Shining a light on soccer injuries in Africa

- A descriptive and comparative Cohort study on soccer injuries in Rwanda and Swaziland

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Abstract

Background/Problem definition
There are few epidemiological studies on soccer injuries in Africa. The prevalence and variables linked to injuries needs to be recognized. Better mapping and knowledge about injury prevalence/incidence could play an important role in helping players sustain a career in soccer without major injuries.

Objective
To explore prevalence, mechanism, severity of injuries and injured body parts in players from top divisions of Rwanda and Swaziland during season 2012/2013.

Methods
The study was of a retrospective, descriptive, comparative design with a quantitative approach on a cohort of n=738 players from Rwanda and Swaziland. Injury frequencies from data sets was analyzed. Data was analyzed using the F-MARC injury-questionnaire.

Results
The subpopulations had varying frequencies of injuries. Age 18-24 sustained the most injuries in both countries, n=215. There was a significant difference of injury prevalence, 71,8% of the Swaziland players sustained injuries. In Rwanda 34,8% sustained injuries. However, the severity of injuries was significantly higher in the Rwanda.

Conclusion
The results of the findings in this study shows that the players in Swaziland had almost a two-time higher injury prevalence. Although the reason to this can only be speculated in by the authors. Further research is encouraged to increase the mapping of injuries in Africa, and factors associated to them.

Keywords
Soccer – Football - Injuries – Africa - Rwanda - Swaziland
Sammanfattning

Bakgrund/Problemformulering
Studier på fotbollsskador i Afrika är få till antal. Det finns ett behov av att undersöka skadeprevalansen och variabler som påverkar skador. En större kartläggning och mer kunskap om skadeprevalens/incidens kan spela en viktig roll i att hjälpa fotbollsspelare att undvika allvarligare skador under deras karriär.

Syfte
Att utforska prevalens, mekanism, svårighetgrad av skador samt skadad kroppsdel hos spelare i Rwandas och Swazilands högsta fotbollsligor.

Metod
Studien var av en retrospektiv, deskriptiv, komparativ design med en kvantitativ inriktning i en kohort på n=738 fotbollsspelare från Rwanda och Swaziland. Skadefrekvenser från data analyserades. Data analyserades och sammanfattades genom användning av skadeformuläret F-MARC.

Resultatsammanfattning
Subpopulationerna hade tydliga variationer i skadefrekvens. Åldersgruppen 18–24 ådrog sig flest skador, 215 st. Det fanns en signifikant skillnad i skadeprevalens mellan länderna. I Swaziland ådrog 71,8% av spelarna sig en skada, Rwanda var denna siffra 34,8%. Däremot var allvarlighetsgraden av skador, mätt i tid borta från fotbollsspelande, större i Rwanda.

Slutsats
Resultatet av denna studie visar på att spelarna i Swaziland hade cirka två gånger högre skadeprevalens än spelarna i Rwanda. Författarna av denna studie kan endast spekulera i anledningen till detta. Vidare forskning uppmuntras för att få en bättre kartläggning av skadeprevalensen i Afrika samt faktorer som påverkar denna.

Sökord
Soccer – Football - Injuries – Africa - Rwanda – Swaziland
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Background

Soccer

Football, or soccer to separate it from the sport American football, is one of the most popular
sports worldwide. Federation Internationale de Football Associations (FIFA) most recent
large-scale survey, ”Big Count 2006” (1), showed that approximately 265 million people
played soccer. This included registered as well as non-registered, male and female players
around the world, which at that time equaled 4% of the total population of the world.
According to the same survey, Africa as a continent had 46 million soccer players. The
overall total of 265 million players is almost 10% higher than the number recorded in the first
survey performed in the year of 2000 (242 million) which used the same criteria as in 2006.
Between 2000 and 2006 no other study of that magnitude has been done. It is also worth
noticing that the number of female soccer players had increased with 50% since 2000 (1).

FIFA and the Union of European Football Associations (UEFA), the two major governing
bodies of soccer, have expressed their concern regarding the increased demand on
professional soccer players. These demands have increased the risk of injuries by exposing
the players to higher training loads and more intense frequency in match playing (2-3).
Soccer is an intense contact sport that over the years has evolved to be faster, and depending
on the importance of the game, more aggressive. This requires the players to be at a good
physical fitness level. Player age, exercise load, level of play and training standard are factors
related to soccer injuries, and the increased number of games played is also putting a mental
pressure on the players (4).

To reach a professional level of soccer the development of the athlete must be initiated in
young years. The transition from childhood to adulthood or in short, youth, is according to
the United Nations Educational, Scientific and Cultural Organization (UNESCO) defined as
the ages between 15 and 24 (5). Within the ages 15-24, the most talented of the players are
placed in so called youth academies, where the intensity and volume of the training sessions
increases (6), while the players also face higher psychosocial stress due to greater
expectations of coaches and parents (7), another factor that have been linked to injury
prevalence (2-6).
A study done by Dendir (2016), examined 3102 players from 4 of Europe's top leagues in soccer, The Italian Serie A, The German Bundesliga, The Spanish La liga and The English Premier League. According to the study, soccer players generally reach the peak of their careers at the ages between 24-28 with their prime physical level of playing soccer at the ages between 25-27. The study also showed that different playing positions had different ages of maturity and prime in soccer (8). The study was comprehensive and discusses the psychological factors such as motivation, experience and tactical awareness, although the authors did not take these into account in the results but focuses only on the physiological and physical factors. According to a study containing 185 players by Fuller and Drawer (2002), the soccer players retired with a mean age of 32. A major limitation of this study however was the low response rate of 37% (185 out of 500 responded) (9). This could significantly influence the results and therefore cannot be generalized.

**Soccer in Africa**

The Confédération Africaine de Football (CAF) was founded in 1957, currently 54 countries are members of this federation. CAF is responsible for the arrangement of the African Cup of Nations which is the largest tournament of soccer in Africa. The tournament currently hosts 24 national teams from all over Africa and is held once every two years (10).

Studies of the epidemiology of injuries in African soccer are insufficient by number, and so are studies on injury prevention strategies (11). One of the few epidemiological studies was made by LeBrun et al. on African adolescents and suggests that over 23 million people suffer a sport-related injury every year, although the instruments used to asses injury did not cover injuries from specific sports, such as soccer (12). A weakness of the study reported by LeBrun et al. was that the chosen instrument, *Global School-Based Student Health Survey* (GSHS) does not account for which type of injury or sport the students have been exposed to/participated in. The data reported on also ranged from 2003 to 2014, a lengthy period, which can give misguided results. Furthermore, the study is mostly based on students from Eastern- and Northern Africa, providing a better understanding in those parts but not of the other regions in Africa such as Central, Southern and Western Africa.

The limited presence of medical practitioners in African football might be a contributing factor to the high prevalence of injuries in the region. According to Phillips et. al. the presence of medically trained personnel in matches and trainings could play a valuable role in the management of acute injuries and in the provision of sport-specific rehabilitation and
prevention programs for the players (13). These factors all contribute to the fact that there is very little knowledge about injuries and rehabilitation in African soccer and if the prevalence of career-ending injuries is very high compared to e.g. European soccer. Importance lies in identifying factors, such as excessive training and match playing loads, to reduce the risk of sustaining injuries.

The United Nations sustainable development goal 17.9 addresses the need to implement effective and targeted capacity-building in development countries (14). The bigger clubs are doing this by raising the standard of soccer and the surroundings of the arena by establishing youth soccer academies or collaborations with clubs in Africa (15-16). This then improves the soccer experience for the players, helping them maintain a sustainable and thriving career. It also provides jobs for coaches/personnel, keeps children off the streets and improves the community health by integrating the population into the sport (17). Soccer, is a way to integrate the population and community into sport and it provides a natural, cheap and effective way to raise the physical activity levels of the community. This contributes to raise the community’s security by extracting people from unfavorable conditions such as engaging in violence and drug-related groups (17).

**Injury mechanisms**

The study by Fuller et al. from 2006 suggested a consensus statement where injuries were defined as; “any physical complaint sustained by a player that results from a soccer match or soccer training, irrespective of the need for medical attention or time-loss from soccer activities”. Injuries can be divided into two subgroups: Traumatic and overuse. Traumatic injuries are referred to as “an injury resulting from an identifiable and specific event”. Overuse injuries are referred to as “an injury due to repeated micro-trauma without an identifiable or specific event” (3).

Two European studies showed that injuries in youth that play soccer often arise because of intensive, no-contact-related sprinting (18-19). A study by Nielsen et al. showed that 27% of the players observed, under 18 years of age, often had injuries related to running (18). Hawkins et al. suggests that in addition to running, injuries because of tackles and in-fights with other players are a common cause of injury. Furthermore, the study showed that the injury prevalence of no-contact related injuries was 58%, compared to contact related injuries which was 38% of the injuries. The remaining 4% was categorized as “Non-specified”. The most common no-contact related injuries in this study were running (19%), twisting and
running (8%), shooting (4%) and landing (4%). The most common contact injuries occurred when a player received a tackle (15%) or when tackling another player (9%) (19).

A review by Wong (2005) on injuries in soccer players showed that most of the injuries occur in the lower extremities, where ankle, and knee-related injuries are the most common (20). According to that review injuries occur during tackles mostly because the players are unable to react as quick as needed to avoid movement which causes injuries. Rapid and unpredictable movement are the most correlated mechanisms to injuries. Other factors which correlate to injuries are inferior playing surfaces, which can result in a higher load on ligaments and muscles. Also, non-suited footwear, which may not provide enough frictional force and can lead to unpredictable movement such as slipping or falling. Too much friction can lead to increased torque when twisting and turning which can also lead to injuries (20).

An increased weight of the player, might also contribute to a higher risk of injuries (21), usually measured as Body Mass Index (BMI) (22). According to World health organization (WHO) a “healthy” BMI is ranged between 18,5-24,9 kg/m², ranges between 25-29,9 kg/m² is seen as overweight and risk of comorbidities. A BMI above 30 kg/m² is considered as obesity, while a BMI under 18,5 kg/m² is considered underweight (22).

Another factor which is often discussed and analyzed in different studies is time of exposure. This factor plays a big role in defining injury incidence and prevalence and to understand why injuries occur and how much soccer the players are exposed to. A retrospective cohort study, written by Calligeris et al. on a soccer team in the Premier Soccer League (PSL) in South Africa, aimed to investigate the incidence of injuries and exposure time to training and match over a full season (23). The study resulted in a collection of a total of 132 injuries. The thigh (21%) and the ankle (27,21%) were the most injured body parts during the period. The study by Calligeris also showed that the injury rate was 6.6 injuries/1,000 player hours during training and 88,9 injuries/1,000 player hours during matches (23). In comparison, a Swedish study by Hägglund et al. reported an injury rate of 5,3 injuries/1,000 player hours during training and 22,7/1,000 player hours during matches (24). When compared to the study by Calligeris this equals a four-time lower risk of injury incidence per 1,000 match hours in Swedish soccer. The study by Calligeris et al. suggests that the higher incidence of injuries in South Africa is due to factors such as vision for the game, skill, difference in fitness levels, player’s strength, difference in preparation and training methods, nutrition and the mental state of players.
Severity levels of injuries sustained during playing soccer have been defined in a study by Jones et al. as the total number of days from the occurrence of the injury to when the player returns to full participation in training or match. The severity levels of injuries were categorized as: slight (1-3 days away from soccer), minor (4-7 days away from soccer), moderate (8-28 days away from soccer) and major (over 28 days away from soccer) (25).

**Injuries in Africa**

The main issue today is that research and mapping of injuries in the African soccer society is lacking. In Europe, there are large numbers of studies made on injuries in soccer, therefore the interest lies more in exploring differences and likenesses in a lesser studied region, such as Africa. A cursory glance and search on the database PubMed gave the following results; “Soccer Football Europe” gave 569 results. In comparison, a search on PubMed where the phrase “Soccer Football Africa” gave 84 results. These results clearly point to the huge discrepancies that exist with regards to soccer surveillance studies between Africa and a region like Europe.

Africa is a large continent with 55 countries, within which, there is a need for better research and mapping of soccer injuries. Rwanda is a country situated in the central part of Africa with a poverty rate of 39.1% (26). Swaziland is located in the southern part of Africa and the poverty rate is 63% (27). In Africa soccer is seen as a way to emigrate from poor conditions and uncertainty to a more sustainable and financially secure future (28). Interest lies in identifying differences and likenesses in injury prevalence between Rwanda and Swaziland to further contribute to the mapping of injuries in Africa as whole.

Without knowledge about injuries and how to prevent them, both short and long term, there will be problems to explore if a suggested or preventative intervention will have any effect on the treatment of injuries. For prevention efforts to be successful, baseline data on the prevalence and incidence of injuries, and the factors associated with these, are of importance for the African continent.

**Problem definition**

Because of the vast popularity of soccer, measures need to be taken to prevent injuries from happening. To do so, the prevalence and variables linked to the injuries in soccer players need to be recognized and identified. Previous studies have been made to establish which
type, site and severity of the injuries are sustained by soccer players. Nevertheless, the major part of these studies has been conducted in Europe and more developed countries than those in Africa (11). The importance of identifying variables associated with injuries is stressed in several studies (11,12,23,29,30,31). Better mapping and knowledge about injury prevention training and injuries in general could play an important role in developing soccer players from Africa, on both micro and macro levels, so that the full potential of the African soccer population could be attained.

**Objective**

The general aim of the study is to raise awareness of soccer injuries in African soccer players.

The study aimed to describe the injury prevalence and explore potential national differences in male professional soccer in Rwanda and Swaziland. Our hypothesis was that there would be no difference in injury prevalence in the players between the two countries. The study aimed to answer the following research questions:

1. What was the prevalence of injuries in each different age group of the players and did they differ between the countries.
2. How did the prevalence of injuries differ between match and training in the different countries and the age groups?
3. How did the injury severity differ between the countries in the respective age groups?
4. What was the prevalence of contact and no-contact injuries in match and training of the respective countries?
5. What were the locations of injuries reported of the respective countries?

**Method**

**Design**

The study was of a descriptive and comparative design with a quantitative approach. Data from previous studies were received, analyzed and summarized, hence a quantitative approach was chosen (32). Furthermore, the study aimed to describe and compare data of characteristics between the countries and age-groups why a descriptive and comparative design was chosen (33-34).
Original samples

The original data was collected by two student researchers, not dependent on each other, affiliated to the Physiotherapy Department at the University of Western Cape, Cape Town, South Africa. The data was collected using two different questionnaires. The study from Rwanda used the *FIFA Medical Assessment and Research Center* (F-MARC) questionnaire (3) (appendix 1a-1b) and the study from Swaziland used a custom-made questionnaire containing information regarding injuries, sections 1-2.9 (appendix 2). The F-MARC questionnaire (appendix 1a-1b) was handed out to the Rwandan clubs. The custom-made questionnaire (appendix 2) was handed out to the Swaziland clubs. Both questionnaires were then self-administered by the players from teams in the two countries’ top divisions, Rwanda and Swaziland. All the data was collected during the seasons 2012/2013 and necessary ethics was considered with the data collection. Ethics clearance was granted from the University of Western Cape Research Ethics Committee for the Rwanda study (12/4/8) and the Swaziland study (13/1/8). Informed written consent was received from all the players, they participated voluntarily and had the right to withdraw from the studies at any time.

The student researchers from the University of the Western Cape studied two separate groups of players, one group from Swaziland and one form Rwanda. The population from Rwanda comprised the male soccer players from the 1st and the 2nd division teams in the Rwandan National League, containing 24 teams. Each team had a maximum of 30 players. A total of 639 players were approached by the researchers and were conveniently selected to participate in the study. All teams returned the distributed forms in the period of 2012-2013 season in Rwanda. The response rate was 100%. The mean age of the players was 20.7 years and the minimum age was 16 while the maximum age was 32.

The population from Swaziland comprised 12 male soccer clubs and nine female clubs of the Swaziland top division of soccer. Each male soccer club had 25 registered players and the female clubs had 30 registered players. The entire populations consisted of 570 players. A sampling method was used to identify the possible participants. After the purposive sampling method, a number of 210 male and 158 female players, a total of 368 players, were approached to participate in the study. A total of 263 players agreed to participate in the study resulting in a response rate of 71%. Out of the 263 players who took part in the study 29.3% (n=77) were female and 70.7% (n=186) were males.
Sample

The populations examined were at possible risk for sustaining injuries, and because the population belonged to different soccer teams they were described as Cohorts (35). For this study, a purposive sampling method was motivated by the fact that the population had specific attributes (injuries related to soccer) (36).

In a total the population contained \( n = 902 \) players from two countries, Rwanda and Swaziland from the ages of 16-39, where 825 players had male gender and 77 players had female gender. The players were all part of the country's top leagues and played on an elite level of soccer. Inclusion criteria - All consenting soccer players from the teams studied in Rwanda and Swaziland during the season 2012/2013. Ages 18-32. Exclusion criteria - Female gender. After the inclusion and exclusion criteria were applied, the population consisted of a total of \( n = 738 \) male professional soccer players from Rwanda and Swaziland, aged 18-32. Five male and 77 female players from Swaziland were excluded and 82 male players from Rwanda were excluded. The population consisted of players from all positions (Goalkeeper, Defender, Midfielder, Forward). The players regularly took part in soccer training sessions and competitive matches during the seasons 2012/2013. The population were then divided into three sub-populations sorted by age. Classified as youth, - peak level, - and senior ages. This classification was used to distinguish the players from the beginning, - their prime, - and the maturity of the player’s careers (5,8-9). Youth included ages 18-24 \( (n=556) \), peak level included ages 25-27, \( (n = 114) \) and senior included ages 28-32, \( (n = 68 \) players). The sub-populations were not equally distributed because of the chosen categorization with age being the divider.

Procedure

During a time-period of 8 weeks between October and December in 2018, the authors of this study collaborated with the Physiotherapy Department at the University of the Western Cape, Cape Town, South Africa. In Cape Town, the authors received the collected data for the descriptive and comparative study. The raw data from the different questionnaires were then sorted by the authors to fit this study according to the F-MARC Questionnaire (Appendix 1a-1b). The two forms used, included baseline information regarding player anthropometrics and injuries. The data was then analyzed in accordance to fit the research questions of this study as seen under “objective”.
Data Collection

The authors used F-MARC, a medical form which was first introduced by UEFA and later refined by Fuller et al. (3). In this study, the pre-competition medical information form and the injury report form, were used to explore soccer injuries in the different subpopulations. Appendix 1a, 1b.

- Appendix 1a - Pre-Competition Medical Information Form (Baseline Information Form)
- Appendix 1b - Injury Report Form.

The definition of validity can be translated to “in which extent an instrument measures what it was meant to measure” (37). Because of the fluctuating variables being measured with F-MARC, not many studies have been made evaluating the validity of the instrument. Though the F-MARC validity has been assured by discussions between experts in the field of soccer injury prevention (3). The reliability has been reviewed in a study made by Junge, Dvorak and Graf-Baumann who found the reporting on injury description in the F-MARC standardized forms to be accurate, therefore establishing the reliability of the instrument(38). The custom made questionnaire used on the original population in Swaziland, has not been assured of validity and reliability (appendix 2).

Data Analysis

Statistical analysis of the data was done using Microsoft Excel, a statistical computer program used to analyze numerical and statistical data (39). The data was of a nominal scale as it could not be ranked. Descriptive data was expressed as percentages (%) and frequencies (n). The level of significance was set as $p<0.05$ (40).

1. The first and third question were descriptive and comparative, results were reported as frequencies (n) and percentages (%) in figures and tables and calculated with a Chi-square test because the data was on a nominal scale (35,40).
2. The second question was comparative, results were reported as frequencies (n) and percentages (%) in figures and tables and calculated with a Chi-square test because the data was on a nominal scale (35,40).
3. The fourth and fifth question were descriptive, and results were reported as frequencies (n) and percentages (%) described in tables and figures (35,40).
Results

Population

A total of 738 players were included in the study in the season 2012/2013, where 557 (75%) players were from Rwanda and 181 (25%) players were from Swaziland. The ages varied between 18-32. All the participants were male soccer players of the country’s top leagues and played on an elite level of soccer.

As seen in table I, the age group 18-24 had the highest number of participating players of the Rwandan population. The same age group was also most represented in the Swaziland population. Also, seen in table I, the midfielder position of the Rwandan players was the most represented. Within the Swaziland population, the defender position was the most represented. Table I furthermore reported the BMI of the players where the category “Healthy”, BMI 18,5-24,9, was the most represented BMI in both countries.

Table I: Summary of population described as frequencies (n) and percentages (%).

<table>
<thead>
<tr>
<th>Summary</th>
<th>Country</th>
<th></th>
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<tbody>
<tr>
<td></td>
<td>Rwanda n (%)</td>
<td>Swaziland n (%)</td>
<td></td>
</tr>
<tr>
<td>Age group</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18 - 24</td>
<td>475 (85)</td>
<td>81 (45)</td>
<td></td>
</tr>
<tr>
<td>25 - 27</td>
<td>58 (10)</td>
<td>56 (31)</td>
<td></td>
</tr>
<tr>
<td>28 - 32</td>
<td>24 (4)</td>
<td>44 (24)</td>
<td></td>
</tr>
<tr>
<td>Player Position</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Goalkeeper</td>
<td>48 (9)</td>
<td>17 (9)</td>
<td></td>
</tr>
<tr>
<td>Defender</td>
<td>174 (31)</td>
<td>75 (41)</td>
<td></td>
</tr>
<tr>
<td>Midfielder</td>
<td>184 (33)</td>
<td>57 (32)</td>
<td></td>
</tr>
<tr>
<td>Striker</td>
<td>151 (27)</td>
<td>32 (18)</td>
<td></td>
</tr>
<tr>
<td>BMI group</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Underweight</td>
<td>1 (0,2)</td>
<td>1 (0,6)</td>
<td></td>
</tr>
<tr>
<td>Healthy</td>
<td>554 (99,5)</td>
<td>133 (74)</td>
<td></td>
</tr>
<tr>
<td>Overweight</td>
<td>2 (0,4)</td>
<td>44 (24)</td>
<td></td>
</tr>
<tr>
<td>Obesity</td>
<td>0 (0%)</td>
<td>3 (2)</td>
<td></td>
</tr>
</tbody>
</table>
Injuries per country and age group

As figure 1.0 shows there is a major percental difference of injury prevalence between the populations of Rwanda and Swaziland.

![Injuries per country n (%)](image)

Figure 1.0: Injured and not injured players described as frequencies \((n)\) and percentages \(\%\).

As seen in table II the age-groups of the players in Rwanda and Swaziland had varying frequencies of injuries. The ages 18-24 had the most injuries in Rwanda, likewise the ages 18-24 had the most injuries in Swaziland.

![Injuries per age group (%)](image)

Figure 2.0: Injuries per age-group described as percentages \(\%\).
Table II: Injuries per age group and country with P-values.

<table>
<thead>
<tr>
<th>Age group</th>
<th>Rwanda n(%)</th>
<th>Swaziland n(%)</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>18 - 24</td>
<td>153 (80)</td>
<td>62 (48)</td>
<td>P&lt;0.001</td>
</tr>
<tr>
<td>25 - 27</td>
<td>30 (15)</td>
<td>41 (32)</td>
<td>P&lt;0.001</td>
</tr>
<tr>
<td>28 - 32</td>
<td>11 (6)</td>
<td>27 (20)</td>
<td>P&lt;0.001</td>
</tr>
<tr>
<td>Total</td>
<td>194</td>
<td>130</td>
<td></td>
</tr>
</tbody>
</table>

Injuries in match and training

As seen in figure 3.0 and table III, most of the injuries in Rwanda occurred in training. The players in Swaziland sustained most of their injuries during match play. A significant difference was found to be $p<0.05$ measured by using frequencies and percentages of injuries in match and training between the different countries.

![Figure 3.0: Injuries sustained in training and match described as percentages (%).](image)

Table III: Prevalence of injuries in match vs training, per country and age group, described as frequencies (n), percentages (%) and P values set at $p<0.05$.

<table>
<thead>
<tr>
<th>Prevalence of injuries in</th>
<th>Difference match Vs training</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rwanda</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Swaziland</td>
<td></td>
<td></td>
</tr>
<tr>
<td>match vs training per country and age group.</td>
<td>Training n (%)</td>
<td>Match n (%)</td>
</tr>
<tr>
<td>------------------------------------------</td>
<td>----------------</td>
<td>-------------</td>
</tr>
<tr>
<td>18 - 24 Rwanda</td>
<td>104 (68)</td>
<td>49 (32)</td>
</tr>
<tr>
<td></td>
<td>14 (23)</td>
<td>48 (77)</td>
</tr>
<tr>
<td>25 - 27 Rwanda</td>
<td>21 (70)</td>
<td>9 (30)</td>
</tr>
<tr>
<td></td>
<td>5 (12)</td>
<td>36 (88)</td>
</tr>
<tr>
<td>28 - 32 Rwanda</td>
<td>7 (64)</td>
<td>4 (36)</td>
</tr>
<tr>
<td></td>
<td>3 (11)</td>
<td>24 (89)</td>
</tr>
</tbody>
</table>

Severity of injuries

As seen described in figure 4.0 and table IV, of the total injuries of the Rwandan population, the most common severity of injuries was reported as moderate (8-28 days away from soccer). The least common severity of injuries was reported as slight (1-3 days away from soccer). Of the total injuries of the Swaziland population, the most common severity of injuries was reported as slight (1-3 days away from soccer). The least common severity of injuries was reported as major (over 28 days away from soccer).

![Severity of injuries (%)](image)

**Figure 4.0:** Severity of injuries described as percentages (%).

Of the total injuries of the Rwandan and Swaziland populations 324 injuries, the most common severity of injuries was reported as moderate (4-7 days away from soccer). The least common severity of injuries was reported as severe (over 28 days away from soccer). A significant difference was found to be $p<0.05$, measured by using frequencies and percentages of severity in injuries between the different countries.
Table IV: Severity of injuries described as frequencies (n), percentages (%) and P values set at p<0.05.

<table>
<thead>
<tr>
<th>Severity of injuries per age group and country</th>
<th>1-3 days n (%)</th>
<th>4-7 days n (%)</th>
<th>8-28 days n (%)</th>
<th>Over 28 days n (%)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rwanda 18-24</td>
<td>9 (5,9)</td>
<td>50 (32,7)</td>
<td>65 (42,5)</td>
<td>29 (19)</td>
<td>P&lt;0,001</td>
</tr>
<tr>
<td>Swaziland</td>
<td>29 (46,8)</td>
<td>18 (29)</td>
<td>8 (12,9)</td>
<td>7 (11,3)</td>
<td></td>
</tr>
<tr>
<td>Rwanda 25-27</td>
<td>4 (13,3)</td>
<td>11 (36,7)</td>
<td>10 (33,3)</td>
<td>5 (16,7)</td>
<td>P&lt;0,001</td>
</tr>
<tr>
<td>Swaziland</td>
<td>17 (41,5)</td>
<td>17 (41,5)</td>
<td>4 (9,8)</td>
<td>3 (7,3)</td>
<td></td>
</tr>
<tr>
<td>Rwanda 28-32</td>
<td>0 (0)</td>
<td>4 (36,4)</td>
<td>5 (45,5)</td>
<td>2 (18,2)</td>
<td>P&lt;0,001</td>
</tr>
<tr>
<td>Swaziland</td>
<td>8 (29,6)</td>
<td>14 (51,9)</td>
<td>3 (11,1)</td>
<td>2 (7,4)</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>67(20,6)</strong></td>
<td><strong>114(35,1)</strong></td>
<td><strong>95(29,3)</strong></td>
<td><strong>48(14,8)</strong></td>
<td></td>
</tr>
</tbody>
</table>

**Injuries with or without contact**
The most common mechanism of injuries in the Rwandan population was no-contact related during training sessions. The least common was no contact related injuries during match play. In Swaziland, the no-contact related injuries during matches were the most common mechanism of injury while the contact related injuries during training sessions were the least common. As seen in Table V, the most common mechanism of injury in the Rwandan and Swaziland populations combined was contact related during matches.

Table V: Injuries due to contact or no contact in separate and combined populations, described as frequencies (n) and percentages (%).

<table>
<thead>
<tr>
<th>Venue</th>
<th>Contact/ no contact</th>
<th>Rwanda (n) (%)</th>
<th>Swaziland (n) (%)</th>
<th>Combined frequency n</th>
<th>Combined percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Training</td>
<td>Contact</td>
<td>47 (24)</td>
<td>10 (8)</td>
<td>57</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>No contact</td>
<td>85 (44)</td>
<td>12 (9)</td>
<td>97</td>
<td>30</td>
</tr>
</tbody>
</table>
### Injured body part

As seen described in figure 5.0 and 5.1, the most common localizations of injuries in both countries were the ankle followed by the knee.

![Figure 5.0: Body parts injured in Rwanda described as percentages (%).](image)

![Figure 5.1: Body parts injured in Swaziland described as percentages (%).](image)

### Discussion

#### Summary of results

The players of the two countries and the different age groups had varying frequencies of injuries, see table II and figure 2.0. The results showed that the age group 18-24 sustained the most injuries in both countries. The age group 25-27 sustained the second most injuries in both countries.
There was a significant difference in the players regarding injury prevalence between the different countries. Swaziland had a higher prevalence of injuries in their population with 71.8% sustaining an injury during the season. Of the Rwandan players, 34.8% of them sustained an injury. The results also revealed a significant difference between the countries in all ages groups with a higher degree of severe injuries in the Rwandan population than in the Swaziland one.

Injuries in match and training differed significantly between the countries in all the age-groups of the players. In the Rwandan population, most injuries occurred during training and were not contact related, as seen in table V. While in the Swaziland population most injuries were sustained during match and were contact related. The ankle and the knee as individual body parts were the most common localization of injury in both populations.

Discussion of results

The majority of all injuries sustained, (n=215, 66.3%) occurred in the age group 18-24 in total for the two countries. The high number might be explained by the higher number of players in this sub-population, as 75.3% (n=556) of the players were represented in this age group. However in the whole sub-population of the 18-24 age group, 38.6% (n=215) injuries were sustained. In Rwanda, 32.2% (n=153) of the players in the age group 18-24 sustained an injury. In Swaziland, 76.5% (n=62) of the players in that same age group sustained an injuries. The high representation of this age group (18-24) may be expected as literature reports that soccer as a professional sport, is often played during younger years and as shown by Dendir soccer players reach the peak of their careers at the ages between 24-28 (8-9).

A significant difference was shown when comparing the two countries’ injury prevalence. The players in Swaziland had a prevalence percentage (71.8%) that was more than twice the one in Rwanda (34.8%). The injured population from Swaziland was considerably smaller than the one from Rwanda. The lesser number of players might mean that the players from Swaziland are exposed to more playing time in soccer, which is a factor that leads to a higher risk of sustaining an injury as exposure is highly correlated with injuries in soccer players. Other factors that might influence the higher percentage of injury prevalence in Swaziland could be harder style of play and inferior playing surface (20,23,24).

Twenty six percent of the players in Swaziland had a BMI above levels of overweight and obesity which can also be correlated to injuries in soccer players (21). It is known that BMI
can be misread if the player is more muscular in body composition (41). Although this study has not investigated these factors in correlation with injuries, further research is needed to establish evidence and laying a ground for a baseline in injury prevention research in Africa.

There was a significant difference in match and training regarding injury prevalence between the countries. The Rwandan population sustained the majority (132, 68%) of their injuries during training, while the Swaziland population sustained the majority (108, 83.1%) injuries during matches. This study does not allow for analysis of the cause of this difference however it might be speculated that differences in the trainer and professional medical staff could be important in this matter. According to a study by Phillips and Niyonsenga that examined factors associated with injuries among female soccer players in Rwanda, the absence of medically trained personnel at games and practices could contribute to a higher prevalence of injuries. However the study does not reveal any statistics of the presence of medically trained personnel. The researchers of that study discusses that implementation of prevention programs and adequate rehabilitation with a sports medicine-trained physiotherapist could play a valuable role in the management of injuries and lower the prevalence of recurrent injuries (30). The high percentage of injuries sustained in Rwanda can be connected to another study from Phillips and Niyonsenga that showed that the return-to-play decision was totally automatic (13). This means that the decisions were made by either the coach or the player and the absence of medically trained personnel was obvious. The premature return to sport might be a factor that increased the risk of sustaining more severe injuries. In this study though, Rwanda had a smaller prevalence of injuries than Swaziland, therefore revealing an even greater need of injury preventative strategies in Swaziland.

The high prevalence of injuries sustained in training of the Rwandan population in this study might have been avoided with the presence or consultation of medically trained personnel. In the Swaziland population however, the high prevalence of injuries during matches might be due to medically personnel being present and treating the player in an adequate way and consistently reporting the injuries. The low prevalence of injuries sustained during training in Swaziland suggests that there might be a better injury prevention program implemented before the training session. During the match, however the injury rate rises, as seen in previous studies, in general there is a higher injury incidence rate in matches compared to training (23-24).
The present study investigated which body part was injured to establish if there was any body part more injured in the populations. In this study, the ankle (39%) and the knee (21%) were the most dominant body parts injured in the combined population. The results add to the existent evidence from previous studies about injury location, in the high velocity dynamic sport soccer, which reported that the most injuries occurred in the lower extremities (20).

The fact that the Rwandan population sustained less injuries than the Swaziland population is discussed above. However, an interesting finding of the study was that the injuries of the Rwandan players in general were more severe than the ones in Swaziland. It may be speculated that, once again this might be linked to a smaller presence of medically trained personnel in the Rwandan population in comparison to the Swaziland population. There might be financial aspects to consider, the teams in Rwanda might choose to not put their fundings on medically trained personnel, however the poverty rate in Rwanda is lesser than the one in Swaziland which could contradict this speculation, this study does however not investigate this. On the other hand, it can be discussed the reason might be that the players in Rwanda are being kept a longer time-period away from soccer when an injury is sustained to assure that the players is fully fit when returning to the sport. As seen in table IV, 41% of the injured players in Rwanda sustained a moderate severity injury (8-28 days away from soccer) compared to the Swaziland population 11,5% within the same category of injury severity, p<0.001. The reason to this difference might be that medical personnel recognize the injuries of the players in Swaziland on an earlier stage, leading to that the treatment and the rehabilitation of the injury can be implemented as soon as possible. Resulting in that the player can return to soccer earlier. On the other hand, within the Rwandan population the injuries might not be recognized or managed in an early stage. This might lead to bad injury management and a higher prevalence of more severe injuries, by not being fit to play or because of compensational movement pattern. The rehabilitation in the Rwandan population might also be insufficient seen to the higher prevalence of longer time loss from soccer (30).

**Discussion of methods**

A limitation of the study was that the study contained data priory collected by two independent student researchers and not by the authors of this study. This made it hard for the authors to adapt the priory collected data to this study, because the data was collected with two separate questionnaires, making it difficult to ensure a good validity and reliability of the results. Ideally the variables could be chosen to answer the research question in a prospective
study, and the validity and reliability could be better ensured by using the standardized form F-MARC.

The sample of players in this study was chosen with a purposive sample-method, obtained from the two original studies by the student researchers at UWT, as it was considered adequate to studying the chosen variables in the populations of soccer players. The size of the sample is a major strength of the study. This increases the generalizability of the study however, it must be noted that the Rwandan population was bigger than the Swaziland population, the results of the Rwandan players could therefore be more generalized in the measured variables. The distribution of players in the different age groups was also unequally distributed. In this study, the age groups were sorted to fit the description of players of youth, - prime, - and senior ages. However, the players in the youth-category had a larger range of years in the category and therefore was more represented than the other two groups. Despite the higher representation in the younger age groups it is likely to reflect the actual age distribution of the soccer population of the two studied countries and the results may therefore apply to these.

The instrument of measure, the F-MARC was chosen because of the relevancy of the variables for this study within the instrument. F-MARC is meant to measure injury incidence and prevalence and is developed by UEFA, nowadays used as the recommended instrument of measurement of injuries within the frames of FIFA, the major governing soccer bodies of the world. The validity and reliability of the instrument has been ensured by experts in the field of soccer injury prevention (3,38). However, this study is based on data from two different studies where one did not use F-MARC as an instrument, therefore the authors of this study could not use the whole F-MARC but only chosen variables. Therefore, the reliability and validity of the F-MARC as an instrument cannot be ensured by the authors but only the researched variables.

Because the original data was collected by two different, independent student researchers and no co-operation between them was used, there might be a source of error in how the researchers collected their separate data. For example, in one of the raw data-sets it is not clear if the investigated players only had one injury per player or if the data included the same player but with different injuries. This is a source of error for the study and could have been avoided if the student-researchers of the original data would have used the same code for the previously injured player.
Clinical application and ethical consideration

This study shows that there is a significant difference in injury prevalence at elite level of soccer between the two countries Rwanda and Swaziland. The high amount of injuries in the populations makes this study highly interesting for physiotherapists and shows a need to further investigate the reason of the high prevalence of injuries within the populations. This can lead to implementation of injury preventative strategies to decrease the amount of injuries. The clinical benefit of this study shows that a need of medically trained personnel in populations suffering from sports related injuries is of high significance to assess and improve the management of injuries (42). This study contributes to the social benefit of highlighting injuries in the African soccer population, leading to the possibility of teams implementing necessary prevention and rehabilitation strategies to lower the prevalence of injuries and in that way helping the players achieving a sustainable and longer career.

The players of the two original data-sets gave their consent to those studies. Therefore an ethical consideration of this particular study was that the individuals of the population did not give consent to be included in this study. This could have led to ethical complications. Therefore, considerations were taken by the authors of this study to contact each individual player to receive consent. Although, this would have affected the anonymity of the study and because the data was from the season of 2012/2013, assumedly, many players would not be reached, leading to external loss and a smaller study population. A perk for the players to participate in the study was to benefit the development of injury preventative strategies in soccer.

Conclusion

The general aim of this study was to raise awareness of soccer injuries in African soccer players. As seen in the results of this study, many players from both Rwanda and Swaziland had injuries, more alarming, the injuries were sustained during a time-period of only one season. The injury prevalence differed between the countries where the Swaziland players had a higher injury prevalence while the Rwandan players sustained more severe injuries. However, the reason to the high prevalence of injuries in these populations can only from this study be speculated in. Future studies should examine the association of factors such as training load, training exercises, recovery, playing surface. Also, studies should examine the effect of the presence of medically trained personnel such as physiotherapists and sports scientists to recognize injuries needed of attention. Therefore, the authors of this study want to encourage further research in the field of soccer in African populations.
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Appendices

Appendix 1a.

<table>
<thead>
<tr>
<th>Player's code No.</th>
<th>Playing position</th>
<th>Age, years</th>
<th>Stature, cm</th>
<th>Body mass, kg</th>
<th>Dominant leg (L/R/B)</th>
<th>Details of previous major injuries</th>
<th>Study specific variable</th>
<th>Study specific variable</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes: 1. Use additional sheets if required  2. Goalkeeper, Defender, Midfielder, Forward  3. Age as at the start of season / year / tournament  4. Left, Right, Bilateral
Appendix 1b.

### Injury Report Form

(Team) Player-code: ________________ Date: ________________

<table>
<thead>
<tr>
<th>1A Date of injury: __________</th>
<th>1B Date of return to full participation: __________</th>
</tr>
</thead>
<tbody>
<tr>
<td>2A Injured body part</td>
<td>2B Injured body part</td>
</tr>
<tr>
<td>□ head / face</td>
<td>□ right</td>
</tr>
<tr>
<td>□ neck / cervical spine</td>
<td>□ left</td>
</tr>
<tr>
<td>□ sternum / ribs / upper back</td>
<td>□ not applicable</td>
</tr>
<tr>
<td>□ abdomen</td>
<td></td>
</tr>
<tr>
<td>□ low back / sacrum / pelvis</td>
<td></td>
</tr>
<tr>
<td>□ shoulder / clavicle</td>
<td>□ lesion of meniscus or cartilage</td>
</tr>
<tr>
<td>□ upper arm</td>
<td>□ haematoma / contusion / bruise</td>
</tr>
<tr>
<td>□ elbow</td>
<td>□ muscle rupture / strain / tear / cramps</td>
</tr>
<tr>
<td>□ forearm</td>
<td>□ abrasion</td>
</tr>
<tr>
<td>□ wrist</td>
<td>□ laceration</td>
</tr>
<tr>
<td>□ hand / finger / thumb</td>
<td>□ tendon injury / rupture / tendinosis / bursitis</td>
</tr>
<tr>
<td>□ foot / toe</td>
<td>□ nerve injury</td>
</tr>
</tbody>
</table>

3 Type of injury

- □ concussion with or without loss of consciousness
- □ fracture
- □ other bone injury
- □ dislocation / subluxation
- □ sprain / ligament injury
- □ other injury (please specify):

4 Diagnosis (text or Orchard code): ________________

5 Has the player had a previous injury of the same type at the same site (i.e. this injury is a recurrence)?
   - □ no
   - □ yes

   If YES, specify date of player’s return to full participation from the previous injury: ________________

6 Was the injury caused by overuse or trauma?
   - □ overuse
   - □ trauma

7 When did the injury occur?
   - □ training
   - □ match

8 Was the injury caused by contact or collision?
   - □ no
   - □ yes, with another player
   - □ yes, with the ball
   - □ yes, with other object (specify) ________________

9 Did the referee indicate that the action leading to the injury was a violation of the Laws?
   - □ no
   - □ yes, free kick / penalty
   - □ yes, yellow card
   - □ yes, red card

   If YES, what was the referee’s sanction against:
   - □ injured player
   - □ opponent

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Appendix 2.

A questionnaire on prevalence and risk factors associated with soccer injuries among soccer players in Swaziland

Questionnaire number .............

Dear player,

My name is Haaron Wambaa and am a postgraduate physiotherapy student enrolled in the physiotherapy department of University of Western Cape- South Africa. I kindly request your participation in this study by completing the questionnaire with your views, according to the statements of the questionnaire.

SECTION 1: DEMOGRAPHIC DATA

1.1 Player research ..................

1.2 Age ..........................

1.3 Player position ..................

1.4 Height (cm) ..................

1.5 Body mass (kg) ..................

1.6 Dominant leg (L/R/B).............

1.7 Player position in the squad starter □ substitute □

1.8 Occupation..................

SECTION 2

2.0 INJURIES

2.1 Have you suffered any soccer injury in this current season Yes: □ No: □

If yes is it a new injury or a recurrent injury Yes □ No □

2.2 How many days of competitive game and training session did you miss because of the injury?

Training time
☐ 1-3 days  ☐ 4-7 days  ☐ 8-28 days  ☐ over 28 days

Game time
☐ 1-3 days  ☐ 4-7 days  ☐ 8-28 days  ☐ over 28 days

2.3 In which activity were you involved with when you sustained the injury?

Competitive game: ☐ practice game: ☐ small-sided game: ☐ practice drill: ☐ others: ☐

2.4 Which body parts sustained injury? (One or more answers applicable)

Injured body part
1) Head/face  ☐  7) Shoulder/clavicle  ☐  13) Hip/groin ☐
2) Neck/cervical spine ☐  8) Upper arm ☐  14) Thigh ☐
3) Sternum/ribs/upper back: ☐  9) Elbow ☐  15) Knee ☐
4) Abdomen ☐  10) Forearm ☐  16) Leg ☐
5) Back/sacrum/pelvis ☐  11) Wrist ☐  17) Ankle ☐
6) Hand/finger/thumb ☐  12) Foot/toe ☐

2.5 How did you sustain the injury (One or more mechanisms are possible depending on the number of injuries. Indicate the number of the body part ticked above next to the mechanism of the injury).

Training session
Tackling: ☐  Tackled: ☐  Running: ☐  Shooting: ☐  Jumping: ☐
Landing: ☐  Heading: ☐  Turning: ☐  Collision: ☐  Overuse: ☐

Match
Tackling: ☐  Tackled: ☐  Running: ☐  Shooting: ☐  Jumping: ☐
Landing: ☐  Heading: ☐  Turning: ☐  Collision: ☐  Overuse: ☐

2.6 At what time of the game or training did the injury occur?

<table>
<thead>
<tr>
<th>Time Interval</th>
<th>Match</th>
<th>Training</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-15 min</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16-30 min</td>
<td></td>
<td></td>
</tr>
<tr>
<td>31-45 min</td>
<td></td>
<td></td>
</tr>
<tr>
<td>45-60 min</td>
<td></td>
<td></td>
</tr>
<tr>
<td>60-75 min</td>
<td></td>
<td></td>
</tr>
<tr>
<td>76-90 min</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;90 min</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
2.6 What kind of treatment did you receive following injuries? (One or more answers are possible).
   Medical: □  Physiotherapy: □  Traditional: □  Self treatment: □  None: □

2.7 Who decides for an injured soccer player when to restart sporting activities?
   Self: □  Coach: □  Team physiotherapist: □  Team Doctor: □  Team Administrators: □  Others: □

2.8 Playing and training surface:
   Training surface
   Grass: □  Artificial: □  Indoor Gym: □  All Weather: □  Others: □
   Playing surface
   Grass: □  Artificial: □  Indoor Gym: □  All Weather: □  Others: □

2.9 Surface condition:  Dry: □  Wet: □  Hard: □  Soft: □