not undertaking warm up prior to training and matches respectively. Finally on cool down, two thirds of the players (66.9%) gave too tired as a reason for not undertaking cool down after training and matches as illustrated in table 4.15.

When coaches were asked the same almost all 6 (85.7%) gave lack of enough time as reason for not conducting strength and flexibility training at least once a week with players. In addition more than two thirds 5 (71.4%) of the teams' coaches gave lack of proper equipment as another reason for not conducting strength training with players at least once a week. On warm up all 7 (100%) and 6 (85.7%) of the team coaches gave lack of enough time to conduct warm up prior to training and matches respectively. Finally, on cool down almost all 6 (85.6%) and more than two thirds 5 (71.4%) gave lack of time as reason for their players not conducting cool down literally opposite to their players, after training and matches respectively. However almost all 6 (85.7%) gave the same reason as their players as players being too tired to undertake cool down after matches as illustrated in table 4.15 and 4.16 below.

**Table 4.15 Reasons for not following rugby injury prevention strategies as reported by rugby players**

<b>Rugby players reasons (n=118)</b>	<b>Strength training</b>	<b>Flexibility</b>	<b>Warm up at training</b>	<b>Warm up at matches</b>	<b>Cool down at training</b>	<b>Cool down at matches</b>
Not enough time	44.9%	22.7%	40.7%	44.9%	11.9%	11.9%
Too tired	6.8%	16.9%	6.8%	5.1%	66.9%	66.9%
Not given enough advice on the technique	15.3%	39.8%	5.9%	2.5%	5.1%	5.1%
Do not believe it is necessary	3.4%	12.7%	10.2%	3.4%	7.6%	7.6%
Nobody else does it	5.1%	9.3%	11%	5.1%	4.2%	5.9%
Lack of proper equipments	44.1%	17.8%	5.1%	6.8%	5.9%	4.2%

**Table 4.16 Reasons for not following rugby injury prevention strategies as reported by team coaches**

<b>Team coaches reasons (n=7)</b>	<b>Flexibility</b>	<b>Warm up at training</b>	<b>Warm up at matches</b>	<b>Cool down at training</b>	<b>Cool down at matches</b>	<b>Strength training</b>
Not enough time	5 (85.7)	6 (85.7)	7 (100)	6 (85.7)	6 (85.7)	5 (71.4)
Too tired	2 (28.6)	1(14.3)	1 (14.3)	0 (0.0)	2 (28.6)	6 (85.7)
Not given enough advice on the technique	0 (0.0)	3 (42.9)	3 (42.9)	2 (28.6)	0 (0.0)	0 (0.0)
Do not believe it is necessary	0 (0.0)	1 (14.3)	1 (14.3)	1 (14.3)	0 (0.0)	0 (0.0)
Nobody else does it	1 (0.0)	0 (0.0)	0 (0.0)	1 (14.3)	0 (0.0)	0 (0.0)
Lack of proper equipments	5 (71.4)	1 (14.3)	0 (0.0)	1 (14.3)	1 (14.3)	0 (0.0)



#### 4.5.2 Factors that were raised by coaches and team managers on the qualitative section of the questionnaire

Team coaches and managers were asked an extra open ended question on whether they had other factors which may be hindering their efforts in implementing rugby injury prevention strategies. Team Coaches and team managers both of them reported that “factors such as lack of capital, poor playing surfaces, improper facilities, lack of proper equipment, lack of qualified personnel, lack of knowledge regarding injury prevention, inadequate strength and condition training and lack of earlier player development projects as barriers to successful implementation of rugby injury prevention strategies in Kenya” as summarized in table 4.17.

**Table 4.17 Factors raised by team managers and coaches to be hindering the implementation of rugby injury prevention strategies (n=7)**

Factors	Team Coaches	Team Managers
	n (%)	n (%)
Lack of Capital	5 (71.4)	3 (42.9)
Poor playing surface	4 (57.1)	1 (14.3)
Improper facilities	3 (42.9)	0 (0.0)
Lack of proper equipment	2 (28.6)	4 (57.1)
Lack of qualified personnel	2 (28.6)	1 (14.3)
Lack of knowledge regarding to injury prevention	2 (28.4)	2 (28.6)
Lack of early player development programmes	0 (0.0)	1 (14.3)
Inadequate pre-season strength and conditioning	0 (0.0)	1 (14.3)

#### **4.6 KNOWLEDGE REGARDING SPORTS INJURY PREVENTION**

Rugby players and team coaches were asked for their opinion on 11 statements. These statements were to assess their knowledge regarding injury occurrence, risk factors and injury prevention strategies. These statements were all true and players and coaches were given three options to pick from, that is agree, neutral and disagree. Those who agreed with the statements, meant that they were conversant with injury prevention strategies and occurrence while those who were neutral were taken to have some knowledge and the ones who disagreed, meant that they lacked knowledge regarding sports injury prevention.

More than two thirds of the players agreed that use of warm up, cool down, stretching and strength training can prevent or minimize sports injuries. Also almost three quarters (71.4%) of the team coaches also agreed that use of different injury prevention strategies can prevent sports injuries. However some players (25.4%) and almost all (71.4%) team coaches lacked knowledge on use of strength training and headgear as injury prevention measures as illustrated in table 4.18 and 4.19.



UNIVERSITY *of the*  
WESTERN CAPE

**Table 4.18 Knowledge of rugby players regarding sports injury prevention (n=162)**

<b>Description</b>	<b>Agree n (%)</b>	<b>Neutral n (%)</b>	<b>Disagree n (%)</b>
<b>Rugby players (N=162)</b>			
The chance of sustaining an injury during training that prevents you from being available for selection is likely to happen	111 (68.5)	31 (19.1)	20 (12.3)
The chances for sustaining an injury during competitive match that prevents you from being available for selection is likely to happen	113 (70.2)	30 (18.5)	18 (11.2)
There is a greater chance of sustaining an injury during a competitive match than during training	100 (61.7)	35 (21.7)	26 (16.2)
Injuries are a consequence of the action of another player	61 (38.4)	62 (39)	36 (22.6)
The risk of head injury in training is reduced by wearing a headgear	113 (69.8)	35 (21.6)	14 (8.7)
Injury is more likely towards the end of a match	76 (48.4)	41 (26.1)	40 (25.4)
The risk of injury is reduced by thoroughly warming up and stretching prior to training or competition	135 (84.9)	16 (10.1)	7 (4.4)
The risk of injury is reduced by thoroughly cooling down and stretching after training or competition	122 (75.8)	27 (16.8)	12 (7.4)
Players with poor flexibility are more likely to get injured than those with good flexibility	76 (66.7)	40 (25.2)	13 (8.2)
Strong muscles are important in the protection against injuries	116 (72.5)	29 (18.1)	15 (9.4)
The majority of other players wear headgear during training or competition	89 (55.3)	31 (19.3)	41 (25.4)

**Table 4.19 Knowledge of team coaches regarding sports injury prevention (n=7)**

<b>Description</b>	<b>Agree n (%)</b>	<b>Neutral n (%)</b>	<b>Disagree n (%)</b>
<b>Team coaches (n=7)</b>			
The chance of sustaining an injury during training that prevents you from being available for selection is likely to happen	7 (100)	0 (0.0)	0 (0.0)
The chances for sustaining an injury during competitive match that prevents you from being available for selection is likely to happen	7 (100)	0 (0.0)	0 (0.0)
There is a greater chance of sustaining an injury during a competitive match than during training	4 (57.1)	3 (42.9)	0 (0.0)
Injuries are a consequence of the action of another player	4 (57.1)	0 (0.0)	3 (42.9)
The risk of head injury in training is reduced by wearing a headgear	5 (71.4)	1 (14.3)	1 (14.3)
Injury is more likely towards the end of a match	3 (42.9)	3 (42.9)	1 (14.3)
The risk of injury is reduced by thoroughly warming up and stretching prior to training or competition	5 (71.4)	1 (14.3)	1 (14.3)
The risk of injury is reduced by thoroughly cooling down and stretching after training or competition	5 (71.4)	0 (0.0)	2 (28.6)
Players with poor flexibility are more likely to get injured than those with good flexibility	5 (71.4)	1 (14.3)	1 (14.3)
Strong muscles are important in the protection against injuries	3 (42.9)	3 (42.9)	1 (14.3)
The majority of other players wear headgear during training or competition	1 (14.3)	1 (14.3)	5 (71.4)

#### 4.6.1 Source of Knowledge regarding injury prevention

Both rugby players and team coaches were asked their source of knowledge regarding injury prevention. The most important source of information regarding sports injury prevention for rugby players was from physiotherapists (72.8%) followed by team coaches (39.9%) and the internet (17%). On the other hand almost all team coaches (71.4%) got their knowledge regarding sports injury prevention from the internet while (57.1%) got their knowledge from IRB, media and physiotherapists as illustrated in table 4.20 below.

**Table 4.20 Source of knowledge regarding sports injury prevention**

<b>Coaches</b>	<b>39.9%</b>	<b>0.0%</b>
<b>Internet</b>	<b>17%</b>	<b>71.4%</b>
<b>Physiotherapists</b>	<b>72.8%</b>	<b>57.1%</b>
<b>Doctors</b>	<b>30.4%</b>	<b>28.6%</b>
<b>Media</b>	<b>30.4%</b>	<b>42.9%</b>
<b>IRB</b>	<b>0.6%</b>	<b>57.1%</b>
<b>Conferences</b>	<b>3.8%</b>	<b>0.0%</b>
<b>Other Players</b>	<b>7.5%</b>	<b>0.0%</b>
<b>FIFA</b>	<b>1.3%</b>	<b>0.0%</b>

## **4.7 DESCRIPTION OF SPORTS SAFETY PRACTICES FOLLOWED BY CLUBS**

All the participants, rugby players, team coaches, team managers and team medical practitioners were asked to describe/report on different sports safety practices in place in their various clubs and union and what role they played to ensure successful implementation of this sports safety practices in their clubs. The following information was reported.

### **4.7.1 Sports safety practices followed by team coaches and rugby players**

Almost a half (51.3%) of the players reported that team coaches always considered players' physical development and build up when assigning position, and almost the same number of players reported that coaches balanced fitness and skills development at training, gradually increased training intensity, and taught players on landing, tackling and safe play techniques. However, less than half (42.2%) of the players reported that coaches always modified play according to the weather and playing surface as illustrated in table 4.21 below.

When coaches were asked which sports safety practices they followed more than half (57.1%) reported that they always considered players' physical development and build up when assigning positions while (85.7%) balanced fitness and skill during training, gradually increased training intensity, taught players landing, tackling and safe play techniques, and modified play according to weather and playing surface as illustrated in table 4.22.

**Table 4.21 Sport safety practices followed by coaches as reported by rugby players**

Safety practices	Never n (%)	Sometimes n (%)	Often n (%)	Very often n (%)	Always n (%)
Considering players physical development and build up when assigning positions (N=158)	3(1.9)	18 (5.1)	24 (15.2)	42 (26.6)	81 (51.3)
Balancing of fitness and skills development in training (N=162)	2(1.2)	3(1.9)	24 (14.8)	54 (33.3)	79 (48.8)
Gradually increasing training in intensity (N=160)	3 (1.9)	2 (1.3)	16 (10)	61 (38.1)	78 (48.8)
Teaching on landing, tackling and safe play techniques (N=159)	4 (2.5)	10 (6.3)	17 (10.7)	47 (29.6)	81 (50.9)
Modifying play according to the playing surface (N=161)	7 (4.3)	14 (8.7)	17 (10.6)	55 (34.2)	68 (42.2)
Modifying play according to the weather (N=161)	9 (5.6)	16 (9.9)	29 (18)	41 (25.5)	66 (41)
Coach demonstrating the skill to players during stretching (N=162)	4 (2.5)	11 (6.8)	22 (13.6)	39 (24.1)	86 (53.1)
Explaining the skill to the players (N=161)	1 (0.6)	10 (6.2)	14 (8.7)	46 (28.6)	90 (55.9)

**Table 4.22 Sports safety practices followed by the team coaches (n=7)**

Safety practices	Never n (%)	Sometimes n (%)	Often n (%)	Very often n (%)	Always n (%)
Considering players physical development and build up when assigning positions	0 (0.0)	0 (0.0)	1 (14.3)	2 (28.6)	4 (57.1)
Balancing of fitness and skills development in training	0 (0.0)	0 (0.0)	1 (14.3)	0 (0.0)	6 (85.7)
Gradually increasing training in intensity	0 (0.0)	0 (0.0)	0 (0.0)	2 (28.6)	5 (71.4)
Teaching on landing, tackling and safe play techniques	0 (0.0)	0 (0.0)	1 (14.3)	0 (0.0)	6 (85.7)
Modifying play according to the playing surface	0 (0.0)	0 (0.0)	0 (0.0)	1 (14.3)	6 (85.7)
Modifying play according to the weather	0 (0.0)	0 (0.0)	1 (14.3)	1 (14.3)	5 (71.4)
Coach demonstrating the skill to players during stretching	0 (0.0)	0 (0.0)	1 (14.3)	1 (14.3)	5 (71.4)
Explaining the skill to the players	0 (0.0)	0 (0.0)	1 (14.3)	2 (28.6)	4 (57.1)

#### **4.7.2 Sports safety practices followed by team medical practitioners**

Team medical practitioners were asked to report on what sport safety practices they had implemented and any other safety practices they had observed to be in place in their various clubs. All team medical practitioners (100%) had observed that padding of corner and goal posts was always done during matches and water was always made available during training and matches. However 50% of the team medical practitioners observed that padding of corner and goal post was not always done during training while a third (33.3%) of practitioners reported that the players' equipment was never checked by an official both during training and matches. The same number reported that a telephone was not available at training, however almost two thirds (66.7%) reported that telephone was always available during matches. On access of ambulance to the clubs training facility a third (33.3%) reported that was never ensured. However during matches access for ambulance to the facility was ensured while appropriate first aid kit and good playing ground condition was not ensured. However almost two thirds (66.7%) of team medical practitioners attended training sessions as illustrated in figure 4.23.

Further the team medical practitioners were asked to report the sports safety practices they followed in their clubs to help prevent rugby injuries. All the team medical practitioners 6 (100%) reported that they always encouraged players to warm up, cool down, drink water and stretch during training and matches. Furthermore all team medical practitioners 6 (100%) reported that they always encouraged their players to seek treatment when injured as illustrated in table 4.24.



**Table 4.23 Sports safety practices followed by team medical practitioners (n=6)**

<b>Sports safety practices</b>	<b>Never (%)</b>	<b>Sometimes (%)</b>	<b>Often (%)</b>	<b>Very often (%)</b>	<b>Always (%)</b>
Attendance at training	0.0	0.0	33.30	0.0	66.7
Availability of appropriate first aid kit at training and matches	0.0	16.7	16.70	33.3	33.3
Availability of Telephone at training	33.3	0.0	0.0	16.7	50.0
Availability of Telephone at matches	33.3	0.0	0.0	0.0	66.7
Access for ambulance at training	33.3	16.7	33.3	0.0	16.7
Access for ambulance at matches	16.7	0.0	16.7	0.0	66.7
Playing ground in safe playing condition	0.0	33.3	33.3	16.7	16.7
Padding of corner and goal posts at training	16.7	33.3	0.0	0.0	50.0
Padding of corner and goal posts at matches	0.0	0.0	0.0	0.0	100
Checking players equipment prior to training and matches	33.3	16.7	33.3	16.7	0.0
Availability of drinking water at training	0.0	0.0	0.0	0.0	100
Availability of drinking water at matches	0.0	0.0	0.0	0.0	100
Coach training targeting injury prevention	5.0	0.0	16.7	83.3	0.0

**Table 4.24 Other safety practices followed by team medical practitioners (n=6)**

<b>Other sports safety practices</b>	<b>Never (%)</b>	<b>Sometimes (%)</b>	<b>Often (%)</b>	<b>Very often (%)</b>	<b>Always (%)</b>
Encouraging players to drink water at training	0.0	0.0	0.0	0.0	100
Encouraging players to drink water at matches	0.0	0.0	0.0	0.0	100
Encouraging players to warm up prior to training	0.0	0.0	16.7	16.7	66.7
Encouraging players to warm up prior to matches	0.0	0.0	0.0	0.0	100
Encouraging players to cool down after training	0.0	0.0	0.0	0.0	100
Encouraging players to cool down after matches	0.0	0.0	0.0	16.7	83.3
Encouraging players to stretch at training	0.0	0.0	0.0	16.7	83.3
Encouraging players to stretch at training	0.0	0.0	0.0	0.0	100
Encouraging players to seek treatment when injured	0.0	0.0	0.0	0.0	100

### **4.7.3 Availability and use of protective equipment**

Players and team coaches were asked to report whether they ensured that their protective equipment are in good condition, maintained and available for use when needed. More than a half (57.1%) of the rugby players reported that they always ensured that their protective equipment was available and used. In addition a similar percentage of the players did not always ensured that their protective equipment is appropriate, sized properly, fitted correctly and maintained. However only (48.1%) of the players always ensured that their protective equipments were repaired when damaged, is of high quality and in good condition as illustrated in table 4.25.

Similarly the coaches were asked how frequently they ensured that their players' protective equipment was available and used. This was to get a clearer picture on their role in implementation of this sports safety practice. Less than half (42.9%) of the coaches often ensured that the players' protective equipment was available and used, appropriate, and repaired when damaged. However only (57.1%) of the coaches often ensured that the players' protective equipment was of high quality, in good condition, sized properly, fitted correctly and maintained as illustrated in table 4.25.

**Table 4.25 Distribution on how players and coaches maintained and used their protective equipments**

<b>Rugby players</b>	<b>Never (%)</b>	<b>Sometimes (%)</b>	<b>Often (%)</b>	<b>Very often (%)</b>	<b>Always (%)</b>
Paying attention stretching	0.6	2.6	7.1	28.2	61.5
Available and used	3.1	10.6	10.6	18.6	57.1
Appropriate	3.1	9.9	9.9	24.1	53.1
High quality	4.3	11.1	17.4	25.5	41.6
Good condition	3.7	9.90	18	21.7	46.6
Sized properly	4.3	10.50	14.2	16.7	54.3
Fitted correctly	2.5	9.90	12.3	21	54.3
Maintained	2.5	10	13.1	24.4	50
Repaired when damaged	3.7	8.6	21	18.5	48.1
<b>Team coaches</b>					
Paying attention stretching	0.0	14.3	42.9	28.6	14.3
Available and used	0.0	0.0	42.9	42.9	14.3
Appropriate	0.0	0.0	42.9	28.6	28.6
High quality	0.0	0.0	57.1	42.9	0.0
Good condition	0.0	0.0	71.4	28.4	0.0
Sized properly	0.0	14.3	57.1	0.0	28.6
Fitted correctly	0.0	14.3	57.1	0.0	28.6
Maintained	0.0	14.3	57.1	0.0	28.6
Repaired when damaged	0.0	28.6	42.9	14.3	14.3

#### **4.7.4 Sports safety practices implemented by team managers**

Team managers were asked to report on the sport safety practices in place in their clubs. This was because the team managers are directly involved in formulation and implementation of sports safety practices and policies in their various clubs. More than half (57.1%) of the team managers reported that they always ensured that telephone was available at training and matches and ambulance always accessed their facility at both training and matches. Less than half (42.9%) reported that qualified first aid personnel attended training and matches however a qualified cardiopulmonary resuscitation personnel did not always attend both training and matches while 42.9% reported that corner and goal posts were always padded during matches. However, they were not always padded during training. Finally, 14.3% of the managers reported that referees and their assistants, team

coaches and medical practitioners' qualification were never checked by club or union as summarized in table 4.26.

**Table 4.26 Sports safety practices followed in clubs as reported by team managers (n=7)**

<b>Safety practices</b>	<b>Never n (%)</b>	<b>Sometimes n (%)</b>	<b>Often n (%)</b>	<b>Very often n (%)</b>	<b>Always n (%)</b>
Availability of drinking water at training	0 (0.0)	0 (0.0)	0 (0.0)	2 (28.6)	5 (71.4)
Availability of drinking water at matches	0 (0.0)	0 (0.0)	0 (0.0)	1 (14.3)	6 (85.7)
Attendance of qualified first aid personnel during training	1 (14.3)	0 (0.0)	1 (14.3)	2 (28.6)	3 (42.9)
Attendance of qualified first aid personnel during matches	1 (14.3)	0 (0.0)	0 (0.0)	3 (42.9)	3 (42.9)
Attendance of qualified Cardiopulmonary resuscitation personnel at training	3 (42.9)	1 (14.3)	0 (0.0)	1 (14.3)	2 (28.6)
Attendance of qualified cardiopulmonary resuscitation personnel at matches	1 (14.3)	2 (28.6)	1 (14.3)	1 (14.3)	2 (28.6)
Availability of Telephone at training	2 (28.6)	1 (14.3)	0 (0.0)	0 (0.0)	4 (57.1)
Availability of Telephone at matches	1 (14.3)	0 (0.0)	1 (14.3)	0 (0.0)	4 (57.1)
Access for ambulance to club facility during training	2 (28.6)	1 (14.3)	0 (0.0)	0 (0.0)	4 (57.1)
Access for ambulance to club facility during matches	0 (0.0)	1 (14.3)	2 (28.6)	0 (0.0)	4 (57.1)

Padding of corner and goal posts during training	2 (28.6)	1 (14.3)	0 (0.0)	3 (42.9)	1 (14.3)
Padding of corner and goal posts during matches	0 (0.0)	1 (14.3)	0 (0.0)	3 (42.9)	3 (42.9)
Ensuring that playing surface is in safe playing condition	1 (14.3)	2 (28.6)	2 (28.6)	1 (14.3)	1 (14.3)
Adequate separation of spectators and officials from playing field	1 (14.3)	2 (28.6)	1 (14.3)	1 (14.3)	2 (28.6)
Checking referee and assistants qualification by clubs or union	2 (28.6)	1 (14.3)	1 (14.3)	1 (14.3)	2 (28.6)
Checking Coaches qualification by clubs or union	3 (42.9)	1 (14.3)	1 (14.3)	1 (14.3)	1 (14.3)
Checking team medical practitioners qualification by clubs or union	0 (14.3)	1 (28.6)	2 (14.3)	0 (14.3)	4 (28.6)
Coach providing training targeting injury prevention	0 (0.0)	0 (0.0)	1 (14.3)	5 (71.4)	1 (14.3)
Coach considering players physical development when assigning positions	0 (0.0)	0 (0.0)	1 (14.3)	4 (57.1)	2 (28.6)

#### 4.7.5 Other sports safety practices followed in the clubs

Coaches were also asked to report whether they had other specific sport safety practices such as injury record keeping, promoting training and providing information on safety practices and policies to their club members and if the club would like to get assistance in developing and implementation of sports safety practices. More than half 4 (57.1%) of the team managers reported that their clubs did not keep record of injuries however they promoted attendance of relevant club

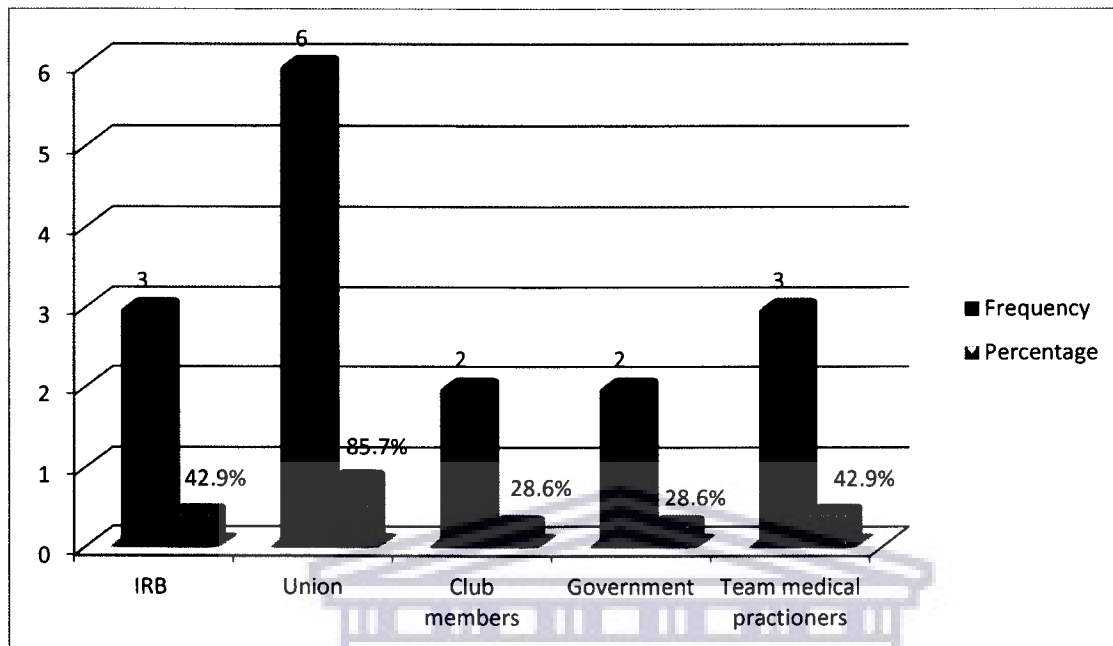
members in safety training. However all the team managers 7 (100%) reported that they could like to access to more safety training and get assistance in developing sports safety programmes as shown in table 4.27.

**Table 4.27 Other sports safety practices implemented in the clubs (n=7)**

<b>Keeping a record of injuries</b>	<b>2 (28.6)</b>	<b>4 (57.1)</b>	<b>1 (14.3)</b>
<b>Promoting attendance of relevant club members in safety training</b>	<b>4 (57.1)</b>	<b>1 (14.3)</b>	<b>2 (28.6)</b>
<b>Providing regular information on safety policies to relevant members</b>	<b>5 (71.4)</b>	<b>1 (14.3)</b>	<b>1 (14.3)</b>
<b>Club need to access more safety training programs</b>	<b>7 (100)</b>	<b>0 (0.0)</b>	<b>0 (0.0)</b>
<b>Club needs assistance to develop sports safety programmes</b>	<b>7 (100)</b>	<b>0 (0.0)</b>	<b>0 (0.0)</b>

#### **4.7.6 Managers' opinion on who should support clubs during implementation of injury prevention strategies**

When managers were asked who they thought is supposed to play a role in assisting clubs in implementation of rugby injury prevention strategies. Almost all (85.7%) of the team managers reported that the union should play a role in the implementation of rugby injury prevention strategies. Consequently, less than half (42.9%) of the team managers also reported that IRB and team medical practioners should play a bigger role in the implementation process as illustrated in figure 4.8.



**Figure 4.8 Frequency and percentage of team managers opinion on who should support clubs in implementation of injury prevention strategies (n=7)**

#### 4.8 SUMMARY OF THE CHAPTER

This chapter presented the results of the present study. Socio-demographic characteristics of the participants were represented. Secondly, results on prevalence of rugby injuries such as total number of injuries, site of injury, mechanism of injury, severity of injury and time of injury were all presented.

Injury prevention strategies and factors hindering the implementation of rugby injury prevention strategies in Kenya are described and presented in detail. Thereafter, knowledge regarding rugby injury prevention strategies, causes, risk factors and sources of knowledge are described.

The chapter ends with safety practices that are in place in the Kenyan rugby clubs.

## CHAPTER FIVE

### 5 DISCUSSION

#### 5.1 INTRODUCTION

The aims of this study were to determine the prevalence of rugby injuries in the KRFU League 2011-2012 season, to identify and describe various injury prevention strategies and sports safety practices in place among rugby clubs in Kenya and to determine the factors influencing the implementation of rugby injury prevention strategies in Kenya. This chapter presents a discussion of the results outlined in the previous chapter; and compares it with the salient literature in the field.

#### 5.2 DESCRIPTION OF THE STUDY SAMPLE DEMOGRAPHICS

Although it is not a specific objective of the study to profile the rugby player, team coaches and team doctor, a short discussion is offered here to highlight the differences and similarities between teams in the KRFU and what is generally found elsewhere.

##### Rugby players

According to International Rugby Board, rugby is a contact sport that is played all over the world by both children and adults of all ages (IRB, 2008). However several studies have indicated that the age of the majority of male professional, semi professional and amateur league rugby players range between 15-33 years (Pettersen, 2002; Gabbett, 2002; Gabbett, 2001; Gabbett, 2000a; Gabbett, 2000b). Moreover rugby players are thought to be a mean age of 22.1-29.1 years (Olds, 2001). These sentiments are supported by this current study findings with the mean age of the rugby players being 22.86 years (SD=0.784) and the majority of the players being 20-24 years of age.



This mean age is similar to that of Garraway and Macleod (1995) in which their study sample ranged from 16-29 years old with the majority being 20-24 years of age.

Experience and skill level has been attributed to success and low risk of injury among rugby players (Edgar, 1995). Moreover playing experiences of 2-8 years has been reported among rugby players (Gabbett 2001). In our study rugby players were found to have inadequate rugby playing experience. Our results showed that 42% of the rugby players had no past rugby experience before joining the first division league. This inadequate skill and experience among rugby players may be associated with the high prevalence of injury since fitness and experience has been considerably found to reduce the injury rate in rugby players (Edgar, 1995).

#### **Team coaches**

Studies have shown that the mean age of rugby coaches is 37.4 years (SD=11) with a reported range of 19 – 64 years. Furthermore, a mean of 11.8 years of experience coaching rugby has been reported (Butt, 2008) with the majority (65.1%) of the rugby coaches being amateurs. The present study's team coaches had a comparable age but their coaching experience (mean = 2.14 years) were less than reported above. The lack of coaching experience is of particular concern in this study as the majority of the coaches had no previous experience of coaching teams prior to joining the first division. Saunders et al. (2010) pointed out that lack of prior experience means lack of coaching skills and ideas for training drills.

#### **Team Medical Practitioners**

Previous studies have reported first aid services to be offered by the team coaches, parents and club trainers or no first aid is offered sometimes (Donaldson et al., 2002). In addition, in Rwanda, nurses have been reported to be the majority of first aid providers followed by physiotherapists, medical

doctors and dentists. Moreover, very few have adequate experience as a team medical practitioner (Pharaoh and Assuman, 2011). The team medical practitioners were somewhat different in the present study as 87.5% were physiotherapists.

The major issues with regard to the socio-demographics of the study sample of importance to injury risks are the low level of experience of the rugby players prior to joining the first league and the lack of coaching experience of team coaches. It is therefore of utmost importance to implement programmes to nurture and develop talented rugby players to ensure greater exposure and hence skills and experience. Moreover, in future injury prevention strategies specifically targeted at minimizing injuries such as coaching on correct tackling technique and player education should be encouraged (Gabbett, 2001). This may ensure that younger and inexperienced rugby players get enough training to master the skill and technique, therefore minimizing the risk of injury. In addition, the lack of coaching experience should be addressed by the respective governing bodies by means of encouraging or offering coaching courses to improve their skills and experience. Furthermore first aid training, educational workshops and seminars regarding the prevention of sports injuries should be implemented and offered to all stakeholders.

### **5.3 PREVALENCE OF RUGBY INJURIES**

The sport of rugby has been found out to have a higher injury risk as compared to other sports (Junge et al., 2004). Macqueen and Dexter (2010) also stated that injuries are more prevalent in rugby because of its nature of high body contact, collision and the speed of the game. These sentiments were supported in the present study in which 94.4% of the participants sustained an injury in the 2011-2012 season. Furthermore, a total of 520 injuries were reported, of which 232 (44.6%) were sustained during training while 288 (55.4%) injuries were sustained during matches.

When comparing this prevalence stated above with others, it is similar to the 95% found by Viljoen et al. (2009) in a professional South African rugby team. One has to be cautious however when comparing prevalence rates for several reasons. Firstly the current study investigated the prevalence of rugby injuries in the previous season (retrospectively) whereas Viljoen et al. (2009) investigated injuries prospectively. In addition the players who participated in Viljoen's study were assessed during the pre-season and monitored by the team physiotherapist and sports physician during the study, decreasing recall bias. Furthermore, slightly different injury definitions were used by Viljoen et al. (2009) and could thus have led to an increase in the number of injuries reported.

Despite these differences, attention should be paid to the high number of injuries that are occurring during both training and matches. These findings highlight the importance of implementing and following sports safety practices at both training and match sessions. Moreover, appropriate and sufficient pre-season strength and conditioning is important in preparation of players to the physical and collision for the physiological, musculoskeletal and collision complexion of the sport (Gabbett & Domrow, 2007). Nevertheless the consensus injury definition (Fuller et al., 2006) should be applied across rugby injuries studies as it is in soccer to avoid under or over estimation of rugby injuries.

### **Location**

Similar to other studies (Junge et al., 2004; Bathgate et al., 2002; Wekesa et al. 1996), the present study found that most (48.7%) of the total injuries were sustained to the lower limb. Furthermore, shoulder injuries are common in contact and collision sport (Headey, Oxon, Brooks & Kemp, 2007; Gabbett, 2003) and account for 9 – 11% of all rugby injuries (Brooks, Fuller, Kemp & Reddin, 2005a, 2005b). Shoulder injuries were the second highest in the present study with 11% of the total

injuries sustained to the shoulder. In addition to the above locations, several studies have highlighted the seriousness of rugby injuries sustained to the neck (Quarrie, Cantu & Chalmers, 2002). These concerns of neck injuries are mostly because an injury to the spinal cord may result to death or severe permanent disability depending on the severity of the spinal injury (Quarrie et al., 2002). A total of 9.6% of the injuries in the present study were sustained to the neck.

Several conclusions can be drawn from the findings highlighted above. Researchers have alerted that lower limb injuries in rugby is of great concern and urged teams to emphasize strength, speed, stamina, rule change and consistent use of protective equipment to minimize injuries (Garraway, Lee, Hutton, Russel & Macleod, 2000). In addition, agility training to improve speed and sudden change of direction, defensive drills, correct tackling and landing techniques should be emphasized by coaches during training as they could help minimize injury incidences (Gabbett, 2001). Furthermore continuous injury surveillance should be conducted to help identify the depth of the problem, risk factors. This could help to develop a potential complete sports injury prevention programmes (Van Mechelen et al., 1992).

Furthermore, coaches should specifically provide training targeted at injury prevention and provide adequate training and coaching for safe participation (Donaldson et al., 2002). Tackling has been attributed to be the main shoulder injury mechanism; therefore players should be taught proper tackling technique to help minimize the shoulder injury incidences (Headey et al., 2007). Lastly, due to the seriousness of neck injuries, it is important that rugby players be educated and taught proper tackling technique during training to minimize risk of neck injuries (Gabbett, 2001). Laws of the game must be re-inforced that are always followed by rugby players. In addition, rules regarding high tackles and foul play should be adhered to strictly.

## Severity of injury

Injuries may result in loss of training, playing, medical and employment costs depending on the extent of the injury (Gabbett, 2001). Moreover severe injuries may result in death or permanent disabilities to the athletes (Quarrie, Cantu & Chalmers, 2002). Recent studies in rugby have reported that majority of the injuries are minor or transient (Swain, Pollard & Bonello, 2010; Gabbett, 2001). This study's findings are in line with the above sentiments with more than half 273 (52.5%) of the injuries sustained being mild, 186 (35.8%) were moderate and only 61 (11.7%) of the injuries were severe. Similarly, Gabbett (2004b) reported that the majority of training (97.9%) and match (92.9%) injuries were minor with no loss of playing time. However, this study finding is contrary to a study conducted in Australia by Stevenson, Hamer, Finch, Elliot and Kresnow (2000) where most injuries (58%) were moderate. This difference in findings may be explained in that, their study classified severity of injuries into three categories; severe injuries required hospitalization; moderate injuries required treatment by team medical practitioner while minor injuries required players to treat themselves. While in this current study injury severity was classified into same three categories that's; mild, moderate and severe. However, in this classification a mild injury a player was never attended a match or training for one week. For moderate injuries the symptoms persisted for at least 2–4 weeks and the player never participated in a match or training while for severe injuries the symptoms existed for more than four weeks and the player was out of play or training for four or more weeks. The severe injuries involved injury to the musculoskeletal system (Goga & Gongal, 2003, Chomiak, Junge, Peterson & Drovak, 2000; Ekstrand & Gillquist, 1983). Therefore, in Stevenson et al. (2000) study minor and moderate injuries could have been easily gone unnoticed or unaccounted for, as most players did self-

treatment for the minor injuries, therefore there is high possibility that the medical team did not have a chance to record them.

These study findings suggest that since most of the injuries were moderate, it is therefore the responsibility of the coaches and team medical practitioners to implement and teach players different injury prevention strategies to minimize incidences of future severe injuries. In addition, clubs and unions should ensure that a team physiotherapist, sports trainer or a first aider regularly attends training and matches to ensure that mild and moderate injuries are given earlier and appropriate treatment. Finally, a consensus definition of severity of injury (Fuller et al. 2006) should be used among rugby studies, as it is in soccer, to enable easier comparisons of study findings in future.

### **Time of Injury**

More injuries occur during the second half of play compared to the first half in rugby union matches (Gabbett, 2000a; Stephenson et al., 1996; Wekesa et al., 1996; Gibbs, 1994). The above findings were supported by this study finding, with the majority (45.7%) of the rugby players being injured during the second half of play. This is in line with a study done in Kenya by Wekesa et al. (1996) which reported few injuries occurring in the first half (38.3%) with a high proportion of injuries (61.7%) occurring in the second half. The high number of injuries during second half as depicted in this study may be associated to fatigue of the players which has been found to affect the concentration, technique and general coordination of the players (Van der neut et al., 1991 as cited in Wekesa et al., 1996). Moreover, inappropriate training and poor endurance (Shawdon & Brukner, 1994), fatigue and micro trauma may have contributed to these injuries in the second half (National Health & Medical Research Council, 1994).

Therefore re-warm up during half time can increase endurance and reduce injury incidence during second half (Lovell, Kirke, Siegler, McNaughton & Greig, 2007). Furthermore “game specific attacking and defensive drills practiced before and during fatigue may encourage players to make appropriate decisions and apply learnt skills during the pressure of competitive matches thereby minimizing injury incidences” (Gabbett, 2001 p 345). In addition coaching players on how to absorb the collision and tackle contact forces may also help minimize the injury risk in rugby.

#### **5.4 INJURY PREVENTION STRATEGIES**

Injury prevention strategies in place and used by teams were examined in the present study. The findings of each prevention strategy will be discussed hereafter.

##### **Use of protective Equipment**

Protective equipment is made specifically to protect specific body parts from the risk of injury while allowing the athlete to participate in different sporting activities. It is also used on return to play after injury to prevent any further or aggravation of injury during the direct contacts phases of the sport. Such protective equipment include mouth guards, shoulder pads, forearm and groin protectors, knee pads, wrist guards, footwear, headgear, braces and taping (Brukner & Khan, 2011). Researchers have shown that the use of protective equipment can prevent injury incidence (Jones et al., 2004; Wilson, 1998). Use of headgear can minimize the degree of severity of concussion in players who use it, compared to players who do not (Kahanov, Dusa, Wilkinson & Roberts, 2005). Similarly Jones et al. (2004) found that headgear reduced the risk of head and face injuries.

The present study findings showed inconsistent use of protective equipment at both training and matches, despite the fact that players and coaches were aware of the fact that it can minimize risk of injury. Similar findings have been reported in previous studies (Donaldson et al., 2002; Hawkins &

Fuller, 1998). The poor use of protective equipment by rugby players in the current study could be due to the fact that players were never encouraged by coaching staff to use the protective equipment at both training and competitive matches, as argued by Hawkins and Fuller (1998). In addition, inaccessibility to protective equipment for players due to financial constraints, as most of them were university students, could be another reason for the inconsistent use as also highlighted by Kiwanuka (2011). This should be brought under the attention of team managers, coaches, and team medical officials to facilitate encouragement of players to always use protective equipment at both training and matches as they can drastically reduce injury incidences as stated by Hawkins and Fuller (1998).

This study also depicted a lack of knowledge regarding injury occurrence and risk factors among rugby players and coaches. Players and coaches also did not know which time of play had a greater risk to injury, and if an action of another player can cause an injury. Even though coaches agreed that use of head gear can minimize risk of head injury, they did not ensure that players always used the protective equipments.

Therefore, more studies needs to be conducted to carefully examine if there is a relation between rugby injuries and use of protective equipment at both training and matches. In addition, the present study findings shows inadequate use of protective equipment and lack of sports injury prevention knowledge, therefore these factors might have exposed majority of player to risk of sustaining an injury. In future clubs and unions should hold workshops and conferences and use media to educate and create awareness among players, team coaches, manager, medical practitioners and the public at large on sports injury prevention, occurrence, risk factors and management and encourage players to use protective equipment.



## **Warm up**

Warming up and stretching before and after training and matches can effectively help minimize the risk of injury (Woods, Bishop & Jones, 2007; Mjølunes, Arnason, Ostagen, Raastad & Bahr, 2004; Kujala, Orava & Jarvinen, 1997). The present study findings reported that the majority of players conducted warm up and were aware of different sports injury prevention strategies. This is similar to Hawkins and Fuller (1998) study findings. Although the majority of players engaged in warm-up activities, a considerable number of injuries still occurred at both training and matches. A possible reason for this could be that the majority of players engaged in warm-up activities for less than 25 minutes. This is an inadequate time as it has been shown that an appropriate duration of warm-up should be between 25 – 30 minutes for intense sporting activities such as rugby (Training.gov.au, 2012). In addition understaffing of physiotherapists and sports trainers might have played a key role to insufficient warm up. Nevertheless individual player susceptibility, inadequate rehabilitation and early return to play may be the reason for high injury prevalence (Dadebo et al., 2004).

This study highlights the depth of knowledge regarding the appropriate duration of warm-up activities among rugby clubs in Kenya. Rugby teams should always perform warm up activities for the recommended of at least 25 minutes or more, prior to training and matches. Clubs should ensure that they employ sufficient team medical practitioner to assist in directing and conducting warm up in future. Furthermore, it is also important to conduct further research on the role of warm-up on performance and minimizing injury incidences in different environmental conditions in future (Bishop, 2003).

### **Cool down and stretching**

Cool down enhances the elimination of muscle metabolism waste products and enhances the recovery time (Stamford, 1995 as cited in Pharaoh & Assuman, 2011). Similarly, stretching has been found to increase flexibility, muscular strength and reduce injury risk if practiced adequately (McArdle, Katch & Katch, 2006; American College of Sports Medicine, 1998).

The finding of this study showed that few players conducted cool down, however, the majority of the players always stretched during warm up and cool down before and after matches and training. Similar findings have been reported in previous studies (Donaldson et al., 2002; Hawkins & Fuller, 1998). The reason for players not engaging in cool downs may be that they were too tired after matches and training or they lacked advice or appropriate skill in conducting the cool-down and stretching. Therefore, cool down and stretching should be encouraged among players after training and matches, as it can help minimize risk of injury. Moreover, improvement in the technique of stretching and consistency of these techniques may help minimize injury incidences (Dadebo et al., 2004).

### **Flexibility and strength training**

Muscle flexibility reduces risk of injury (Verrall et al., 2005; Worrel & Perrin, 1992; Wallin et al., 1985). Furthermore, flexibility training with static stretching for at least 2-3 days per week with each stretch held to a mild discomfort for 30-60 seconds with 3-4 repetition per stretch has been found to be effective (McArdle, Katch & Katch, 2006). Similarly, strong muscles can protect players from injury and may reduce injury incidences (Heiser, Weber, Sullivan et al., 1984).

This study, however, found that the majority of players did not conduct pre-season conditioning, strength and flexibility training even though the majority of the players and coaches agreed that

players who do not conduct flexibility are more prone to injuries than those who do not. This lack of strength training may be associated with lack of knowledge regarding the importance of strong muscles as part of injury prevention. Moreover, players may have not been encouraged and given advice on the correct technique of undertaking flexibility and strength training. In addition, lack of proper equipment might have contributed to the inadequate flexibility and strength training as it was reported by players in this study.

In general, team coaches and medical practitioners should encourage their players to conduct warm-up, cool-down, stretch and conduct flexibility and strength training as it can help minimize injury risks (Verrall et al., 2005; Woods, Bishop & Jones, 2007). Nevertheless, further education of coaches on injury mechanisms, risk factors and early management of sports injuries should be staged in future (Carter & Muller, 2008).

The study findings suggest that team physiotherapists and physicians should play a significant role in educating and supervising players on stretching techniques during cool down and warm-up activities (Ekstrand et al., 1983). In addition, players should always be supervised by coaches, sports trainers, biokineticians and physiotherapists when conducting warm ups, stretching and cool downs.

### **Nutrition and Hydration**

For the past years, researchers have tried to understand the role of proper nutrition in health and performance in sports (Brotherhood, 1984). For instance, balanced nutritional and fluid intake may play an important role in improving athletes' performance (Sallis, 1996) while inadequate hydration may result to life threatening injuries/conditions such as heatstroke (American Dietetic Association, Dieticians of Canada and American College of Sports Medicine, 2000). Furthermore, inadequate

nutrition intake may lead to increase injury risk and slow athletes' recovery (Brukner & Khan, 2011). According to Brotherhood (1984) the high power output by sports personalities requires substrate energy and water with carbohydrate, specifically muscle glycogen being recommended in athletes who require greater power output.

This study finding showed that rugby players took very adequate amounts of water at both training and matches. However there was poor intake of carbohydrate by players at both pre and post training and matches. Moreover the rugby players were never given enough nutritional advice. Similar findings have been reported by Hawkins and Fuller (1998), where players had inadequate intake of carbohydrate and information regarding nutrition.

This study finding suggests that more advice to players and coaches on nutrition is needed from experts in sports nutrition, and in future teams should consider hiring services of a sports nutritionist. Moreover, teams are encouraged to always supply enough carbohydrate foods, water and sports drinks to their players prior and after matches and training sessions. Furthermore, team coaches, managers and team medical practitioners should attend sports nutrition workshops and courses to get more information regarding proper nutrition in athletes; this will help them to be in a position to advise their players on what to eat and drink.

### **Sources of knowledge regarding sports injury prevention**

Several previous studies have reported the Internet, information booklets, specific coaching training courses, training manual books, information kits, a website, team medical practitioners, magazines, doctors, team coaches, media and seminars to be the most important resources of information amongst team coaches and players (Pharaoh & Assuman, 2011; Saunders et al., 2010; Sefton, 2003). This study's finding is slightly differed from the above sentiments in that the most important

source of information to coaches and rugby players were physiotherapists, followed by coaches and the Internet. Moreover, no team coach received any information from other team coaches, FIFA, players and conferences. The reason for this may be that the previous studies were conducted in developed countries, where programmes on injury prevention strategies have been rolled out and information kits, booklets, training manual kits and seminars have been disseminated amongst players and coaches, unlike Kenya where this is yet to be done.

This study finding reveals that team medical practitioners, coaches and the Internet are important sources of information regarding sports injury prevention and therefore they should be used in educating rugby players, team coaches and managers on injury prevention measures. In addition, further educational workshops and seminar courses on sports injury prevention, rules of the game and injury risk factors should be staged to educate players, coaches and the public. Moreover information booklets, specific coaching training courses, training manuals, information kits, media and a website (Internet) should be used to educate and disseminate sports injury prevention to players, coaches, managers, team medical practitioners, referees and their assistants in future. Nevertheless, a nationwide programme website like that of South Africa (BokSmart programme) should be put in place among rugby unions in future to disseminate sports injury prevention information as this could be an important source of information regarding rugby injury prevention to all rugby players, coaches, medical practitioners, referees and their assistants.

The factors influencing the implementation of the above rugby injury prevention strategies were examined and the findings are discussed below.

## **5.5 FACTORS INFLUENCING IMPLEMENTATION OF RUGBY INJURY PREVENTION STRATEGIES**

Few studies have investigated factors hindering the implementation of injury prevention strategies. These few studies have reported several factors to hinder sporting clubs from implementing these injury prevention strategies. Some of the factors that have been reported include; lack of volunteers and players, and lack of safety policies and practices (Casey et al., 2004), lack of sports injury prevention knowledge among coaches and players, and insufficient number of medical physicians, physiotherapists and medical personnel (Pharaoh & Assuman, 2011), lack of qualified referees, umpires, coaches, trainers, medical personnel and financial constraints (Casey et al., 2004), lack of qualified professionals in injury prevention and first aid provision and lack of sports safety knowledge (Clarke, 1990). In addition, factors such as the decline of population and sporting structures have been reported elsewhere (Clarke, 1990). Other factors that have been reported by players and coaches as reasons for not following injury prevention strategies include: lack of advice on training technique, nobody else does it, players being too tired (fatigue), lack of time and proper equipments and players believe that it is not necessary to conduct the injury preventative measures (Hawkins & Fuller, 1998).

This study's findings supported the above sentiments with the majority of players and coaches reporting that the reasons for not following the preventive measures such as conducting warm-up, cool-down, strength and flexibility training at least once a week as a team or individual session was because of: lack of enough time, lack of proper equipment, players not given advice on technique, players too tired after training and matches, players did not believe it was necessary and no players practiced the preventive measures.

These study findings further indicate that there is a lack of knowledge regarding sports injury prevention strategies. In addition, lack of knowledge regarding the benefits of conducting cool downs, stretching, strength and flexibility training might exist among rugby players, team medical practitioners, team managers and coaches even though they indicated to have a good knowledge on different injury prevention strategies, causes, occurrence and risk factors of sports injury. It is therefore important that rugby players, team coaches and team medical practitioners undergo more training in relation to injury prevention and importance of practising and implementing these injury prevention strategies in their various clubs. Moreover, the use of media and workshops to disseminate injury prevention information should be encouraged by the various rugby stakeholders and rugby governing bodies. In addition, coaches should provide supervision, issue proper instructions about techniques, teach rules of the game and ensure that players receive proper training and attention and are discouraged from violent actions as supported by Doyle (2000). Therefore sports governing bodies and clubs should ensure that they recruit trained, qualified and accredited coaches (Finch & McGrath, 1997), managers and team medical practitioners in future.

The study also found that lack of funds, financial constraints, poor playing surfaces, improper facilities, lack of training equipment, lack of qualified personnel, lack of sports injury prevention knowledge, inadequate strength, flexibility and pre-season training and lack of earlier players development projects might have been among the major factors that hindered the implementation of rugby injury prevention strategies in Kenya. Similar factors have been reported by different authors in the past (Pharaoh & Assuman, 2011; Donaldson et al., 2002; Casey et al., 2004). However, this study finding are contrary to Saunders et al. (2010) where coaches lacked ideas for training drills, lack of coaching skills and training space even though they did report similar findings on lack of proper equipment and time. This difference in the study findings may be due to the fact that the

team coaches' coaching skills were not specifically investigated. Therefore, more research is needed in this area in future to understand the coaching skills and qualifications amongst rugby team coaches. In addition, non-partnership between rugby stakeholders, rugby clubs, Union and Government may have played a big role in non-implementation of rugby injury prevention strategies.

## **5.6 SPORTS SAFETY PRACTICES AND POLICIES**

Few studies have investigated sports safety policies and practices (Casey et al. 2004; Donaldson et al., 2002). Sports safety policies and practices ensure that sporting activities are carried out in safe and hazard free environment (New South Wales, 1999). Moreover, sports safety practices and risk management are essential as they help sports bodies to prevent or reduce injuries (SISAC, 1995 as cited in Finch & Hannessy, 2000). According to Finch and Hannessy (2000) sports safety is an important part of health and therefore an understanding of sports safety policies and practices can effectively help identify gaps and enable in the implementation of comprehensive injury prevention programmes. Moreover, sports safety practices and policies may also help clubs to improve their facilities and enable them to implement injury prevention strategies. Nevertheless they may be useful to clubs and governing bodies during the implementation and evaluation of injury prevention initiatives (Donaldson et al., 2002).

This study finding indicated that the majority of the team coaches considered players' physical development and build up when assigning positions, balanced fitness and skills development at training, gradually increased training intensity and taught players on landing, tackling and safe play techniques. In addition, the majority of rugby players and team coaches ensured that the protective equipment was always appropriate, sized properly, fitted correctly and maintained but this was not checked regularly by an official at both training and matches. However, they did not ensure that



protective equipment were repaired when damaged, is of high quality and in good condition. Nevertheless, the team coaches never modified play according to weather and playing surface. All these might have put more rugby players at greatest risk of injury and it should be brought under the attention of team coaches and team management.

Team medical practitioners played a major role in implementation of injury prevention strategies as they always encouraged players to drink water at training and matches, warm-ups, cool-downs, stretch and seek treatment when injured, but they were unsupervised warm-up and stretching sessions. This is contrary to Ekstrand, Gillquist and Liljedahl (1983), who recommended that physiotherapists and team physicians should supervise warm-ups, cool-downs and stretching.

On the other hand, managers did not ensure the availability of telephone and padding of goal and corner posts at training, and neither did they ensure the attendance of qualified *cardiopulmonary resuscitation personnel* at both matches and training. However, they ensured attendance of qualified first aid personnel at both training and matches. Neither did the clubs or union check the qualifications of referees and their assistants, team coaches and team medical practitioners. Furthermore, the clubs did not keep record of injuries even though they promoted attendance of relevant club members in safety training. In addition, clubs reported that they could like to access more safety training and get assistance in developing sports safety programmes. This is contrary to Donaldson et al. (2002) where clubs wanted to access more safety training but did not want assistance in developing the sports safety programmes.

All clubs indicated that they would like the union, IRB, team medical practitioners, club members and the Government to play an important role in assisting them to implement different sports safety programmes in their clubs in future. This is similar to Australian study (Donaldson et al., 2002)

where clubs revealed that they could like to get help from their government, union and associations in implementation of their safety programmes.

This study finding suggest that programmes targeted at put into effect sports safety practices and policies in any nationwide league should incorporate all the club members and governing bodies such as the players, team coaches, team medical practitioners, team managers, governing union, IRB and the Government. Moreover, the county councils can also play a big role in setting standards for sports safety and disseminating sports safety information and resources (Donaldson et al., 2002). In addition, these study findings indicates that safety practices are less often implemented during training than during matches. Therefore, as injuries occurs more at training, and players always spends considerably more time at training than competing, therefore clubs should always ensure that adequate sports safety policies and practices are always carried and put into practice at training. (Donaldson, Forero, Finch & Hill, 2004).

## **5.7 SUMMARY OF THE CHAPTER**

This chapter discussed the socio-demographic characteristics findings of the participants, prevalence of rugby injuries in KRFU League 2011-2012 season, use of different injury prevention strategies such as protective equipment, warm up, cool down, stretching, hydration and nutrition.

Thereafter factors influencing the implementation of these injury prevention strategies in Kenya were discussed. Knowledge regarding injury prevention, risk factors and causes of injury and the sources of knowledge was also discussed.

Finally sports safety practices in place among rugby clubs in Kenya is discussed in detail. The study findings were discussed was based on comparison with previous studies in this area. The study findings were the results gathered from rugby players, team coaches, managers and team medical

practitioners of seven rugby teams in Kenya during the December 2011 - Jan 2012 rugby season break in Kenya.



UNIVERSITY *of the*  
WESTERN CAPE

## CHAPTER SIX

### 6 SUMMARY, CONCLUSION, RECOMMENDATION AND LIMITATIONS

#### 6.1 INTRODUCTION

The main aim of the study was to determine the factors that are influencing the implementation of rugby injury prevention strategies and sports safety practices among rugby clubs in Nairobi, Kenya. The results of the study were presented in Chapter Four and discussed in the previous chapter. This concluding chapter will provide a summary of the study and recommendations based on the results of the study.

#### 6.2 SUMMARY

Limited literature is available on rugby injury prevalence, injury prevention strategies and factors influencing the implementation of these strategies in the World, Africa and more so in Kenya. The aim of this study was thus to determine the factors that are influencing the implementation of rugby injury prevention strategies and sports safety practices among rugby clubs in Nairobi, Kenya. In order to achieve the aim of the study, questionnaires were administered to rugby players, team coaches, team managers and team medical practitioners.

In summary, the majority of the clubs carried out sports safety practices during matches; however they did not do the same during training. The safety practices that were never ensured included: checking coaches and medical personnel qualifications, padding fixtures, corner and goal posts during training, availability of telephone at training, access of ambulance to clubs training facility during training, use of protective equipment, warming up and cooling down during training and matches, inadequate warm-up and cool-down duration, clubs did not conduct flexibility and

strength training, non-attendance of qualified Cardiopulmonary resuscitation personnel at both training and matches, playing surface was not ensured to be in good condition before matches and training, clubs did not take a record of injuries. Nevertheless, clubs did not ensure proper carbohydrate consumption by players prior to and after matches and training.

However, the majority of clubs ensured attendance of first aiders at training and matches, ensured proper hydration of players at training and matches, coaches taught players safe tackling and landing technique and considered players physique in a signing positions, clubs ensured that fixtures including goal and corner posts were always padded during matches and access of ambulance to club facility during matches.

Moreover, all clubs were interested to be assisted to develop and implement sports safety policies and practices plan. In addition, they were interested to receive information, assistance and training regarding safety issues. Further clubs proposed institutions like the governing body, IRB, team members, medical personnel and the government to support them in implementing the sports safety plan.

The factors which hindered the clubs from following injury prevention strategies and practices included: player and coaches lacked enough time, too tired, not given advice on technique, and do not believe it is necessary. Other factors that came up include: financial constraints, lack of equipment and qualified personnel, lack of knowledge regarding sports injury prevention, and poor playing surfaces and facilities.

### **6.3 CONCLUSION**

The study highlighted a high prevalence of lower limb injuries among rugby players and thus the need for injury prevention strategies targeting lower limb. Moreover, tackling, being tackled,

running and collision were the common mechanism of injury with the majority of the injuries being mild. Although the majority of clubs followed sports safety practices during matches, they never ensured the same during training. Financial constraints, lack of sports injury prevention knowledge, lack of proper equipment, qualified personnel and poor facilities were main factors that were reported and they might have hindered the implementation of the rugby injury prevention strategies among clubs. Therefore clubs should elect sports safety committee to ensure that sports safety practices and policies are developed and implemented in future. Moreover training targeted in injury prevention can help minimize incidences of rugby injuries and clubs should recruit physiotherapists as they can help manage the mild and moderate injuries reported among the clubs.

#### **6.4 RECOMMENDATIONS**

The following recommendation were made to the rugby governing body, players, team coaches, managers and medical practitioners based on the findings of this study.

- The teams in the KRFU League should be encouraged to conduct sports injury surveillance programmes as this will assist with the development of appropriate sports injury preventive programmes.
- There is a need to translate of the latest scientific evidence about effective injury prevention into coaching practices, and this should be brought under the attention of team management. These include pre-season training, correct duration of warm-up/cool-down activities, stretching, flexibility and strength training, adherence to the rules of the game, and the consistent use of protective equipment.
- Pre-season training, warm-up and cool-down activities should be under the supervision of adequately trained coaches and medical personnel.

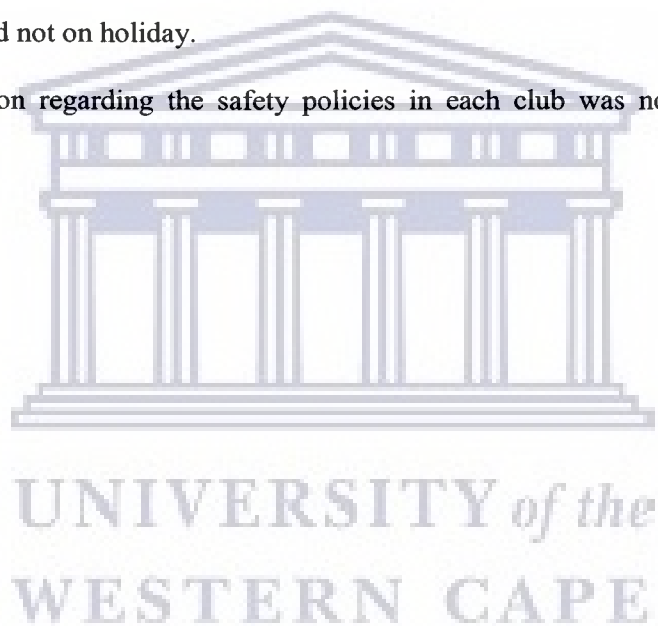
- Players should receive adequate rehabilitation of injuries and should not return to sport prematurely.
- Workshops, seminars, first aid and training courses specifically targeting injury prevention should be encouraged for coaches, referees and assistants, team medical practitioners and sports trainers regarding injury prevention strategies.
- Coaches, team medical practitioners and sports trainers' qualification and accreditation should always be checked by clubs and the union before their recruitment/employment.
- Written sports safety policies and practices should be developed by governing bodies especially KRFU and made available to all rugby clubs and monitor the implementation and maintenance of these policies.
- All teams should ensure that first aiders, access to telephones and ambulances are available at all matches and training.
- Rugby clubs should complete a ground safety checklist during training and match days to check the playing surface conditions (Otago et al., 2007).

## 6.5 LIMITATION OF THE STUDY

The results of the study should be interpreted in the light of the following limitations:

- The study was conducted among the seven clubs in the first division league therefore the study findings should be interpreted carefully to avoid unnecessary generalization to all rugby clubs in Kenya. However, given the context of the rugby clubs that participated in this study, being from the main Kenya Rugby Union League which represent the region with the highest rugby sporting activities in Kenya, therefore the findings of this study are likely to reflect the actual picture of the majority of rugby clubs in Kenya and therefore the study findings can be generalized to a certain extent.

- The injuries and information was self-reported and the accuracy cannot be completely guaranteed.
- Construct validity of the study instruments would have added value and rigour to the instruments if they were conducted.
- Being a retrospective study, there is a possibility of recall bias in reporting the prevalence of injuries.
- A higher response rate could have been achieved if the data was collected when all teams were in training and not on holiday.
- Detailed information regarding the safety policies in each club was not followed up or investigated.





## REFERENCES

- ACC-Sport Smart (2009). ACC-Sport Smart: Educational Resource. Retrieved on 2<sup>nd</sup> April 2012 at 12pm <http://www.acc.co.nz/sportsmart>
- Addley, K., & Farren, J. (1988). Irish Rugby Injury Survey: Dungannon Football Club (1986–87). *British Journal Sports Medicine*, 22, 22–24.
- Amako M, Oda T, Masuoka, K., et al., (2003). Effect of static stretching on prevention of injuries for military recruits. *Military Medicine*, 168 (6): 442-446.
- American College of Sports Medicine, (1998). The recommended quantity and quality of exercise for developing and maintaining cardiorespiratory and muscular fitness and flexibility in healthy adults. *Medicine and Science in Sports and Exercise*, 30, 975–991.
- American Dietetic Association, Dieticians of Canada and American College of Sports Medicine (2000). Position of American Dietetic Association, Dieticians of Canada and American College of Sports Medicine. Nutrition and Athletic. *Journal of American Dieticians Association*, 100 (12), 1543-1553.
- Askling, C., Karlsson, J., & Thorstensson, A. (2003). Hamstring injury occurrence in elite soccer players after preseason strength training with eccentric overload. *Scandinavian Journal of Medicine and Science in Sports*, 13, 244-250.
- Arendt, E., & Dick, R. (1995). Knee injury patterns among men and women in collegiate basketball and soccer. NCAA data and review of literature. *American Journal of Sports Medicine*, 23, 694–701.
- Arnheim, D. D., & Prentice, W. E. (1993). *Principles of athletic training*. (8th Ed.), Mosby-Year book, St. Louis, Missouri. pp. 246-267.

- Bahr, R., & Bahr, I. A. (1997). Incidence of acute volleyball injuries: A prospective cohort study of injury mechanisms and risk factors. *Scandinavian Journal of Medicine & Science in Sports*, 7, 166–171.
- Bahr, R., & Holme, I. (2003). Risk factors for sports injuries - a methodological approach. *British Journal of Sports Medicine*, 37, 384-392.
- Bahr, R., Lian, O., & Bahr, I. A. (1997). A two fold reduction in the incidence of acute ankle sprains in volleyball after the introduction of an injury prevention program: A prospective cohort study. *Scandinavian Journal of Medicine & Science in Sports*, 7, 172–177.
- Bandy, W. D., Irion, J. M., & Briggler, M. (1998). The effect of static stretch and dynamic range of motion training on the flexibility of the hamstring muscles. *Physical Therapy*, 27, 295–300.
- Barbic, D., Pater, J., & Brison, R. J. (2005). Comparison of mouth guard designs and concussion prevention in contact sports: a multicentre randomized controlled trial. *Clinical Journal of Sports Medicine*, 15 (5), 294-298.
- Barker, H. B., Beynnon, B. D., Renstroöm, A. F. H. (1997). Ankle injury risk factors in sports. *Sports Medicine*, 23, 69–74.
- Bathgate, A., Craig, G., Jamieson, M., Wiley, J. P., & Best, J. P. (2002). A prospective study of injuries to elite Australian rugby union players. *British Journal of Sports Medicine*, 36 (2), 265-269.
- Bergeron, D.J., & Greene, H.W. (1989). Coaches guide to sports injuries. Human Kinetics, Champaign. USA.
- Bird, Y. N., Waller, A. E., Marshall, S. W., et al., (1998). The New Zealand rugby injury and performance project. V. Epidemiology of a season of rugby injury. *British Journal of Sports Medicine*, 32, 319–325.

- Bishop, D. (2008). An applied research model for the sport sciences. *Sports Medicine*, 38, 253–263.
- Bishop, D. (2003). Performance changes following active warm up and how to structure the warm up. *Sports Medicine*, 33 (7), 483-498
- BokSmart, (2012). The BokSmart National Rugby Safety Program. Retrieved on 13<sup>th</sup> April 2012 at 1pm from <http://www.sarugby.co.za/boksmart/default.aspx>
- Bottini, E., Pottini, E. T., Luzuriaga, F., & Secin, F. P. (2000). Incidence and nature of the most common rugby injuries sustained in Argentina(1991-1997). *British Journal of Sports Medicine*, 34, 94-97.
- Brewer, J., & Davis, J. (1995). Applied physiology of rugby league. *Sports Medicine*, 20 (3), 139-135.
- Brooks, J. H., & Kemp, S. P. (2008). Recent trends in rugby union injuries. *Clinical Sport Medicine*, 27, 57-73.
- Brooks, J. H. M., Fuller, C. W., Kemp, S. P. T., & Reddin, D. B. (2006). Incidence, Risk, and Prevention of Hamstring Muscle Injuries in Professional Rugby Union. *The American Journal of Sports Medicine*, 34 (8), 1297-1306.
- Brooks, J. H. M., Fuller, C. W., Kemp, S. P. T., & Reddin, D. B. (2005a). Epidemiology of injuries in English professional rugby union, part 1: match injuries. *British Journal of Sports Medicine*, 39, 757-766.
- Brooks, J. H. M., Fuller, C. W., Kemp, S. P. T., & Reddin, D. B. (2005b). Epidemiology of injuries in English professional rugby union, part 2: training injuries. *British Journal of Sports Medicine*, 39, 767-775.
- Brotherhood, J. R. (1984). Nutrition and Sports Performance. *Sports Medicine*. 1 (5), 350-389.

- Brown, J. C., Verhagen, E., Viljoen, W., Readhead, C., Van Mechelen, M., Hendricks, S., & Lambert, M.I. (2012). The incidence and severity of injuries at the 2011 South African Rugby Union (SARU) Youth Week tournaments. *South African Journal of Sports Medicine*, 24(2), ISSN: 1015-5163.
- Brukner, P., & Khan, K. (2003). *Clinical sports medicine*. (2<sup>nd</sup> edition) Sydney, McGraw-Hill. pp. 372-391.
- Brukner, P., & Khan, K. (2011). *Clinical sports medicine*. (Revised 3<sup>rd</sup> edition) Sydney, McGraw-Hill. pp. 78-101.
- Burkett, L. N. (1975). Investigation into hamstring strains: The case of the hybrid muscle. *Journal of Sports Medicine*, 3, 228–231.
- Butt, C. K. (2008). An investigation into knowledge and perception of rugby coaches in the greater Durban area with regard to Chiropractic and other sports medical personnel. Unpublished thesis, Durban university of Technology.
- Callaghan, M. J. (1997). Role of ankle taping and bracing in the athlete. *British Journal of Sports Medicine*, 31, 102–108.
- Campbell, H. and O’Driscoll, S. (1995). Rugby injuries. *The Lancet*, 346, 188-189.
- Caraffa, A., Gerulli, G., Projetti M, et al., (1996). Prevention of anterior cruciate ligament injuries in soccer: A prospective study of proprioceptive training. *Knee Surgery, Sports Traumatology, Arthroscopy*, 4, 19–21.
- Carter, A. F., & Muller, R. (2008). A survey of injury knowledge and technical needs of junior Rugby Union coaches in Townsville (North Queensland). *Journal of science and Medicine in Sports*, 11 (2), 167-173.

- Casey, M., Finch, C. F., Mahoney, M., & Townsend, M. (2004). Sport safety policies and practises in two rural Victorian communities. *Journal of Science and Medicine in Sport*, 7 (2), 226-231.
- Chalmers, D. J., Simpson, J. C., & Depree, R. (2004). Tackling Rugby Injury: Lessons learned from the implementation of five-year sports injury prevention program. *Journal of Science and Medicine in Sport*, 7 (1), 74-84.
- Chalmers, D. J. (2002). Injury prevention in sport: not yet part of the game? *Injury Prevention*, 8 (4), 22-25.
- Chalmers, D.J. (1998). Mouth guards: Protection for the Mouth in Rugby Union. *Sports Medicine*, 25 (5), 339-349.
- Chapman, P.J. (1985). Orofacial injuries and the use of mouth guards by the 1984 Great Britain Rugby League touring team. *British Journal of Sports Medicine*, 19, 34-36.
- Chomiak, J., Junge, A., Peterson, L., & Drovak, J. (2000). Severe injuries in football players: Influencing factors. *American Journal of Sports Medicine*, 28 (5), 58-68.
- Christensen, C., Wiseman, D. (1972). Strength, the common variable in hamstring strains. *Athletic Training*, 7, 36-40.
- Clarke, J. (1990). An Analysis of the Health Status of Rural People, In T. Cullen, *Rural Health and Welfare in Australia*. Centre for Rural Welfare research, Charles Stuart University, Riverina: Wagga Wagga.
- Clark, D. R., Roux, C., & Noakes, T. D. (1990). A prospective study of the incidence and nature of injuries to adult rugby players. *South African Medical Journal*, 77, 559-562.

- Colombani, P. C., & Mannhart, C. (2000). Nutritional in sports. *Ther Umsch Journal*, 57 (3), 110-120.
- Comstock, R. D., Fields, S. K., & Knox, C. L. (2005). Protective equipment use among female rugby players. *Clinical Journal of Sports Medicine*, 15 (4), 241-245.
- Croisier J. L., Forthomme, B., Namurois, M. H., Vanderthommen, M., & Crielaard, J. M. (2002). Hamstring muscle strain recurrence and strength performance disorders. *American Journal Sports Medicine*, 30, 199-203.
- Dadebo, B., White, J., & George, K. P. (2004). A survey of flexibility training protocols and hamstring strains in professional football clubs in England. *British Journal Sports Medicine*, 38, 388-394.
- David, M., & DeHaven, M. D. (1986). Athletic Injuries: Comparison by age, sport & gender. *American Journal of Sports Medicine*, 14 (3), 218-224.
- Davis, M. F., & Davis, P. F. (2005). *Nutrition and sports*. Expert Guide to Sports Medicine. ACP Press, USA, pp19-28.
- de Loes, M., Dahlstedt, R., & Thomee, R. (2000). A 7-year study on risks and costs of knee injuries in male and female youth participants in 12 sports. *Scandinavian Journal of Medicine & Science in Sports*, 10, 90-97
- Dirx, M., Bouter, L. M., & De Geus, G. H. (1992). Aetiology of handball injuries: A case-control study. *British Journal of Sports Medicine*, 26: 121-124, 1992
- Donaldson, A., Forero, R., Finch, C. F., & Hill, T. (2004). A comparison of the sports safety policies and practices of community sports club during training and competition in Northern Sydney, Australia. *British Journal of Sports Medicine*, 38, 60-63.

Donaldson, A., Hill, T., Finch, C. F., & Forero, R. (2003). The development of a tool to audit the safety policies and practices of community sports clubs. *Journal of Science and Medicine in Sport*, 6(2), 226-230.

Donaldson, A., & Hill, T. (2002). The sports safety policies and practises of community soccer clubs: on the northern beaches and in the Hornsby-Ryde-Ring-Gai region of Northern Sydney. Sydney.

Doyle B (2000). Legal Implications for coaching. *The Sport Educator*, 12(2), 40–43.

Dunn, N. R., & Spuy, D. V. (2010). Rugby and cervical spine injuries-has anything changed? A 5-year review in the western cape. *South African Medical Journal*, 100 (4).

Dvorak, J., & Junge, A. (2000). Football injuries and physical symptoms. A review of the literature. *American Journal of Sports Medicine*, 28(1), 3–9.

Drovak, J., Junge, A., Chomiak, J., Graf-Baumann, T., Peterson, L., Rosch, D., & Hogdson, R. (2000). Risk Factor Analysis for Injuries in Football Players: Possibilities for a Prevention Program. *American Journal of Sports Medicine*, 28 (5), 69-74.

Edgar M. (1995). Tackling rugby injuries. *Lancet*, 343, 1452-1453.

Ekstrand, J., Gillquist, J., Moller, M, et al., (1993). Incidence of soccer injuries and their relation to training and team success. *American Journal of Sports Medicine*, 11, 63–67

Ekstrand, J., & Gillquist, J. (1984). Prevention of sport injuries in football players. *International Journal of Sports Medicine*, 5(1), 140-144.

Ekstrand, J., & Gillquist, J. (1983). The avoidability of soccer injuries. *International Journal of Sports Medicine*, 4, 124-128.

- Ekstrand, J., Gillquist, J., & Liljedahl, S. O. (1983). Prevention of soccer injuries: Supervision by doctor or physiotherapist. *American Journal of Sports Medicine*, 11, 116–120.
- Estell, J., Shenstone B., & Barnsley L. (1995). Frequency of injuries in different age-groups in an elite rugby league club. *Australian Journal of Science and Medicine in Sport*, 27, 95–97.
- Faugenbaum, A. D., Belluci, M., Barnieri, A., Bakker, B., Hoorans, K. (2005). Acute effects of different warm up protocols on fitness performance in children. *Journal of Strength & Conditioning Research*, 19 (2), 376-381.
- F-MARC, (2009). FOOTBALL FOR HEALTH 15 years of F-MARC Research and Education 1994-1999. FIFA, Zurich Switzerland.
- Finch, C. F. (2011). No longer lost in translation: the art and science of sports injury prevention implementation research. *British Journal of Sports Medicine* doi: 10.1136/bjsports-2011-090230
- Finch, C. F., & Donaldson, A. (2009). A sports setting matrix for understanding the implementation context for community sport. *British Journal of Sports Medicine*. Published Online First: 21 January 2009. Doi: 10.1136/bjism.2008.055798.
- Finch, C. (2006). A new framework for research leading to sports injury prevention. *Journal of Science in Medicine Sport*, 9, 3-9.
- Finch, C., & Hannessy, M. (2000). The safety practices of sporting clubs/centres in the city of Hume. *Journal of Science and Medicine in Sport*, 3 (1), 9-16.
- Finch, C., & McGrath, A. (1997). *Sport Safety Australia: a national sports safety framework. A report prepared for the Australian Sports Injury Prevention Taskforce*. Government report. Canberra: Australian Sports Commission.



- Fletcher, Iain, M., Jones & Bethan, (2004). The effect of different warm up protocols on 20 Meter sprint performance in trained rugby union players. *Journal of Strength & Conditioning Research*, 18 (4) 885-888.
- Fuller, C. W., Brooks, J. H., Cancea R. J., Hall, J., & Kemp, S. P.(2007). Contact events in rugby union and their propensity to cause injury. *British Journal of Sports Medicine*, 41, 862-867.
- Fuller, C. W., Ekstrand, J., Junge, A., Anderson, T.E., Bahr, R., Drovak, J., Hagglund, M., McCrory, P., & Meeuwisse, W. H. (2006). Consensus statement on injury definitions and data collection procedures in studies of football (soccer) injuries. *Scandinavian Journal of Medicine & Science in Sports*, 16 (2), 83-92.
- Gabbett, T. J., & Domrow, N. (2007). Relationships between training load, injury, and fitness in sub-elite collision sport athletes. *Journal of Sports Science*, 25 (13), 1507-1519.
- Gabbett, T. J. (2004a). Incidence of injury in junior and senior rugby league players. *Sports Medicine*, 34(12), 849-859.
- Gabbett, T. J. (2004b). Influence of training and match intensity on injuries in Rugby league. *Journal of Sports Sciences*, 22 (5), 409-417.
- Gabbett T. J. (2003) Incidence of injury in semi-professional rugby league players. *British Journal of Sports Medicine*, 37, 36-44.
- Gabbett, T. J. (2002): Influence of physiological characteristics on selection in a semiprofessional first grade rugby league team: a case study. *Journal of Sports Sciences*, 20 (5), 399-405
- Gabbett T. J. (2001). Severity and cost of injuries in amateur rugby league: A case study. *Journal of Sports Sciences*, 19 (5), 341-347.
- Gabbett, T. J. (2000a). Incidence, site, and nature of injuries in amateur rugby league over three consecutive seasons. *British Journal of Sports Medicine*, 34, 98-103.

- Gabbett, T.J. (2000b). Physiological and anthropometric characteristics of amateur rugby league players. *British Journal of Sports Medicine*, 34, 303-307.
- Gardiner, D. M., & Ranalli, D. N. (2000). Attitudinal factors influencing mouth guard utilization. *Dental Clinics of North America*, 44 (1), 53-65.
- Garraway, W., Michael, Lee, A. J., & Hutton, S. J. (2000). Impact of professionalism on injuries in rugby union. *British Journal of Sports Medicine*, 34 (5), 348-351.
- Garraway, W. M., Lee, A. J., Macleod, D. A. D., et al. (1999). Factors influencing tackle injuries in rugby union football. *British Journal of Sports Medicine*, 33, 37-41.
- Garraway, M., & Macleod, D. (1995). Epidemiology of rugby football injuries. *The Lancet*, 345, 1485-1487.
- Garrett, W. E. J., Safran, M. R., Seaber, A. V., et al., (1987). Biomechanical comparison of stimulated and non-stimulated skeletal muscle pulled to failure. *American Journal of Sports Medicine*, 15, 448-454.
- Gerrard, D.F., Waller, A.E., & Bird, Y.N. (1994). The New Zealand Rugby Injury and Performance Project II: Previous injury experience of a rugby playing cohort. *British Journal of Sports Medicine*, 28(4), 229-233.
- Gianotti, S., Hume, P. A., & Tunstall, H. (2010). Efficacy of injury prevention related coach education within netball and soccer. *Journal of Science & Medicine in Sport*, 13, 32-35.
- Gibbs, N. (1994). Common rugby league injuries: Recommendations for treatment and preventative measures. *Sports Medicine*, 18, 438-450.

- Glasgow, R. E., Vogt, T. M., & Boles, S. M. (1999). Evaluating the public health impact of health promotion interventions: the RE-AIM framework. *American Journal of Public Health, 89*, 1322–1327.
- Glick, J. M., Gordon, R. B., Nishimoto, D. (1976). The prevention and treatment of ankle injuries. *American Journal of Sports Medicine, 4*, 136–141.
- Goga, I. E., & Gongal, P. (2003). Severe Soccer Injuries in amateurs. *British Journal of Sports Medicine, 37*, 498-501.
- Goodstadt, M. (2001). Settings, Introduction. In I. Rootman (Ed.), *Evaluation in Health Promotion: Principles and Perspectives* (p. 209). Copenhagen, Denmark: WHO Regional Office, European Series.
- Green, L. W., Poland, B. D., & Rootman, I. (2000). The settings approach to health promotion. In B. D. Poland, L. W. Green, & I. Rootman (Eds.), *Settings for Health Promotion: Linking Theory and Practice* (pp. 1-36). Thousand Oaks, California: Sage.
- Hackney, R.G. (1994). ABC of Sports Medicine Nature, Prevention and Management of injury in sport. *British Medical Journal, 308*, 1356.
- Hawkins, R. D., & Fuller, C. W. (1999). A prospective epidemiological study of injuries in four English professional football clubs. *British Journal of Sports Medicine, 33*, 196–203
- Hawkins, R. D., & Fuller, C. W. (1998). A preliminary assessment of professional footballers' awareness of injury prevention strategies. *British Journal of Sports Medicine, 32* (4), 140-143.

- Headey, J., Oxon, M. A., Brooks, J. H. M., & Kemp, S. P. T. (2007). The epidemiology of shoulder injuries in English Professional Rugby Union. *American Journal of Sports Medicine*, 35 (9), 1537-1543.
- Heiser, T. M., Weber, J., Sullivan, G., Clare, P., & Jacobs, R. R. (1984). Prophylaxis and management of hamstring muscle injuries in intercollegiate football players. *American Journal of Sports Medicine*, 12, 368-370.
- Hendricks, S., & Lambert, M. (1999). Tackling in rugby: Coaching strategies for effective technique and injury prevention. *International Journal of Sports Science and Coaching*, 5 (1), 117-136.
- Hergenroeder, A. C. (1998). Prevention of sports injuries. *Paediatrics*, 101, 1057–1063.
- History of Rugby in Kenya retrieved from <http://kenyapage.net/rugby/rugby-hist.html> on Weans day 23 Feb 2011 at 2pm.
- Hopkins, N., & Viljoen, W. (2008). Boksmart: Preventive rehabilitation for rugby injuries to the lower back and core. *South African Journal of Sports Medicine*, 20(4).
- Hopkins, W. G. (1998). Quantitative Research design. Retrieved at 10am 11<sup>th</sup> April 2012 from <http://www.sportsci.org/resource/design/design.html>
- Hughes, D. C., & Fricker, P. A. (1994). A prospective survey of injuries to first-grade rugby union players. *Clinical Journal of Sports Medicine*, 4, 249-256.
- Hume, P. A., & Gerrard, D. F. (1998). Effectiveness of external ankle support: Bracing and taping in rugby union. *Sports Medicine*, 25 (5), 285-312.

- Injury Research, (2012). Rugby injuries. Retrieved on 3<sup>rd</sup> April 2012 at 11am from  
<http://www.injuryresearch.bc.ca/publications/fact%20sheets/rugby%20fact%20sheet.pdf>
- International Rugby Board, (2008). *Playing Charter and Laws of the Game- Rugby Union*. Dublin.
- Jakarta Declaration, (1997). Leading Health Promotion into the 21st Century: adopted at the Fourth International Conference on Health Promotion, Jakarta, Indonesia.
- Jakoet, S., & Noakes, T. D. (1997). A high rate of injury during the 1995 Rugby World Cup. *South African Medical Journal*, 87, 45-47.
- Jones, S. J., Lyons, R. A., Evans, R., Newcombe, R.G., Nash, P., McCabe, M. & Palmer, S. R. (2004). Effectiveness of rugby headgear in preventing soft tissue injuries to the head: a case-control and video cohort study. *British Journal of Sports Medicine*, 38 (2), 159-162.
- Junge, A., Langeroot, G., & Pipe, A. et al., (2006). Injuries in team sport tournaments during the 2004 Olympic Games. *American Journal of Sports Medicine*. 34, 565-576.
- Junge, A., Cheung, K., Edwards, T., & Drovak, J. (2004). Injuries in youth amateur soccer and rugby players-comparison of incidence and characteristics. *British Journal of Sports Medicine*, 38 (2), 168-172.
- Junge, A., & Dvorac, J. (2004). Soccer injuries – A review on the incidence and prevention. *Sports Medicine*, 34(13), 929-938.
- Junge, A., & Dvorak, J. (2000). Influence of definition and data collection on the incidence of injuries in football. *American Journal of Sports Medicine*, 28, 40–46.
- Larsen, E., Jensen, P. K., & Jensen, P. R. (1999). Long term outcome of knee and ankle injuries in elite football. *Scandinavian Journal of Medicine and Science in Sports*, 9, 285-289.

- Lee, A. J., & Garraway, W. M. (2000). The influence of environmental factors on rugby football injuries. *Journal of Sports Science*, 18(2), 91–95.
- Lee, A. J., Myers, J. L., & Garraway, W. M. (1997). Influence of players' physique on rugby football injuries *British Journal of Sports Medicine*, 31, 135-138.
- Lee, A. J., & Garraway, W. M. (1996). Epidemiological comparison of injuries in school and senior club rugby. *British Journal of Sports Medicine*, 30, 213–217.
- Linderberg, H., Roos, H., & Gardsell, P. (1993). Prevalence of coarthritis in former soccer players: 286 players compared with matched controls. *Acta Orthopaedic Scandinavian*, 64, 165-167.
- Looney, M. A., & McAllister, B. P. (1989). Is critical analysis of sports medicine research necessary? *Athletic Training*, 24, 333–336.
- Lovell, R. J., Kirke, I., Siegler, J., McNaughton, L. R., & Greig, M. P. (2007). Soccer half time strategy influences thermoregulation and endurance performance. *Journal of Sports Medicine and Physical Fitness*, 47 (3), 263-269.
- Lüthje, P., Nurmi, I., Kataja, M., Belt, E., Helenius, P., & Kaukonen, J.P., et al. (1996). Epidemiology and traumatology of injuries in elite soccer: a prospective study in Finland. *Scandinavian Journal of Medicine and Science in Sports*, 6, 180-185.
- Kahanov, L., Dusa, M. J., Wilkinson, S., & Roberts, J. (2005). Self-reported headgear use and concussions among collegiate men's rugby union players. *Research in Sports Medicine*, 13 (2), 77-89.
- Kaplan, K. M., Goodwillie, A., Strauss, E. J., & Rosen, J. E., (2008) Rugby Injuries: A Review of Concepts and Current Literature. *Bulletin of the New York University Hospital for Joint Diseases*, 66(2), 86-93

- Klügl, M., Shrier, I., McBain, K., Shultz, R., Meeuwisse, W. H., Garza, D & Matheson, G. O. (2010). The Prevention of Sport Injury: An Analysis of 12 000 Published Manuscripts. *Clinical Journal of Sport Medicine*, 20 (6), 407-412
- Kirkendall, D.T., Garrett, W. E. J. (1998). The effects of aging and training on skeletal muscle. *American Journal of Sports Medicine*, 26, 598–602.
- Kiwanuka, S. L. (2011). Incidence and prevalence of injuries among rugby players during a rugby tournament. Unpublished master's thesis, University of the Western Cape
- Knapik, J. J., Marshall, S. W., Lee, R. B., Darakjy, S. S., Jones, S. B. Mitchener, T. A., Delacruz, G. G. & Jones, B. H. (2007). Mouth guards in sport activities: history, physical properties and injury prevention effectiveness. *Sports Medicine*, 37 (2), 117-144.
- Kreighbaum, E., Barthels, K. M. (1996). Biomechanics: a qualitative approach for studying human movement. (4<sup>th</sup> Ed). Boston (MA), Allyn and Bacon.
- Kujala, U. M., Orava, S., & Jarvinen, M. (1997). Hamstring injuries: current trends in treatment and prevention. *Sports Medicine*, 23, 397-404.
- Kujala, U.M., Kaprin, J., & Sarna, S. (1994). Osteoarthritis of weight bearing joints of lower limbs in former elite male athletes. *British Medical Journal*, 308, 231-234.
- MacQueen, A. E., & Dexter, W. W. (2010). Injury trends and prevention in rugby union football. *Current Sports Medicine Reports*, 9 (3), 139-143.
- Mahaffey, J., Owen, J., Owen, L., Van Schalkwyk, D., Theron, N., & Joubert, G. (2006). Epidemiology of rugby injuries sustained by Free State University hostel-league players during the 2003 rugby season. *South African Family Practice Journal*, 48 (8), 17a-17d.

Maps of the world (2011) retrieved from <http://www.mapsofworld.com/cities/kenya/nairobi/> on 25<sup>th</sup> April 2011.

Marshall, S. W., Waller, A. E., Loomis, D. P., Feehan, M., Chalmers, D. J., Bird, Y. N., & Quarrie, K. L. (2001). Use of protective equipment in a cohort of rugby players. *Medicine & Science in Sports & Exercise*, (12), 2131-2138.

McArdle, W.D., Katch, F.I., & Katch, V.L. (2006). *Exercise Physiology: Energy, Nutrition, and Human Performance*. (6<sup>th</sup>ed) L.W. & Wilkins. Philadelphia.

McCrea, M., Hammeke, T., Olsen, Garry, M. S. Leo, Peter, B. S., Guskiewicz & Kevin, A. T. C. (2004). Unreported concussion in high school football players: Implications for prevention. *Clinical Journal of Sports Medicine*, 14 (1), 13-17.

McManus, A., Stevenson, M., Finch, C. F., Elliott, B., Hamer, P., Lower, A., & Bulsara, M. (2004). Incidence and risk factors for injury in non-elite Australian Football. *Journal of Science and Medicine in Sport*, 7 (3), 384-391

McManus, A., & Cross, D. S. (2004). Incidence of injury in elite junior Rugby Union: A prospective descriptive study. *Journal of Science Medicine in Sport*, 7(4), 438-445.

McNitt, A., Waddington, D., & Middour, R. (1997). *Traction Measurement on Natural Turf*. West Conshohocken, PA: American Society for Testing and Materials.

MCpoil, G. T. (2000). Athletic footwear: design, performance and selection issues. *Journal of Science and Medicine in Sport*, 3 (3), 260-267.

MCpoil, G. T. Jr. (1988). Footwear. *Physical Therapy Journal of the American Physical Therapy Association*, 68 (12), 1857-1865.

Mickel, T. J., Bottoni, C. R., Tsuji, G., Chang, K., Baum, L., & Tokushige, K. A. (2006). Prophylactic bracing versus taping for the prevention of ankle sprains in high school



- athletes: a prospective, randomized trial. *Journal of Foot and Ankle Surgery*, 45 (6), 360-365.
- Milburn, P. D., & Barry, E. B. (1998). Shoe surface interactions and the reduction of injury in Rugby Union. *Sports Medicine*, 25 (5), 319-327.
- Mittelmark, M. (2008). Shaping the future of health promotion: priorities for actions. *Promotion and Education*, 23, 98-102.
- Mjølunes, R., Arnason, A., Ostagen, T., Raastad, T., & Bahr, R. A. (2004). 10-week randomized trial comparing eccentric vs. concentric hamstring strength training in well-trained soccer players. *Scandinavian Journal of Medicine and Science in Sports*, 14, 311-317.
- Murphy, D. F., Connolly, D. A. J., & Beynonn, B. D. (2003). Risk factors for lower extremity injury: A review of the literature. *British Journal of Sports Medicine*, 37 (1), 13-29.
- Myklebust, G, Bahr, R. (2005) Return to play guidelines after anterior cruciate ligament surgery. *British Journal of Sports Medicine*, 39, 127–131.
- Myklebust, G., Maehlum, S., Holm, I., & Bahr, R. (1998). A prospective cohort study of anterior cruciate ligament injuries in elite Norwegian team handball. *Scandinavian Journal of Medicine & Science in Sports*, 8(3), 149–153.
- Naidoo, J., & Wills, J. (1998). Targeting Health Promotion. In *Practising Health Promotion: Dilemmas and Challenges* (pp. 92-111). London: Baillière Tindall.
- National Health and Medical Research Council, (1994). *Football injuries of the head and neck*. Canberra: Australian Government Publishing Service.
- New South Wales, (1999). *Guidelines for safe conduct of sport and physical activity in schools*.
- Retrieved on 29 August 2012 at 11pm from

[https://www.det.nsw.edu.au/policies/student\\_serv/student\\_welfare/safe\\_sport/pd02\\_12\\_safe\\_sport.pdf](https://www.det.nsw.edu.au/policies/student_serv/student_welfare/safe_sport/pd02_12_safe_sport.pdf)

- Nicholl, J. P, Coleman, P., & Williams, B.T. (1995). The epidemiology of sports and exercise related injury in the United Kingdom. *British Journal of Sports Medicine*, 29(4), 232-238.
- Noakes, T. D., Jakoet, I., & Baalbergen, E. (1999). An apparent reduction in the incidence and severity of spinal cord injuries in schoolboy rugby players in the Western Cape since 1990. *South African Medical Journal*, 89, 540-545.
- Olds, T. (2001). The evolution of physique in male rugby union players in the twentieth century. *Journal of Sports Sciences*, 19, 253-262.
- Olsen, O. E., Myklebust, G., & Bahr, R. (2003). Effect of floor type on injury risk in team handball. *Scandinavian Journal of Medicine and Science in Sports*, 13 (5), 299-304.
- Oluwatoyosi, B. A & Owwoeye, O. (2010). Pattern and Management of Sports injuries presented by Lagos state athletes at the 16th National Sports Festival (KADA games 2009) in Nigeria. *Sports Medicine Arthroscopic Rehabilitation Therapy Technology*, 2 (3).
- Orchard, J. W., Chivers, I., Aldous, D., Bennell, K., & Seward, H. (2005). Rye grass is associated with fewer non-contact anterior cruciate ligament injuries than Bermuda grass. *British Journal of Sports Medicine*, 39 (10), 704-709.
- Orchard, J. (2002). Is there a relationship between ground hardness and climatic conditions and injuries in football? *Sports Medicine*, 32 (7), 419-432.
- Orchard, J., James, T., Alcott, E. et al., (2002). Injuries in Australian cricket at first class level 1995/1996 to 2000/2001. *British Journal of Sports Medicine*, 36, 270-274.
- Orchard, J.W. (2001). Intrinsic and Extrinsic Risk factors for muscle strains in Australian Football. *The American Journal of sports Medicine*, 29 (3), 300-303.

- Orchard, J., Marsden, J., Lord, S. et al., (1997). Preseason hamstring muscle weakness associated with hamstring muscle injury in Australian footballers. *American Journal Sports Medicine*, 25, 81–85.
- Orchard, J. (1995). Orchard Sports Injury Classification System (OSICS). *Sports Health*, 11, 39-41.
- Otago, L., Swan, P., Chivers, I., Finch, C., Payne, W., & Orchard, J. (2007). Ground conditions and injury risk—implications for sports grounds assessment practices in Victoria. School of Human Movement and Sport Sciences, University of Ballarat
- Ottawa Charter, (1986). Ottawa Charter for Health Promotion: *First International Conference on Health promotion*, Ottawa. Retrieved on 22<sup>nd</sup> June at 2pm from [http://www.who.int/hpr/NPH/docs/ottawa\\_charter\\_hp.pdf](http://www.who.int/hpr/NPH/docs/ottawa_charter_hp.pdf)
- Parkari, J., Kujala, U.M., & Kannus, P. (2001). Is it possible to prevent sports injuries? Review of controlled trials and recommendations for future work. *Sports Medicine*, 31(14), 985-995.
- Pettersen, J. A., (2002). Does rugby headgear prevent concussion? Attitudes of Canadian players and coaches. *British Journal of Sports Medicine*, 36, 19-22.
- Pharaoh, H. & Assuman, N. (2011). Factors influencing the implementation of soccer injury prevention strategies in Rwanda. *African Journal of Physical Health education, Recreation and Dance*, 17(1), 96-102
- Potts, G. (1998). A model for preventing rugby union and league injuries with New Zealand. In Safety Science Monitor. *Sports and Exercise*, 3 (4).
- Powell, J.W. (1987). Incidence of injury associated with playing surfaces in the National Football League 1980-1985. *Athletic Training*, 22, 202-211.

- Proske, U., Morgan, D. L., Brockett, C. L., & Percival, P. (2004). Identifying athletes at risk of hamstring strains and how to protect them. *Clinical Explained Pharmacology Physiology*, 31, 546-550.
- Quarrie, L.K., Gianotti, M.S., Hopkins, G.W., & Hume, P.A. (2007). Effect of nationwide injury prevention program on serious spinal injuries in New Zealand rugby union: ecology study. *British Medical Journal*, 34, 1150.
- Quarrie, K. C., Cantu, R. C., & Chalmers, D. J. (2002). Rugby union injuries to the cervical spine and spinal cord. *Sports medicine*, 32 (10), 633-653.
- Rifat, S. F., McKeag, D. B. (1996). Practical methods of preventing ankle injuries. *American Family Physician*, 53, 2491-2498, 2501-2503.
- Roe, B., & Doll, H. (1995). Information point: Prevalence and Incidence. *Journal of clinical Nursing*, 9, 178-188
- Romiti, M., Finch, C. F., & Gabbe, B. (2008). A prospective cohort study of the incidence of injuries among junior Australian football players: evidence for an effect of playing-age level. *British Journal of Sports Medicine*, 42, 441-446.
- Roos, H. (1998). Are there long term sequelae from soccer? *Clinical Sports Medicine*, 17, 819-831
- Roux, C. E., Goedeke, R., Visser, G. R., et al., (1987). The epidemiology of schoolboy rugby injuries. *South African Medical Journal*, 71, 307-313.
- Rugby Football History, (2012). Retrieved from [http://www.rugbyfootballhistory.com/south\\_africa.html](http://www.rugbyfootballhistory.com/south_africa.html) on 15th August 2012 at 10pm
- Rugby injury Statistics, (2011). Retrieved on September 3<sup>rd</sup> 2011 at 12pm from [http://osteopathywales.com/index.php?option=com\\_content&view=article&id=106:rugby-injury-statistics&catid=23:sport-and-sports-injuries](http://osteopathywales.com/index.php?option=com_content&view=article&id=106:rugby-injury-statistics&catid=23:sport-and-sports-injuries)

- Safran, M. R., Seaber, A. V., & Garrett, W. E. (1989). Warm-up and muscular injury prevention: an update. *Sports Medicine*, 8, 239-249.
- Sallis, R. E. (1996). *Essentials of Sports Medicine*. Mosby-yearbook, Philadelphia.
- Sarantakos, S. (2005). Principles of social research. In *Social research*. (2<sup>nd</sup>ed.) Palgrave Macmillan.
- Saunders, N. (2006). Characteristics of the female landing pattern. PhD Thesis, University of Ballarat, Ballarat.
- Saunders, N., Otago, L., Romiti, M., Donaldson, A., White, P., & Finch, C.F. (2010). Coaches' perspectives on implementing evidence-informed injury programme in junior community netball. *British Journal of Sports Medicine*, 44, 1128-1132.
- Sefton, J.M. (2003). An examination of factors that influence knowledge of and reporting of head injuries in college football. Unpublished Master's Thesis. Central Connecticut University, New Britain, Connecticut
- Sharkey, B. J., & Gaskill, S. E. (2006). *Sport physiology for coaches*. Human Kinetics. Champaign, USA.
- Shawdon, A., & Brukner, P. (1994). Injury profile of amateur Australian rules footballers. *Australian Journal of Science and Medicine in Sport*, 26, 59-61.
- Shellock, F. G., & Prentice, W. E. (1985). Warming-up and stretching for improved physical performance and prevention of sports-related injuries. *Sports Medicine*, 2 (4), 267-279.
- Sinclair, M. R. (2009). Protective Equipment in Rugby - Literature review. Retrieved from <http://www.sarugby.co.za/boksmart/pdf/BokSmart - Protective Equipment in Rugby Union Evidence-based support document.pdf> on June 18, 2012 at 2pm.

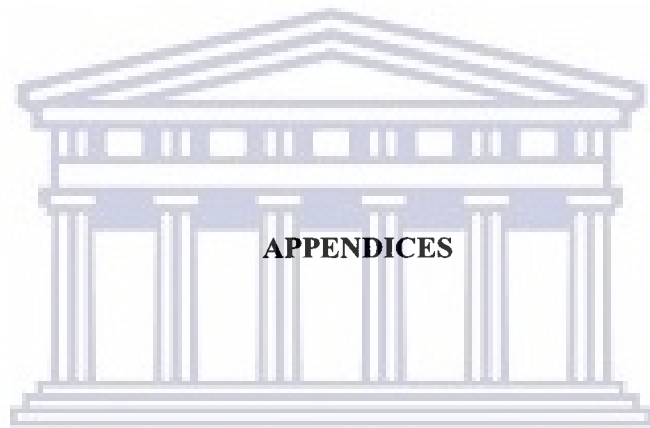
- Smith, C. A. (1994). The warm up procedure: to stretch or not to stretch: A brief review. *The Journal of Orthopaedic and Sports Physical Therapy*, 19 (1), 12-17.
- Sparling, P., Millare, S. M. (1999). Keeping Sports participants safe in hot weather. *Physiology in Sports Medicine*, 27 (7), 27.
- Sports Medicine Australia, (2007). *Preventing sports injuries* In Sports Medicine for Sports Trainers (9<sup>th</sup> Ed) MOSBY Elsevier, Australia p 26.
- Stasinopoulos, D. (2004). Comparison of three preventive methods in order to reduce the incidence of ankle inversion sprains among female volleyball players. *British Journal of Sports Medicine*, 38, 182–185.
- Stevenson, M. R., Hamer, P., Finch, C. F., Elliot, B., & Kresnow, M. J. (2000). Sport, age, and sex specific incidence of sports injuries in Western Australia. *British Journal of Sports Medicine*, 34, 188–194.
- Stephenson, S., Gissane, C. & Jennings, D. (1996). Injury in rugby league: A four year prospective survey. *British Journal of Sports Medicine*, 30, 331-334.
- Strand, T., Tvedte, T., Engebretsen, L., & Tegnander, A. (1990). Anterior cruciate ligament injuries in handball playing: Mechanisms and incidence of injuries. *Tidsskr Nor Laegeforen*, 110 (17), 2222-2225.
- Swain, M. S., Pollard, H. P., & Bonello, R. (2010). Incidence, severity, aetiology and type of neck injury in men's amateur rugby union: Prospective cohort study. *Chiropractic & Osteopathy*, 18 (18) doi: 10.1186/1746-1340
- Taimela, S., Kujala, U. M., & Osterman, K. (1990). Intrinsic risk factors and athletic injuries. *Sports Medicine*, 9(4), 205-215.

- Thacker, S. B., Stroup, D. F., Branche, C. M., Gilchrist, J., Goodman, R. A., & Weitman E. A. (1999). The prevention of ankle sprains in sports: A systematic review of literature. *The American Journal of Sports Medicine*, 27 (6), 573-760.
- Thein, L.A. (1995). Environmental conditions affecting the athlete. *Journal of Orthopaedic and Sports Physical Therapy*, 21, 158-171.
- Tippett, S. R. (1990). *Coaches Guide to Sports Rehabilitation*. Human Kinetics. Champaign. USA.
- Training.gov.au (2012), Retrieved from <http://training.gov.au/Training/Details/SISSSPT201A> at 1pm July 2012.
- Twizere, J. (2004). *Epidemiology of soccer injuries in Rwanda: a need for physiotherapy intervention*. Unpublished Master's Thesis. University of the Western Cape. Bellville.
- Twomey, D., Finch, C., Roediger, E., & Lloyd, D.G. (2009). Preventing lower limb injuries: is the latest evidence being translated into the football field? *Journal of Science and Medicine in Sport*, 12 (4), 452-456.
- Ultimate Rugby, (2012). Introducing Kenya's National Sevens Circuit. Available at <http://ur7s.com/news/597> retrieved on 10th April 2012 at 12pm.
- Van Mechelen, W. (1997). The severity of sports injuries. *Sports Medicine*, 24 (3), 176-180.
- Van Mechelen, W., Hlobil, H., & Kemper, H.C. (1992). Incidence, severity, etiology and prevention of sports injuries: A review of concepts. *Sports Medicine*, 14 (2), 82-89.
- Verrall, G.M., Slavotinek, J. P., & Barnes, P. G. (2005). The effect of sports specific training on reducing the incidence of hamstring injuries in professional Australian Rules football players. *British Journal of Sports Medicine*, 39, 363-368.

- Viljoen, W., Saunders, C.J., Aginsky, K.D., & Millson, H.B. (2009). Training Volume and Injury Incidence in a Professional Rugby Union Team. *South Africa Journal of Medicine*, 21(3), 97-101.
- Waller, A.E., Feehan, M., Marshall, S.W., Chambers, D.J. (1994). The New Zealand Rugby Injury and Performance Project: I. Design and methodology of a prospective follow-up study. *British Journal of Sports Medicine*, 28(4), 223-228
- Wallin, D., Ekblom, B., Grahn, R., et al., (1985). Improvement of muscle flexibility: a comparison between two techniques. *American Journal of Sports Medicine*, 13, 263–268.
- Warburton, D.E., Nicol, C.W., & Bredin, S.S. (2006). Health benefits of physical activity: The evidence. *Clinical Medical Association Journal*, 174, 801-809.
- Weaver, J., Moore, C. K., & Howe, W. B. (1996). Injury prevention. In D. J. Caine, C. G. Caine, & K. J. Lindner (Eds.), *Epidemiology of sports injuries* . Champaign: Human Kinetics.
- Wekesa, M., Asembo, J.M., & Njiraroi, W.W. (1996). Injury surveillance in a rugby tournament. *British Journal of Sports Medicine*, 30, 60-63.
- Werstein, K. M., & Lund, R. J. (2012). The effects of two stretching protocols on the reactive strength index in female soccer and rugby players. *Journal of Strength & Conditioning Research*, 26(6), 1564–1567.
- Whitelaw, S., Baxendale, A., Bryce, C., MacHardy, L., Young I., & Witney, E. (2001). Setting based health promotion: a review. *Health Promotion*, 16:339-353.

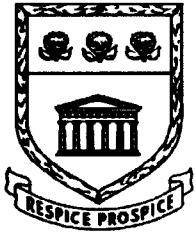


- Wilk, B. R., Fisher, K. L., & Gutierrez, W. (2000). Defective running shoes as a contributing factor in plantar fasciitis in a triathlete. *The Journal of Orthopaedic and Sports Physical Therapy*, 30(1), 21-28
- Wilson, B. D., Quarrie, K. L., Milburn, P. D., et al. (1999). The nature and circumstances of tackle injuries in rugby union. *Journal of Scandinavian Medicine in Sport*, 2, 153–162.
- Wilson, B.D. (1998). Protective headgear in rugby union. *Sports Medicine*, 25 (5), 333-337.
- Woods, K., Bishop, P., & Jones, E. (2007). Warm up and stretching in prevention of muscular injury. *Sports Medicine*, 37 (12), 1089-1099.
- Worrel, T. W., Perrin D. H. (1992). Hamstring muscle injury: The influence of strength, flexibility warm-up and fatigue. *Journal of Orthopaedic and Sports Physical Therapy*, 16, 12-18.
- Yamamoto, T. (1993). Relationship between hamstring strains and leg muscle strength. A follow-up study of collegiate track and field athletes. *Journal of Sports Medicine & Physical Fitness*, 33, 194–199.
- Zuluaga, M., Briggs, C., Carlisle, J., McDonald, V., McMeeken, J., Nickson, W., Oddy, P., & Wilson, D. (1995). *Sports physiotherapy: Applied science and practice*. Melbourne: Churchill Livingstone.



**APPENDICES**

UNIVERSITY *of the*  
WESTERN CAPE



## UNIVERSITY OF THE WESTERN CAPE

Private Bag X 17, Bellville 7535, South Africa

Tel: +27 21-959-2542, Fax: 27 21-959-2516

### APPENDIX A: CONSENT FORM

**Title of Research Project:** *A descriptive of the factors influencing the implementation of rugby injury prevention strategies in Nairobi, Kenya.*

The study has been described to me in language that I understand and I freely and voluntarily agree to participate. My questions about the study have been answered. I understand that my identity will not be disclosed and that I may withdraw from the study without giving a reason at any time and this will not negatively affect me in any way.

**Participant's name**.....

**Participant's signature**.....

**Witness**.....

**Date**.....

Should you have any questions regarding this study or wish to report any problems you have experienced related to the study, please contact the study coordinator:

**Prof. Julie Philips**

**University of the Western Cape**

**Private Bag X17, Belville 7535**

**Telephone: +27(021)959-2542**

**Cell: +27(021)959-2542**

**Fax: (021)959-2542**

**Email: [jphilips@uwc.ac.za](mailto:jphilips@uwc.ac.za)**



## UNIVERSITY OF THE WESTERN CAPE

Private Bag X 17, Bellville 7535, South Africa

Tel: +27 21-959-2542, Fax: 27 21-959-2516

### APPENDIX B: INFORMATION SHEET

**Project title:** *A descriptive of the factors influencing the implementation of rugby injury prevention strategies in Nairobi, Kenya.*

#### **What is this study about?**

This is a research project being conducted by **Lamech Bogonko Francis** pursuing a Master's degree in Physiotherapy at the University of the Western Cape South Africa. We are inviting you to participate in this research project because you are among the rugby stakeholders in Kenya due to your regular involvement in rugby as player, Coach, Manager and a Medical Practitioner.

The purpose of this research project is to determine the factors which are influencing the possible implementation of rugby injury prevention strategies in Kenya. The information from this study might be useful when clubs and governing bodies are setting priorities for injury prevention initiatives and when evaluating the impact of any initiatives implemented. It will also assist the coaches, physiotherapist and managers to implement or improve the injury prevention strategies which will be for the best of the rugby players.

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

You will be required to sign a written informed consent if you do agree to participate in this study before participating in this study. You will be asked to give the information on the injury prevention strategies and safety practices in place at your club. You will be required to complete a closed ended Questionnaire by ticking the rating answers given in the questionnaire which best describe your answer to the question. This study will be conducted at all the Seven Rugby clubs in Nairobi, Kenya. It's estimated that the questionnaire completion will take 15-20 minutes just during your free time during a training session at your club. Most questions in the questionnaire will ask on how frequent you perform certain safety practises and injury prevention strategies at your club. You will give your answers in terms of All or Always = 100%, Most of the time/ Very often = 75%, Half the time/Often = 50%, Some or Sometimes = 25%, None or Never = 0%.

#### **Would my participation in this study be kept confidential?**

We will do our best to keep your personal information confidential. To help protect your confidentiality, you will be required not to write your name on the questionnaire and only your age and experience will be taken. The study will use numbers for the questionnaire therefore nobody will know who gave the information. Only the researcher will have the access to identification codes. If this article is published in the leading sports Journal, your identity will be protected to the maximum extent possible.

**What are the risks of this research?**

There are no known risks associated with participating in this research project.

**What are the benefits of this research?**

The benefits to you include will help get information about injury prevention strategies and safety practises in place at your club and this will help in future in protecting players from injuries and possibly assist in addressing factors that have made it difficult in implementing the injury prevention strategies at your team in future. We hope that, in the future, other people might benefit from this study through improved understanding of the prevalence and factors influencing implementation of rugby injury prevention strategies in Kenya.

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

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

**Is any assistance available if I am negatively affected by participating in this study?**

In case of severe and high report of severe injuries to you as a rugby player, we will advise you to seek or you will be referred to proper health care provider for further treatment and rehabilitation. In case the team Coaches and Managers seek for more information on rugby injury prevention, and then they will be advised accordingly where they can get such information.

**What if I have questions?**

This research is being conducted by Lamech Bogonko Francis a master's student in physiotherapy at the University of the Western Cape. If you have any questions about the research study itself, please contact

**Lamech Bogonko Francis at:**

**3603-00200,**

**City Square,**

**Nairobi, Kenya**

**Telephone number: +254 729 006 837 / +27 715 247 152/+27 793 592 273**

**E-mail address: lamechfrancis@yahoo.com or lamech2030@gmail.com**

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

**Head of Physiotherapy Department:**

**Dean of the Faculty of Community and Health Sciences:**

**University of the Western Cape**

**Private Bag X17**

**Bellville 7535**

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



UNIVERSITY of the  
WESTERN CAPE

## APPENDIX C: QUESTIONNAIRE FOR RUGBY PLAYERS

*All questions are strictly confidential. Please be as truthful as possible and tick one box per question unless otherwise indicated.*

### Section 1: Demographic Data

1. Team name.....
2. Age.....
3. Education level: Finished high school  University  College
4. Number of years as player in 1<sup>st</sup> Division: .....
5. Number of years as a player before 1<sup>st</sup> Division: .....
6. Number of years in your current club: .....
7. Playing position:  
**Forward**  *LHP*  *H*  *THP*  *LR*  *RL*  *F*  *NE*   
**Backs**  *SH*  *FH*  *IC*  *OC*  *RW*  *LW*  *FB*
8. Height.....Meters      9. Weight.....Kgs
9. BMI .....**For official use only (do not fill this Question)**

### Section 2: History of Injury

In the answers you give below, consider only the information over the last competitive season.

**10. How many injuries have you got/received/sustained during training or competitive match that have resulted in you missing the following session(s)?**

Number of Injuries Sustained	1	2	3	4	5	6
Training sessions						
Competitive matches						

**11. Which body parts sustained injury? (One or more answers are possible).**

**Upper body parts**

- Head:  Face:  Neck:  Shoulder:  Back:  Chest:  Upper arm:  Elbow:  Fore arm:  Wrist:   
 Hand:  Finger:  Neck:  Ribs:

**Lower body parts**

Pelvis:  Buttock:  Groin:  Hip:  Front thigh:  Back thigh:  Knee:  Shin:

Calf:  Ankle:  Foot:  Toe:

**12. Which were the injury mechanisms in the following periods? (One or more mechanisms are possible depending on the number of injuries).**

**Training session**

Tackling:  Tackled:  Running:  Scrumming:  Ruck:  Landing:  Blocking Turning:   
Collision:  Overuse:  Mauls:

**Competitive sessions**

Tackling:  Tackled:  Running:  Scrumming:  Ruck:  Landing:  Blocking:  Turning:   
Collision:  Overuse:  Mauls

13. What was the nature of you injury?

Abrasion  blisters  concussion  contusion  dislocation  fracture  laceration  overuse  
 sprain  strain  other (specify.....)

**13. How many training sessions and competitive matches did you miss last season as result of an injury?**

**Training sessions**

0:  1:  2:  3:  4:  5:  6:  7: 8: 9: 10:

If more than 10 please indicate the number.....

*Number of hours training missed..... (Do not fill this Question)*

**Competitive matches**

0:  1:  2:  3:  4:  5:  6:  7: 8: 9: 10: 11: 12: 13: 14:

If more than 14 please indicate the number.....

*Number of hours matches missed..... (Do not fill this Question)*

**14. What type of playing surface do you play your matches on?**

Grass  Track  Indoor  All-weather  Artificial

**15. What time of play did you got injured (Minutes)**



First half  0-15  15-30  30-45   
 Second half  45-60  60-75  75-80  N/A

15.2 Advice given Rest/No sport activity:  Limited sport activity:  Full sport activity:

16. How long have you been unavailable for training or competitive matches because of injury?

**Training sessions**

	3- 4 days	1 week	2-3weeks	1Month	3Months	6 months	>6 months
First injury							
Second injury							
Third injury							
Fourth injury							
Fifth injury							

**Competitive matches**

	3- 4 days	1 week	2-3weeks	1Month	3Months	6 months	>6 months
First injury							
Second injury							
Third injury							
Fourth injury							
Fifth injury							

17. Did you get facilities to access treatment services when required?

Always (100%): Very often(75%): Often(50%): Sometimes (25%): Never(0%):

18. If no access to Treatment services, what were the reasons?

Financial:  Not informed:  Absence of service:  Ignorance:

**Section 3:Rugby Injury Prevention Strategies**

	Always (100%)	Very often (75%)	Often (50%)	Sometimes (25%)	Never (0%)
<b>Do you wear a headgear during?</b>					
Training session					
competitions					
<b>Do you use a Mouth guard during?</b>					
Training session					
Competitions					
<b>Do you wear ankle protection during?</b>					
Training sessions					
competitions					

<b>Do you wear appropriate footwear/shoe during?</b>					
Training session					
Competitions					
<b>Do you have a warm up period in your team prior to:</b>					
Training					
Competition					

<b>How long is your warm up programme?</b>	5 min	10 min	15 min	20 min	25 min
Prior to training					
Prior to matches					

<b>In your warm up period, do you include activities like?</b>	Always (100%)	Very often (75%)	Often (50%)	Sometimes (25%)	Never (0%)
Light aerobic activities					
Sprinting					
Running					
Short passes					
<b>How often does your coach supervise a cool down period at the completion of the following sessions?</b>					
Training					
Matches					
<b>In your cool down, do you include activities?</b>					
Light jogging					
Light calisthenics					
Stretching					
<b>Do you stretch the major leg muscles in the following situations?</b>					
Warming up prior to training					
Warming up prior to matches					
Cooling down after training					
Cooling down after matches					

<b>How long is your cool down programme?</b>	5 min	10 min	15 min	20 min	25 min	>25 min
--	-------	--------	--------	--------	--------	---------

After training						
After matches						
<b>Do your coach supervise stretching sessions prior and after</b>	Always (100)	Very often (75%)	Often (50%)	Sometimes (25%)	Never (0%)	
Training						
Matches						
<b>Do you make sure you warm up your muscles first before stretching?</b>						
<b>Does your coach often consider players' physical development and build up when assigning team positions?</b>						
<b>Do you slowly stretch the muscle to the point of tension?</b>						
<b>Do you bounce while stretching?</b>						
<b>Do you hold the stretch for at least</b>	5 sec	10 sec	15 sec	20 sec	25 sec	
<b>How many times do you repeat the stretch per muscle on both sides of the body?</b>	0	1	2	3	4	5
<b>Do you undertake flexibility training with your coach (not included as part of a warm up or cool</b>	0	1	2	3	4	5
Times per week as part of a team session						
Times per week as extra individual work						
<b>Do you undertake strength training with your coach in the gym?</b>						
Times per week as part of a team session						
<b>The preseason starts?</b>						
2 weeks <input type="checkbox"/> 3 weeks <input type="checkbox"/> 4 weeks <input type="checkbox"/> 5 weeks <input type="checkbox"/> > 5 weeks <input type="checkbox"/>						
<b>In your training plan, do your coach</b>	Always (100%)	Very often (75%)	Often (50%)	Sometimes (25%)	Never (0%)	
Balance of fitness and skill development						

Gradually increase in intensity					
Teach you on landing technique, tackling, safe play					
Modify training according to the playing field					
Modify training according to the weather					
<b>During the stretching session, do your coach</b>					
Demonstrate the skill to the players					
Explain the skill to the players					
<b>During the stretching session, do you</b>	Always (100%)	Very often (75%)	Often (50%)	Sometimes (25%)	Never (0%)
Pay attention to the coach's instructions on the skill					
<b>Do you ensure that you protective equipments are?</b>					
Available and used					
Appropriate					
Of high quality					
In good condition					
Sized properly					
Fitted correctly					
Maintained					
Repaired or replaced when damaged					

#### **Section 4: Other Factors Influencing the Implementation Of Rugby Injury Prevention Strategies.**

*If you do not undertake the following activities indicate all the reasons why not*

- Strength training at least once per week
- Flexibility training at least once per week
- Warm up always after training and matches
- Cool down always after training and matches

Reasons	Strength Training	Flexibility	Warm ups		Cool downs	
			Training	Competition	Training	Competition
Not enough time						
Too tired after training						
Are no given advice on techniques						
Do not believe it is necessary						
Nobody else does it						
Lack of proper equipments						
Other( please specify)						

### Section 5: Sports Injury Prevention Strategies Knowledge

#### a) Source of Knowledge regarding sports injury prevention

	coaches	physiotherapist	doctors	media	conferences	Other(specify)
Source of knowledge						

#### b) Knowledge Regarding Sports Injury Prevention

*In the following questions tick the description which most closely matches your opinion of the statement.*

Description	<i>Strongly agree</i>	<i>agree</i>	<i>Neither agree nor disagree</i>	<i>disagree</i>	<i>Strongly disagree</i>
The chance of sustaining an injury during training that prevents you from being available for selection is likely to happen					
The chances for sustaining during competitive match that prevents you from being available for selection is likely to happen					
There is a greater chance of sustaining an injury during a competitive match than during training					
Injuries are a consequence of the action of another player					
The risk of head injury in training is reduced by wearing a headgear					
Injury is more likely towards the end of a match					

The risk of injury is reduced by thoroughly warming up and stretching prior to training or competition					
The risk of injury is reduced by thoroughly cooling down and stretching after training or competition					
Players with poor flexibility are more likely to get injured than those with good flexibility					
Strong muscles are important in the protection against injuries					
The majority of other players wear headgear during training or competition					

**Section 6: Nutritional Advice**

<b>Do you consciously consume carbohydrate (e.g.: bread, pasta, rice, potatoes, chocolate, sugar) in the following situations? (Provided by your team)</b>	<b>Always (100%)</b>	<b>Very often (75%)</b>	<b>Often (50%)</b>	<b>Sometimes (25%)</b>	<b>Never (0%)</b>
Pre training					
Post training					
Pre match					
Post match					
<b>What is the quantity of water do you take during the following sessions?</b>	<b>Excellent</b>	<b>Very good</b>	<b>Good</b>	<b>Fair</b>	<b>Poor</b>
Training					
Match					
<b>Are you given any nutritional advice on what to eat or to drink?</b>	<b>A lot</b>	<b>A little</b>	<b>None</b>		

THANK YOU VERY MUCH

**APPENDIX D: QUESTIONNAIRE FOR TEAM COACHES**

*All questions are strictly confidential. Please be as truthful as possible and tick one box per question unless otherwise indicated.*

**Section 1: Demographic Data**

1. Team name .....
2. Age: ..... Education level: Finished high school  University  College
3. Number of years as Coach in 1<sup>st</sup> Division: .....
4. Number of years as a coach before 1<sup>st</sup> Division: .....
5. Number of years in your current club: .....
6. Have you ever coached another team? If yes, how long? .....

**Section 2: Rugby Injury Prevention Strategies**

	Always (100%)	Very often (75%)	Often (50%)	Sometimes (25%)	Never (0%)
<b>Do your players wear headgear during?</b>					
Training session					
competitions					
<b>Do your players use Mouth guard during?</b>					
Training session					
Competitions					
<b>Do your players wear ankle protection during?</b>					
Training sessions					
competitions					
<b>Do your players wear appropriate footwear/shoe during?</b>					
Training session					
Competitions					
<b>Do you have a warm up period in your team prior to:</b>					
Training					
Competition					

<b>How long is your warm up programme?</b>	5 min	10 min	15 min	20 min	25 min
Prior to training					

Prior to matches					
------------------	--	--	--	--	--

<b>In your warm up period, do you include activities like?</b>	<b>Always (100%)</b>	<b>Very often (75%)</b>	<b>Often (50%)</b>	<b>Sometimes (25%)</b>	<b>Never (0%)</b>	
Light aerobic activities						
Sprinting						
Running						
Short passes						
<b>How often do you supervise a cool down period at the completion of the following sessions?</b>						
Training						
Matches						
<b>In your cool down, do you include activities?</b>						
Light jogging						
Light calisthenics						
Stretching						
<b>Do your players stretch the major leg muscles in the following situations?</b>						
Warming up prior to training						
Warming up prior to matches						
Cooling down after training						
Cooling down after matches						
<b>How long is your cool down programme?</b>	5 min	10 min	15 min	20 min	25 min	>25 min
After training						
After matches						
Training						
Matches						
<b>Do you make sure the players warm their muscles first before stretching?</b>						
<b>Do you often consider your players' physical development and build up when assigning team positions?</b>						



<b>Do your players slowly stretch the muscle to the point of tension?</b> <b>Do your players slowly stretch the muscle to the point of tension?</b>						
<b>Do your players bounce while stretching?</b>						
<b>Do your players hold the stretch for at least</b>	5 sec	10 sec	15 sec	20 sec	25 sec	
<b>How many times do your players repeat the stretch per muscle on both sides of the body?</b>	0	1	2	3	4	5
<b>Do you undertake flexibility training with your players (not included as part of a warm up or cool</b>	0	1	2	3	4	5
Times per week as part of a team session						
Times per week as extra individual work						
<b>Do you undertake strength training with your players in the gym?</b>						
Times per week as part of a team session						
<b>The preseason starts?</b>						
2 weeks <input type="checkbox"/> 3 weeks <input type="checkbox"/> 4 weeks <input type="checkbox"/> 5 weeks <input type="checkbox"/> > 5 weeks <input type="checkbox"/>						
<b>In your training plan, do you</b>	Always (100%)	Very often (75%)	Often (50%)	Sometimes (25%)	Never (0%)	
Balance of fitness and skill development						
Gradually increase in intensity						
Teach players on landing technique, tackling, safe play						
Modify training according to the playing field						
Modify training according to the weather						
<b>During the stretching session, do you</b>						

Demonstrate the skill to the players					
Explain the skill to the players					
<b>During the stretching session, do you</b>	Always (100%)	Very often (75%)	Often (50%)	Sometimes (25%)	Never (0%)
Pay attention to the player practicing the skill					
<b>Do you ensure that equipments are?</b>					
Available and used by players					
Appropriate					
High quality					
In good condition					
Sized properly					
Fitted correctly					
Maintained					
Repaired or replaced when damaged					

**Section 3: Other Factors Influencing the Implementation of Rugby Injury Prevention Strategies.**

**If you do not undertake the following activities with your players indicate all the reasons why not**

- Strength training at least once per week
- Flexibility training at least once per week
- Warm up always after training and matches
- Cool down always after training and matches

	Strength training	Flexibility	Warm ups		Cool downs	
			Training	Competition	Training	Competition
Not enough time						
Too tired after training						
Are no given advice on techniques						
Do not believe it is necessary						
Nobody else does it						
Lack of proper equipments						
Other( please specify)						

**Section 4: Injury Prevention Strategies Knowledge**

**A. Sources of Knowledge Regarding Injury Prevention**

	FIFA	IRB	physiotherapists	doctor	media	conference	Other (specify)
Source of knowledge							

**B. Injury Prevention Strategies Knowledge**

*In the following questions tick the description which most closely matches your opinion of the statement.*

Description	Strongly Agree	agree	Neither agree nor disagree	disagree	Strongly disagree
The chance of sustaining an injury during training that prevents you from being available for selection is likely to happen					
The chances for sustaining during competitive match that prevents you from being available for selection is likely to happen					
There is a greater chance of sustaining an injury during a competitive match than during training					
Injuries are a consequence of the action of another player					
The risk of head injury in training is reduced by wearing a headgear					
Injury is more likely towards the end of a match					
The risk of injury is reduced by thoroughly warming up and stretching prior to training or competition					
The risk of injury is reduced by thoroughly cooling down and stretching after training or competition					

Players with poor flexibility are more likely to get injured than those with good flexibility					
Strong muscles are important in the protection against injuries					
The majority of other players wear headgear during training or competition					

**Section 5: Nutritional Advice**

<b>Do your players consume carbohydrate (e.g.: bread, pasta, rice, potatoes, chocolate, sugar) in the following situations? (Provided by your team)</b>	<b>Always (100%)</b>	<b>Very often (75%)</b>	<b>Often (50%)</b>	<b>Sometimes (25%)</b>	<b>Never (0%)</b>
Pre training					
Post training					
Pre match					
Post match					
<b>What is the quantity of water do your players take during the following sessions?</b>	<b>Excellent</b>	<b>Very good</b>	<b>Good</b>	<b>Fair</b>	<b>Poor</b>
Training					
Match					
<b>Do you give any nutritional advice to your players on what to eat or to drink?</b>	<b>A lot</b>	<b>A little</b>	<b>None</b>		

**What other factors/ circumstances make it difficult to implement rugby injury prevention strategies in your team? Please state them and explain briefly.....**

.....  
 .....  
 .....  
 .....

**THANK YOU VERY MUCH**

**APPENDIX E: QUESTIONNAIRE FOR THE TEAM MANAGERS**

This questionnaire consists of questions about safety **Policies** in place at your Club.

When completing the questionnaire, please tick the box that best represents the situation at your Club, unless the instructions indicate to tick all appropriate boxes.

**Section 1: Demographic information**

What is the name your club.....

Your primary position in the Club (tick one box)

President  Chairman  Secretary  Treasurer  Other (specify).....

Approximately how many players are registered with your club, in your sport, this year?

Age	Number
Up to & including 12 years	
13-18 years	
19-34 years	
35 years	
Total	

**Section 2: Sports Safety practices**

The following questions seek to identify the actual safety **practices** currently in place at your Club and Union during competition and training.

It is generally expected that these practices reflect your Club and Union practices, but this need not necessarily be so. They may simply be commonplace practices that are known to club personnel and carried out routinely.

**Important Note:** *These practices may be implemented by your own club or your Union.*

<b><u>First aid &amp; injury prevention</u></b>
Who usually provides first aid services to your club at .....(tick one or more)
<b><u>Competition?</u></b>
Club Trainer/First aider <input type="checkbox"/>
Team Coach <input type="checkbox"/>
St John Ambulance <input type="checkbox"/>
Physiotherapist <input type="checkbox"/>
Doctor <input type="checkbox"/>
No first aid provided <input type="checkbox"/>

<b>Training?</b>					
Club Trainer/First aider <input type="checkbox"/>					
Team Coach <input type="checkbox"/>					
St John Ambulance <input type="checkbox"/>					
Physiotherapist <input type="checkbox"/>					
Doctor <input type="checkbox"/>					
No first aid provided <input type="checkbox"/>					
<b>Where is your club's designated first aid treatment area? (tick one box)</b>					
Sideline <input type="checkbox"/> First aid room <input type="checkbox"/> Club rooms <input type="checkbox"/> Changing rooms <input type="checkbox"/> No designated area <input type="checkbox"/>					
Other.....					
	(0%) never	(25%) sometim es	(50%) About half the time	(75%) Most of the time	(100%) Always
<b>How often are qualified first aid personnel in attendance during</b>					
Competition?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Training?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>How often are qualified cardio-pulmonary resuscitation (CPR) providers in attendance during</b>					
Competition	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Training	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>How often is a telephone available in the case of emergency at</b>					
Competition?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Training?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>How often does your club ensure clear and unlocked access for ambulance and emergency service vehicles to the facilities during</b>					
Competition?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Training?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Record keeping</b>			<b>Yes</b>	<b>No</b>	<b>Don't know</b>
<b>Is a record kept of injuries sustained during participation in club activities?</b>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>If yes please indicate what injuries your club keeps a record of. (tick all appropriate boxes)</b>				Skip to Next Q	Skip to Next Q
All injuries <input type="checkbox"/>					
Injuries that require first aid <input type="checkbox"/>					
Injuries which result in missing a match <input type="checkbox"/>					
Injuries that require attending a medical practitioner <input type="checkbox"/>					
Injuries that require admission to hospital <input type="checkbox"/>					
Injuries that generate an insurance claim <input type="checkbox"/>					
<b>Does your club use injury records to create a Sports Safety</b>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

<b>Plan?</b>					
<b>If yes</b>					
Is it updated regularly?		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Is the plan communicated to relevant club stakeholders?		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<b>Does your club keep a register of death/major disability (paraplegia, quadriplegia, serious injury preventing future participation) of your players?</b>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<b>If yes, how many recorded cases have there been in the past ten years? (please indicate number)</b>					
Death <input type="checkbox"/> Disability <input type="checkbox"/>					
<b>Accreditation</b>	(0%) Never	(25%) someti mes	(50%) About half the time	(75%) Most of the time	(100%) Always
How often does your club or union check the qualifications of applicants for referee/assistants?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
How often does your club or union check the qualification of applicants for coaching positions?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
How often does your club or union check the qualification of applicants for sport trainer, first aider or physiotherapists' positions?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Playing environment and equipment</b>	(0%) Never	(25%) someti mes	(50%) About half the time	(75%) Most of the time	(100%) Always
How often are your club/union home ground playing surfaces inspected <u>immediately</u> prior to: Competition? Training?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Who is responsible for conducting inspections of your home ground club playing surfaces immediately prior to ...</b> (tick all appropriate boxes)					
<b>Competition?</b>					
Coach <input type="checkbox"/> Sports trainer <input type="checkbox"/> First aider <input type="checkbox"/> Physiotherapist <input type="checkbox"/>					
Club grounds controller <input type="checkbox"/> Team manager <input type="checkbox"/> Referee/assistants <input type="checkbox"/> Players <input type="checkbox"/> No inspection undertaken <input type="checkbox"/>					
Other(specify).....					
<b>Training?</b>					
Coach <input type="checkbox"/> Sports trainer <input type="checkbox"/> First aider <input type="checkbox"/> Physiotherapist <input type="checkbox"/> Club grounds controller <input type="checkbox"/>					
Team manager <input type="checkbox"/> Referee/assistants <input type="checkbox"/> Players <input type="checkbox"/> No inspection undertaken <input type="checkbox"/>					
Other (specify).....					
	(0%) Never	(25%) someti mes	(50%) About half the time	(75%) Most of the time	(100%) Always

			time	time	
<b>How often is a written checklist used when pre-game or pre-training safety inspections are conducted?</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>How often, in your opinion, are your playing surfaces generally in safe playing condition?</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>How often structures and fittings within playing fields are made safe for players (e.g. goal post padding, collapsible corner posts/flags) at...</b>					
<u>Competition?</u>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>Training?</u>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>How often does your club ensure adequate separation of spectators &amp; officials from the field of play?</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>How often are any of the following personal equipment items checked by someone in authority prior to</b>					
<b><u>Competition?</u></b>					
Head gear N/A <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Mouth guard N/A <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Shoulder pads N/A <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
boots/shoes N/A <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
ankle braces N/A <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b><u>Training?</u></b>					
Head gear N/A <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Mouth guard N/A <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Shoulder pads N/A <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ankle braces N/A <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
boots/shoes N/A <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	(0%) None	(25%) Some	(50%) About half	(75%) Most	(100%) All
<b>What proportion of players at your club wear the following at</b>					
<b><u>Competition?</u></b>					
Head gear N/A <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Mouth guard N/A <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Shoulder pads N/A <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
boots/shoes N/A <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b><u>Training?</u></b>					
Head gear N/A <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Mouth guard N/A <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Shoulder pads N/A <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
boots/shoes N/A <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



	(0%) Never	(25%) Someti mes	(50%) About half the time	(75%) Most of the time	(100%) Always
<b>Procedures</b>					
<b>How often your club ensure that drinking water/fluid is available at</b>					
Competition?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Training?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>How often is training or coaching provided that is specifically target preventing injury? (E.g. safe tackling, safe landing techniques)?</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>How often is the physical development and build of players taken into account when assigning team positions?</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>General</b>			Yes	No	Don't know
<b>Are modified rules &amp; equipment used for masters/veterans sport at your Club?</b>		N/A <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Does your Club actively promote the attendance of relevant safety or training programs to your members?</b>		N/A <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Does your club regularly inform relevant stakeholders of its sports safety policies?</b>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>If yes, how often?</b> (tick all appropriate boxes)					
Upon joining the club	<input type="checkbox"/>				
Monthly meetings	<input type="checkbox"/>				
Yearly	<input type="checkbox"/>				
As policies become available	<input type="checkbox"/>				
Other (specify).....					
<b>Would your club like to access to more safety and training programs?</b>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Would your club like assistance to develop a sports safety program?</b>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Whom do you think should be actively supporting your club in implementing injury prevention strategies and policies? (tick all appropriate boxes)</b>					
IRB	<input type="checkbox"/>				
Union	<input type="checkbox"/>				
Club members and players	<input type="checkbox"/>				
Sponsors	<input type="checkbox"/>				
Ministry of sports/Government	<input type="checkbox"/>				

Others (specify).....				
<b>Please indicate your satisfaction with the support with to safety issues, given to your club by the following stakeholders. (tick all appropriate boxes)</b>				
		Unsatisfied	Moderately satisfied	Very satisfied
Ministry of sports/ Government		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
IRB		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Union		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Club members/players		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
First aiders	N/A <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sports trainers	N/A <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Physiotherapists	N/A <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sponsors	N/A <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**What other factors do you think are hindering implementation of injury prevention strategies/practices and policies you will like to bring to attention. State and briefly explain.**

.....

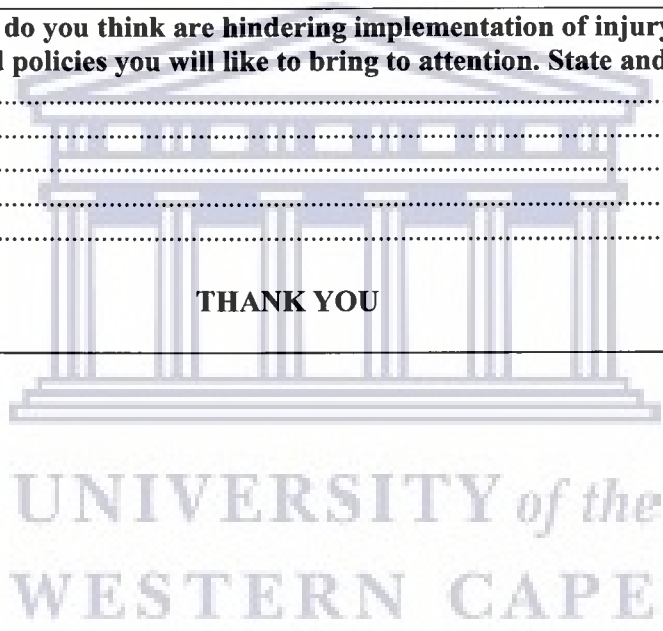
.....

.....

.....

.....

**THANK YOU**



## APPENDIX F: QUESTIONNAIRE FOR TEAM MEDICAL PRACTITIONERS

### Section 1: Demographic Data

1. Are you

Medical Doctor     

Physiotherapist     

First aider     

Red Cross agent     

Other (specify)       .....

2. Name of your team.....

3. What is your qualification? .....

4. Number of years as a team Medical practitioner .....

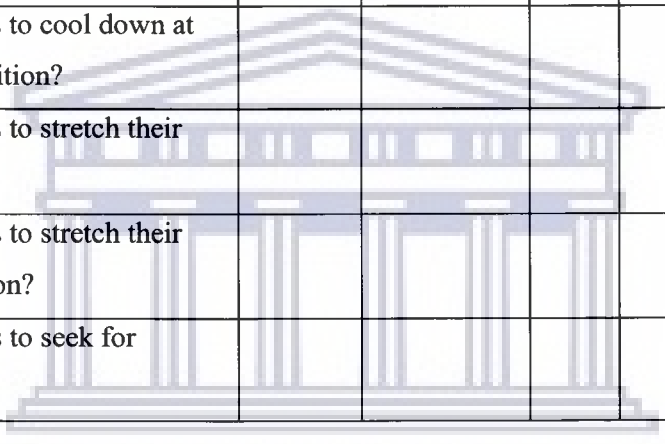
### Section 2: Sport Safety Practices

**The following questions seek to identify the actual safety practices currently in place at your club during competition and training sessions.**

How frequent?	Always	Very often	often	sometimes	never
Is your attendance during training?					
Is your attendance during competition?					
Is appropriate First Aid equipment readily available at training/ competition?					
Is a telephone available in case of emergency at training?					
Is a telephone available in case of emergency at competition?					
Does your club ensure access for ambulance					

and emergency service vehicles to the facilities during training?					
Does your club ensure access for ambulance and emergency service vehicles to the facilities during competition?					
Are your playing grounds generally in safe playing condition?					
Are fixtures and fittings within playing fields made safe for players (e.g. goalpost padding, collapsible corner posts/flags) at training?					
Are fixtures and fittings within playing fields made safe for players (e.g. goalpost padding, collapsible corner posts/flags) at competition?					
Do players personal equipments, items checked by someone in authority prior to training?					
Do players personal equipments, items checked by someone in authority prior to competition?					
Does your club ensure that drinking water/fluid is available at training?					
Does your club ensure that drinking water/fluid is available at competition?					
Do you encourage players to drink water more frequently during training?					
Do you encourage players to drink water more frequently during competition?					

Is the injury preventing one of the targets of the training or coaching? (e.g. safe tackling, landing techniques)					
Do you encourage players to warm up prior to training?					
Do you encourage players to warm up prior to competition?					
Do you encourage players to cool down at the completion of training?					
Do you encourage players to cool down at the completion of competition?					
Do you encourage players to stretch their muscles during training?					
Do you encourage players to stretch their muscles during competition?					
Do you encourage players to seek for treatment when injured?					


  
**THANK YOU VERY MUCH** *of the*
  
**WESTERN CAPE**

**APPENDIX G: APPROVAL LETTER TO CONDUCT RESEARCH FROM THE KENYA  
RUGBY UNION**



**Kenya  
Rugby  
Union**

RFUEA Grounds, Ngong Road  
P. O. Box 48222 00100, Nairobi, KENYA  
Mobile : 254 724 256179  
254 733 236179  
E-mail : info@kenyarfu.com  
: kenyarugbyunion@gmail.com  
Website : www.kenyarfu.com

29<sup>th</sup> November 2011

Francis Lemock Bogenko  
University of the Western Cape  
Department of Physiotherapy  
Private Bcg XI, Belville, 7535  
South Africa  
+27 (0) 21 959 2542/ 2546  
Jfrantz@uwc.ac.za

Dear Sir

**PERMISSION TO CONDUCT STUDY ON RUGBY INJURY PREVENTION**

In reference to your letter received on the 29<sup>th</sup> of November 2011, the Kenya Rugby Union (KRU) hereby approves your request to conduct a study on "Factors influencing the implementation of rugby injury prevention strategies in Kenya".

We are confident that the various club coaches, team managers and physiotherapists will lend a helping hand in assisting you with the completion of your research. We all hope to be privy to your research findings for the betterment of Rugby as a sport in Kenya.

Regards

  
**FRED OLOWES**  
**TECHNICAL & DEVELOPMENT MANAGER**

**APPENDIX H: APPROVAL LETTER TO CONDUCT RESEARCH FROM THE  
NATIONAL COUNCIL FOR SCIENCE AND TECHNOLOGY**

REPUBLIC OF KENYA



**NATIONAL COUNCIL FOR SCIENCE AND TECHNOLOGY**

Telegrams: "SCIENCETECH", Nairobi  
Telephone: 254-220-241349, 2213102  
254-020-10571, 2213123,  
Fax: 254-020-2213215, 318245, 318249  
When replying please quote

P.O. Box 30a21-00100  
NAIROBI-KENYA  
Website: www.ncst.go.ke

Our Ref:

NCST/RR/12/1/MED-011/207/4

Date:  
22<sup>nd</sup> December, 2011

Francis Bogonko Lamech  
University of the Western Cape  
Private Bag X17, Bellville 7535  
SOUTH AFRICA

**RE: RESEARCH AUTHORIZATION**

Following your application for authority to carry out research on "*Factors influencing implementation of rugby injury prevention strategies in Nairobi, Kenya*" I am pleased to inform you that you have been authorized to undertake research in Nairobi Province for a period ending 28<sup>th</sup> February 2012.

You are advised to report to the Provincial Commissioner, the Provincial Director of Medical Services, Nairobi Province & the Club Managers of the selected Rugby Clubs before embarking on the research project.

On completion of the research, you are expected to submit one hard copy and one soft copy of the research report/thesis to our office.

  
**SAID HUSSEIN**  
**FOR: SECRETARY/CEO**

Copy to:  
The Medical Officers of Health  
Selected Hospital in Nairobi

The Club Managers  
Selected Rugby Clubs in Nairobi

**APPENDIX I: APPROVAL LETTER TO CONDUCT RESEARCH FROM THE SENATE  
RESEARCH GRANTS AND STUDY LEAVE COMMITTEE OF THE UNIVERSITY OF THE  
WESTERN CAPE**



UNIVERSITY OF  
WESTERN CAPE

**OFFICE OF THE DEAN  
DEPARTMENT OF RESEARCH DEVELOPMENT**

20 September 2011

**To Whom It May Concern**

I hereby certify that the Senate Research Committee of the University of the Western Cape has approved the methodology and ethics of the following research project by:  
**Mr FB Lamech (Physiotherapy)**

**Research Project:** Factors influencing implementation of rugby injury prevention strategies in Nairobi, Kenya.

**Registration no:** 11/8/19

*Ms Patricia Justus*  
**Research Ethics Committee Officer**  
*University of the Western Cape*

Private Bag 117, Bellville 7535, South Africa  
Tel: +27 21 959 2948/9  
Fax: +27 21 959 1179  
Website: [www.uwc.ac.za](http://www.uwc.ac.za)