EPIDEMIOLOGY OF SPORTS-RELATED INJURIES IN CHILDREN AND YOUTH PRESENTING TO CANADIAN EMERGENCY DEPARTMENTS FROM 2007/08 TO 2009/10

LIRAZ FRIDMAN

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ABSTRACT

Although injuries related to sports and recreation represent a significant burden to children and youth, there is a paucity of information about descriptive epidemiology of sports related injury since 2005. The objective of this study was to provide the descriptive epidemiology of sports-related injuries treated in emergency departments for children and youth aged 5 – 19.

Children and youth (5 – 19 years) in CHIRPP (2007 – 2010) were included. Descriptive statistics, including frequency by sport, age and sex, and the percent of concussions within each sport were calculated.

Out of a total of 56, 691 reported sports-related injuries, soccer accounted for 11,941 injuries. The 10 – 14 age group reported the greatest number of injuries. Males reported a greater number of minor injuries. The largest percentage of concussions (16.7%) was reported in ringette.

Injury prevention programs in Canada should focus on improving evidence-based programs to reduce the burden of injuries in all sports.

ABBREVIATIONS: SRIs, Sports Related Injuries; ED, Emergency Department; CCHS, Canadian Community Health Survey; CHIRPP, Canadian Hospitals Injury Reporting and Prevention Program; PHAC, Public Health Agency of Canada

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Chapter 1

REVIEW OF THE LITERATURE

Introduction

In Canada, injury is the leading cause of death for young people aged 1 to 34 (Billette & Janz, 2011). Sports-related injuries (SRIs) are defined as injuries that occur as a result of participating in physical activity for the purposes of competition or recreation and are the second leading cause of emergency department (ED) visits (Burt et al., 2001; O'Rourke et al., 2006; Pakzad-vaezi et al., 2011). Over 4 million SRIs sustained by children and adolescents are evaluated in emergency departments throughout the United States each year (Monroe, Thrash, Sorrentino, & King, 2011). In 2011, a study conducted by the Canadian Community Health Survey (CCHS), reported that two out of three injuries that are sustained by adolescents are related to sports. Furthermore, the Public Health Agency of Canada (PHAC) reports that 30% of injuries in children aged 5- 9 years, 68% of injuries in children aged 10 – 14 years, and 55% of injuries in children aged 15 – 19 years that are treated in an ED are related to a sports or recreational activity. Sports provide children and youth with many positive benefits such as exercise and increased social skills (Caine et al., 2008; Monroe et al., 2011; Verhagen et al., 2009). However, the impact that sports related injuries have on participants, families, coaches, and healthcare systems are significant (Pakzad-vaezi & Singhal, 2011). Canadians need to be aware of the risks that are involved for children and youth participating in some sports activities.

Age Differences

The literature on SRIs in children and adolescents report that the number of injuries sustained by youth participating in a variety of sports differ by age, however there is a lack of consensus as to which age group is most at risk. This lack of consensus is likely due to differences in the populations studied including different sports, different countries and different outcomes. O'Rourke et al. (2007) examined SRIs to children and youth under 17 years old in Ireland who participated in soccer, Gaelic football, and rugby. They found an increased presentation of SRIs with increasing age. Conversely, Burt et al. (2001) reported that the greatest number of visits for sports-related injuries occurs for patient's aged 5 – 14 and that this trend tapers for older age groups.

In one study conducted in British Columbia, the researchers reported that children between the ages of 10 and 14 were the only age group to show a significant upward trend in the number of sports-related injuries reported to an ED between 1992 and 2005 (Pakzad-vaezi & Singhal, 2011). In another study that examined the number of head injuries sustained by youth playing soccer in Canada, children aged 10 – 14 accounted for 50% of the ED visits (Giannotti et al., 2010). Furthermore, Billette and Janz (2011) reported that between 2009 and 2010, two thirds (66%) of injuries among children aged 12 to 19 were related to sports participation. Similarly, Mello et al. (2009) found that male participants aged 12 – 17 reported four times the number of sports-related injuries than the younger participants during the study period. However in other recreational activities such as sledding where participation is higher in younger age groups, children between the ages of 3 and 10 reported a greater number of sports-related injuries (Shorter, Mooney, & Harmon, 1999). It is clear throughout the literature that children and

youth of varying ages are at risk for SRIs. As the number of injuries resulting from sport continues to increase, the risk of sustaining an injury by age group needs to be elucidated (Monroe, Thrash, Sorrentino, & King, 2011).

Sex Differences

There is a lack of consensus among researchers about whether males or females are more at risk for sports-related injuries. Studies have cited differences in physical maturity, body size, and muscle strength as some potential risk factors for injury among boys and girls (Caine et al., 2008). Pakzad-vaezi and Singhal (2011) reported that males experienced more sports injuries than females accounting for 68% of the sample and that injury for both males and females have increased over the 14-year study period. Conversely, Billette and Janz (2011) found that although males in general were more likely than females to be injured, adolescent girls have experienced an increase in injuries over the past decade from 18% to 23%. The variation in the literature reflects differences in the populations studied including differences in sport, sex, and age group.

Differences by Sport

Within the literature there is a discrepancy between researchers in both the United States and Canada regarding which sports account for the greatest number of reported injuries. One study reported that between 1992 and 2005, there was a 28% increase in the number of injuries that resulted from sports activity (Pakzad-vaezi & Singhal, 2011). Taylor and Attia (2000) reported that in their study, parents and patients named 35 different sports activities that lead to an SRI. Of these injuries children involved in basketball, football, baseball/softball, soccer, rollerblading/skating, and hockey accounted for 76% of the total injuries. Conversely, Monroe et al. (2011) found that cycling,

basketball, playground injuries, and football accounted for the largest number of ED visits in their study. According to one study conducted in the US, between 1997 and 2007, pediatric basketball related injuries accounted for 375,350 visits to an ED. Adolescents aged 15 to 19 years made up 50.7% of all the basketball related injuries evaluated in an ED. This amounted to a rate of 9.3 injuries per 1000 individuals (Randazzo et al., 2010). In addition, boys made up approximately 75% of the basketball related injuries seen in an ED (Pakzad-vaezi et al., 2011; Randazzo et al., 2010). Most injuries sustained by children who played basketball included fractures, dislocations, and traumatic brain injuries (TBIs), although these varied by age. In another study conducted in the US, between 2001 and 2005 football caused an estimated 1,111,917 injuries to children between the ages of 7 to 17 years who were assessed in an ED. Older participants (12 – 17 years) were twice as likely to sustain a TBI, sprain/strain, or fracture when compared to younger participants (7 – 11 years) (Mello et al., 2009).

Baseball accounts for the largest number of SRIs after basketball and football in the US. Approximately 44% of injuries that occur to children who participate in baseball are maxillofacial fractures. In baseball, sliding was the mechanism of injury that caused the greatest proportion of fractures among children of all ages (Lawson et al., 2009). Another study found that cycling had the highest number of injuries of any sport and accounted for 13.5% of all SRIs (Pakzad-vaezi & Singhal, 2011). Similarly, in a US study conducted between 2006 and 2007, cycling resulted in the largest number of sports-related ED visits (Monroe et al., 2011). In Canada, soccer is the most prevalent sport played by youth followed by hockey (Clark 2008; Giannotti et al., 2010). However, there is less information about participation in unorganized sports and recreational physical

activities for these age groups and this may be due to the difficulty in measuring participation in unorganized sports such as cycling. Although there is no literature on ringette injuries sustained by Canadian youth, one study reported that ice hockey injuries increased from 65 in 1992 to 161 in 2005 (Pakzad-vaezi & Singhal, 2011). Some sports have shown a decrease in the number of reported injuries over time. A study by Pollard et al. (2011) reported that between 1990 and 2009 the annual number of volleyball related injuries that were reported to an ED by children younger than 18 years declined by 23%. Generally, it is still unclear throughout the literature which sports put children and youth at a greater risk for injury and some activities such as snow sports and ringette are in need of further evaluation.

Concussions in Sport

There is a paucity of research comparing the percent of concussions to all other injuries within individual sports. One study specifically analyzed the proportion of head injuries sustained by children and youth participating in soccer in Canada. The results showed that 15% of all soccer-related injuries reported to an ED between 1994 and 2004 were related to a head injury and of these 11% were diagnosed with a concussion (Giannotti et al., 2010). In another study by Pakzad-vaezi and Singhal (2011), over the 14 year study period, the proportion of head injuries to other injuries resulting from sports participation in Vancouver, British Columbia increased from 196 to 284 between 1992 and 2005. In a US study that examined pediatric volleyball-related injuries treated in an ED the researchers reported that children 6 years and under were more likely to sustain head injuries. The authors attributed this trend to the proportionally larger head size in young children and their likelihood to fall headfirst when they are injured (Pollard et al.,

2011). Monroe et al. (2011) looked at the two most common sports played by American children and youth – basketball and football. Their results showed that the most common injuries reported for both sports were closed head injuries, lacerations, and fractures. A few studies have examined the proportion of head injuries sustained in snow sports such as skiing and sledding (Howell et al., 2010; Meyers et al., 2007). One study looked at pediatric and adolescent sledding-related injuries treated in US emergency departments between 1997 and 2007. These authors reported that the most frequently injured body part was the head, which accounted for 34.1% of the sledding-related injuries reported to an ED. One fourth of these injuries were classified as TBIs (Howell et al., 2007). Similarly, Meyers et al. (2007) found that head and neck injuries accounted for 11% – 20% of all downhill skiing-related injuries in their study. These studies provide some insight on the trends of head injuries in a variety of sports, however there is still a paucity of research comparing the percent of concussions to all other injuries within individual sports.

Rationale and Objectives

There are gaps in the literature on the nature and severity of pediatric injuries caused by participating in different sports by age and sex. In addition, there is a paucity of research that compares the proportion of concussions sustained by children and youth to all other injuries within each sport. Finally, some sports such as ringette have never been evaluated. It is important to obtain more current research on the types of injuries that children are sustaining in order to provide parents and coaches with knowledge about the likelihood of being injured while participating in sport-related activities. This study provides insight on the distribution of injuries in various sports for children of different

ages. In addition, this study adds knowledge to the field of pediatric sports-related injuries by specifically examining the percent of concussions between sexes in a variety of sports.

The primary purpose of this study was to provide the descriptive epidemiology of sports-related injuries treated in Canadian emergency departments for children and adolescents aged 5 – 19 from 2007 to 2010. A secondary purpose was to further examine the percent of concussions in comparison to all other injuries within each sport reported by children and youth with a focus on age and sex differences.

Chapter 2

METHODS

Data Source: Canadian Hospitals Injury Reporting and Prevention Program.

A retrospective data analysis on sports-related injuries in Canada was performed using data from the Canadian Hospitals Injury Reporting and Prevention Program (CHIRPP) between January 1, 2007 and December 31, 2010. CHIRPP was created in 1990 by the Public Health Agency of Canada (PHAC). CHIRPP is a computerized information system that collects data on injuries sustained by children and adolescents who are seen in the EDs of the 11 pediatric hospitals and 5 general hospitals in Canada. These hospitals include Janeway Children's Health and Rehabilitation Centre in St. John's, Newfoundland; IWK Health Centre in Halifax, Nova Scotia; Hôpital de l'Enfant-Jésus in Québec, Quebec; CHU Ste-Justine in Montreal, Quebec; Montreal Children's Hospital, of the McGill University Health Centre in Montreal, Quebec; Children's Hospital of Eastern Ontario in Ottawa, Ontario; Hotel Dieu Hospital in Kingston, Ontario; Kingston General Hospital in Kingston, Ontario; The Hospital for Sick Children in Toronto, Ontario; Children's Hospital of Western Ontario in London, Ontario; Winnipeg Children's Hospital in Winnipeg, Manitoba; Alberta Children's Hospital in Calgary, Alberta; Stollery Children's Hospital in Edmonton, Alberta; BC Children's Hospital in Vancouver, British Columbia and Stanton Territorial Hospital in Yellowknife, Northwest Territories.

When an injured individual presents to an ED affiliated with CHIRPP, either they or a caregiver fills out a one-page questionnaire with information regarding the circumstances that surrounded the injury. Some of this information includes what the

person was doing at the time of the injury, the cause of the injury, any contributing factors to the injury, the time and place that the injury occurred, and the age and sex of the patient. Additional information is then provided by an ED staff member, which includes details on the nature of injury, any body parts injured, as well as any treatment that was provided. Once these questionnaires are filled out they are sent to the PHAC where the information is entered into an electronic database.

Inclusion criteria.

All children and youth aged 5 – 19 who were evaluated in an ED that was part of the CHIRPP network between 2007 and 2010 for a SRI were included in this study. The majority of studies that reported the descriptive epidemiology of sports-related injuries to children and youth end in 2005 therefore this study aimed to evaluate current trends. We excluded any record in which the cause of trauma was related to death (e.g., drowning).

Study Variables

The primary outcome measure in this study was any sports-related injury reported by Canadian youth and evaluated in an emergency department that participated in CHIRPP. The secondary outcome measure was the percent of concussions compared to other injuries within the same sport.

Thirteen sports were evaluated including baseball, basketball, cycling, football, ice hockey, lacrosse, ringette, rugby, skiing, sledding, snowboarding, soccer, and volleyball. These sports were chosen because they are popular sports that are coded in the CHIRPP database. A number of variables were analyzed in this study including age, sex, body part, and nature of injury. Age groups were separated into three categories: 5 – 9 years, 10 – 14 years, and 15 – 19 years, these age groups were chosen because they

broadly reflect developmental stages and are frequently used by the Public Health Agency of Canada (Beaulne, 1997). Further, we examined the percent of concussions within each sport, stratified by age and sex.

Statistical Analyses

Data analyses were conducted using SPSS version 20.

Chapter 3

MANUSCRIPT

Epidemiology of Sports-Related Injuries in Children and Youth Presenting to Canadian Emergency Departments from 2007/08 to 2009/10

Liraz Fridman, MSc Candidate a, Jessica L. Fraser-Thomas, PhD a, Steven R. McFaull, MSc b, Alison K. Macpherson, PhD a

a School of Kinesiology and Health Science, York University, Toronto, Ontario, Canada
b Injury and Child Maltreatment Section, Health Surveillance and Epidemiology Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, Ottawa, Ontario

Liraz Fridman
York University
Department of Kinesiology & Health Science
Bethune College
4700 Keele Street
Toronto, Ontario, Canada
M3J 1P3
liraz@yorku.ca
(647) 272-7041

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Abstract

Background

Although injuries related to sports and recreation represent a significant burden to children and youth, few studies have examined the descriptive epidemiology of sports related injury since 2005, and some sports such as ringette have not been evaluated to date. The primary purpose of this study was to provide the descriptive epidemiology of sports-related injuries treated in emergency departments for children and youth aged 5 – 19.

Methods

A retrospective data analysis was performed using data from the Canadian Hospitals Injury Reporting and Prevention Program [CHIRPP] from fiscal years (April – March) 2007/08 to 2009/10. CHIRPP is a computerized information system designed by the Public Health Agency of Canada that collects information about injuries to people evaluated in emergency departments across 11 pediatric hospitals and 5 general hospitals in Canada. Thirteen sports or activities were analyzed (baseball, basketball, cycling, football, ice hockey, lacrosse, ringette, rugby, skiing, sledding, snowboarding, soccer, and volleyball). Descriptive statistics, including frequency by sport, age and sex, as well as the percent of concussions within each sport were calculated.

Results

Out of a total of 56, 691 reported sports and recreational injuries, soccer accounted for the largest proportion of injuries with 11,941 reported cases over the 3 year time period. Of these, approximately 30% were fractures. The 10 – 14 year age group reported the greatest proportion of injuries in 10 out of the 13 sports analyzed. In

addition, males reported a greater number of overall injuries than females in 11 out of the 13 sports analyzed. The largest percentage of concussions was reported in ringette; these injuries accounted for 17.1% of overall injuries within this sport.

Conclusions

Although males were injured most frequently in the majority of sports, females tended to suffer from a higher percentage of concussion-related injuries in some sports. Injury prevention programs in Canada should focus on improving evidence-based programs to reduce the burden of injuries in all sports.

Key words

Epidemiology, sports-related injuries, pediatric injuries

Background

Sports-related injuries (SRIs) are defined as injuries that occur as a result of participating in physical activity for the purposes of competition or recreation; these injuries involve individuals who participate in both organized and unorganized sports, and are the second leading cause of emergency department (ED) visits.[1-3] In Canada, injury is the leading cause of death for young people aged 1 to 34.[4] Over 4 million SRIs sustained by children and adolescents are evaluated in emergency departments throughout the United States each year.[5] In 2011 a study conducted by the Canadian Community Health Survey (CCHS), reported that two out of three injuries that are sustained by adolescents are related to sports.[4] Furthermore, the Public Health Agency of Canada (PHAC) reports that 30% of injuries in children aged 5- 9 years, 68% of injuries in children aged 10 – 14 years, and 55% of injuries in children aged 15 – 19 years that are treated in an ED are related to a sports or recreational activity.[6] In one study from British Columbia Canada, between 1992 and 2005, there was a 28% increase in the number of injuries that result from sports activity.[2] As the number of injuries resulting from sport continues to increase, the risk of sustaining an injury needs to be elucidated.

There has been some research conducted on sex differences in relation to sports injuries throughout the literature, however researchers have reported inconsistent findings. In one study using data from the Canadian Hospitals Injury Reporting and Prevention Program [CHIRPP] from British Columbia Canada, males reported 68% of the total SRIs.[2] Other studies reported sex differences by sport. For example, one study examining the incidence of soccer-related injuries between males and females reported that the proportion of males who had a sports-related injury while participating in soccer

was 89% compared to 11% in females.[1] In a recent study conducted in 2010, the authors examined differences between the severity of injuries reported by both sexes. In this study, boys were more likely to be diagnosed with lacerations, fractures, and dislocations whereas girls were more likely to sustain strains and traumatic brain injuries (TBIs).[7] Overall, it is unclear whether males or females are more likely to sustain SRIs and how the severity of these injuries differ by sport.

In the United States, football, basketball and baseball are associated with the greatest number of injuries in children under the age of 18. However; the nature and mechanism of injury vary by age, sex, and sport.[5, 7-10] According to one study conducted in the US, between 2001 and 2005 football was associated with an estimated 1,111,917 injuries to children between the ages of 7 to 17 years who were assessed in an ED.[10] Older participants (12 – 17 years) were twice as likely to sustain a TBI, sprain/strain, or fracture when compared to younger participants (7 – 11 years). [10] In another study conducted in the US, between 1997 and 2007, pediatric basketball related injuries accounted for 375,350 visits to an ED.[7] Adolescents aged 15 to 19 years made up 50.7% of all the basketball related injuries evaluated in an ED. This amounted to a rate of 9.3 injuries per 1000 individuals.[7] In addition, boys made up approximately 75% of the basketball related injuries seen in an ED.[2, 7] Most injuries sustained by children who played basketball included fractures, dislocations, and TBIs although these varied by age. Baseball accounts for the most SRIs after football and basketball in the US; between 1994 and 2006 baseball accounted for 43,052 injuries reported to an ED by children 18 years and younger.[9] Approximately 44% of injuries that occur to children who participate

in baseball are maxillofacial fractures. In baseball, sliding was the mechanism of injury that caused the greatest proportion of fractures among children of all ages.[9]

There is a paucity of research on pediatric SRIs in Canada. In one Canadian study, cycling, basketball and soccer accounted for the greatest number of reported injuries to a pediatric hospital in British Columbia.[2] In Canada, soccer and hockey are among the most prevalent sports played by youth.[11-12] Clark (2008) reported that nearly 20% of Canadian youth play soccer. [12] Another study in Vancouver Canada reported that ice hockey injuries reported to the British Columbia Children's Hospital increased from 65 in 1992 to 161 in 2005.[2] Burt and Overpeck (2001) found that cycling had the highest number of injuries of any sport in Canada, accounting for 13.5% of all SRIs.[3] Similarly in a US study conducted between 2006 and 2007, cycling, basketball, playground injuries, and football resulted in the largest number of sports-related ED visits.[5]

Overall, past research shows the nature, severity, and mechanism of pediatric injuries associated with participating in a variety of sports varies by sport, age group and sex; however, some sports such as ringette have never been evaluated to date. Further, there is a paucity of research comparing the percent of concussions to all other injuries within individual sports, and research comparing the percentage of concussions to all other injuries by sex and sport has not been reported. It is important to conduct more current research on the types of injuries that children are sustaining in order to provide parents, coaches, and other stakeholders with knowledge about the risk of being injured while participating in sport-related activities. This study provides insight on the distribution of injuries in various sports and highlights the frequency of participating in specific sports for children of different ages. In addition, this study adds knowledge to

the field of pediatric SRIs by specifically examining the percent of concussions between sexes in a variety of sports.

The primary purpose of this study was to provide the descriptive epidemiology of SRIs treated in Canadian emergency departments for children and adolescents aged 5 – 19 from 2007/08 to 2009/10. A secondary purpose in this study was to further examine the percent of concussions in comparison to all other injuries within each sport reported by children and youth, with a focus on age and sex differences.

Methods

Data Collection

We conducted a retrospective analysis of data from the Canadian Hospitals Injury Reporting and Prevention Program [CHIRPP] for the 2007/08 – 2009/10 perio. CHIRPP is a computerized information system designed by the Public Health Agency of Canada that collects information about injuries to people evaluated in emergency departments across 11 pediatric hospitals and 5 general hospitals in Canada. These hospitals are located in Newfoundland, Quebec, Ontario, Manitoba, Alberta, and the Northwest Territories. When a patient arrives at the hospital the injured person or a caregiver fills out a voluntary CHIRPP form where information surrounding the circumstances of the injury are recorded including factors that contributed to the injury, the nature of the injury, body parts injured, the patient's age and sex, as well as any treatment that was provided. The capture rate varies by hospital, currently between 80 – 100%. Children aged 5 to 19 who sought care in an ED between fiscal years (April – March) 2007/08 and 2009/10 were evaluated in this study.

Study Variables

The primary outcome measure in this study was any sports-related injury reported by Canadian youth and evaluated in an emergency department that participated in CHIRPP. The secondary outcome measure was the percent of concussions compared to other injuries within the same sport.

Thirteen sports/recreational activities were evaluated including baseball, basketball, cycling, football, ice hockey, lacrosse, ringette, rugby, skiing, sledding, snowboarding, soccer, and volleyball. These sports were chosen because they are popular sports that are coded in the CHIRPP database and some sports such as ringette have not been evaluated to date. A number of variables were analyzed in this study including age, sex, and nature of injury. Age groups were separated into three categories: 5 – 9 years, 10 – 14 years, and 15 – 19 years; these age groups were chosen because they broadly reflect developmental stages and are standardly used by the Public Health Agency of Canada.[13] Further, we examined the percent of concussions within each sport, stratified by age and sex. Using the number of other injuries within the sport as the denominator allowed us to estimate the risk of a concussion controlling for the total number of injured children and youth in each sport.

Statistical Analyses

Descriptive statistics and the percent of concussions in comparison to all other injuries within each sport were calculated. Data analyses were conducted using SPSS version 20.

Results

Age Differences

Between 2007 and 2010 a total of 56,691 SRIs were evaluated in Canadian emergency departments at CHIRPP hospitals. Children and adolescents aged 10 – 14 reported over half (56.6%) of the SRIs evaluated in an ED. In 11 out of the 13 sports analyzed, the 10 – 14 age group reported the greatest number of injuries; see Table 1. This was with the exception of sledding in which the 5 – 9 age group reported the greatest number of injuries and rugby where the 15 – 19 age group reported the greatest number of injuries.

Sex Differences

In general, males reported the majority of SRIs (71.1%). Specifically, in 11 out of the 13 sports analyzed, males reported a greater number of injuries to a CHIRPP hospital than females; see Table 1. This was with the exception of volleyball and ringette where females reported a greater number of injuries. In addition, individuals who were injured in soccer, skiing and sledding showed nearly an equal amount of injuries between the sexes.

Sports Differences

Out of a total of 56,691 reported SRIs that were evaluated in a Canadian emergency department at a CHIRPP hospital, 11,941 (21%) were sustained by youth participating in soccer; see Table 1. The sport with the lowest number of reported injuries was Ringette, which accounted for a total of 324 (0.57%) injuries.

Nature of Injury

The nature of injuries for individuals who reported a sports-related injury to a CHIRPP hospital varied by sport discipline. In 6 out of the 13 sports analyzed, fractures accounted for the leading diagnoses among children and adolescents participating in a variety of sports; see Table 2. In basketball and volleyball, the leading diagnoses were sprains/strains. In the remaining 5 sports that included ice hockey, sledding, rugby, baseball, and ringette, the diagnoses belonged to the 'other' category.[a]

Percent Concussions

The greatest percent of concussions was reported in ringette; these injuries accounted for 17.1% of overall injuries within this sport. Although there are variations by age group, in general girls sustained a higher percentage of concussions in 6 out of the 13 sports analyzed. Males had higher percentages of concussions than females in basketball, cycling, football, lacrosse, sledding and snowboarding. Boys and girls had a similar percentage of concussions in skiing. When age and sex were included, female children aged 5 – 9 who participated in ringette reported the greatest percentage of concussions (20.7%) in comparison to all other injuries within this sport. Males aged 10 – 14 who played hockey sustained the greatest percentage of concussions among males of which concussions accounted for 11.4% of all hockey injuries in that age group. The lowest percentage of concussions was seen in children and youth who played volleyball (1.9%).

Discussion

During the three-year study period between 2007-2010 some general trends were apparent within the injury data across sports. First, youth participating in soccer

accounted for the greatest number of sports-related injuries evaluated in an emergency department. As previously noted, soccer is the most popular sport in Canada, which could explain the high injury rates in this sport.[12] Further, given that soccer is a sport that requires minimal equipment, children and youth who are injured as a result of playing soccer may be sustaining injuries during unorganized play.

In general, males sustained a greater number of overall injuries than females in every sport except for volleyball and ringette. In addition children participating in soccer, sledding, and skiing reported nearly an equal number of injuries irrespective of sex. A study performed by Pakzad-Vaezi in 2011 reported similar findings; in their study males accounted for 68% of the SRIs reported to emergency departments.[2]

The highest percentage of concussions was reported among females between the ages of 5 and 9 participating in ringette. Throughout the literature there was a paucity of research comparing the percentage of concussions sustained by males and females of different ages within each sport. The findings in this study are consistent with Randazzo et al. who reported that girls were more likely to sustain a TBI.[7] This was the first study to report on the percentage of concussions seen in ringette and the findings show that young girls are reporting the greatest number of concussions in comparison to all other injuries within this sport.

Youth between the ages of 10 and 14 reported the greatest number of injuries in every sport except for sledding where children aged 5-9 reported the majority of injuries and rugby where adolescents aged 15-19 reported the majority of injuries. These findings are consistent with the literature on SRIs. Several studies have demonstrated that youth

aged 10-14 most frequently report a SRI to the emergency department.[1, 3-4, 14-15] The Public Health Agency of Canada reports that 68% of SRIs occur to children aged 10-14.[6]

Several studies that have examined the nature of sport-related injuries among youth reported that fractures were most frequently evaluated in the emergency departments. [1, 5, 10, 16] A study performed by Taylor and Attia in 2000 showed that fractures accounted for 29.4% of all sports-related diagnoses.[14] Our study was consistent with the literature as fractures were the most common diagnosis in 6 out of the 13 sports, with the exception of volleyball and basketball where sprains/strains were more frequently diagnosed, and ice hockey, sledding, rugby, baseball, and ringette where 'other' injuries were most frequently diagnosed.

The main strength of this study is that our findings are generalizable to Canadians because we drew upon data from many provinces.[17] The main limitation of this study is that we were only able to capture youth who were evaluated in an emergency department with the CHIRPP surveillance system for a SRI. Unfortunately our study could not account for children and adolescents who were seen in other emergency departments or by a family physician, chiropractor, sports therapist, etc. Therefore the number of sustained injuries over this time period was certainly higher than the statistics presented here. In addition, because CHIRPP uses self-reported data this may have introduced a recall bias into our study. Finally, without knowing how many youth participated in formal and informal sport and physical activity within this time period, we could not calculate rates of injury in this study. Future studies should focus on obtaining participation rates in order to be able to evaluate a truer measure of sports risk.

Conclusions

Injuries sustained by youth in Canada differ greatly by age, sex, and sport discipline. In Canada, future injury prevention should focus on youth participating in soccer as it showed the greatest amount of SRIs. In addition, injury prevention policies should also target children aged 10-14. Although males are injured most frequently in the majority of sports females tend to suffer from a higher percentage of concussions in comparison to all other injuries in some sports and therefore more attention needs to be put on preventing concussions among females in sports such as ringette. Concussion prevention strategies need to take age and gender into account. The need to incorporate evidence-based strategies and policies that reduce injuries is reflected in these data.

List of Abbreviations

SRI: Sports-related injuries

ED: Emergency Department

CCHS: Canadian Community Health Survey

PHAC: Public Health Agency of Canada

CHIRPP: Canadian Hospitals Injury Reporting and Prevention Program

TBI: Traumatic Brain Injury

Authors' Contributions

LF performed the statistical analyses and drafted the manuscript for this study. JLFT made critical revisions to the manuscript. SRM helped in the acquisition and organization of data. AKM aided in designing the study and interpreting the data. All authors read and approved the final manuscript.

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Endnotes

[a] A detailed description of all categories can be found at: http://www.phac-aspc.gc.ca/injury-bles/chirpp/#sec3

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Tables

Table 1: Age and Sex Distribution 2007 – 2010

Sport/Activity	N = 56,691(%)	Age Group (yr), # (%)			% Male
		5-9	10-14	15-19	
Soccer	11,941 (21.1)	1,949(16.3)	6,946 (58.2)	3,046 (25.5)	57.7
Ice Hockey	9,413 (16.6)	681 (7.2)	5,694 (60.5)	3,038 (32.3)	89.6
Cycling	8,935 (15.8)	3,009(33.6)	4,473 (50.1)	1,453 (16.3)	73.5
Basketball	7,698 (13.6)	492 (6.4)	4,684 (60.9)	2,522 (32.8)	65.2
Football	6,141 (10.8)	388 (6.3)	3,672 (59.8)	2,081 (33.9)	91.7
Snowboarding	3,194 (5.6)	153 (4.8)	2,021 (63.3)	1,020 (31.9)	73.5
Skiing	1,970 (3.5)	470 (23.9)	1,108 (56.2)	392 (19.9)	58.4
Sledding	1,793 (3.2)	861 (48.0)	821 (45.8)	111 (6.2)	56.1
Rugby	1,651 (2.9)	8 (0.5)	376 (22.8)	1.267 (76.7)	68.4
Baseball	1,633 (2.9)	271 (16.6)	949 (58.1)	413 (25.3)	70.7
Volleyball	1,505 (2.7)	43 (2.9)	873 (58.0)	589 (39.1)	37.3
Lacrosse	493 (0.1)	26 (5.3)	291 (59.0)	176 (35.7)	85.0
Ringette	324 (0.1)	29 (9.0)	210 (64.8)	85 (26.2)	2.5

Table 2: Nature of Injury Distribution, 2007 – 2010

Sport/Activity	Nature of Injury, # (%)				
	Fractures	Sprains/Strains	Soft Tissue Injuries	Concussions	Other
Soccer	3590 (30.1)	2699 (22.6)	2628 (22.0)	413 (3.5)	2611 (21.9)
Ice Hockey	2447 (26.0)	1212 (12.9)	2154 (22.9)	1023 (10.9)	2577 (27.4)
Cycling	3028 (33.9)	463 (5.2)	1334 (14.9)	356 (4.0)	2194 (24.6)
Basketball	2046 (26.6)	2246 (29.2)	1591 (20.7)	170 (2.2)	1645 (21.4)
Football	2046 (33.3)	1113 (18.1)	1274 (20.7)	345 (5.6)	1363 (22.2)
Snowboarding	1783 (55.8)	350 (11.0)	429 (13.4)	217 (6.8)	415 (13.0)
Skiing	756 (38.4)	338 (17.2)	335 (17.0)	118 (6.0)	423 (21.5)
Sledding	582 (32.5)	158 (8.8)	351 (19.6)	99 (5.5)	603 (33.7)
Rugby	391 (23.7)	259 (15.7)	328 (19.9)	182 (11.0)	491 (29.7)
Baseball	392 (24.0)	189 (11.6)	386 (23.6)	47 (2.9)	619 (37.9)
Volleyball	367 (24.4)	490 (32.6)	334 (22.2)	0 (0.0)	314 (20.9)
Lacrosse	154 (31.2)	81 (16.4)	109 (22.1)	19 (3.9)	120 (24.3)
Ringette	48 (14.8)	60 (18.5)	73 (22.5)	54 (16.7)	89 (27.5)

Table 3: Percent Concussion Distribution for Females 2007 – 2010

Sport/Activity	Age Group (yr), # (%)			% of concussions all ages
	5-9	10-14	15-19	
Ringette	6 (20.7)	36 (17.5)	12 (14.8)	17.1
Ice Hockey	*	74 (12.5)	52 (16.3)	13.3
Rugby	0 (0.0)	11 (14.5)	53 (11.9)	12.3
Snowboarding	*	21 (4.4)	24 (7.1)	5.5
Skiing	5 (2.4)	24 (5.2)	20 (13.6)	6.0
Football	0 (0.0)	12 (3.8)	6 (3.7)	3.5
Sledding	13 (3.5)	17 (4.8)	6 (10.2)	4.6
Cycling	35 (3.2)	40 (3.8)	8 (3.7)	3.5
Lacrosse	*	0 (0.0)	0 (0.0)	2.7
Soccer	8 (1.5)	96 (3.2)	107 (7.0)	4.2
Baseball	*	18 (6.6)	*	4.6
Basketball	*	33 (1.8)	23 (3.2)	2.1
Volleyball	0 (0.0)	15 (2.6)	5 (1.5)	2.1

* Cell size <5

Table 4: Percent Concussion Distribution for Males 2007 – 2010

Sport/Activity	Age Group (yr), # (%)			% of concussions all ages
	5-9	10-14	15-19	
Ice Hockey	56 (9.1)	580 (11.4)	257 (9.5)	10.6
Rugby	0 (0.0)	30 (10.0)	87 (10.6)	10.4
Snowboarding	6 (6.7)	89 (6.4)	76 (8.7)	7.3
Skiing	12 (4.6)	40 (6.2)	17 (6.9)	6.0
Football	9 (2.5)	178 (5.3)	140 (7.3)	5.8
Sledding	36 (3.5)	17 (4.8)	*	6.3
Cycling	54 (2.8)	152 (4.4)	67 (5.4)	4.2
Lacrosse	*	13 (5.2)	*	4.1
Soccer	39 (2.7)	110 (2.8)	53 (3.5)	2.9
Baseball	*	15 (2.2)	6 (2.3)	2.2
Basketball	6 (1.6)	76 (2.7)	31 (1.7)	2.3
Volleyball	0 (0.0)	7 (2.3)	*	1.4

* Cell size <5

** No males sustained a concussion playing ringette

Chapter 4

EXPANDED RESULTS

Descriptive Statistics

Between 2007 and 2010 a total of 56,691 sports-related injuries were evaluated in Canadian emergency departments at CHIRPP hospitals. Out of these reported injuries, 11,941 were sustained by youth participating in soccer. The sport with the lowest number of reported injuries was ringette, which accounted for a total of 324 injuries. Children and adolescents aged 10 – 14 reported over half (56.6%) of the sports-related injuries evaluated in an ED. In addition, males reported the majority of sports-related injuries (71.1%). The greatest percentage of concussions was reported in ringette, these injuries accounted for 16.7% of overall injuries within this sport. The age, sex, body part injured, nature of injury and the percentage of concussion differed by sport.

Soccer

Soccer accounted for the greatest number of injuries between 2007 and 2010 (N = 11,941, 21.1% of all sports injuries). Youth between the ages of 10 and 14 were injured most frequently (58.2%), see Table 1[a].The majority of soccer injuries were sustained by males (57.7%), see Table 2. The most frequently diagnosed injuries were fractures (30.1%) and sprains/strains (22.6%), see Table 3. The body part that was most frequently injured belonged to the 'other' category (37.8%) and the ankle (16.1%), see Table 4. Concussions accounted for 3.5% of all soccer related injuries with the highest percentage reported in females aged 15 – 19 (7.0%), see Table 11.

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[a] Tables and figures display the same results

Hockey

Hockey had the second highest number of reported sports-related injuries within the 3-year study period (N = 9,413, 16.6% of all sports injuries). Youth between the ages of 10 and 14 were injured most frequently (60.5%), see Table 12. The majority of hockey injuries were sustained by males (89.6%), see Table 13. The most frequently diagnosed injuries were fractures (26.0%) and soft tissue injuries (22.9%), see Table 14. The body part that was most frequently injured belonged to the 'other' category (37.7%), see Table 15. Concussions accounted for 10.9% of all hockey related injuries with the highest percentage reported in females aged 15 – 19 (16.3%), see Table 22.

Cycling

Cycling accounted for 8,935 (15.8%) injuries reported by children and adolescents between 2007 and 2010. Youth between the ages of 10 and 14 were injured most frequently (50.1%), see Table 23.The majority of cycling injuries were sustained by males (73.5%), see Table 24. The most frequently diagnosed injuries were fractures (33.9%) and open wounds (17.5%), see Table 25.The body part that was most frequently injured belonged to the 'other' category (24.5%) followed by the forearm (13.3%), see Table 26. Concussions accounted for 4.0% of all cycling related injuries with the highest percentage reported in males' aged 15 – 19 (5.4%), see Table 33.

Basketball

Basketball accounted for 7,698 (13.6%) of all reported sports-related injuries. Youth between the ages of 10 and 14 were injured most frequently (60.8%), see Table 34. The majority of basketball injuries were sustained by males (65.2%), see Table 35. The most frequently diagnosed injuries were sprains/strains (29.2%) and fractures (26.6%),

see Table 36. The body part that was most frequently injured belonged to the 'other' category (26.9%) followed closely by the finger/thumb (25.6%), see Table 37. Concussions accounted for 2.2% of all basketball related injuries with the highest percentage reported in females aged 15 – 19 (3.2%), see Table 44.

Football

Football accounted for 6,141 (10.8%) of all reported sports-related injuries. Youth between the ages of 10 and 14 were injured most frequently (59.8%), see Table 45. The majority of football injuries were sustained by males (91.7%), see Table 46. The most frequently diagnosed injuries were fractures (33.3%) and soft tissue injuries (20.7%), see Table 47. The body part that was most frequently injured belonged to the 'other' category (31.8%) followed by the finger/thumb (18.5%), see Table 48. Concussions accounted for 5.6% of all football related injuries with the highest percentage reported in males aged 15 – 19 (7.3%), see Table 55.

Snowboarding

Snowboarding accounted for 3,194 (5.6%) of all reported sports-related injuries. Youth between the ages of 10 and 14 were injured most frequently (58.3%), see Table 56. The majority of snowboarding injuries were sustained by males (73.6%), see Table 57. The most frequently diagnosed injuries were fractures (55.8%) and soft tissue injuries (13.4%), see Table 58. The body part that was most frequently injured belonged to the 'other' category (40.0%) followed by the forearm (27.8%), see Table 59. Concussions accounted for 6.8% of all snowboarding related injuries with the highest percentage reported in males aged 15 – 19 (8.7%), see Table 66.

Skiing

Skiing accounted for 1,970 (3.5%) of all reported sports-related injuries. Youth between the ages of 10 and 14 were injured most frequently (56.2%), see Table 67. The majority of skiing injuries were sustained by males (58.4%), see Table 68. The most frequently diagnosed injuries were fractures (38.4%), sprains/strains (17.2%) and soft tissue injuries (17.0%), see Table 69.The body part that was most frequently injured belonged to the 'other' category (40.7%) followed by the knee (16.0%), see Table 70. Concussions accounted for 6.0% of all skiing related injuries with the highest percentage reported in females aged 15 – 19 (13.6%), see Table 77.

Sledding

Sledding accounted for 1,793 (3.2%) of all reported sports-related injuries. Youth between the ages of 5 and 9 were injured most frequently (48.0%), followed closely by 10-14 year olds (45.8%), see Table 78.The majority of sledding injuries were sustained by males (56.1%), see Table 79. The most frequently diagnosed injuries were fractures (32.5%) and soft tissue injuries (19.6%), see Table 80. The body part that was most frequently injured belonged to the 'other' category (46.0%), see Table 81. Concussions accounted for 5.5% of all sledding related injuries with the highest percentage reported in females' aged 15 – 19 (10.2%), see Table 88.

Rugby

Rugby accounted for 1,651 (2.9%) of all reported sports-related injuries. Youth between the ages of 15 and 19 were injured most frequently (76.7%), see Table 89. The majority of rugby injuries were sustained by males (68.4%), see Table 90. The most frequently diagnosed injuries were fractures (23.7%) and soft tissue injuries (19.9%), see

Table 91. The body part that was most frequently injured belonged to the 'other' category (39.4%), see Table 92. Concussions accounted for 11.0% of all rugby related injuries with the highest percentage reported in females aged 15 – 19 (11.9%), see Table 97.

Baseball

Baseball accounted for 1,633 (2.9%) of all reported sports-related injuries. Youth between the ages of 10 and 14 were injured most frequently (58.1%), see Table 98. The majority of baseball injuries were sustained by males (70.7%), see Table 99. The most frequently diagnosed injuries were fractures (24.0%) and soft tissue injuries (23.6%), see Table 100. The body part that was most frequently injured belonged to the 'other' category (39.4%) followed by the face (17.8%). Concussions accounted for 2.9% of all baseball related injuries with the highest percentage reported in females aged 10 – 14 (6.6%), see Table 108.

Volleyball

Volleyball accounted for 1,505 (2.7%) of all reported sports-related injuries. Youth between the ages of 10 and 14 were injured most frequently (58.0%), see Table 109. The majority of volleyball injuries were sustained by females (62.7%), see Table 110. The most frequently diagnosed injuries were sprains/strains (32.6%) and fractures (24.4%), see Table 111. The body part that was most frequently injured belonged to the 'other' category (33.4%) followed by the ankle (25.2%), see Table 112.. The lowest percentage of concussions were reported in volleyball, concussions accounted for 1.9% of all volleyball related injuries with the highest percentage reported in females aged 10 – 14 (2.6%), see Table 117.

Lacrosse

Lacrosse accounted for the second lowest number of injuries between 2007 and 2010 (N = 493, 0.9% of all sports injuries). Youth between the ages of 10 and 14 were injured most frequently (59.0%), see Table 118. The majority of lacrosse injuries were sustained by males (85.0%), see Table 119. The most frequently diagnosed injuries were fractures (31.2%) and soft tissue injuries (22.1%), see Table 120.The body part that was most frequently injured belonged to the 'other' category (34.7%) and the wrist (10.3%), see Table 121. Concussions accounted for 3.9% of all lacrosse related injuries with the highest percentage reported in females aged 15 – 19 (5.9%), see Table 127.

Ringette

Ringette accounted for the lowest number of injuries between 2007 and 2010 (N = 324, 0.6% of all sports injuries). Youth between the ages of 10 and 14 were injured most frequently (64.8%), see Table 128. The majority of ringette injuries were sustained by females (97.5%), see Table 129. The most frequently diagnosed injuries were soft tissue injuries (22.5%) and sprains/strains (18.5%), see Table 130. The body part that was most frequently injured belonged to the 'other' category (41.7%), see Table 131. The highest percentage of concussions was reported in ringette, concussions accounted for 16.7% of all ringette related injuries with the highest percentage reported in females aged 5 – 9 (20.7%), see Table 135.

Chapter 5

EXTENDED DISCUSSION

Descriptive Epidemiology of Sports-Related Injuries

In this study we found that over the three-year study period between 2007 and 2010, soccer accounted for the greatest number of injuries reported by children and youth presenting to a CHIRPP ED. Our findings were consistent with other studies. According to Giannotti et al. (2010), soccer is the most prevalent sport played by Canadians with the highest proportion of players being youth. They reported that approximately 50% of ED visits related to a soccer injury occurred to children between the ages of 10 and 14. In addition, of all age groups males accounted for the highest proportion (70.0%) of soccer-related injuries. Similarly, Clark (2008) reported that nearly 20% of Canadian youth play soccer. Leininger et al. (2007) examined the epidemiology of pediatric soccer-related injuries that presented to a US ED from 1990 to 2003. They reported that during this time children and youth sustained an estimated 1,597,528 soccer-related injuries. Boys reported the majority (58.6%) of soccer-related injuries. In addition the 10 – 14 age group reported nearly half (49.0%) of the soccer-related injuries. Our findings were consistent with these studies, males accounted for 57.7% of all soccer-related injuries and the 10 – 14 age group accounted for 58.2% of the sample. Therefore the popularity of soccer among Canadian youth may be the driving force behind the increased number of injuries rather than an increased risk of injury. Nevertheless examining factors to prevent injuries in soccer may result in fewer injuries.

The number of SRIs by sport differs slightly between the US and Canada. In the US, basketball, football, and baseball accounted for the greatest amount of SRIs reported

to EDs. In our study basketball accounted for 7,698 (13.6%) of total injuries between 2007 and 2010, followed by football (10.8%). In addition, Canadian children and youth injured while participating in baseball accounted for 2.9% of the sample. Taylor and Attia (2000) conducted a study examining SRIs in children over a two-year time period during 1995 – 1997. They reported that in the US SRIs accounted for 3.7% of the ED visits by children at this time. The majority of children evaluated in the ED were males (71%) and in the 12 – 18 age group (61%). In addition, the following sports accounted for 76% of the total injuries including basketball (19.5%), football (17.1%), baseball/softball (14.9%), soccer (14.2%), rollerblading/skating (5.7%), and hockey, ice and in-line (4.6%). The nature of these SRIs fell into four main categories, sprains/strains made up the majority of injuries (32.0%), followed by fractures (29.4%), contusions/abrasions (19.3%), and lacerations (9.7%). Similarly, Randazzo et al. (2010) found that between 1997 and 2007 there was an estimated 4,128,853 basketball-related injuries reported to a US ED among children and youth; nearly three quarters of these injuries (74.2%) were sustained by males. In addition, one-half (50.7%) of basketball-related injuries were sustained by adolescent's aged 15 to 19. The most common injury diagnoses were strains and sprains (44.8%), followed by fractures and dislocations (22.0%). Our study showed similar findings when comparing sexes, as males accounted for the majority (65.2%) of children injured while participating in basketball. In addition, our study also showed that sprains/strains were the leading diagnoses for basketball-related injuries accounting for 29.2% of all injuries. However, unlike Randazzo et al. (2010), our study found that children aged 10 – 14 sustained the majority (60.9%) of basketball-related injuries followed by the 15 – 19 age group (32.8%).

As previously mentioned, in the US football accounts for the greatest number of SRIs after basketball. Mello et al. (2009) found that between 2001 and 2005 children and youth report an estimated 1,111,917 football-related injuries to a US ED; males sustained the majority of these injuries. Specifically, males' aged 12 to 17 reported four times the number of football-related injuries compared to older children. Similarly, O'Rourke et al. (2007) examined the epidemiology of soccer, Gaelic football, and rugby in Ireland. Their study reported an increasing presentation of SRIs with increasing age for all three sports. In our study, football accounted for 10.8% of all SRIs sustained by children and youth between 2007 and 2010. Males accounted for 91.7% of all football-related injuries and children aged 10 – 14 accounted for 59.8% of the injuries.

Baseball is the third sport in which the majority of SRIs are reported in the US. Lawson et al. (2009) conducted a study examining baseball-related injuries to children treated in EDs in the US from 1994 – 2006. Over the 13-year time period 43,052 baseball-related injuries sustained by children aged 18 and under were reported to an ED. Boys accounted for the majority (83%) of these injuries. In their study the most common diagnosis was soft tissue injuries (34.3%) and, baseball only accounted for 2.9% of all SRIs. Some of these differences are likely due to differences in participation rates between the two countries.

The top five sports that accounted for the majority of injuries in our study included soccer (21.1%), ice hockey (16.6%), cycling (15.8%), basketball (13.6%), and football (10.8%). After soccer, ice hockey accounts for the highest number (n = 9,413) of injuries sustained by Canadian children and youth. In this study males accounted for 89.6% of youth injured playing hockey and children aged 10 – 14 sustained 60.5% of

these injuries. The most common diagnoses included injuries that fell into the 'other' category (27.4%) followed by fractures (26.0%). Similar trends were observed in another Canadian study. Pakzad-vaezi and Singhal (2011) examined trends in pediatric sport and recreation-related injuries at the British Columbia Children's Hospital between 1992 and 2005. Children aged 10 to 14 were the only age group to show a significant upward trend in sports-related injuries reported to an ED during the study period. Cycling accounted for the majority (13.5%) of all sports injuries followed by basketball (11.7%), soccer (10.7%), ice hockey (5.4%), and lacrosse (0.4%). In addition, Yard and Comstock (2006) found that between 1990 – 2003, children engaged in ice hockey accounted for an estimated 172,128 injuries reported to a US ED. The most common diagnoses for injuries while playing ice hockey were contusions/abrasions, sprains/strains, fractures, and lacerations.

Throughout the literature, snow sports such as skiing, sledding, and snowboarding accounted for a number of injuries seen in US EDs. In our study snowboarding, skiing, and sledding related injuries accounted for 5.6%, 3.5%, and 3.2% of the sample respectively. Meyers et al. (2007) state that in the US there are over 500,000 skiing-related injuries per year; 180,000 of these injuries are sustained by children aged 16 and under. Howell et al. (2010) reported that between 1997 and 2007, an estimated 22,023 patients aged 0 – 19 were treated in a US ED for a sledding-related injury. Of these injuries, children aged 10 to 14 sustained the largest proportion of injuries (42.4%) followed by children aged 5 to 9 (29.5%). In addition, boys sustained the majority of sledding-related injuries (59.8%). Fractures accounted for 26.3% of sledding-related injuries in children and youth over this time period. Throughout the literature there have

been few studies that examined age and sex specific differences in snowboarding-related injuries. In our study, males accounted for the majority (73.5%) of snowboarding-related injuries and the 10 – 14 age group accounted for 63.3% of the sample. The most common diagnoses for these injuries included fractures (55.8%).

In our study the smallest number of SRIs were sustained by children and youth participating in volleyball, lacrosse, and ringette. Volleyball and ringette showed unique results because they were the only two sports where females sustained more injuries than males. In our study, females accounted for 62.7% of the volleyball injuries and the most common diagnoses included strains/sprains (32.6%). Similarly, Pollard et al. (2011) reported that in their study that examined pediatric volleyball-related injuries treated in US EDs between 1990 and 2009 children and youth under the age of 18 reported an estimated 692,024 volleyball-related injuries. This averaged to 34,601 injuries annually. Girls accounted for the majority (71%) of volleyball-related injuries. The most common injury diagnosis for children and youth playing volleyball were strains/sprains (54%). In another US study Yard and Comstock (2006) found that an estimated 85,039 US children who played lacrosse were injured over the 13 year time period of their study. The most common diagnoses for children injured while playing lacrosse included contusions/abrasions, sprains/strains, and fractures. In our study there were only 493 lacrosse-related injuries over the 3-year period, the majority of which were fractures (31.2%). Finally, we could not locate previous studies related to ringette injuries. In our study however ringette accounted for the lowest number of injuries sustained by children and youth (n = 324, 0.1%). However, many of these injuries (16.7%) were diagnosed as

concussions and suggesting that monitoring trends in ringette injuries over time is warranted.

There is substantial variation in the literature regarding which age group, sex, and sport sustained the highest number of injuries. In our study, children and youth in the 10 – 14 age group sustained over half (56.6%) of SRIs. and males sustained 71.1% of the injuries. Similarly, Burt and Overpeck (2001) conducted a study that examined ED visits for SRIs in the US between 1997 and 1998. They found that the rate of visits by males for SRIs was more than double that for female patients. In addition children and youth aged 5 to 24 were most frequently injured while participating in basketball and pedal cycling. Caine et al. (2008) reported that in sports played my males, the risk for injury is greater among older boys. They believe that this is related to their speed and weight, which allows them to generate more force on contact. However, they also note that the relationship between age and sex for risk of injury differs by sport. In addition, differences in biological maturity between boys and girls who have varying levels of physical development may also contribute to the risk of injury in some contact sports such as football and ice hockey. To conclude, injury prevention strategies should be age, sex, and sport- specific.

Importance of Concussion Specific Research

There are numerous studies examining the epidemiology of head injuries in a variety of sports that report varying results in terms of which age group and sex are most at risk. Few studies specifically compare the number of head injuries to all other injuries sustained by children and youth by sport. In our study we examined the number of concussion-related injuries in comparison to all other injuries by age, sex, and sport.

The Canadian Institute for Health Information published an article in August 2006 that examined head injuries in Canada between 1993 – 1994 and 2003 – 2004. They reported that 28% of traumatic head injuries sustained by children and youth (0 – 19 years) were related to sports and recreational activities.

Some authors argue that older children are most at risk for sustaining a concussion while participating in a sports-related activity. Halstead et al. (2010) reported that in a recent review it was estimated that up to 3.8 million sports and recreation related concussions occur annually in the United States. In addition pediatric and adolescent age groups account for the majority of these concussions. Similarly, Yang et al. conducted a study in 2008 examining the hospitalizations for sports-related concussions in the US during 2001 – 2004. They reported that during this time period there were 742 annual hospitalizations for sports-related concussions. Of these, about half (50.3%) occurred to youth between the ages of 15 and 18; boys were hospitalized for the majority (83.7%) of concussions. Other authors have reported that younger children are more at risk than older children for concussion-related injuries. Knox et al. (2006) reported that nearly 60% of children under the age of 6 had injuries that involved the head or face. Yard and Comstock (2006) found that younger children (aged 2 – 9 years) sustained double the proportion of head and face injuries while playing ice hockey and lacrosse in comparison to older children. In our study, older children aged 15 – 19 were the group that sustained the greatest percentage of concussions followed by the 10 – 14 age group. Therefore our results are consistent with some of the literature that shows that older children are more likely to sustain a concussion.

There is also a discrepancy throughout the literature about which sex is most at risk for head injury. Giannotti et al. (2010) found that the proportions of soccer-related concussions were similar for both sexes across age groups. In addition, Browne and Lam (2006) conducted a study in New South Wales, Australia between 2000 and 2003 that examined concussive head injury in children and adolescents related to sports activity. In their study the majority of children evaluated in an ED for a sports-related concussion were male (71.6%) and older than 10 (51.4%). In addition, football accounted for the greatest number of concussive injuries sustained by children and youth. Conversely, Halstead & Walter (2010) found that girls reported a higher rate of concussions than boys in similar sports. Some of the literature suggests that this may be because girls have weaker neck muscles or that boys are more reluctant to report their symptoms for fear of being removed from play (Halstead & Walter, 2010) . In our study, when examining sex differences without including age, girls reported a higher percentage of concussion-related injuries in 6 out of the 13 sports. Boys had a higher percentage of concussions in basketball, cycling, football, lacrosse, sledding and snowboarding. Boys and girls had a similar percentage of concussions in skiing. However, when age was accounted for the greatest percentage of concussions in comparison to all other injuries was seen among girls in the 5 – 9 age group (20.7%) who participated in ringette. Concussions in all age groups accounted for 17.1% of total injuries within ringette.

Finally, throughout the literature the number of reported head injuries also differs by sport. Bakhos et al. (2010) conducted a study in the US between 2001 and 2005 examining ED visits for concussion in youth and adolescents. They reported that approximately half of all ED visits for concussions were related to sports. In addition,

older children (14 – 19 years old) reported double the amount of sports-related concussions. Younger children (8 – 13 years old) were more likely to sustain a concussion while participating in cycling, playground activities, snow skiing, skateboarding, and horseback riding. The greatest number of reported ED visits for concussion resulted from football, followed by basketball, baseball, soccer, and ice hockey for both younger and older children. In contrast, Hayes and Groner (2008) conducted a study looking at the increasing incidence of snowboard-related trauma in a level one pediatric trauma center in the United States. In their study more than a quarter of the children sustained head trauma related to snowboarding. As previously mentioned, in our study females aged 5 – 9 who participated in ringette reported the greatest percentage of concussions compared to all other injuries within this sport. However, ringette is a sport predominantly played by females. When observing a similar sport predominantly played by males, ice hockey, the percentage of concussions among boys and girls in the same age groups show similar trends. Concussions sustained while participating in ice hockey accounted for 13.3% of all injuries for females and 10.6% for males. When comparing age groups, females aged 15 – 19 reported a higher percentage of concussions (16.3%) than males in the same age group (9.5%). These results suggest that the number of concussion-related injuries differs by age, sex, and sport and that some sports such as ringette warrant ongoing assessment.

Implications for Prevention

Overall, SRIs impact children and youth in a variety of ways and some preventative measures need to be implemented in order to keep them safe during sports participation. In our study, soccer accounted for the greatest number of overall injuries

(21.1%). Ankle sprain is one type of common injury seen among soccer players. Proprioception is an important factor in balance training and functional ability during soccer play. Warm-up programs such as the FIFA 11 + have been shown to significantly decrease the proprioception error and therefore decrease the number of soccer-related injuries (Daneshjoo et al., 2012). Programs that include balance training should be performed before soccer practices and games to reduce the number of injuries sustained in this sport.

In hockey, body checking is a major cause of serious injury specifically concussion-related injuries (Hagel et al., 2006; Macpherson et al., 2006; Emery et al., 2010). Concussions have debilitating symptoms and can affect an athlete over their lifetime. Specifically youth may experience fatigue, inattention, lack of concentration, memory loss, and headaches, which affects them in both their athletic and academic lives. In addition, repeated concussions may lead to chronic traumatic encephalopathy (CTE) that can have long-term effects including behavioral and personality changes, depression, and early dementia. For this reason, it has been suggested that body checking in ice hockey should be removed from younger levels of play because of physical differences in size between players in the same age groupings (Johnson, 2011). In addition, Emery et al. (2010) conducted a study examining the risk of injury associated with body checking among youth ice hockey players between Quebec where body checking is banned at the Peewee level (ages 11 – 12) and Alberta where body checking is currently allowed at the Peewee level. They reported that the estimated absolute risk reduction that would be achieved was 2.84 for game-related injuries, 0.72 for severe injuries, 1.08 for concussions, and 0.20 for severe concussions if body checking was not permitted in

Alberta. In addition, the decision to raise the body checking age in hockey occurred subsequent to research indicating an increase risk of concussions (Hagel et al., 2006; Macpherson et al., 2006; Emery et al., 2010). In our study the percentage of concussions related to a hockey injury were highest among females aged 15 – 19 (16.3%). These findings reflect the need to implement evidence-based strategies to reduce hockey injuries in Canada.

Other studies have shown the effectiveness of using helmets to reduce head injuries in a variety of sports. Hagel et al. (2005) examined the effectiveness of helmets in skiers and snowboarders in reducing head injury. They found that wearing a helmet while skiing or snowboarding reduces the risk of head injury by 29% - 56%. In addition, Bergenstal et al. (2012) conducted a study looking at injury patterns in helmeted and un-helmeted cyclists. They reported that 19.4% of concussions were found in the helmeted group whereas 37.4% were found in the un-helmeted group. This study shows the effectiveness of bicycle helmets in their reduction of head injury. In our study, cycling-related injuries were the third most common SRI after soccer and ice hockey. Concussions accounted for 4.0% of all cycling related injuries with the highest percentage seen in males aged 15 – 19 (5.4%). Our study demonstrates the need to utilize preventative measures such as helmet use to reduce the number of injuries seen in children and youth participating in cycling.

The results from this study demonstrate the need to implement various type of preventable measures such as eliminating body checking from younger leagues, enforcing the use of helmets and participating in balance training programs. The need to

incorporate evidence-based strategies and policies that reduce injuries is reflected in these data.

Strengths and Limitations

Our study had a number of strengths and limitations. The main strength of this study is that our findings are generalizable to Canadians because we drew upon data from many provinces. The biggest limitation of this study is that we were only able to capture youth who were evaluated in an emergency department with the CHIRPP surveillance system for a SRI. Unfortunately our study could not account for children and adolescents who were seen in other emergency departments or by a family physician, chiropractor, sports therapist, etc. Therefore the number of sustained injuries over this time period was certainly higher than the statistics presented here. In addition, because CHIRPP uses self-reported data this may have introduced a recall bias into our study. Furthermore, CHIRPP data has been shown to under-represent older children and those with severe injuries therefore the results from this study may have not accurately reflected minor injuries as well as injuries in older children (Macpherson et al., 2008). Finally, without knowing how many youth participated in formal and informal sport and physical activity within this time period, we could not calculate rates of injury in this study.

Future Research

Future research should address some of the limitations of this study. For instance, researchers should obtain participation denominators in order to be able to evaluate a truer measure of risk in these sports. This study demonstrated that injuries differ by age, sex, and sport. Future studies should focus on injury prevention for children and youth participating in soccer as it showed the greatest amount of SRIs in our study. In addition,

injury prevention policies should also target children aged 10-14. Although males are injured most frequently in the majority of sports females tend to suffer from a higher percentage of concussions in comparison to all other injuries in some sports and therefore more attention needs to be put on preventing concussions among females in sports such as ringette. In the future, concussion prevention strategies need to take age and gender into account.

Summary and Conclusions

Our results suggest that the burden of injury for children and adolescents participating in a variety of sports is high. In particular, Canadian children engaged in soccer, ice hockey, and cycling sustain a large number of injuries requiring treatment in an ED. Children between 10 and 14 tended to report the greatest number of injuries. When examining age and sex, young girls participating in ringette reported the highest percentage of concussions of any sport. Sports-related injuries are preventable and implementing strategies to reduce the amount of injuries sustained by children and youth in Canada is crucial.

APPENDIX

Soccer

CHIRPP 2007/08 – 2009/10 Soccer Injuries Comparison by Age Group
A total of 11,941 soccer related injuries occurred between 2007 and 2010. Out of these injuries, more than half (58.2%) were sustained by children aged 10 – 14 years.

Table 1: Number of Soccer Injuries Sustained by Age Group

Age Group	Number of Injuries (N = 11941)
5 – 9 years	1949 (16.3%)
10 – 14 years	6946 (58.2%)
15 – 19 years	3046 (25.5%)

CHIRPP 2007/08 – 2009/10 Soccer Injuries Comparison by Sex
Males sustained the majority of soccer-related injuries. Out of a total of 11,939 injuries, males accounted for 57.7% of the sample.

Table 2: Number of Soccer Injuries Sustained by Males versus Females

Sex	Number of Injuries (N = 11939)
Males	6886 (57.7%)
Females	5052 (42.3%)

CHIRPP 2007/08 – 2009/10 Soccer Injuries Comparison by Nature of Injury
Out of the 11,941 soccer injuries sustained over a three-year period, over one quarter (30.1%) of the injuries were related to a fracture. Other notable injuries included sprains/strains that made up an additional 22.6% of the sample.

Table 3: Number of Soccer Injuries Sustained by Nature of Injury

Nature of Injury	Number of Injuries (N = 11941)
Fracture	3590 (30.1%)
Sprain or Strain	2699 (22.6%)
Soft Tissue Injury	2628 (22.0%)
Other	1724 (14.4%)
Superficial	739 (6.2%)
Minor Head Injury	561 (4.7%)

CHIRPP 2007/08 – 2009/10 Soccer Injuries Comparison by Body Part Injured
Out of the 11.941 soccer injuries sustained, over one third (37.8%) belonged to the other body part category. Other notable injuries were sustained to the ankle (16.1%).

Table 4: Number of Soccer Injuries Sustained by Body Part Injured

Body Part Injured	Number of Injuries (N = 11941)
Other	4515 (37.8%)
Ankle	1927 (16.1%)
Specified Head Injury	1164 (9.7%)
Knee	1164 (9.7%)
Wrist	1128 (9.4%)
Finger or Thumb	1034 (8.7%)
Forearm	1009 (8.4%)

CHIRPP 2007/08 – 2009/10 Soccer Injuries Comparison by Nature of Injury for Males aged 5 – 9 Years
When examining the nature of injury for males aged 5 – 9, the majority of injuries (34.6%) were related to a fracture. Other notable injuries included "other" injuries and soft tissue injuries that accounted for 18.4% and 16.3% of the injuries respectively.

Table 5: Nature of Soccer Injuries Sustained for Males Aged 5 – 9

Nature of Injury	Number of Injuries (N = 1429)
Fracture	495 (34.6%)
Other	263 (18.4%)
Soft Tissue Injury	233 (16.3%)
Sprain or Strain	204 (14.3%)
Minor Head Injury	122 (8.5%)
Open Wound	112 (7.8%)

CHIRPP 2007/08 – 2009/10 Soccer Injuries Comparison by Nature of Injury for Males Aged 10 - 14 Years
Table 6 shows that over half of the soccer injuries sustained by males aged 10 – 14 were related to a fracture (36.6%) or a soft tissue injury (20.8%).

Table 6: Nature of Soccer Injuries Sustained for Males Aged 10 – 14

Nature of Injury	Number of Injuries (N = 3944)
Fracture	1444 (36.6%)
Soft Tissue Injury	820 (20.8%)
Sprain or Strain	755 (19.1%)
Other	679 (17.2%)
Superficial	246 (6.2%)

CHIRPP 2007/08 – 2009/10 Soccer Injuries Comparison by Nature of Injury for Males Aged 15 – 19 Years

Table 7 shows that over half of the soccer injuries sustained by males aged 15 – 19 were related to a fracture (26.7%) or a sprain/strain (24.0%)

Table 7: Nature of Soccer Injuries Sustained for Males Aged 15 – 19

Nature of Injury	Number of Injuries (N = 1513)
Fracture	404 (26.7%)
Sprain or Strain	363 (24.0%)
Soft Tissue Injury	323 (21.3%)
Other	274 (18.1%)
Open Wound	79 (5.2%)
Superficial	70 (4.6%)

CHIRPP 2007/08 – 2009/10 Soccer Injuries Comparison by Nature of Injury for Females Aged 5 – 9 Years

The majority of soccer injuries sustained by females' aged 5 – 9 were fractures (34.7%). Other notable injuries included soft tissue injuries (23.7%).

Table 8: Nature of Soccer Injuries Sustained for Females Aged 5 – 9

Nature of Injury	Number of Injuries (N = 519)
Fracture	180 (34.7%)
Soft Tissue Injury	123 (23.7%)
Sprain or Strain	85 (16.4%)
Other	51 (9.8%)
Superficial	43 (8.3%)
Minor Head Injury	37 (7.1%)

CHIRPP 2007/08 – 2009/10 Soccer Injuries Comparison by Nature of Injury for Females Aged 10 – 14 Years

The majority of soccer injuries sustained by females' aged 10 – 14 were fractures (28.1%). Other notable injuries included sprains/strains (26.7%).

Table 9: Nature of Soccer Injuries Sustained for Females Aged 10 – 14

Nature of Injury	Number of Injuries (N = 3002)
Fracture	843 (28.1%)
Sprain or Strain	802 (26.7%)
Soft Tissue Injury	725 (24.2%)
Other	431 (14.4%)
Superficial	201 (6.7%)

CHIRPP 2007/08 – 2009/10 Soccer Injuries Comparison by Nature of Injury for Females Aged 15 – 19 Years

Approximately one third (31.9%) of soccer injuries sustained by females' aged 15 – 19 were related to a sprain or strain. Another quarter (26.4%) of the injuries were soft tissue injuries.

Table 10: Nature of Soccer Injuries Sustained for Females Aged 15 – 19

Nature of Injury	Number of Injuries (N = 1532)
Sprain or Strain	489 (31.9%)
Soft Tissue Injury	404 (26.4%)
Other	309 (20.2%)
Fracture	223 (14.6%)
Concussion	107 (7.0%)

CHIRPP 2007/08 – 2009/10 Soccer Injuries Comparison by Head Injuries

Overall, concussions accounted for 3.5% of all soccer related injuries sustained between 2007 and 2010. Concussions accounted for 3.5% of all soccer related injuries sustained by males in the 15 – 19 age group and 7.0% by females in the 15 – 19 age group.

Table 11: Concussion Related Injuries for Males versus Females

	Concussion (N = 413)
Males (N)	
5 – 9 (1429)	39 (2.7%)
10 – 14 (3944)	110 (2.8%)
15 – 19 (1513)	53 (3.5%)
Females (N)	
5 – 9 (519)	8 (1.5%)
10 – 14 (3002)	96 (3.2%)
15 – 19 (1532)	107 (7.0%)

Hockey

CHIRPP 2007/08 – 2009/10 Hockey Injuries Comparison by Age Group
A total of 9,413 hockey related injuries occurred between 2007 and 2010. Out of these injuries over half (60.5%) were sustained by children aged 10 – 14 years.

Table 12: Number of Hockey Injuries Sustained by Age Group

Age Group	Number of Injuries (N = 9413)
5 – 9 years	681 (7.2%)
10 – 14 years	5694 (60.5%)
15 – 19 years	3038 (32.3%)

CHIRPP 2007/08 – 2009/10 Hockey Injuries Comparison by Sex
Males sustained the majority of hockey-related injuries. Out of a total of 9,411 injuries, males accounted for 89.6% of the sample.

Table 13: Number of Hockey Injuries Sustained by Males versus Females

Sex	Number of Injuries (N = 9411)
Males	8433 (89.6%)
Females	978 (10.4%)

CHIRPP 2007/08 – 2009/10 Hockey Injuries Comparison by Nature of Injury
Out of the 9,413 hockey injuries sustained over a three-year period, over one quarter (26.0%) of the injuries were related to a fracture. Other notable injuries included soft tissue injuries that made up an additional 22.9% of the sample.

Table 14: Number of Hockey Injuries Sustained by Nature of Injury

Nature of Injury	Number of Injuries (N = 9413)
Fracture	2447 (26.0%)
Soft Tissue Injury	2154 (22.9%)
Sprain or Strain	1212 (12.9%)
Concussion	1023 (10.9%)
Other	740 (7.9%)
Minor Head Injury	729 (7.7%)
Superficial	583 (6.2%)
Open Wound	525 (5.6%)

CHIRPP 2007/08 – 2009/10 Hockey Injuries Comparison by Body Part Injured
Out of the 9,413 hockey injuries sustained 37.7% belonged to the other body part category. In addition, 19.1% of hockey injuries were a specified head injury.

Table 15: Number of Hockey Injuries Sustained by Body Part Injured

Body Part Injured	Number of Injuries (N = 9413)
Other	3544 (37.7%)
Specified Head Injury	1797 (19.1%)
Shoulder	811 (8.6%)
Forearm	775 (8.2%)
Knee	746 (7.9%)
Wrist	726 (7.7%)
Clavicle	507 (5.4%)
Ankle	507 (5.4%)

CHIRPP 2007/08 – 2009/10 Hockey Injuries Comparison by Nature of Injury for Males aged 5 – 9 Years
When examining the nature of injury for males aged 5 – 9, the majority of injuries (22.5%) were related to a fracture. Other notable injuries included soft tissue injuries (21.9%).

Table 16: Nature of Hockey Injuries Sustained for Males Aged 5 – 9

Nature of Injury	Number of Injuries (N = 613)
Fracture	138 (22.5%)
Soft Tissue Injury	134 (21.9%)
Minor Head Injury	91 (14.8%)
Other	76 (12.4%)
Sprain or Strain	64 (10.4%)
Concussion	56 (9.1%)
Open Wound	54 (8.8%)

CHIRPP 2007/08 – 2009/10 Hockey Injuries Comparison by Nature of Injury for Males Aged 10 - 14 Years

Table 17 shows that approximately one third of the hockey injuries sustained by males aged 10 – 14 were related to a fracture (29.1%). Other notable injuries included soft tissue injuries (21.4%).

Table 17: Nature of Hockey Injuries Sustained for Males Aged 10 – 14

Nature of Injury	Number of Injuries (N = 5102)
Fracture	1483 (29.1%)
Soft Tissue Injury	1091 (21.4%)
Other	897 (17.6%)
Sprain or Strain	637 (12.5%)
Concussion	580 (11.4%)
Minor Head Injury	414 (8.1%)

CHIRPP 2007/08 – 2009/10 Hockey Injuries Comparison by Nature of Injury for Males Aged 15 – 19 Years

Table 18 shows that nearly half of the hockey injuries sustained by males aged 15 – 19 were related to a fracture (24.4%) or a soft tissue injury (23.0%)

Table 18: Nature of Hockey Injuries Sustained for Males Aged 15 – 19

Nature of Injury	Number of Injuries (N = 2718)
Fracture	662 (24.4%)
Soft Tissue Injury	625 (23.0%)
Sprain or Strain	369 (13.6%)
Concussion	257 (9.5%)
Open Wound	237 (8.7%)
Superficial	158 (5.8%)
Other	155 (5.7%)
Minor Head Injury	134 (4.9%)
Dislocation	121 (4.5%)

CHIRPP 2007/08 – 2009/10 Hockey Injuries Comparison by Nature of Injury for Females Aged 5 – 9 Years

The majority of hockey injuries sustained by females' aged 5 – 9 were soft tissue injuries (35.3%). Other notable injuries included fractures (26.5%).

Table 19: Nature of Hockey Injuries Sustained for Females Aged 5 – 9

Nature of Injury	Number of Injuries (N = 68)
Soft Tissue Injury	24 (35.3%)
Fracture	18 (26.5%)
Other	13 (19.1%)
Minor Head Injury	7 (10.3%)
Sprain or Strain	6 (8.8%)

CHIRPP 2007/08 – 2009/10 Hockey Injuries Comparison by Nature of Injury for Females Aged 10 – 14 Years

The majority of hockey injuries sustained by females' aged 10 – 14 were related to a soft tissue injury (29.8%). Other notable injuries included sprains/strains (16.1%).

Table 20: Nature of Hockey Injuries Sustained for Females Aged 10 – 14

Nature of Injury	Number of Injuries (N = 590)
Soft Tissue Injury	176(29.8%)
Sprain or Strain	95 (16.1%)
Fracture	91 (15.4%)
Concussion	74 (12.5%)
Minor Head Injury	63 (10.7%)
Superficial	47 (8.0%)
Other	44 (7.5%)

CHIRPP 2007/08 – 2009/10 Hockey Injuries Comparison by Nature of Injury for Females Aged 15 – 19 Years

The majority (32.5%) of hockey related injuries sustained by females' aged 15 – 19 were soft tissue injuries. Other notable injuries included fractures (16.9%) and concussions (16.3%).

Table 21: Nature of Hockey Injuries Sustained for Females Aged 15 – 19

Nature of Injury	Number of Injuries (N = 320)
Soft Tissue Injury	104 (32.5%)
Fracture	54 (16.9%)
Concussion	52 (16.3%)
Sprain or Strain	41 (12.8%)
Superficial	27 (8.4%)
Other	23 (7.2%)
Minor Head Injury	19 (5.9%)

CHIRPP 2007/08 – 2009/10 Hockey Injuries Comparison by Head Injuries
Overall, concussions accounted for 10.9% of all hockey related injuries sustained between 2007 and 2010. Concussions accounted for 11.4% of all hockey related injuries sustained by males in the 10 – 14 age group, and 16.3% by females in the 15 – 19 age group.

Table 22: Concussion Related Injuries for Males versus Females

	Concussion (N = 1023)
Males (N)	
5 – 9 (613)	56 (9.1%)
10 – 14 (5102)	580 (11.4%)
15 – 19 (2718)	257 (9.5%)
Females (N)	
5 – 9 (68)	4 (5.9%)
10 – 14 (590)	74 (12.5%)
15 – 19 (320)	52 (16.3%)

Cycling

CHIRPP 2007/08 – 2009/10 Cycling Injuries Comparison by Age Group
A total of 8,935 cycling related injuries occurred between 2007 and 2010. Out of these injuries half (50.1%) were sustained by children aged 10 – 14 years.

Table 23: Number of Cycling Injuries Sustained by Age Group

Age Group	Number of Injuries (N = 8935)
5 – 9 years	3009 (33.7%)
10 – 14 years	4473 (50.1%)
15 – 19 years	1453 (16.3%)

CHIRPP 2007/08 – 2009/10 Cycling Injuries Comparison by Sex
Males sustained the majority of cycling-related injuries. Out of a total of 8,934 injuries, males accounted for 73.5% of the sample.

Table 24: Number of Cycling Injuries Sustained by Males versus Females

Sex	Number of Injuries (N = 8934)
Males	6567 (73.5%)
Females	2367 (26.5%)

CHIRPP 2007/08 – 2009/10 Cycling Injuries Comparison by Nature of Injury
Out of the 8,935 cycling injuries sustained over a three-year period, approximately one third (33.9%) of the injuries were related to a fracture. Other notable injuries included open wounds that made up an additional 17.5% of the sample.

Table 25: Number of Cycling Injuries Sustained by Nature of Injury

Nature of Injury	Number of Injuries (N = 8935)
Fracture	3028 (33.9%)
Open Wound	1560 (17.5%)
Soft Tissue Injury	1334 (14.9%)
Superficial	977 (10.9%)
Other	801 (9.0%)
Sprain or Strain	463 (5.2%)
Minor Head Injury	416 (4.7%)
Concussion	356 (4.0%)

CHIRPP 2007/08 – 2009/10 Cycling Injuries Comparison by Body Part Injured
Out of the 8,935 cycling injuries sustained 24.5% belonged to the other body part category. In addition, 13.3% of bike injuries were sustained to the forearm.

Table 26: Number of Cycling Injuries Sustained by Body Part Injured

Body Part Injured	Number of Injuries (N = 8935)
Other	2190 (24.5%)
Forearm	1184 (13.3%)
Specified Head Injury	1090 (12.2%)
Face	889 (9.9%)
Wrist	801 (9.0%)
Elbow	763 (8.5%)
Lower Leg	510 (5.7%)
Knee	508 (5.7%)
Finger	342 (3.8%)
Hand	339 (3.8%)
Ankle	319 (3.6%)

CHIRPP 2007/08 – 2009/10 Cycling Injuries Comparison by Nature of Injury for Males aged 5 – 9 Years
When examining the nature of injury for males aged 5 – 9, the majority of injuries (28.0%) were related to a fracture. Other notable injuries included open wounds (22.0%).

Table 27: Nature of Cycling Injuries Sustained for Males Aged 5 – 9

Nature of Injury	Number of Injuries (N = 1897)
Fracture	531 (28.0%)
Open Wound	418 (22.0%)
Other	332 (17.5%)
Superficial	252 (13.3%)
Soft Tissue Injury	228 (12.0%)
Minor Head Injury	136 (7.2%)

CHIRPP 2007/08 – 2009/10 Cycling Injuries Comparison by Nature of Injury for Males Aged 10 - 14 Years

Table 28 shows that over one third of the cycling injuries sustained by males aged 10 – 14 were related to a fracture (36.6%). Other notable injuries included open wounds (17.3%).

Table 28: Nature of Cycling Injuries Sustained for Males Aged 10 – 14

Nature of Injury	Number of Injuries (N = 3433)
Fracture	1257 (36.6%)
Open Wound	595 (17.3%)
Soft Tissue Injury	500 (14.6%)
Superficial	317 (9.2%)
Other	298 (8.7%)
Sprain or Strain	181 (5.3%)
Concussion	152 (4.4%)
Minor Head Injury	133 (3.9%)

CHIRPP 2007/08 – 2009/10 Cycling Injuries Comparison by Nature of Injury for Males Aged 15 – 19 Years

Table 29 shows that nearly half of the cycling injuries sustained by males aged 15 – 19 were related to a fracture (32.0%) or a soft tissue injury (17.7%)

Table 29: Nature of Cycling Injuries Sustained for Males Aged 15 – 19

Nature of Injury	Number of Injuries (N = 1236)
Fracture	396 (32.0%)
Soft Tissue Injury	219 (17.7%)
Open Wound	200 (16.2%)
Other	113 (9.1%)
Superficial	109 (8.8%)
Sprain or Strain	78 (6.3%)
Concussion	67 (5.4%)
Minor Head Injury	55 (4.4%)

CHIRPP 2007/08 – 2009/10 Cycling Injuries Comparison by Nature of Injury for Females Aged 5 – 9 Years

The majority of cycling injuries sustained by females' aged 5 – 9 were fractures (35.8%). Other notable injuries included open wounds (18.9%).

Table 30: Nature of Cycling Injuries Sustained for Females Aged 5 – 9

Nature of Injury	Number of Injuries (N = 1111)
Fracture	398 (35.8%)
Open Wound	210 (18.9%)
Soft Tissue Injury	148 (13.3%)
Superficial	134 (12.1%)
Other	79 (7.1%)
Sprain or Strain	50 (4.5%)
Dental Injury	49 (4.4%)
Minor Head Injury	43 (3.9%)

CHIRPP 2007/08 – 2009/10 Cycling Injuries Comparison by Nature of Injury for Females Aged 10 – 14 Years

Over half of the cycling injuries sustained by females' aged 10 – 14 were related to either a fracture (38.8%) or a soft tissue injury (18.0%).

Table 31: Nature of Cycling Injuries Sustained for Females Aged 10 – 14

Nature of Injury	Number of Injuries (N = 1040)
Fracture	403 (38.8%)
Soft Tissue Injury	187 (18.0%)
Superficial	128 (12.3%)
Open Wound	102 (9.8%)
Other	102 (9.8%)
Sprain or Strain	78 (7.5%)
Concussion	40 (3.8%)

CHIRPP 2007/08 – 2009/10 Cycling Injuries Comparison by Nature of Injury for Females Aged 15 – 19 Years

The majority (23.6%) of cycling related injuries sustained by females' aged 15 – 19 were soft tissue injuries. Other notable injuries included fractures (19.9%).

Table 32: Nature of Cycling Injuries Sustained for Females Aged 15 – 19

Nature of Injury	Number of Injuries (N = 216)
Soft Tissue Injury	51 (23.6%)
Fracture	43 (19.9%)
Superficial	37 (17.1%)
Open Wound	35 (16.2%)
Other	27 (12.5%)
Minor Head Injury	12 (5.6%)
Sprain or Strain	11 (5.1%)

CHIRPP 2007/08 – 2009/10 Cycling Injuries Comparison by Head Injuries

Overall, concussions accounted for 4.0% of all cycling related injuries sustained between 2007 and 2010. Concussions accounted for 5.4% of all cycling related injuries sustained by males in the 15 – 19 age group, and 3.8% by females in the 10 – 14 age group.

Table 33: Concussion Related Injuries for Males versus Females

	Concussion (N = 356)
Males (N)	
5 – 9 (1897)	54 (2.8%)
10 – 14 (3433)	152 (4.4%)
15 – 19 (1237)	67 (5.4%)
Females (N)	
5 – 9 (1111)	35 (3.2%)
10 – 14 (1040)	40 (3.8%)
15 – 19 (216)	8 (3.7%)

Basketball

CHIRPP 2007/08 – 2009/10 Basketball Injuries Comparison by Age Group
A total of 7,698 basketball related injuries occurred between 2007 and 2010. Out of these injuries, more than half (60.9%) were sustained by children aged 10 – 14 years.

Table 34: Number of Basketball Injuries Sustained by Age Group

Age Group	Number of Injuries (N = 7698)
5 – 9 years	492 (6.4%)
10 – 14 years	4684 (60.8%)
15 – 19 years	2522 (32.8%)

CHIRPP 2007/08 – 2009/10 Basketball Injuries Comparison by Sex
Males sustained the majority of basketball-related injuries. Out of a total of 7,698 injuries, males accounted for 65.2% of the sample.

Table 35: Number of Basketball Injuries Sustained by Males versus Females

Sex	Number of Injuries (N = 7698)
Males	5018 (65.2%)
Females	2680 (34.8%)

CHIRPP 2007/08 – 2009/10 Basketball Injuries Comparison by Nature of Injury
Out of the 7,698 basketball injuries sustained over a three-year period, over one quarter (29.2%) of the injuries were related to a sprain or strain. Other notable injuries included fractures that made up an additional 26.6% of the sample.

Table 36: Number of Basketball Injuries Sustained by Nature of Injury

Nature of Injury	Number of Injuries (N = 7698)
Sprain or Strain	2246 (29.2%)
Fracture	2046 (26.6%)
Soft Tissue Injury	1591 (20.7%)
Other	440 (5.7%)
Superficial	367 (4.8%)
Open Wound	348 (4.5%)
Minor Head Injury	290 (3.8%)
Dislocation	200 (2.6%)
Concussion	170 (2.2%)

CHIRPP 2007/08 – 2009/10 Basketball Injuries Comparison by Body Part Injured
Out of the 7,698 basketball injuries sustained, over one quarter (26.9%) belonged to the other body part category. Another quarter (25.6%) of injuries occurred to the finger or thumb. Other notable injuries occurred to the ankle (21.4%).

Table 37: Number of Basketball Injuries Sustained by Body Part Injured

Body Part Injured	Number of Injuries (N = 7698)
Other	2073 (26.9%)
Finger or Thumb	1971(25.6%)
Ankle	645(21.4%)
Specified Head Injury	587 (7.6%)
Knee	570 (7.4%)
Wrist	466 (6.1%)
Face	386 (5.0%)

CHIRPP 2007/08 – 2009/10 Basketball Injuries Comparison by Nature of Injury for Males aged 5 – 9 Years
When examining the nature of injury for males aged 5 – 9, the majority of injuries (31.0%) were related to a fracture. Other notable injuries included soft tissue injuries and sprains/strains that accounted for 17.0% and 16.4% of the injuries respectively.

Table 38: Nature of Basketball Injuries Sustained for Males Aged 5 – 9

Nature of Injury	Number of Injuries (N = 365)
Fracture	113 (31.0%)
Soft Tissue Injury	62 (17.0%)
Sprain or Strain	60 (16.4%)
Other	38 (10.4%)
Open Wound	33 (9.0%)
Minor Head Injury	32 (8.8%)
Superficial	27 (7.4%)

CHIRPP 2007/08 – 2009/10 Basketball Injuries Comparison by Nature of Injury for Males Aged 10 - 14 Years

Table 39 shows that over half of the basketball injuries sustained by males aged 10 – 14 were related to a fracture (31.5%) or a sprain/strain (24.8%).

Table 39: Nature of Basketball Injuries Sustained for Males Aged 10 – 14

Nature of Injury	Number of Injuries (N = 2856)
Fracture	899 (31.5%)
Sprain or Strain	708 (24.8%)
Soft Tissue Injury	556 (19.5%)
Other	287 (10.0%)
Superficial	147 (5.1%)
Minor Head Injury	130 (4.6%)
Open Wound	129 (4.5%)

CHIRPP 2007/08 – 2009/10 Basketball Injuries Comparison by Nature of Injury for Males Aged 15 – 19 Years

Table 40 shows that over half of the basketball injuries sustained by males aged 15 – 19 were related to a sprain/strain (33.4%) or a fracture (21.3%)

Table 40: Nature of Basketball Injuries Sustained for Males Aged 15 – 19

Nature of Injury	Number of Injuries (N = 1797)
Sprain or Strain	601 (33.4%)
Fracture	383 (21.3%)
Soft Tissue Injury	353 (19.6%)
Other	180 (10.0%)
Open Wound	145 (8.1%)
Dislocation	68 (3.8%)
Superficial	67 (3.7%)

CHIRPP 2007/08 – 2009/10 Basketball Injuries Comparison by Nature of Injury for Females Aged 5 – 9 Years

The majority of basketball injuries sustained by females' aged 5 – 9 were sprains or strains (30.7%). Other notable injuries included fractures (25.2%).

Table 41: Nature of Basketball Injuries Sustained for Females Aged 5 – 9

Nature of Injury	Number of Injuries (N = 127)
Sprain or Strain	39 (30.7%)
Fracture	32 (25.2%)
Soft Tissue Injury	29 (22.8%)
Other	27 (21.3%)

CHIRPP 2007/08 – 2009/10 Basketball Injuries Comparison by Nature of Injury for Females Aged 10 – 14 Years

The majority of basketball injuries sustained by females' aged 10 – 14 were sprains or strains (31.1%). Other notable injuries included fractures (28.2%).

Table 42: Nature of Basketball Injuries Sustained for Females Aged 10 – 14

Nature of Injury	Number of Injuries (N = 1828)
Sprain or Strain	568 (31.1%)
Fracture	515 (28.2%)
Soft Tissue Injury	420 (23.0%)
Other	325 (17.8%)

CHIRPP 2007/08 – 2009/10 Basketball Injuries Comparison by Nature of Injury for Females Aged 15 – 19 Years

Over one third (36.3%) of basketball injuries sustained by females' aged 15 – 19 were related to a sprain or strain. Another quarter (25.0%) of the injuries belonged to the other category.

Table 43: Nature of Basketball Injuries Sustained for Females Aged 15 – 19

Nature of Injury	Number of Injuries (N = 725)
Sprain or Strain	270 (37.2%)
Other	180 (24.8%)
Soft Tissue Injury	171 (23.6%)
Fracture	104 (14.3%)

CHIRPP 2007/08 – 2009/10 Basketball Injuries Comparison by Head Injuries

Overall, concussions accounted for 2.2% of all basketball related injuries sustained between 2007 and 2010. Concussions accounted for 3.2% of all basketball related injuries sustained by females in the 15 – 19 age group.

Table 44: Concussion Related Injuries for Males versus Females

	Concussion (N = 170)
Males (N)	
5 – 9 (365)	6 (1.6%)
10 – 14 (2856)	76 (2.7%)
15 – 19 (1797)	31 (1.7%)
Females (N)	
5 – 9 (127)	1 (0.8%)
10 – 14 (1828)	33 (1.8%)
15 – 19 (725)	23 (3.2%)

Football

CHIRPP 2007/08 – 2009/10 Football Injuries Comparison by Age Group
A total of 6,141 football related injuries occurred between 2007 and 2010. Out of these injuries over half (59.8%) were sustained by children aged 10 – 14 years.

Table 45: Number of Football Injuries Sustained by Age Group

Age Group	Number of Injuries (N = 6141)
5 – 9 years	388 (6.3%)
10 – 14 years	3672 (59.8%)
15 – 19 years	2081 (33.9%)

CHIRPP 2007/08 – 2009/10 Football Injuries Comparison by Sex
Males sustained the majority of football-related injuries. Out of a total of 6,141 injuries, males accounted for 91.7% of the sample.

Table 46: Number of Football Injuries Sustained by Males versus Females

Sex	Number of Injuries (N = 6141)
Males	5633 (91.7%)
Females	508 (8.3%)

CHIRPP 2007/08 – 2009/10 Football Injuries Comparison by Nature of Injury
Out of the 6,141 football injuries sustained over a three-year period, one third (33.3%) of the injuries were related to a fracture. Other notable injuries included soft tissue injuries that made up an additional 20.7% of the sample.

Table 47: Number of Football Injuries Sustained by Nature of Injury

Nature of Injury	Number of Injuries (N = 6141)
Fracture	2046 (33.3%)
Soft Tissue Injury	1274 (20.7%)
Sprain or Strain	1113 (18.1%)
Other	568 (9.2%)
Concussion	345 (5.6%)
Superficial	324 (5.3%)
Minor Head Injury	265 (4.3%)
Dislocation	206 (3.4%)

CHIRPP 2007/08 – 2009/10 Football Injuries Comparison by Body Part Injured
Out of the 6,141 football injuries sustained 31.8% belonged to the other body part category. In addition, 18.5% of football injuries were sustained to the finger or thumb.

Table 48: Number of Football Injuries Sustained by Body Part Injured

Body Part Injured	Number of Injuries (N = 6141)
Other	1954 (31.8%)
Finger or Thumb	1134 (18.5%)
Specified Head Injury	642 (10.5%)
Knee	507 (8.3%)
Ankle	502 (8.2%)
Forearm	437 (7.1%)
Wrist	345 (5.6%)
Shoulder	313 (5.1%)
Hand	307 (5.0%)

CHIRPP 2007/08 – 2009/10 Football Injuries Comparison by Nature of Injury for Males aged 5 – 9 Years
When examining the nature of injury for males aged 5 – 9, the majority of injuries (35.8%) were related to a fracture. Other notable injuries included soft tissue injuries (22.0%).

Table 49: Nature of Football Injuries Sustained for Males Aged 5 – 9

Nature of Injury	Number of Injuries (N = 355)
Fracture	127 (35.8%)
Soft Tissue Injury	78 (22.0%)
Sprain or Strain	54 (15.2%)
Other	47 (13.2%)
Superficial	25 (7.0%)
Minor Head Injury	24 (6.8%)

CHIRPP 2007/08 – 2009/10 Football Injuries Comparison by Nature of Injury for Males Aged 10 - 14 Years

Table 50 shows that over one third of the football injuries sustained by males aged 10 – 14 were related to a fracture (36.3%). Other notable injuries included soft tissue injuries (20.7%).

Table 50: Nature of Football Injuries Sustained for Males Aged 10 – 14

Nature of Injury	Number of Injuries (N = 3360)
Fracture	1218 (36.3%)
Soft Tissue Injury	694 (20.7%)
Sprain or Strain	548 (16.3%)
Other	261 (7.8%)
Superficial	195 (5.8%)
Concussion	178 (5.3%)
Minor Head Injury	156 (4.6%)
Open Wound	110 (3.3%)

CHIRPP 2007/08 – 2009/10 Football Injuries Comparison by Nature of Injury for Males Aged 15 – 19 Years

Table 51 shows that nearly half of the football injuries sustained by males aged 15 – 19 were related to a fracture (27.0%) or a sprain/strain (21.1%)

Table 51: Nature of Football Injuries Sustained for Males Aged 15 – 19

Nature of Injury	Number of Injuries (N = 1918)
Fracture	518 (27.0%)
Sprain or Strain	405 (21.1%)
Soft Tissue Injury	403 (21.0%)
Other	263 (13.7%)
Concussion	140 (7.3%)
Dislocation	99 (5.2%)
Injury to Muscle or Tendon	90 (4.7%)

CHIRPP 2007/08 – 2009/10 Football Injuries Comparison by Nature of Injury for Females Aged 5 – 9 Years

The majority of football injuries sustained by females' aged 5 – 9 were fractures (42.4%). Other notable injuries included "other" (18.2%) and soft tissues injuries (18.2%).

Table 52: Nature of Football Injuries Sustained for Females Aged 5 – 9

Nature of Injury	Number of Injuries (N = 33)
Fracture	14 (42.4%)
Other	6 (18.2%)
Soft Tissue Injury	6 (18.2%)
Sprain or Strain	4 (12.1%)
Minor Head Injury	3 (9.1%)

CHIRPP 2007/08 – 2009/10 Football Injuries Comparison by Nature of Injury for Females Aged 10 – 14 Years

Over half of the football injuries sustained by females' aged 10 – 14 were related to either a fracture (36.5%) or an "other" injury (22.1%).

Table 53: Nature of Football Injuries Sustained for Females Aged 10 – 14

Nature of Injury	Number of Injuries (N = 312)
Fracture	114 (36.5%)
Other	69 (22.1%)
Sprain or Strain	68 (21.8%)
Soft Tissue Injury	61 (19.6%)

CHIRPP 2007/08 – 2009/10 Football Injuries Comparison by Nature of Injury for Females Aged 15 – 19 Years

The majority (33.7%) of football related injuries sustained by females' aged 15 – 19 were fractures. Other notable injuries included sprains/strains (20.9%).

Table 54: Nature of Football Injuries Sustained for Females Aged 15 – 19

Nature of Injury	Number of Injuries (N = 163)
Fracture	55 (33.7%)
Sprain or Strain	34 (20.9%)
Soft Tissue Injury	32 (19.6%)
Other	23 (14.1%)
Minor Head Injury	10 (6.1%)
Superficial	9 (5.5%)

CHIRPP 2007/08 – 2009/10 Football Injuries Comparison by Head Injuries

Overall, concussions accounted for 5.6% of all football related injuries sustained between 2007 and 2010. Concussions accounted for 7.3% of all football related injuries sustained by males in the 15 – 19 age group, and 3.8% by females in the 10 – 14 age group.

Table 55: Concussion Related Injuries for Males versus Females

	Concussion (N = 345)
Males (N)	
5 – 9 (355)	9 (2.5%)
10 – 14 (3360)	178 (5.3%)
15 – 19 (1918)	140 (7.3%)
Females (N)	
5 – 9 (33)	0 (0.0%)
10 – 14 (312)	12 (3.8%)
15 – 19 (163)	6 (3.7%)

Snowboarding

CHIRPP 2007/08 – 2009/10 Snowboarding Injuries Comparison by Age Group
A total of 3,194 snowboarding related injuries occurred between 2007 and 2010. Out of these injuries, more than half (58.3%) were sustained by children aged 10 – 14 years.

Table 56: Number of Snowboarding Injuries Sustained by Age Group

Age Group	Number of Injuries (N = 3194)
5 – 9 years	120 (3.8%)
10 – 14 years	1862 (58.3%)
15 – 19 years	1212 (37.9%)

CHIRPP 2007/08 – 2009/10 Snowboarding Injuries Comparison by Sex
Males sustained the majority of snowboarding-related injuries. Out of a total of 3,192 injuries, males accounted for 73.6% of the sample.

Table 57: Number of Snowboarding Injuries Sustained by Males versus Females

Sex	Number of Injuries (N = 3192)
Males	2348 (73.6%)
Females	844 (26.4%)

CHIRPP 2007/08 – 2009/10 Snowboarding Injuries Comparison by Nature of Injury
Out of the 3,194 snowboarding injuries sustained over a three-year period, the majority (55.8%) of the injuries were related to a fracture. Other notable injuries included soft tissue injuries that made up an additional 13.4% of the sample.

Table 58: Number of Snowboarding Injuries Sustained by Nature of Injury

Nature of Injury	Number of Injuries (N = 3194)
Fracture	1783 (55.8%)
Soft Tissue Injury	429 (13.4%)
Sprain or Strain	350 (11.0%)
Other	311 (9.7%)
Concussion	217 (6.8%)
Minor Head Injury	104 (3.3%)

CHIRPP 2007/08 – 2009/10 Snowboarding Injuries Comparison by Body Part Injured

Out of the 3,194 snowboarding injuries sustained, the majority (40.0%) belonged to the other body part category. Other notable injuries were sustained to the forearm (27.8%).

Table 59: Number of Snowboarding Injuries Sustained by Body Part Injured

Body Part Injured	Number of Injuries (N = 3194)
Other	1278 (40.0%)
Forearm	889 (27.8%)
Wrist	698 (21.9%)
Specified Head Injury	329 (10.3%)

CHIRPP 2007/08 – 2009/10 Snowboarding Injuries Comparison by Nature of Injury for Males aged 5 – 9 Years

When examining the nature of injury for males aged 5 – 9, the majority of injuries (37.8%) were related to a fracture. Other notable injuries included "other" injuries and soft tissue injuries that accounted for 27.8% and 17.8% of the injuries respectively.

Table 60: Nature of Snowboarding Injuries Sustained for Males Aged 5 – 9

Nature of Injury	Number of Injuries (N = 90)
Fracture	34 (37.8%)
Other	25 (27.8%)
Soft Tissue Injury	16 (17.8%)
Sprain or Strain	15 (16.7%)

CHIRPP 2007/08 – 2009/10 Snowboarding Injuries Comparison by Nature of Injury for Males Aged 10 - 14 Years

Table 61 shows that over half of the snowboarding injuries sustained by males aged 10 – 14 were related to a fracture (61.6%).

Table 61: Nature of Snowboarding Injuries Sustained for Males Aged 10 – 14

Nature of Injury	Number of Injuries (N = 1382)
Fracture	852 (61.6%)
Other	168 (12.2%)
Soft Tissue Injury	160 (11.6%)
Sprain or Strain	113 (8.2%)
Concussion	89 (6.4%)

CHIRPP 2007/08 – 2009/10 Snowboarding Injuries Comparison by Nature of Injury for Males Aged 15 – 19 Years

Table 62 shows that over half of the snowboarding injuries sustained by males aged 15 – 19 were related to a fracture (53.9%).

Table 62: Nature of Snowboarding Injuries Sustained for Males Aged 15 – 19

Nature of Injury	Number of Injuries (N = 876)
Fracture	472 (53.9%)
Soft Tissue Injury	115 (13.1%)
Other	115 (13.1%)
Sprain or Strain	98 (11.2%)
Concussion	76 (8.7%)

CHIRPP 2007/08 – 2009/10 Snowboarding Injuries Comparison by Nature of Injury for Females Aged 5 – 9 Years

The majority of snowboarding injuries sustained by females' aged 5 – 9 were fractures (36.7%). Other notable injuries included soft tissue injuries (26.7%).

Table 63: Nature of Snowboarding Injuries Sustained for Females Aged 5 – 9

Nature of Injury	Number of Injuries (N = 30)
Fracture	11 (36.7%)
Soft Tissue Injury	8 (26.7%)
Other	6 (20.0%)
Sprain or Strain	5 (16.7%)

CHIRPP 2007/08 – 2009/10 Snowboarding Injuries Comparison by Nature of Injury for Females Aged 10 – 14 Years

The majority of snowboarding injuries sustained by females' aged 10 – 14 were fractures (57.5%). Other notable injuries included soft tissue injuries (15.7%).

Table 64: Nature of Snowboarding Injuries Sustained for Females Aged 10 – 14

Nature of Injury	Number of Injuries (N = 478)
Fracture	275 (57.5%)
Soft Tissue Injury	75 (15.7%)
Sprain or Strain	61 (12.8%)
Other	46 (9.6%)
Concussion	21 (4.4%)

CHIRPP 2007/08 – 2009/10 Snowboarding Injuries Comparison by Nature of Injury for Females Aged 15 – 19 Years

Over one third (40.8%) of snowboarding injuries sustained by females' aged 15 – 19 were related to a fracture.

Table 65: Nature of Snowboarding Injuries Sustained for Females Aged 15 – 19

Nature of Injury	Number of Injuries (N = 336)
Fracture	137 (40.8%)
Other	62 (18.5%)
Sprain or Strain	58 (17.3%)
Soft Tissue Injury	55 (16.4%)
Concussion	24 (7.1%)

CHIRPP 2007/08 – 2009/10 Snowboarding Injuries Comparison by Head Injuries

Overall, concussions accounted for 6.8% of all snowboarding related injuries sustained between 2007 and 2010. Concussions accounted for 8.7% of all snowboarding related injuries sustained by males in the 15 – 19 age group and 7.1% by females in the 15 – 19 age group.

Table 66: Concussion Related Injuries for Males versus Females

	Concussion (N = 217)
Males (N)	
5 – 9 (90)	6 (6.7%)
10 – 14 (1382)	89 (6.4%)
15 – 19 (876)	76 (8.7%)
Females (N)	
5 – 9 (30)	1 (3.3%)
10 – 14 (478)	21 (4.4%)
15 – 19 (336)	24 (7.1%)

Skiing

CHIRPP 2007/08 – 2009/10 Skiing Injuries Comparison by Age Group
A total of 1,970 skiing related injuries occurred between 2007 and 2010. Out of these injuries, more than half (56.2%) were sustained by children aged 10 – 14 years.

Table 67: Number of Skiing Injuries Sustained by Age Group

Age Group	Number of Injuries (N = 1970)
5 – 9 years	470 (23.9%)
10 – 14 years	1108 (56.2%)
15 – 19 years	392 (19.9%)

CHIRPP 2007/08 – 2009/10 Skiing Injuries Comparison by Sex
Males sustained the majority of skiing-related injuries. Out of a total of 1,970 injuries, males accounted for 58.4% of the sample.

Table 68: Number of Skiing Injuries Sustained by Males versus Females

Sex	Number of Injuries (N = 1970)
Males	1151 (58.4%)
Females	819 (41.6%)

CHIRPP 2007/08 – 2009/10 Skiing Injuries Comparison by Nature of Injury
Out of the 1,970 skiing injuries sustained over a three-year period, the majority (38.4%) of the injuries were related to a fracture. Other notable injuries included sprains/strains that made up an additional 17.2% of the sample.

Table 69: Number of Skiing Injuries Sustained by Nature of Injury

Nature of Injury	Number of Injuries (N = 1970)
Fracture	756 (38.4%)
Sprain or Strain	338 (17.2%)
Soft Tissue Injury	335 (17.0%)
Other	234 (11.9%)
Concussion	118 (6.0%)
Superficial	102 (5.2%)
Minor Head Injury	87 (4.4%)

CHIRPP 2007/08 – 2009/10 Skiing Injuries Comparison by Body Part Injured
Out of the 1,970 skiing injuries sustained, the majority (40.7%) belonged to the other body part category. Other notable injuries were sustained to the knee (16.0%).

Table 70: Number of Skiing Injuries Sustained by Body Part Injured

Body Part Injured	Number of Injuries (N = 1970)
Other	802 (40.7%)
Knee	315 (16.0%)
Lower leg	249 (12.6%)
Specified Head Injury	232 (11.8%)
Finger or Thumb	149 (7.6%)
Wrist	114 (5.8%)
Forearm	109 (5.5%)

CHIRPP 2007/08 – 2009/10 Skiing Injuries Comparison by Nature of Injury for Males aged 5 – 9 Years
When examining the nature of injury for males aged 5 – 9, the majority of injuries (45.0%) were related to a fracture. Other notable injuries included "other" injuries and soft tissue injuries that accounted for 17.3% and 12.7% of the injuries respectively.

Table 71: Nature of Skiing Injuries Sustained for Males Aged 5 – 9

Nature of Injury	Number of Injuries (N = 260)
Fracture	117 (45.0%)
Other	45 (17.3%)
Soft Tissue Injury	33 (12.7%)
Sprain or Strain	31 (11.9%)
Superficial	21 (8.1%)
Minor Head Injury	13 (5.0%)

CHIRPP 2007/08 – 2009/10 Skiing Injuries Comparison by Nature of Injury for Males Aged 10 - 14 Years
Table 72 shows that over half of the skiing injuries sustained by males aged 10 – 14 were related to a fracture (45.2%) or a soft tissue injury (14.1%).

Table 72: Nature of Skiing Injuries Sustained for Males Aged 10 – 14

Nature of Injury	Number of Injuries (N = 646)
Fracture	292 (45.2%)
Soft Tissue Injury	91 (14.1%)
Sprain or Strain	90 (13.9%)
Other	75 (11.6%)
Concussion	40 (6.2%)
Superficial	30 (4.6%)
Minor Head Injury	28 (4.3%)

CHIRPP 2007/08 – 2009/10 Skiing Injuries Comparison by Nature of Injury for Males Aged 15 – 19 Years

Table 73 shows that over half of the skiing injuries sustained by males aged 15 – 19 were related to a fracture (42.4%) or an "other" injury (20.0%)

Table 73: Nature of Skiing Injuries Sustained for Males Aged 15 – 19

Nature of Injury	Number of Injuries (N = 245)
Fracture	104 (42.4%)
Other	49 (20.0%)
Soft Tissue Injury	46 (18.8%)
Sprain or Strain	29 (11.8%)
Concussion	17 (6.9%)

CHIRPP 2007/08 – 2009/10 Skiing Injuries Comparison by Nature of Injury for Females Aged 5 – 9 Years

The majority of skiing injuries sustained by females' aged 5 – 9 were fractures (40.0%). Other notable injuries included "other" injuries (24.3%).

Table 74: Nature of Skiing Injuries Sustained for Females Aged 5 – 9

Nature of Injury	Number of Injuries (N = 210)
Fracture	84 (40.0%)
Other	51 (24.3%)
Soft Tissue Injury	40 (19.0%)
Sprain or Strain	35 (16.7%)

CHIRPP 2007/08 – 2009/10 Skiing Injuries Comparison by Nature of Injury for Females Aged 10 – 14 Years

The majority of skiing injuries sustained by females' aged 10 – 14 were fractures (29.9%). Other notable injuries included sprains/strains (25.2%).

Table 75: Nature of Skiing Injuries Sustained for Females Aged 10 – 14

Nature of Injury	Number of Injuries (N = 462)
Fracture	139 (29.9%)
Sprain or Strain	120 (25.2%)
Soft Tissue Injury	91 (20.1%)
Other	44 (9.7%)
Concussion	24 (5.5%)
Superficial	23 (4.9%)
Minor Head Injury	21 (4.7%)

CHIRPP 2007/08 – 2009/10 Skiing Injuries Comparison by Nature of Injury for Females Aged 15 – 19 Years

The majority (23.1%) of skiing injuries sustained by females' aged 15 – 19 were related to a soft tissue injury. Other notable injuries included sprains/strains (22.4%).

Table 76: Nature of Skiing Injuries Sustained for Females Aged 15 – 19

Nature of Injury	Number of Injuries (N = 147)
Soft Tissue Injury	34 (23.1%)
Sprain or Strain	33 (22.4%)
Other	21 (14.3%)
Fracture	20 (13.6%)
Concussion	20 (13.6%)
Minor Head Injury	10 (6.8%)
Injury to Muscle or Tendon	9 (6.1%)

CHIRPP 2007/08 – 2009/10 Skiing Injuries Comparison by Head Injuries

Overall, concussions accounted for 6.0% of all skiing related injuries sustained between 2007 and 2010. Concussions accounted for 6.9% of all skiing related injuries sustained by males in the 15 – 19 age group and 13.6% by females in the 15 – 19 age group.

Table 77: Concussion Related Injuries for Males versus Females

	Concussion (N = 118)
Males (N)	
5 – 9 (260)	12 (4.6%)
10 – 14 (646)	40 (6.2%)
15 – 19 (245)	17 (6.9%)
Females (N)	
5 – 9 (210)	5 (2.4%)
10 – 14 (462)	24 (5.2%)
15 – 19 (147)	20 (13.6%)

Sledding

CHIRPP 2007/08 – 2009/10 Sledding Injuries Comparison by Age Group
A total of 1,793 sledding related injuries occurred between 2007 and 2010. Out of these injuries, approximately half (48.0%) were sustained by children aged 5 – 9 years.

Table 78: Number of Sledding Injuries Sustained by Age Group

Age Group	Number of Injuries (N = 1793)
5 – 9 years	861 (48.0%)
10 – 14 years	821 (45.8%)
15 – 19 years	111 (6.2%)

CHIRPP 2007/08 – 2009/10 Sledding Injuries Comparison by Sex
Males sustained the majority of sledding-related injuries. Out of a total of 1,793 injuries, males accounted for 56.1% of the sample.

Table 79: Number of Sledding Injuries Sustained by Males versus Females

Sex	Number of Injuries (N = 1793)
Males	1006 (56.1%)
Females	787 (43.9%)

CHIRPP 2007/08 – 2009/10 Sledding Injuries Comparison by Nature of Injury
Out of the 1,793 sledding injuries sustained over a three-year period, the majority (32.5%) of the injuries were related to a fracture. Other notable injuries included soft tissue injuries that made up an additional 19.6% of the sample.

Table 80: Number of Sledding Injuries Sustained by Nature of Injury

Nature of Injury	Number of Injuries (N = 1793)
Fracture	582 (32.5%)
Soft Tissue Injury	351 (19.6%)
Minor Head Injury	204 (11.4%)
Sprain or Strain	158 (8.8%)
Open Wound	149 (8.3%)
Other	127 (7.1%)
Superficial	123 (6.9%)
Concussion	99 (5.5%)

CHIRPP 2007/08 – 2009/10 Sledding Injuries Comparison by Body Part Injured
Out of the 1,793 sledding injuries sustained, the majority (46.0%) belonged to the other body part category. Other notable injuries included specified head injuries (18.9%).

Table 81: Number of Sledding Injuries Sustained by Body Part Injured

Body Part Injured	Number of Injuries (N = 1793)
Other	824 (46.0%)
Specified Head Injury	338 (18.9%)
Face	168 (9.4%)
Forearm	126 (7.0%)
Wrist	120 (6.7%)
Ankle	117 (6.5%)
Clavicle	100 (5.6%)

CHIRPP 2007/08 – 2009/10 Sledding Injuries Comparison by Nature of Injury for Males aged 5 – 9 Years
When examining the nature of injury for males aged 5 – 9, the majority of injuries (28.8%) were related to a fracture. Other notable injuries included minor head injuries and "other" injuries that accounted for 15.8% and 15.4% of the injuries respectively.

Table 82: Nature of Sledding Injuries Sustained for Males Aged 5 – 9

Nature of Injury	Number of Injuries (N = 486)
Fracture	140 (28.8%)
Minor Head Injury	77 (15.8%)
Other	75 (15.4%)
Soft Tissue Injury	63 (13.0%)
Open Wound	54 (11.1%)
Superficial	41 (8.4%)
Concussion	36 (7.4%)

CHIRPP 2007/08 – 2009/10 Sledding Injuries Comparison by Nature of Injury for Males Aged 10 - 14 Years
Table 83 shows that over half of the sledding injuries sustained by males aged 10 – 14 were related to a fracture (36.8%) or a soft tissue injury (21.6%).

Table 83: Nature of Sledding Injuries Sustained for Males Aged 10 – 14

Nature of Injury	Number of Injuries (N = 468)
Fracture	172 (36.8%)
Soft Tissue Injury	101 (21.6%)
Other	52 (11.1%)
Open Wound	40 (8.5%)
Sprain or Strain	35 (7.5%)
Minor Head Injury	34 (7.3%)
Superficial	34 (7.3%)

CHIRPP 2007/08 – 2009/10 Sledding Injuries Comparison by Nature of Injury for Males Aged 15 – 19 Years

Table 84 shows that over half of the sledding injuries sustained by males aged 15 – 19 were related to a fracture (46.2%) or a soft tissue injury (19.2%).

Table 84: Nature of Sledding Injuries Sustained for Males Aged 15 – 19

Nature of Injury	Number of Injuries (N = 52)
Fracture	24 (46.2%)
Soft Tissue Injury	10 (19.2%)
Other	9 (17.3%)
Sprain or Strain	5 (9.6%)
Open Wound	4 (7.7%)

CHIRPP 2007/08 – 2009/10 Sledding Injuries Comparison by Nature of Injury for Females Aged 5 – 9 Years

The majority of sledding injuries sustained by females' aged 5 – 9 were fractures (31.7%). Other notable injuries included soft tissue injuries (18.4%) and minor head injuries (16.3%).

Table 85: Nature of Sledding Injuries Sustained for Females Aged 5 – 9

Nature of Injury	Number of Injuries (N = 375)
Fracture	119 (31.7%)
Soft Tissue Injury	69 (18.4%)
Minor Head Injury	61 (16.3%)
Other	38 (10.1%)
Open Wound	36 (9.6%)
Sprain or Strain	29 (7.7%)
Superficial	23 (6.1%)

CHIRPP 2007/08 – 2009/10 Sledding Injuries Comparison by Nature of Injury for Females Aged 10 – 14 Years

The majority of sledding injuries sustained by females' aged 10 – 14 were fractures (31.4%). Other notable injuries included soft tissue injuries (26.6%).

Table 86: Nature of Sledding Injuries Sustained for Females Aged 10 – 14

Nature of Injury	Number of Injuries (N = 353)
Fracture	111 (31.4%)
Soft Tissue Injury	94 (26.6%)
Other	52 (14.7%)
Sprain or Strain	49 (13.9%)
Minor Head Injury	28 (7.9%)
Superficial	19 (5.4%)

CHIRPP 2007/08 – 2009/10 Sledding Injuries Comparison by Nature of Injury for Females Aged 15 – 19 Years

Over one quarter (27.1%) of sledding injuries sustained by females' aged 15 – 19 were related to a fracture. Other notable injuries included soft tissue injuries (23.7%) and sprains/strains (23.7%).

Table 87: Nature of Sledding Injuries Sustained for Females Aged 15 – 19

Nature of Injury	Number of Injuries (N = 59)
Fracture	16 (27.1%)
Soft Tissue Injury	14 (23.7%)
Sprain or Strain	14 (23.7%)
Concussion	6 (10.2%)
Other	6 (10.2%)
Minor Head Injury	3 (5.1%)

CHIRPP 2007/08 – 2009/10 Sledding Injuries Comparison by Head Injuries

Overall, concussions accounted for 5.5% of all sledding related injuries sustained between 2007 and 2010. Concussions accounted for 7.4% of all sledding related injuries sustained by males in the 5 – 9 age group and 10.2% by females in the 15 – 19 age group.

Table 88: Concussion Related Injuries for Males versus Females

	Concussion (N = 99)
Males (N)	
5 – 9 (486)	36 (7.4%)
10 – 14 (468)	25 (5.3%)
15 – 19 (52)	2 (3.8%)
Females (N)	
5 – 9 (375)	13 (3.5%)
10 – 14 (353)	17 (4.8%)
15 – 19 (59)	6 (10.2%)

Rugby

CHIRPP 2007/08 – 2009/10 Rugby Injuries Comparison by Age Group
A total of 1,651 rugby related injuries occurred between 2007 and 2010. Out of these injuries, more than three quarters (76.7%) were sustained by children aged 15 – 19 years.

Table 89: Number of Rugby Injuries Sustained by Age Group

Age Group	Number of Injuries (N = 1651)
5 – 9 years	8 (0.5%)
10 – 14 years	376 (22.8%)
15 – 19 years	1 267 (76.7%)

CHIRPP 2007/08 – 2009/10 Rugby Injuries Comparison by Sex
Males sustained the majority of rugby-related injuries. Out of a total of 1,651 injuries, males accounted for 68.4% of the sample.

Table 90: Number of Rugby Injuries Sustained by Males versus Females

Sex	Number of Injuries (N = 1651)
Males	1 129 (68.4%)
Females	522 (31.6%)

CHIRPP 2007/08 – 2009/10 Rugby Injuries Comparison by Nature of Injury
Out of the 1,651 rugby injuries sustained over a three-year period, approximately one quarter (23.7%) of the injuries were related to a fracture. Other notable injuries included soft tissue injuries that made up an additional 19.9% of the sample.

Table 91: Number of Rugby Injuries Sustained by Nature of Injury

Nature of Injury	Number of Injuries (N = 1651)
Fracture	391 (23.7%)
Soft Tissue Injury	328 (19.9%)
Sprain or Strain	259 (15.7%)
Concussion	182 (11.0%)
Other	159 (9.6%)
Minor Head Injury	119 (7.2%)
Superficial	111 (6.7%)
Open Wound	102 (6.2%)

CHIRPP 2007/08 – 2009/10 Rugby Injuries Comparison by Body Part Injured
Out of the 1,651 rugby injuries sustained 39.4% belonged to the other body part category. In addition, 19.1% of rugby injuries were a specified head injury.

Table 92: Number of Rugby Injuries Sustained by Body Part Injured

Body Part Injured	Number of Injuries (N = 1651)
Other	651 (39.4%)
Specified Head Injury	315 (19.1%)
Face	161 (9.8%)
Ankle	157 (9.5%)
Shoulder	125 (7.6%)
Knee	125 (7.6%)
Finger or Thumb	117 (7.1%)

CHIRPP 2007/08 – 2009/10 Rugby Injuries Comparison by Nature of Injury for Males Aged 10 - 14 Years
Table 93 shows that over one third of the rugby injuries sustained by males aged 10 – 14 were related to a fracture (34.0%).

Table 93: Nature of Rugby Injuries Sustained for Males Aged 10 – 14

Nature of Injury	Number of Injuries (N = 300)
Fracture	102 (34.0%)
Sprain or Strain	43 (14.3%)
Soft Tissue Injury	39 (13.0%)
Other	32 (10.7%)
Superficial	30 (10.0%)
Concussion	30 (10.0%)
Minor Head Injury	24 (8.0%)

CHIRPP 2007/08 – 2009/10 Rugby Injuries Comparison by Nature of Injury for Males Aged 15 – 19 Years
Table 94 shows that the majority of rugby injuries sustained by males aged 15 – 19 were related to a fracture (22.1%) or a soft tissue injury (18.9%)

Table 94: Nature of Rugby Injuries Sustained for Males Aged 15 – 19

Nature of Injury	Number of Injuries (N = 822)
Fracture	182 (22.1%)
Soft Tissue Injury	155 (18.9%)
Other	140 (17.0%)
Sprain or Strain	122 (14.8%)
Concussion	87 (10.6%)
Open Wound	80 (9.7%)
Minor Head Injury	56 (6.8%)

CHIRPP 2007/08 – 2009/10 Rugby Injuries Comparison by Nature of Injury for Females Aged 10 – 14 Years

Half of the rugby injuries sustained by females' aged 10 – 14 were related to either a soft tissue injury (28.9%) or a fracture (21.1%).

Table 95: Nature of Rugby Injuries Sustained for Females Aged 10 – 14

Nature of Injury	Number of Injuries (N = 76)
Soft Tissue Injury	22 (28.9%)
Fracture	16 (21.1%)
Sprain or Strain	12 (15.8%)
Concussion	11 (14.5%)
Other	8 (10.5%)
Minor Head Injury	7 (9.2%)

CHIRPP 2007/08 – 2009/10 Rugby Injuries Comparison by Nature of Injury for Females Aged 15 – 19 Years

Almost a quarter (24.0%) of the rugby injuries sustained by females' aged 15 – 19 were soft tissue injuries. Other notable injuries included fractures (20.2%) and sprains or strains (19.1%).

Table 96: Nature of Rugby Injuries Sustained for Females Aged 15 – 19

Nature of Injury	Number of Injuries (N = 445)
Soft Tissue Injury	106 (23.8%)
Sprain or Strain	85 (19.1%)
Fracture	79 (17.8%)
Concussion	53 (11.9%)
Other	51 (11.5%)
Minor Head Injury	32 (7.2%)
Superficial	29 (6.5%)

CHIRPP 2007/08 – 2009/10 Rugby Injuries Comparison by Head Injuries
Overall, concussions accounted for 11% of all rugby related injuries sustained between 2007 and 2010. Concussions accounted for 10.6% of all rugby related injuries sustained by males in the 15 – 19 age group and 14.5% by females in the 10 – 14 age group.

Table 97: Concussion Related Injuries for Males versus Females

	Concussion (N = 181)
Males (N)	
10 – 14 (300)	30 (10.0%)
15 – 19 (822)	87 (10.6%)
Females (N)	
10 – 14 (76)	11 (14.5%)
15 – 19 (445)	53 (11.9%)

Baseball

CHIRPP 2007/08 – 2009/10 Baseball Injuries Comparison by Age Group
A total of 1,633 baseball related injuries occurred between 2007 and 2010. Out of these injuries, more than half (58.1%) were sustained by children aged 10 – 14 years.

Table 98: Number of Baseball Injuries Sustained by Age Group

Age Group	Number of Injuries (N = 1633)
5 – 9 years	271 (16.6%)
10 – 14 years	949 (58.1%)
15 – 19 years	488 (25.3%)

CHIRPP 2007/08 – 2009/10 Baseball Injuries Comparison by Sex
Males sustained the majority of baseball-related injuries. Out of a total of 1,633 injuries, males accounted for 70.7% of the sample.

Table 99: Number of Baseball Injuries Sustained by Males versus Females

Sex	Number of Injuries (N = 1633)
Males	1155 (70.7%)
Females	478 (29.3%)

CHIRPP 2007/08 – 2009/10 Baseball Injuries Comparison by Nature of Injury
Out of the 1,633 baseball injuries sustained over a three-year period, approximately one quarter (24.0%) of the injuries were related to a fracture. Other notable injuries included soft tissue injuries that made up an additional 23.6% of the sample.

Table 100: Number of Baseball Injuries Sustained by Nature of Injury

Nature of Injury	Number of Injuries (N = 1633)
Fracture	392 (24.0%)
Soft Tissue Injury	386 (23.6%)
Superficial	198 (12.1%)
Sprain or Strain	189 (11.6%)
Open Wound	124 (7.6%)
Minor Head Injury	115 (7.0%)
Eye Injury	51 (3.1%)
Concussion	47 (2.9%)
Nature of Injury Not Specified	30 (1.8%)
Injury to Muscle or Tendon	29 (1.8%)
Dental Injury	27 (1.7%)
Dislocation	24 (1.5%)
Other	21 (1.3%)

CHIRPP 2007/08 – 2009/10 Baseball Injuries Comparison by Body Part Injured
Out of the 1,633 baseball injuries sustained 39.4% belonged to the other body part category. In addition, 17.8% of baseball injuries were sustained to the face.

Table 101: Number of Baseball Injuries Sustained by Body Part Injured

Body Part Injured	Number of Injuries (N = 1633)
Other	643 (39.4%)
Face	290 (17.8%)
Specified Head Injury	247 (15.1%)
Finger or Thumb	215 (13.2%)
Ankle	137 (8.4%)
Knee	101 (6.2%)

CHIRPP 2007/08 – 2009/10 Baseball Injuries Comparison by Nature of Injury for Males aged 5 – 9 Years
When examining the nature of injury for males aged 5 – 9, the majority of injuries (20.0%) were related to a soft tissue injury. Other notable injuries (19.5%) belonged to the "other" category that included sprain/strain, eye injury, nature of injury not specified, dental injury, concussion, no injury detected, injury to blood vessel, injury to muscle/tendon, foreign body in external eye, and intracranial injury.

Table 102: Nature of Baseball Injuries Sustained for Males Aged 5 – 9

Nature of Injury	Number of Injuries (N = 215)
Soft Tissue Injury	43 (20.0%)
Other	42 (19.5%)
Fracture	36 (16.7%)
Minor Head Injury	34 (15.8%)
Open Wound	34 (14.0%)
Superficial	30 (14.0%)

CHIRPP 2007/08 – 2009/10 Baseball Injuries Comparison by Nature of Injury for Males Aged 10 - 14 Years
Table 103 shows that over half of the baseball injuries sustained by males aged 10 – 14 were related to a fracture (27.9%) or a soft tissue injury (24.7%).

Table 103: Nature of Baseball Injuries Sustained for Males Aged 10 – 14

Nature of Injury	Number of Injuries (N = 677)
Fracture	189 (27.9%)
Soft Tissue Injury	167 (24.7%)
Other	85 (12.6%)
Superficial	79 (11.7%)
Sprain or Strain	68 (10.0%)
Open Wound	43 (6.4%)
Minor Head Injury	42 (6.2%)

CHIRPP 2007/08 – 2009/10 Baseball Injuries Comparison by Nature of Injury for Males Aged 15 – 19 Years

Table 104 shows that nearly half of the baseball injuries sustained by males aged 15 – 19 were related to a fracture (24.7%) or a soft tissue injury (22.1%)

Table 104: Nature of Baseball Injuries Sustained for Males Aged 15 – 19

Nature of Injury	Number of Injuries (N = 263)
Fracture	65 (24.7%)
Soft Tissue Injury	58 (22.1%)
Other	46 (17.5%)
Sprain or Strain	33 (12.5%)
Superficial	27 (10.3%)
Open Wound	21 (8.0%)
Minor Head Injury	13 (4.9%)

CHIRPP 2007/08 – 2009/10 Baseball Injuries Comparison by Nature of Injury for Females Aged 5 – 9 Years

The majority of baseball injuries sustained by females' aged 5 – 9 were open wounds (21.4%) and soft tissue injuries (21.4%).

Table 105: Nature of Baseball Injuries Sustained for Females Aged 5 – 9

Nature of Injury	Number of Injuries (N = 56)
Open Wound	12 (21.4%)
Soft Tissue Injury	12 (21.4%)
Superficial	10 (17.9%)
Other	9 (16.1%)
Fracture	7 (12.5%)
Minor Head Injury	6 (10.7%)

CHIRPP 2007/08 – 2009/10 Baseball Injuries Comparison by Nature of Injury for Females Aged 10 – 14 Years

Over half of the baseball injuries sustained by females' aged 10 – 14 were related to either a soft tissue injury (28.7%) or a fracture (23.9%).

Table 106: Nature of Baseball Injuries Sustained for Females Aged 10 – 14

Nature of Injury	Number of Injuries (N = 272)
Soft Tissue Injury	78 (28.7%)
Fracture	65 (23.9%)
Other	61 (22.4%)
Sprain or Strain	36 (13.2%)
Superficial	32 (11.8%)

CHIRPP 2007/08 – 2009/10 Baseball Injuries Comparison by Nature of Injury for Females Aged 15 – 19 Years

Almost a quarter (24.7%) of the baseball injuries sustained by females' aged 15 – 19 were related to a sprain/strain. Other notable injuries (23.3%) belonged to the "other" category that included minor head injury, open wound, dental injury, concussion, nature of injury not specified, dislocation, injury to muscle/tendon, eye injury, and burn/corrosion.

Table 107: Nature of Baseball Injuries Sustained for Females Aged 15 – 19

Nature of Injury	Number of Injuries (N = 150)
Sprain or Strain	37 (24.7%)
Other	35 (23.3%)
Fracture	30 (20.0%)
Soft Tissue Injury	28 (18.7%)
Superficial	20 (13.3%)

CHIRPP 2007/08 – 2009/10 Baseball Injuries Comparison by Head Injuries

Overall, concussions accounted for 2.9% of all baseball related injuries sustained between 2007 and 2010. Concussions accounted for 6.6% of all baseball related injuries sustained by females in the 10 – 14 age group.

Table 108: Concussion Related Injuries for Males versus Females

	Concussion (N = 47)
Males (N)	
5 – 9 (215)	4 (1.9%)
10 – 14 (677)	15 (2.2%)
15 – 19 (263)	6 (2.3%)
Females (N)	
5 – 9 (56)	1 (1.8%)
10 – 14 (272)	18 (6.6%)
15 – 19 (150)	3 (2.0%)

Volleyball

CHIRPP 2007/08 – 2009/10 Volleyball Injuries Comparison by Age Group
A total of 1,505 volleyball related injuries occurred between 2007 and 2010. Out of these injuries over half (58.0%) were sustained by children aged 10 – 14 years.

Table 109: Number of Volleyball Injuries Sustained by Age Group

Age Group	Number of Injuries (N = 1505)
5 – 9 years	43 (2.9%)
10 – 14 years	873 (58.0%)
15 – 19 years	589 (39.1%)

CHIRPP 2007/08 – 2009/10 Volleyball Injuries Comparison by Sex
Females sustained the majority of volleyball-related injuries. Out of a total of 1,505 injuries, females accounted for 62.7% of the sample.

Table 110: Number of Volleyball Injuries Sustained by Males versus Females

Sex	Number of Injuries (N = 1505)
Males	561 (37.3%)
Females	944 (62.7%)

CHIRPP 2007/08 – 2009/10 Volleyball Injuries Comparison by Nature of Injury
Out of the 1,505 volleyball injuries sustained over a three-year period, approximately one third (32.6%) of the injuries were related to a sprain/strain. Other notable injuries included fractures that made up an additional 24.4% of the sample.

Table 111: Number of Volleyball Injuries Sustained by Nature of Injury

Nature of Injury	Number of Injuries (N = 1505)
Sprain or Strain	490 (32.6%)
Fracture	367 (24.4%)
Soft Tissue Injury	334 (22.2%)
Other	224 (14.9%)
Superficial	90 (6.0%)

CHIRPP 2007/08 – 2009/10 Volleyball Injuries Comparison by Body Part Injured
Out of the 1,505 volleyball injuries sustained 33.4% belonged to the other body part category. In addition, 25.2% of volleyball injuries were sustained to the ankle.

Table 112: Number of Volleyball Injuries Sustained by Body Part Injured

Body Part Injured	Number of Injuries (N = 1505)
Other	503 (33.4%)
Ankle	380 (25.2%)
Finger or Thumb	377 (25.0%)
Wrist	153 (10.2%)
Specified Head Injury	92 (6.1%)

CHIRPP 2007/08 – 2009/10 Volleyball Injuries Comparison by Nature of Injury for Males Aged 10 - 14 Years
Table 113 shows that over one third of the volleyball injuries sustained by males aged 10 – 14 were related to a fracture (35.2%). Other notable injuries included "other" injuries (23.9%).

Table 113: Nature of Volleyball Injuries Sustained for Males Aged 10 – 14

Nature of Injury	Number of Injuries (N = 301)
Fracture	106 (35.2%)
Other	72 (23.9%)
Soft Tissue Injury	62 (20.6%)
Sprain or Strain	61 (20.3%)

CHIRPP 2007/08 – 2009/10 Volleyball Injuries Comparison by Nature of Injury for Males Aged 15 – 19 Years
Table 114 shows that over half of the volleyball injuries sustained by males aged 15 – 19 were related to a sprain/strain (38.3%) or a fracture (23.0%)

Table 114: Nature of Volleyball Injuries Sustained for Males Aged 15 – 19

Nature of Injury	Number of Injuries (N = 243)
Sprain or Strain	93 (38.3%)
Fracture	56 (23.0%)
Other	47 (19.3%)
Soft Tissue Injury	47 (19.3%)

CHIRPP 2007/08 – 2009/10 Volleyball Injuries Comparison by Nature of Injury for Females Aged 10 – 14 Years

Over half of the volleyball injuries sustained by females' aged 10 – 14 were related to either a sprain/strain (32.3%) or a fracture (26.7%).

Table 115: Nature of Volleyball Injuries Sustained for Females Aged 10 – 14

Nature of Injury	Number of Injuries (N = 572)
Sprain or Strain	185 (32.3%)
Fracture	153 (26.7%)
Soft Tissue Injury	133 (23.3%)
Other	101 (17.7%)

CHIRPP 2007/08 – 2009/10 Volleyball Injuries Comparison by Nature of Injury for Females Aged 15 – 19 Years

The majority (42.2%) of volleyball related injuries sustained by females' aged 15 – 19 were sprains/strains. Other notable injuries included soft tissue injuries (24.0%).

Table 116: Nature of Volleyball Injuries Sustained for Females Aged 15 – 19

Nature of Injury	Number of Injuries (N = 346)
Sprain or Strain	146 (42.2%)
Soft Tissue Injury	83 (24.0%)
Other	55 (15.9%)
Fracture	42 (12.1%)
Superficial	20 (5.8%)

CHIRPP 2007/08 – 2009/10 Volleyball Injuries Comparison by Head Injuries

Overall, concussions accounted for 1.9% of all volleyball related injuries sustained between 2007 and 2010. Concussions accounted for 2.3% of all volleyball related injuries sustained by males in the 10 – 14 age group, and 2.6% by females in the 10 – 14 age group.

Table 117: Concussion Related Injuries for Males versus Females

	Concussion (N = 28)
Males (N)	
10 – 14 (301)	7 (2.3%)
15 – 19 (243)	1 (0.4%)
Females (N)	
10 – 14 (572)	15 (2.6%)
15 – 19 (346)	5 (1.5%)

Lacrosse

CHIRPP 2007/08 – 2009/10 Lacrosse Injuries Comparison by Age Group
A total of 493 lacrosse related injuries occurred between 2007 and 2010. Out of these injuries over half (59.0%) were sustained by children aged 10 – 14 years.

Table 118: Number of Lacrosse Injuries Sustained by Age Group

Age Group	Number of Injuries (N = 493)
5 – 9 years	26 (5.3%)
10 – 14 years	291 (59.0%)
15 – 19 years	176 (35.7%)

CHIRPP 2007/08 – 2009/10 Lacrosse Injuries Comparison by Sex
Males sustained the majority of lacrosse-related injuries. Out of a total of 493 injuries, males accounted for 85.0% of the sample.

Table 119: Number of Lacrosse Injuries Sustained by Males versus Females

Sex	Number of Injuries (N = 493)
Males	419 (85.0%)
Females	74 (15.0%)

CHIRPP 2007/08 – 2009/10 Lacrosse Injuries Comparison by Nature of Injury
Out of the 493 lacrosse injuries sustained over a three-year period, approximately one third (31.2%) of the injuries were related to a fracture. Other notable injuries included soft tissue injuries that made up an additional 22.1% of the sample.

Table 120: Number of Lacrosse Injuries Sustained by Nature of Injury

Nature of Injury	Number of Injuries (N = 493)
Fracture	154 (31.2%)
Soft Tissue Injury	109 (22.1%)
Other	94 (19.1%)
Sprain or Strain	81 (16.4%)
Superficial	45 (9.1%)

CHIRPP 2007/08 – 2009/10 Lacrosse Injuries Comparison by Body Part Injured
Out of the 493 lacrosse injuries sustained 34.7% belonged to the other body part category. In addition, 10.3% of lacrosse injuries were sustained to the wrist.

Table 121: Number of Lacrosse Injuries Sustained by Body Part Injured

Body Part Injured	Number of Injuries (N = 493)
Other	171 (34.7%)
Wrist	51 (10.3%)
Forearm	50 (10.1%)
Specified Head Injury	44 (8.9%)
Ankle	40 (8.1%)
Finger or Thumb	36 (7.3%)
Knee	35 (7.1%)
Neck	34 (6.9%)
Hand	32 (6.5%)

CHIRPP 2007/08 – 2009/10 Lacrosse Injuries Comparison by Nature of Injury for Males aged 5 – 9 Years
When examining the nature of injury for males aged 5 – 9, the majority of injuries (32.0%) belonged to the "other" category. Other notable injuries included fractures (20.0%) and soft tissue injuries (20.0%).

Table 122: Nature of Lacrosse Injuries Sustained for Males Aged 5 – 9

Nature of Injury	Number of Injuries (N = 25)
Other	8 (32.0%)
Fracture	5 (20.0%)
Soft Tissue Injury	5 (20.0%)
Sprain or Strain	4 (16.0%)
Open Wound	3 (12.0%)

CHIRPP 2007/08 – 2009/10 Lacrosse Injuries Comparison by Nature of Injury for Males Aged 10 - 14 Years
Table 123 shows that over one third of the lacrosse injuries sustained by males aged 10 – 14 were related to a fracture (36.5%). Other notable injuries included soft tissue injuries (21.4%).

Table 123: Nature of Lacrosse Injuries Sustained for Males Aged 10 – 14

Nature of Injury	Number of Injuries (N = 252)
Fracture	92 (36.5%)
Soft Tissue Injury	54 (21.4%)
Other	35 (13.9%)
Sprain or Strain	34 (13.5%)
Superficial	24 (9.5%)
Concussion	13 (5.2%)

CHIRPP 2007/08 – 2009/10 Lacrosse Injuries Comparison by Nature of Injury for Males Aged 15 – 19 Years

Table 124 shows that over half of the lacrosse injuries sustained by males aged 15 – 19 were related to a fracture (30.3%) or a soft tissue injury (21.1%)

Table 124: Nature of Lacrosse Injuries Sustained for Males Aged 15 – 19

Nature of Injury	Number of Injuries (N = 142)
Fracture	43 (30.3%)
Soft Tissue Injury	30 (21.1%)
Other	27 (19.0%)
Sprain or Strain	22 (15.5%)
Superficial	12 (8.5%)
Open Wound	8 (5.6%)

CHIRPP 2007/08 – 2009/10 Lacrosse Injuries Comparison by Nature of Injury for Females Aged 10 – 14 Years

The majority of lacrosse injuries sustained by females' aged 10 – 14 were soft tissue injuries (35.9%). Other notable injuries included fractures (25.6%).

Table 125: Nature of Lacrosse Injuries Sustained for Females Aged 10 – 14

Nature of Injury	Number of Injuries (N = 39)
Soft Tissue Injury	14 (35.9%)
Fracture	10 (25.6%)
Sprain or Strain	6 (15.4%)
Superficial	4 (10.3%)
Minor Head Injury	3 (7.7%)
Other	3 (7.7%)

CHIRPP 2007/08 – 2009/10 Lacrosse Injuries Comparison by Nature of Injury for Females Aged 15 – 19 Years

The majority (44.1%) of lacrosse related injuries sustained by females' aged 15 – 19 were sprains or strains. Other notable injuries included soft tissue injuries (17.6%) and "other" injuries (17.6%).

Table 126: Nature of Lacrosse Injuries Sustained for Females Aged 10 – 14

Nature of Injury	Number of Injuries (N = 34)
Sprain or Strain	15 (44.1%)
Soft Tissue Injury	6 (17.6%)
Other	6 (17.6%)
Fracture	4 (11.8%)
Superficial	3 (8.8%)

CHIRPP 2007/08 – 2009/10 Lacrosse Injuries Comparison by Head Injuries
Overall, concussions accounted for 3.9% of all lacrosse related injuries sustained between 2007 and 2010. Concussions accounted for 5.2% of all lacrosse related injuries sustained by males in the 10 – 14 age group, and 5.9% of by females in the 15 – 19 age group.

Table 127: Concussion Related Injuries for Males versus Females

	Concussion (N = 19)
Males (N)	
5 – 9 (25)	1 (4.0%)
10 – 14 (252)	13 (5.2%)
15 – 19 (142)	3 (2.1%)
Females (N)	
15 – 19 (34)	2 (5.9%)

Ringette

CHIRPP 2007/08 – 2009/10 Ringette Injuries Comparison by Age Group
A total of 324 ringette related injuries occurred between 2007 and 2010. Out of these injuries over half (64.8%) were sustained by children aged 10 – 14 years.

Table 128: Number of Ringette Injuries Sustained by Age Group

Age Group	Number of Injuries (N = 324)
5 – 9 years	29 (9.0%)
10 – 14 years	210 (64.8%)
15 – 19 years	85 (26.2%)

CHIRPP 2007/08 – 2009/10 Ringette Injuries Comparison by Sex
Females sustained the majority of ringette-related injuries. Out of a total of 324 injuries, females accounted for 97.5% of the sample.

Table 129: Number of Ringette Injuries Sustained by Males versus Females

Sex	Number of Injuries (N = 324)
Males	8 (2.5%)
Females	316 (97.5%)

CHIRPP 2007/08 – 2009/10 Ringette Injuries Comparison by Nature of Injury
Out of the 324 ringette injuries sustained over a three-year period, the majority (22.5%) of the injuries were related to a soft tissue injury. Other notable injuries included sprains/strains that made up an additional 18.5% of the sample.

Table 130: Number of Ringette Injuries Sustained by Nature of Injury

Nature of Injury	Number of Injuries (N = 324)
Soft Tissue Injury	73 (22.5%)
Sprain or Strain	60 (18.5%)
Concussion	54 (16.7%)
Fracture	48 (14.8%)
Minor Head Injury	46 (14.2%)
Other	43 (13.3%)

CHIRPP 2007/08 – 2009/10 Ringette Injuries Comparison by Body Part Injured
Out of the 324 ringette injuries sustained 41.7% belonged to the other body part category. In addition, 30.9% of ringette injuries were a specified head injury.

Table 131: Number of Ringette Injuries Sustained by Body Part Injured

Body Part Injured	Number of Injuries (N = 324)
Other	135 (41.7%)
Specified Head Injury	100 (30.9%)
Knee	24 (7.4%)
Ankle	24 (7.4%)
Neck	21 (6.5%)
Wrist	20 (6.2%)

CHIRPP 2007/08 – 2009/10 Ringette Injuries Comparison by Nature of Injury for Females Aged 5 – 9 Years
The majority of ringette injuries sustained by females' aged 5 – 9 were soft tissue injuries (34.5%). Other notable injuries included fractures (24.1%) and concussions (20.7%).

Table 132: Nature of Ringette Injuries Sustained for Females Aged 5 – 9

Nature of Injury	Number of Injuries (N = 29)
Soft Tissue Injury	10 (34.5%)
Fracture	7 (24.1%)
Concussion	6 (20.7%)
Superficial	4 (13.8%)
Open Wound	1 (3.4%)
Minor Head Injury	1 (3.4%)

CHIRPP 2007/08 – 2009/10 Ringette Injuries Comparison by Nature of Injury for Females Aged 10 – 14 Years
The majority of ringette injuries sustained by females' aged 10 – 14 were related to either a sprain/strain (20.4%) or a soft tissue injury (20.4%).

Table 133: Nature of Ringette Injuries Sustained for Females Aged 10 – 14

Nature of Injury	Number of Injuries (N = 206)
Sprain or Strain	42 (20.4%)
Soft Tissue Injury	42 (20.4%)
Minor Head Injury	36 (17.5%)
Concussion	36 (17.5%)
Fracture	27 (13.1%)
Other	23 (11.2%)

CHIRPP 2007/08 – 2009/10 Ringette Injuries Comparison by Nature of Injury for Females Aged 15 – 19 Years

The majority (23.5%) of ringette related injuries sustained by females' aged 15 – 19 were soft tissue injuries. Other notable injuries included sprains/strains (19.8%).

Table 134: Nature of Ringette Injuries Sustained for Females Aged 15 – 19

Nature of Injury	Number of Injuries (N = 81)
Soft Tissue Injury	19 (23.5%)
Sprain or Strain	16 (19.8%)
Fracture	13 (16.0%)
Concussion	12 (14.8%)
Other	12 (14.8%)
Minor Head Injury	9 (11.1%)

CHIRPP 2007/08 – 2009/10 Ringette Injuries Comparison by Head Injuries

Overall, concussions accounted for 16.7% of all ringette related injuries sustained between 2007 and 2010. Concussions accounted for 17.5% of all ringette related injuries sustained by females in the 10 – 14 age group.

Table 135: Concussion Related Injuries

	Concussion (N = 54)
Females (N)	
5 – 9 (29)	6 (20.7%)
10 – 14 (206)	36 (17.5%)
15 – 19 (81)	12 (14.8%)

Soccer

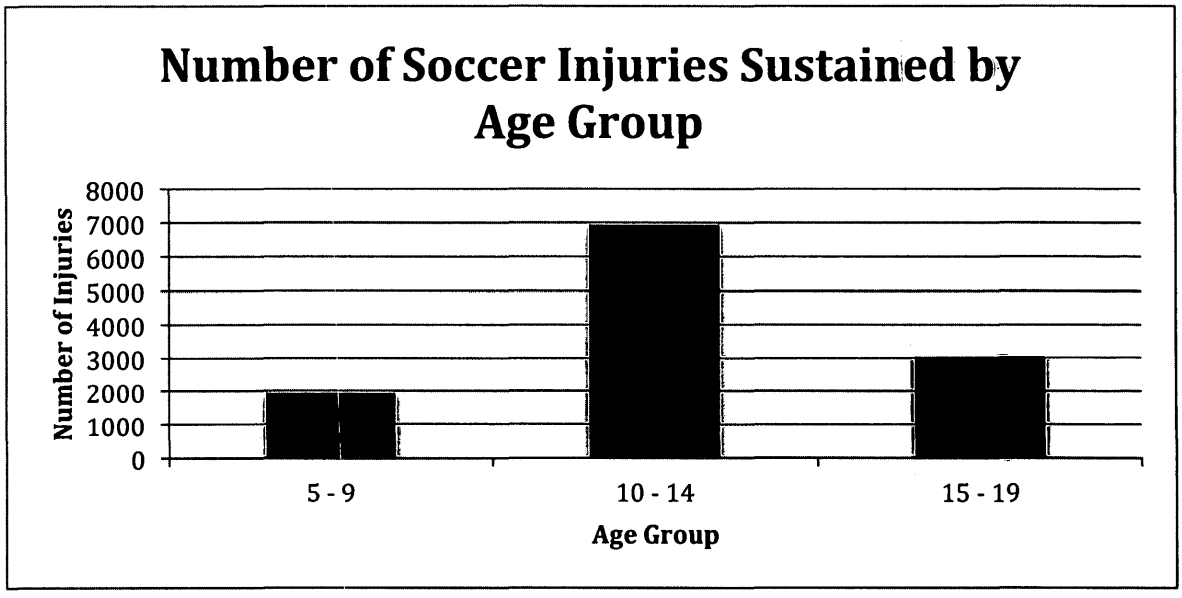

Figure 1: CHIRPP 2007/08 – 2009/10 – Number of Soccer Injuries Sustained by Age Group

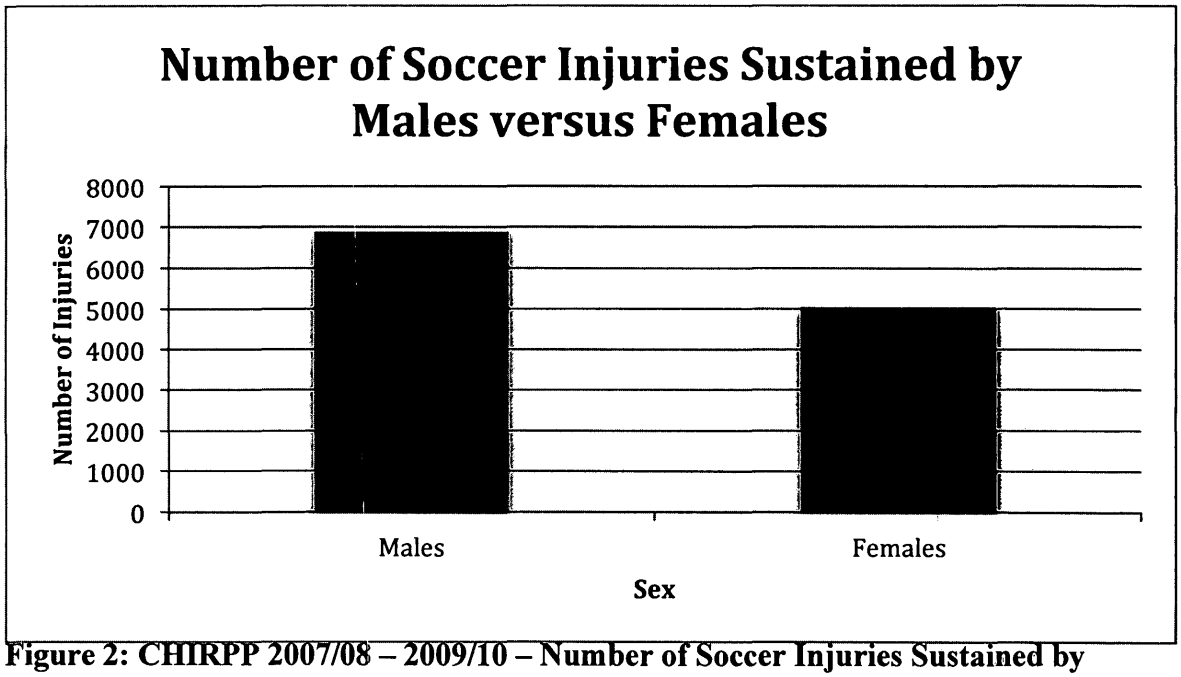

Figure 2: CHIRPP 2007/08 – 2009/10 – Number of Soccer Injuries Sustained by Males versus Females

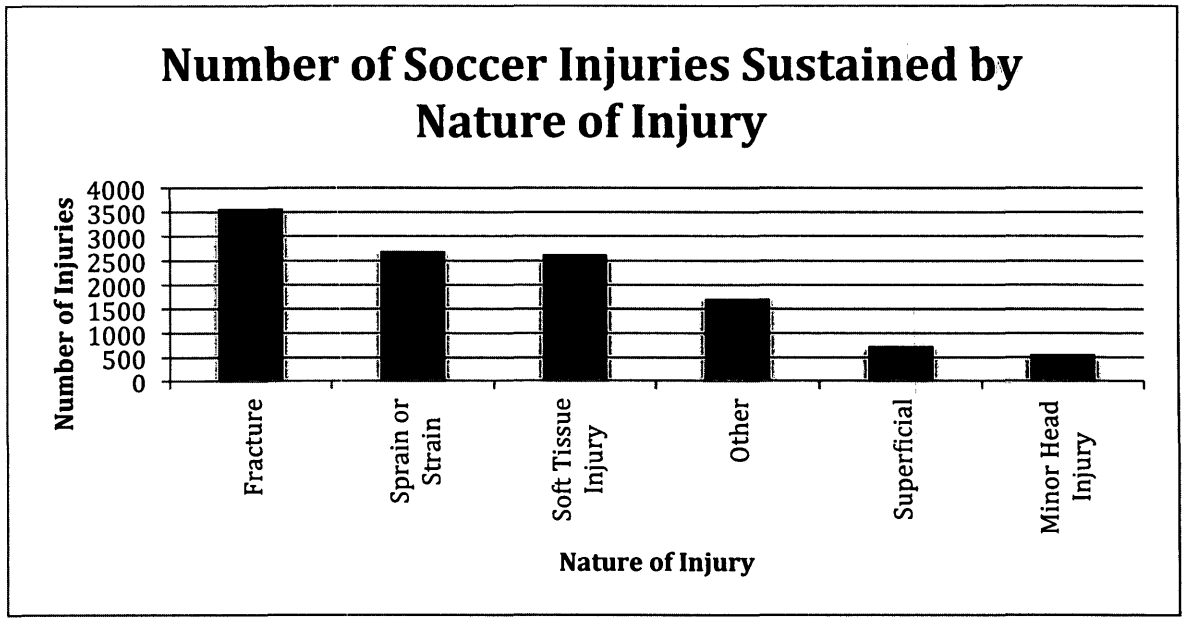

Figure 3: CHIRPP 2007/08 – 2009/10 – Number of Soccer Injuries Sustained by Nature of Injury

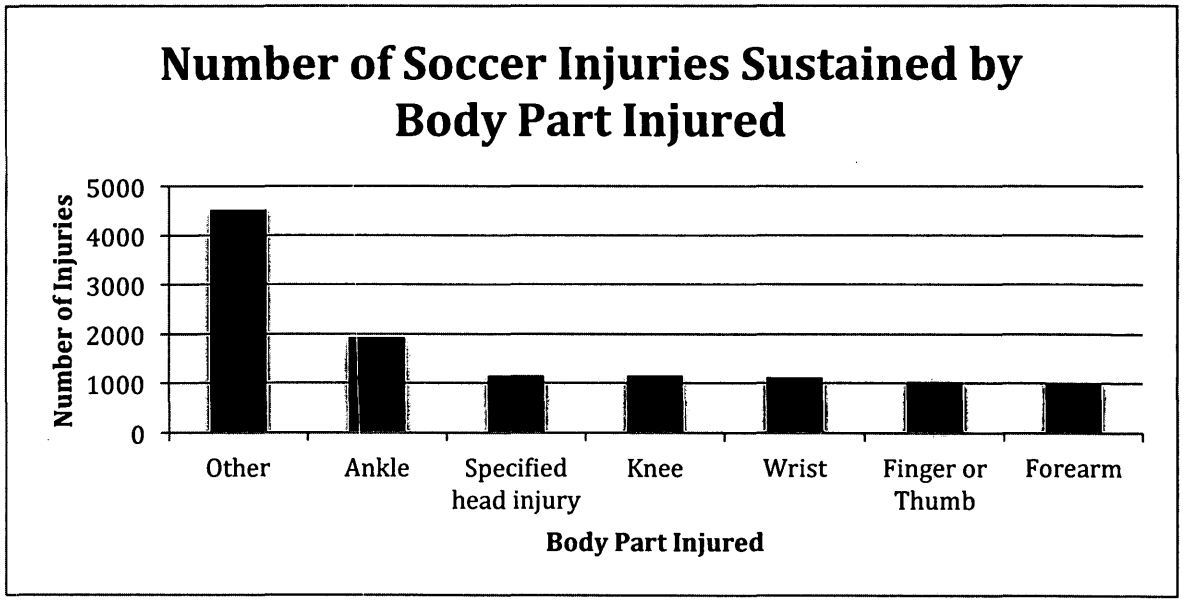

Figure 4: CHIRPP 2007/08 – 2009/10 – Number of Soccer Injuries Sustained by Body Part Injured

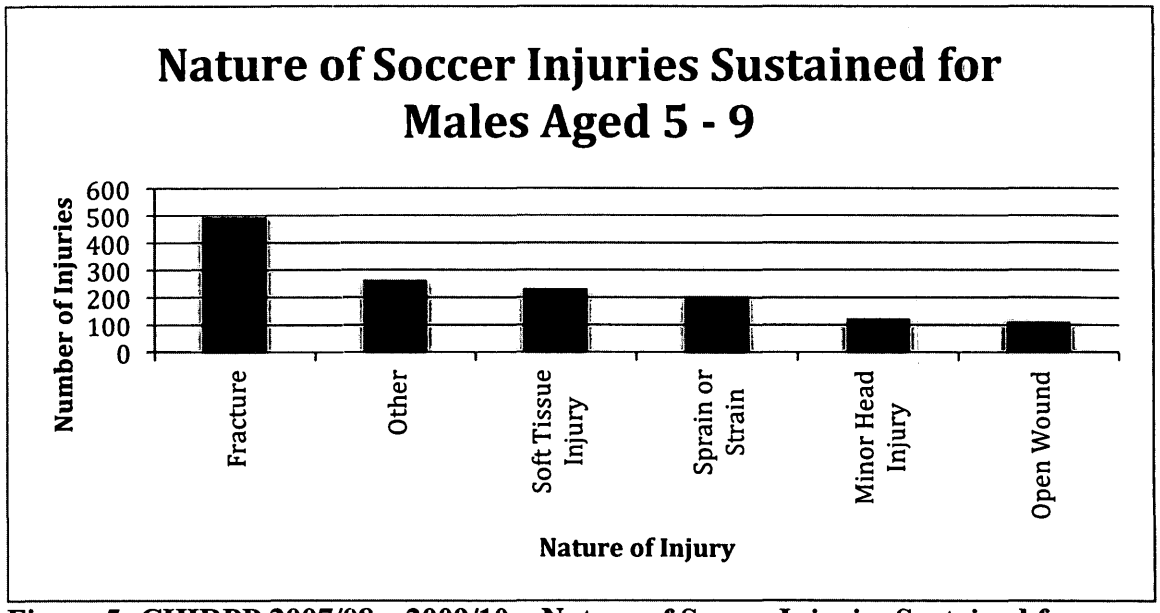

Figure 5: CHIRPP 2007/08 – 2009/10 – Nature of Soccer Injuries Sustained for Males Aged 5 – 9

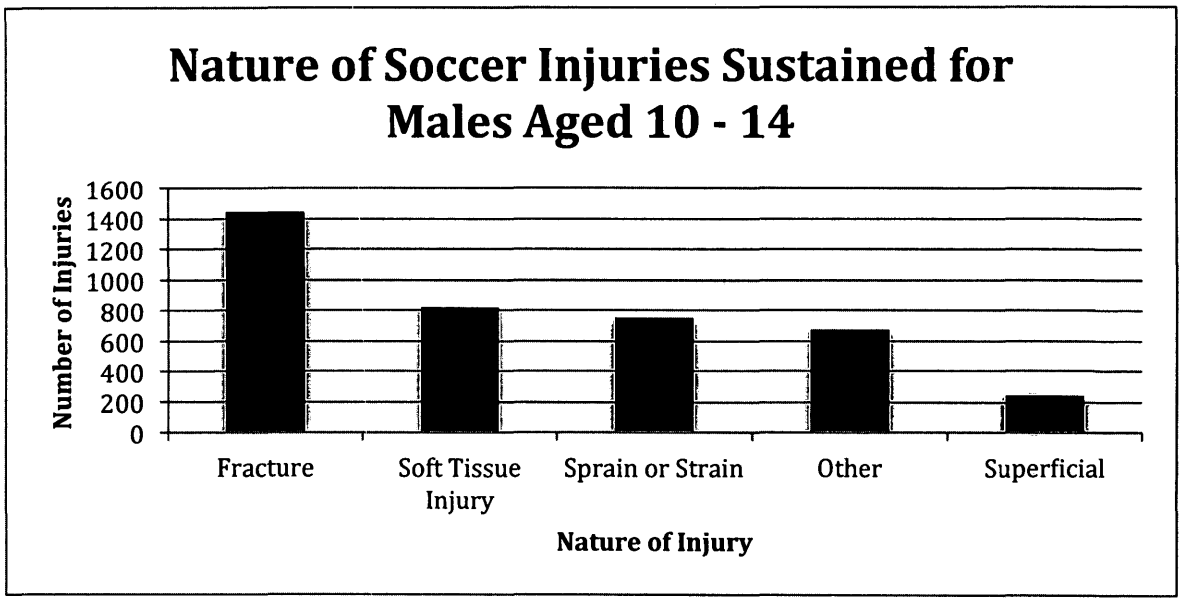

Figure 6: CHIRPP 2007/08 – 2009/10 – Nature of Soccer Injuries Sustained for Males Aged 10 – 14

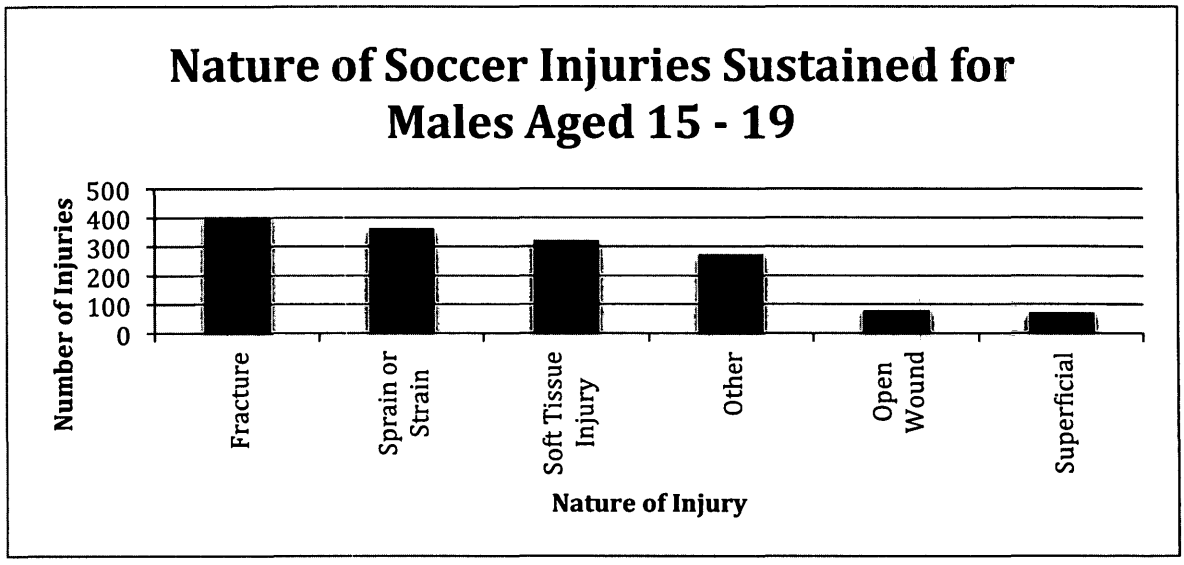

Figure 7: CHIRPP 2007/08 – 2009/10 – Nature of Soccer Injuries Sustained for Males Aged 15 – 19

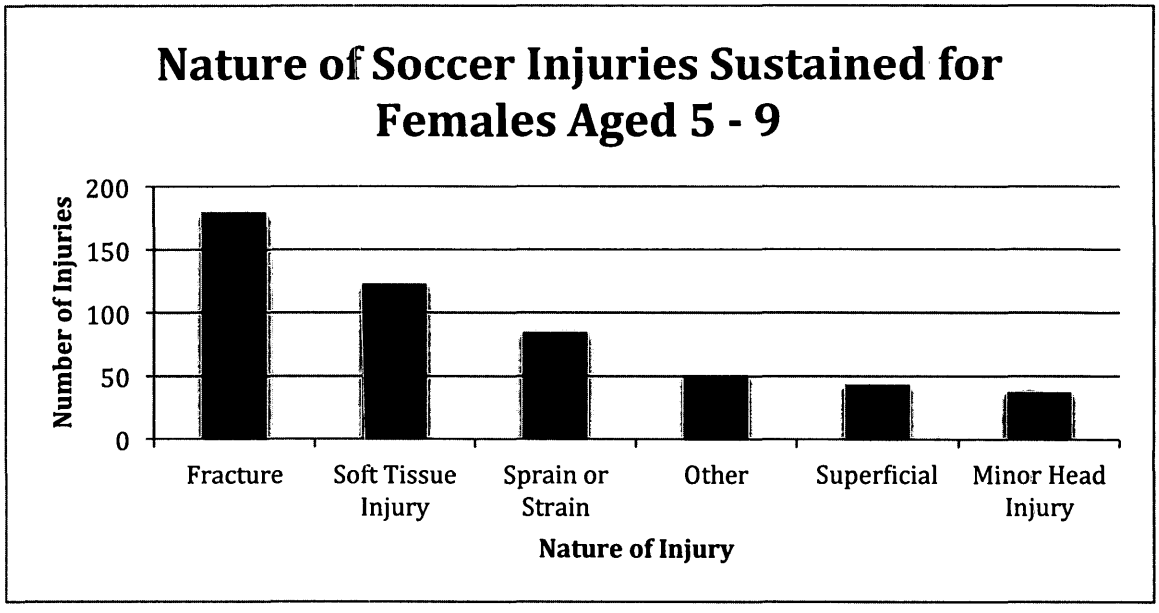

Figure 8: CHIRPP 2007/08 – 2009/10 – Nature of Soccer Injuries Sustained for Females Aged 5 – 9

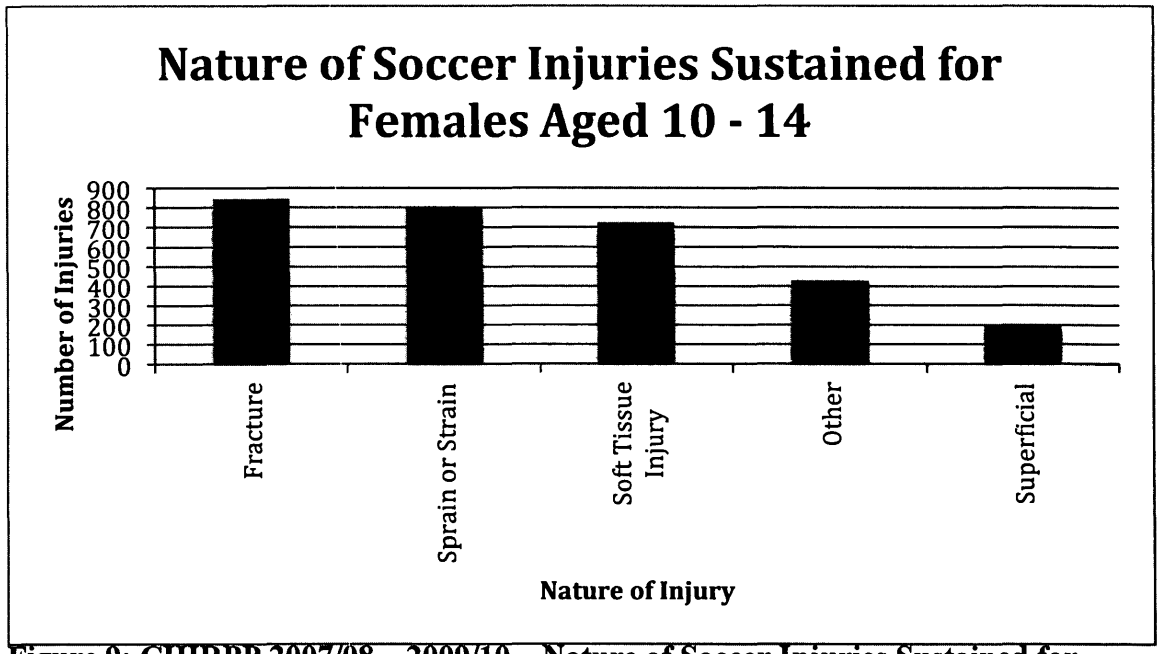

Figure 9: CHIRPP 2007/08 – 2009/10 – Nature of Soccer Injuries Sustained for Females Aged 10 – 14

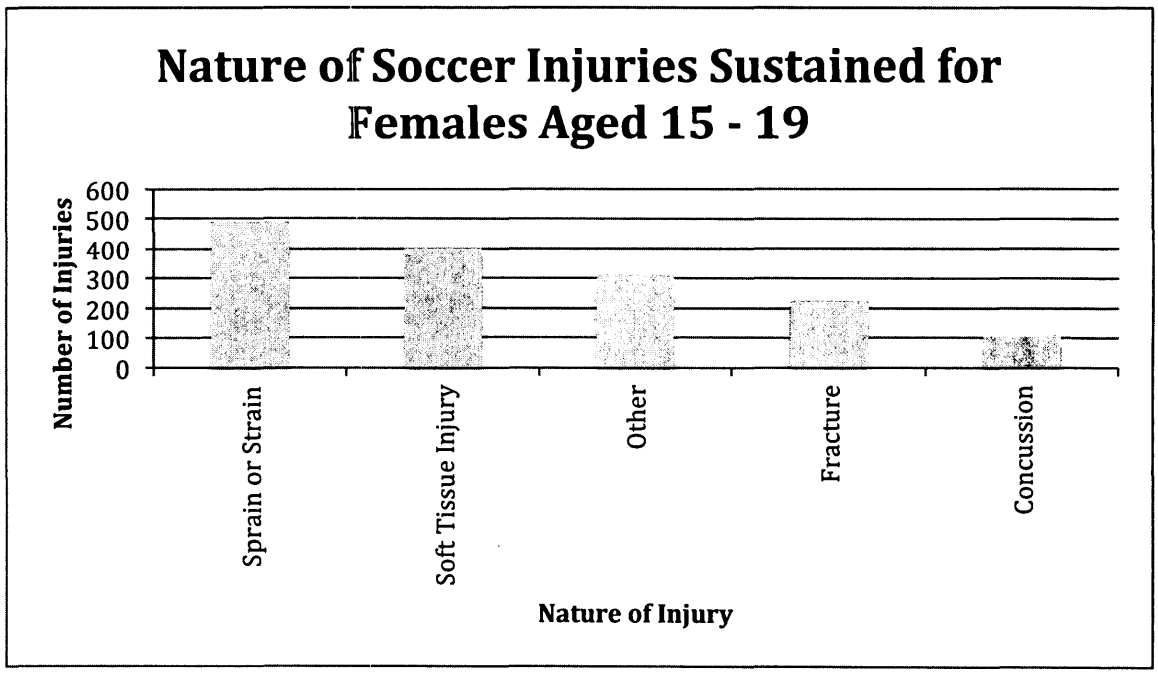

Figure 10: CHIRPP 2007/08 – 2009/10 – Nature of Soccer Injuries Sustained for Females Aged 15 – 19

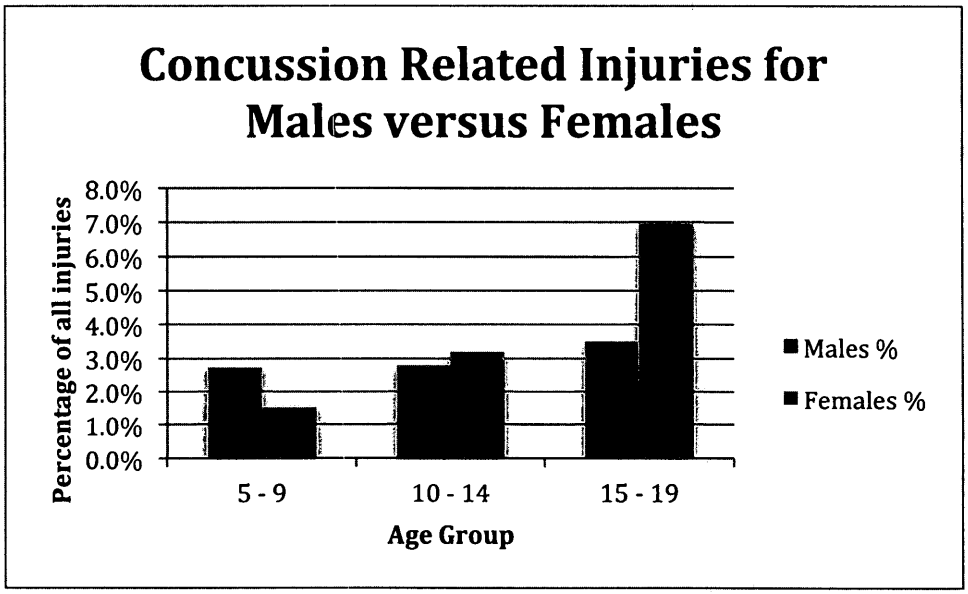

Figure 11: CHIRPP 2007/08 – 2009/10 – Concussion Related Injuries for Males versus Females

Hockey

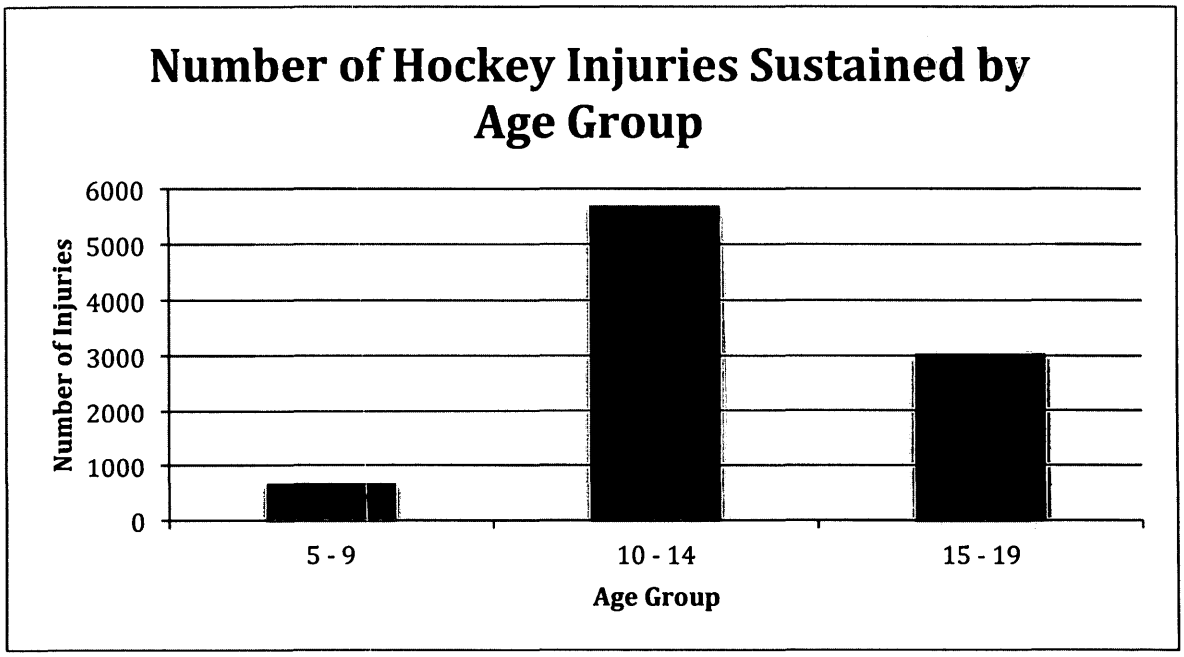

Figure 12: CHIRPP 2007/08 – 2009/10 – Number of Hockey Injuries Sustained by Age Group

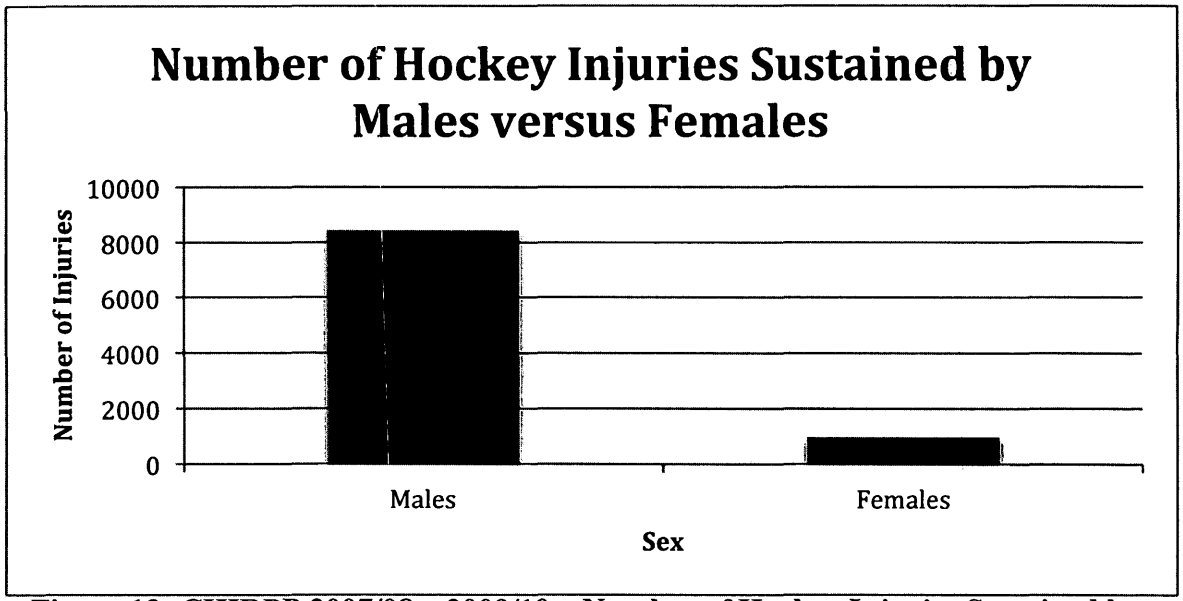

Figure 13: CHIRPP 2007/08 – 2009/10 – Number of Hockey Injuries Sustained by Males versus Females

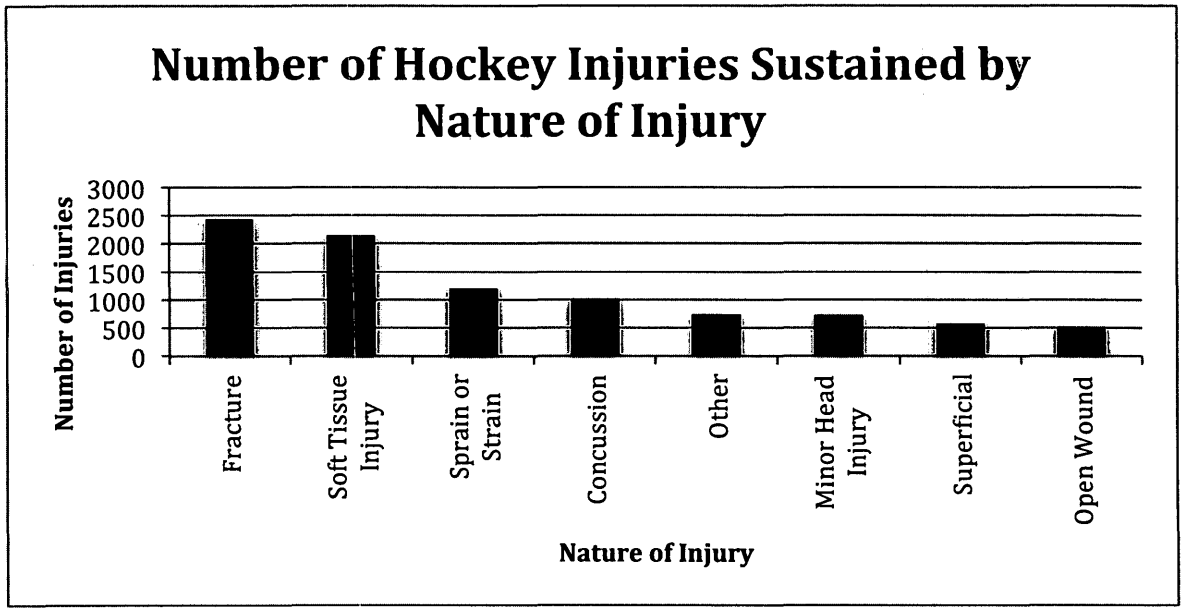

Figure 14: CHIRPP 2007/08 – 2009/10 – Number of Hockey Injuries Sustained by Nature of Injury

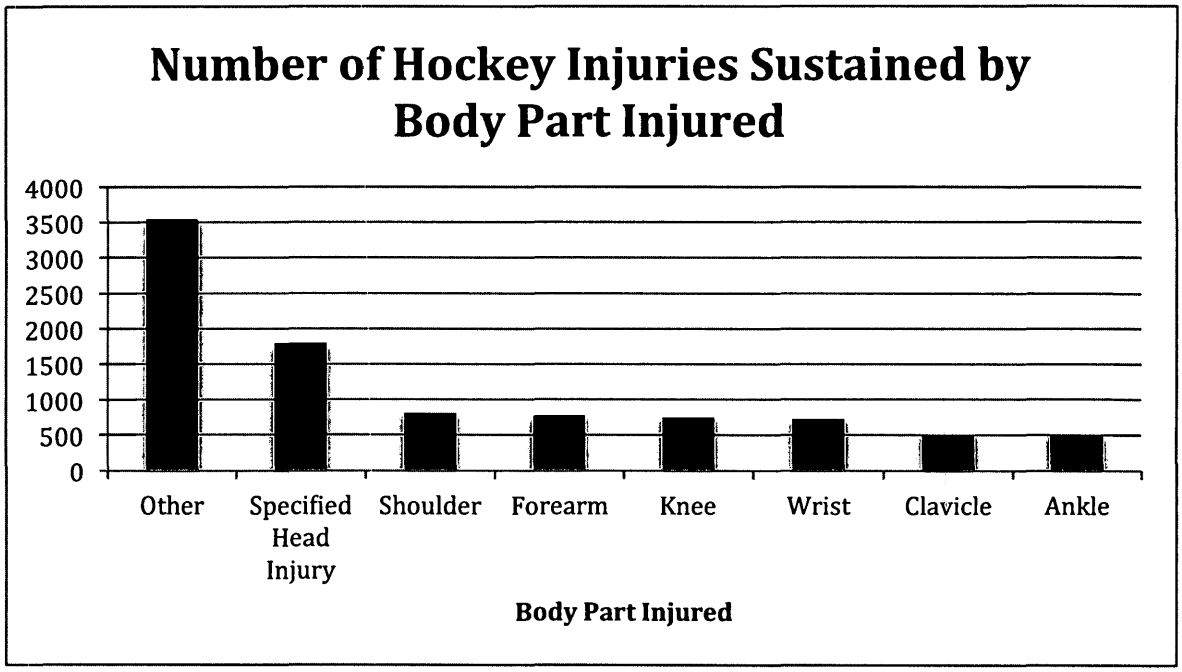

Figure 15: CHIRPP 2007/08 – 2009/10 – Number of Hockey Injuries Sustained by Body Part Injured

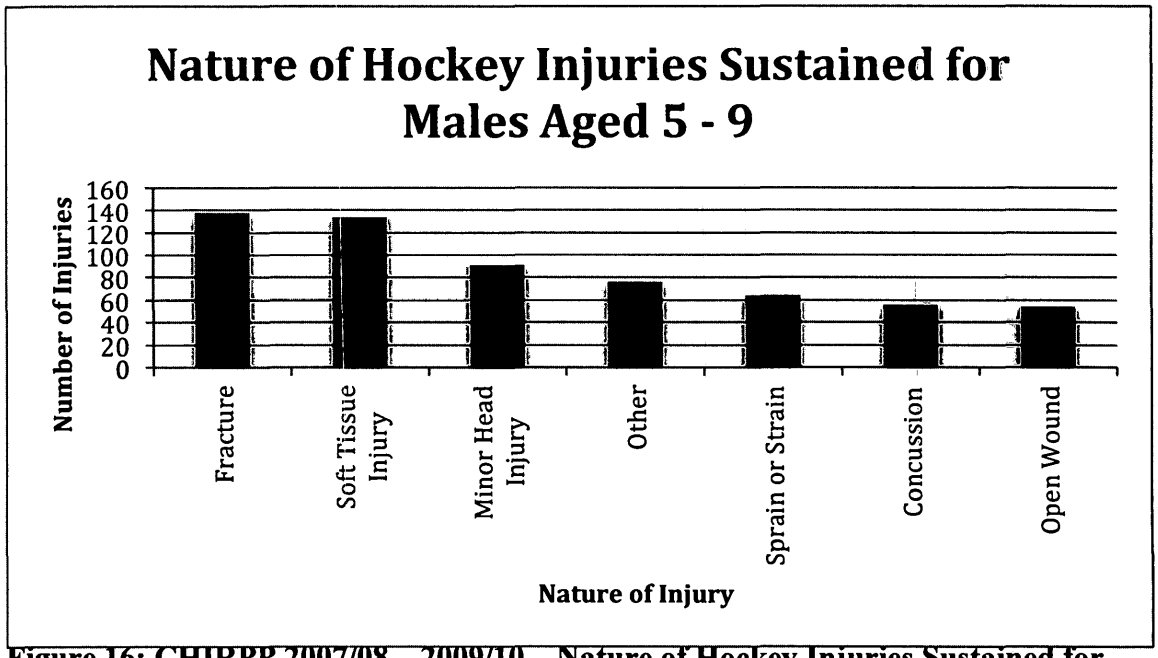

Figure 16: CHIRPP 2007/08 – 2009/10 – Nature of Hockey Injuries Sustained for Males Aged 5 – 9

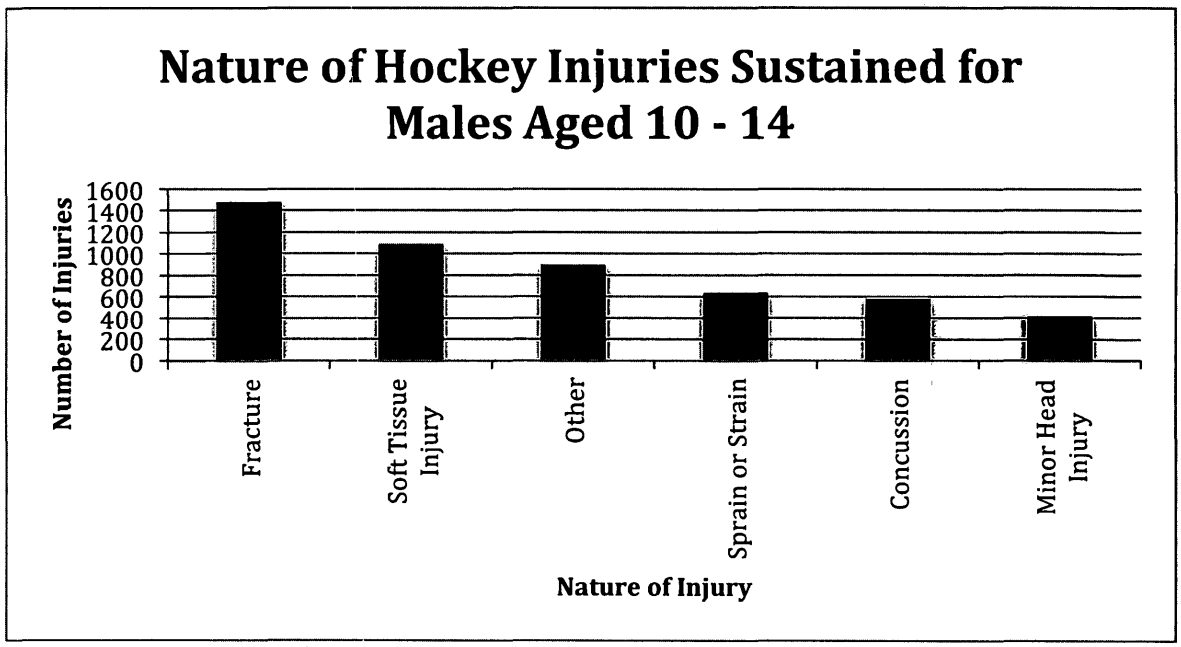

Figure 17: CHIRPP 2007/08 – 2009/10 – Nature of Hockey Injuries Sustained for Males Aged 10 – 14

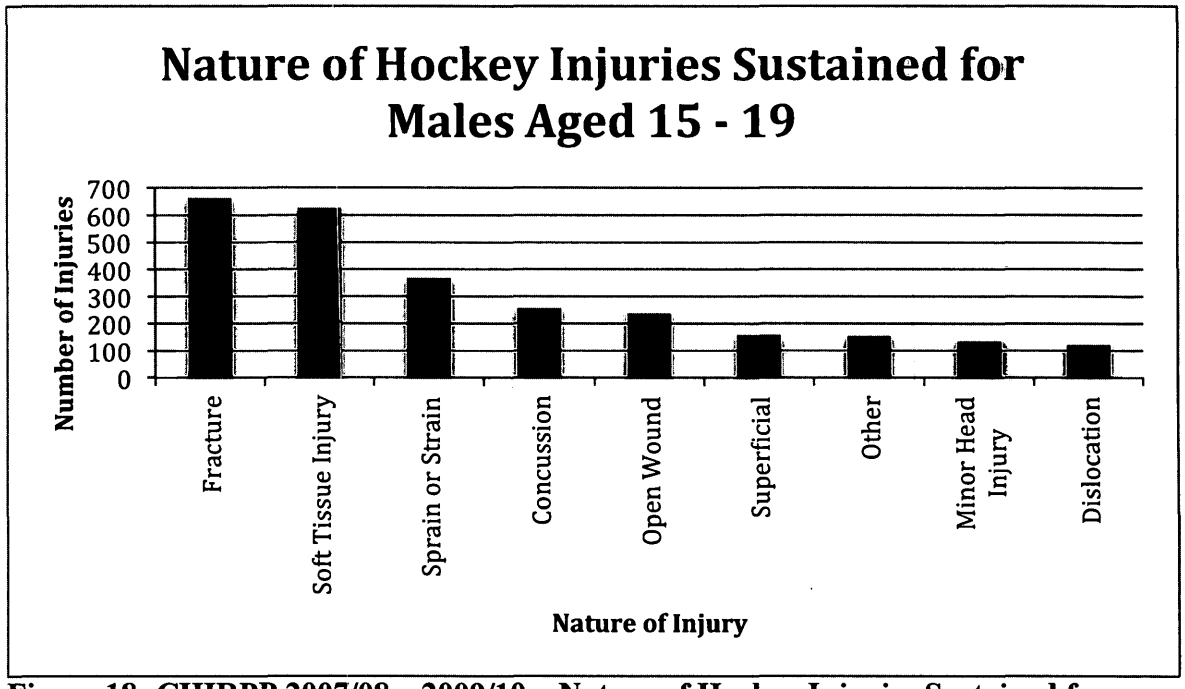

Figure 18: CHIRPP 2007/08 – 2009/10 – Nature of Hockey Injuries Sustained for Males Aged 15 – 19

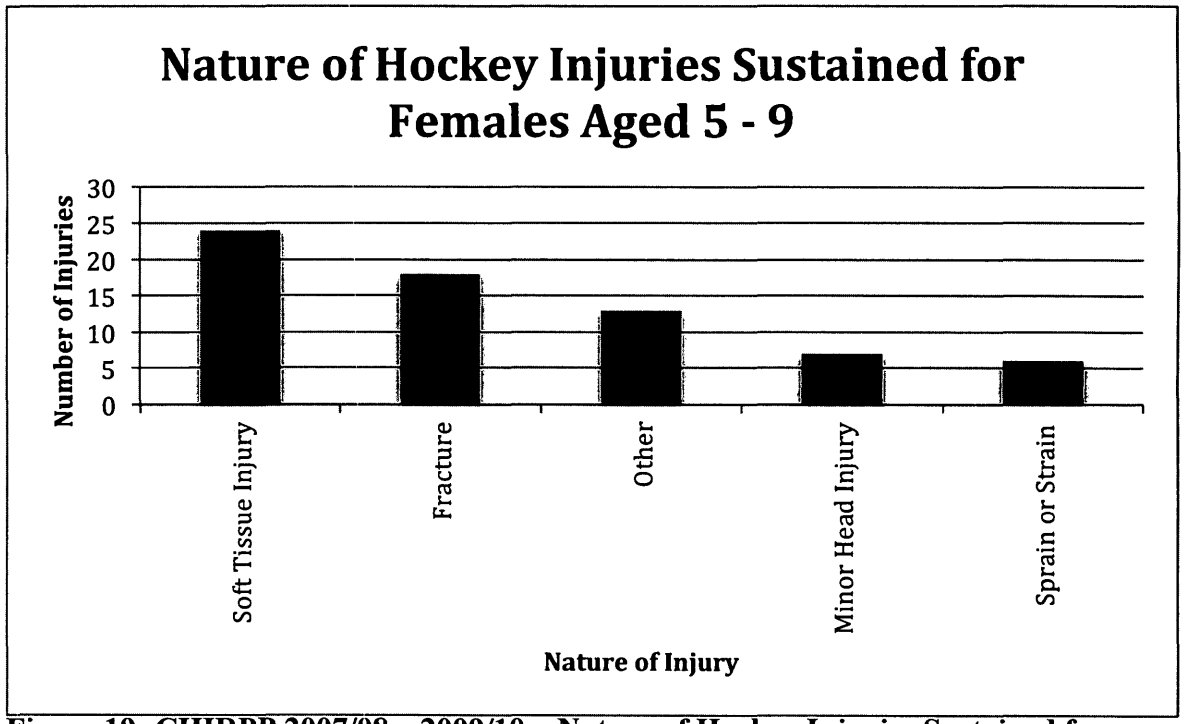

Figure 19: CHIRPP 2007/08 – 2009/10 – Nature of Hockey Injuries Sustained for Females Aged 5 – 9

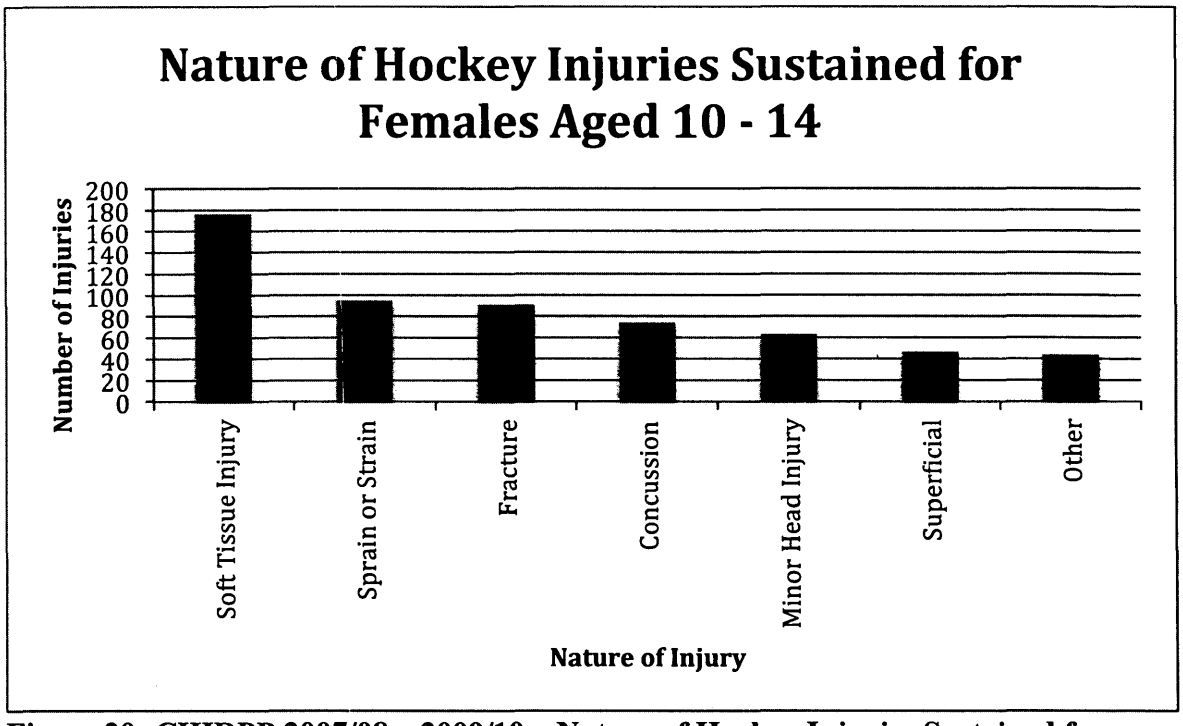

Figure 20: CHIRPP 2007/08 – 2009/10 – Nature of Hockey Injuries Sustained for Females Aged 10 – 14

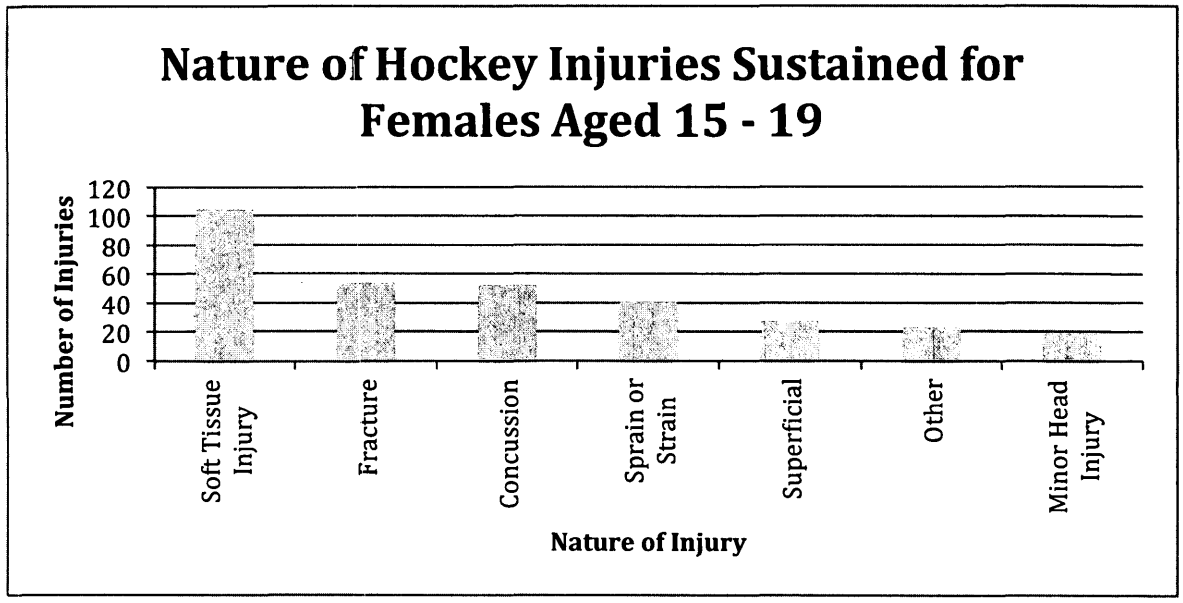

Figure 21: CHIRPP 2007/08 – 2009/10 – Nature of Hockey Injuries Sustained for Females Aged 15 – 19

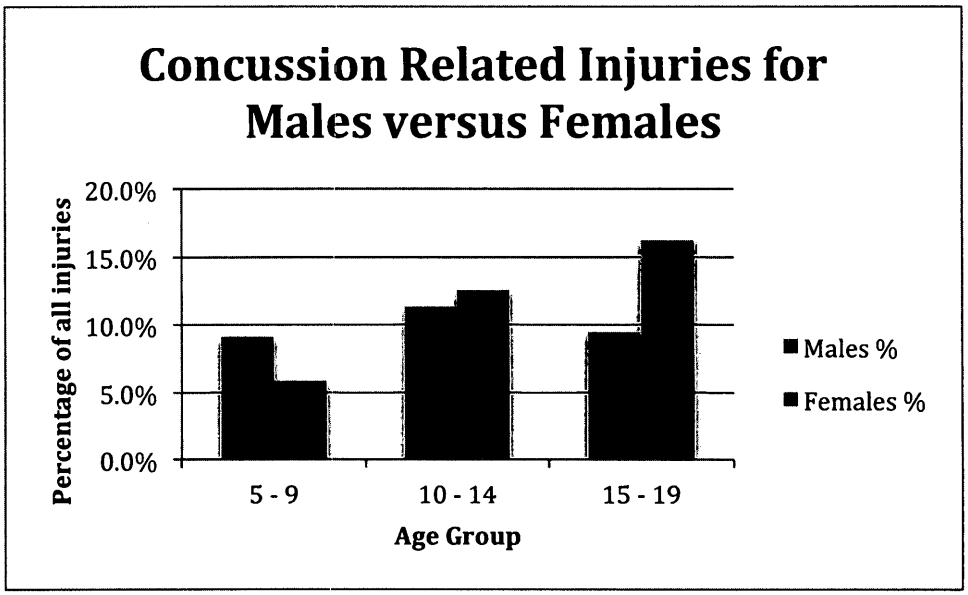

Figure 22: CHIRPP 2007/08 – 2009/10 – Concussion Related Injuries for Males versus Females

Cycling

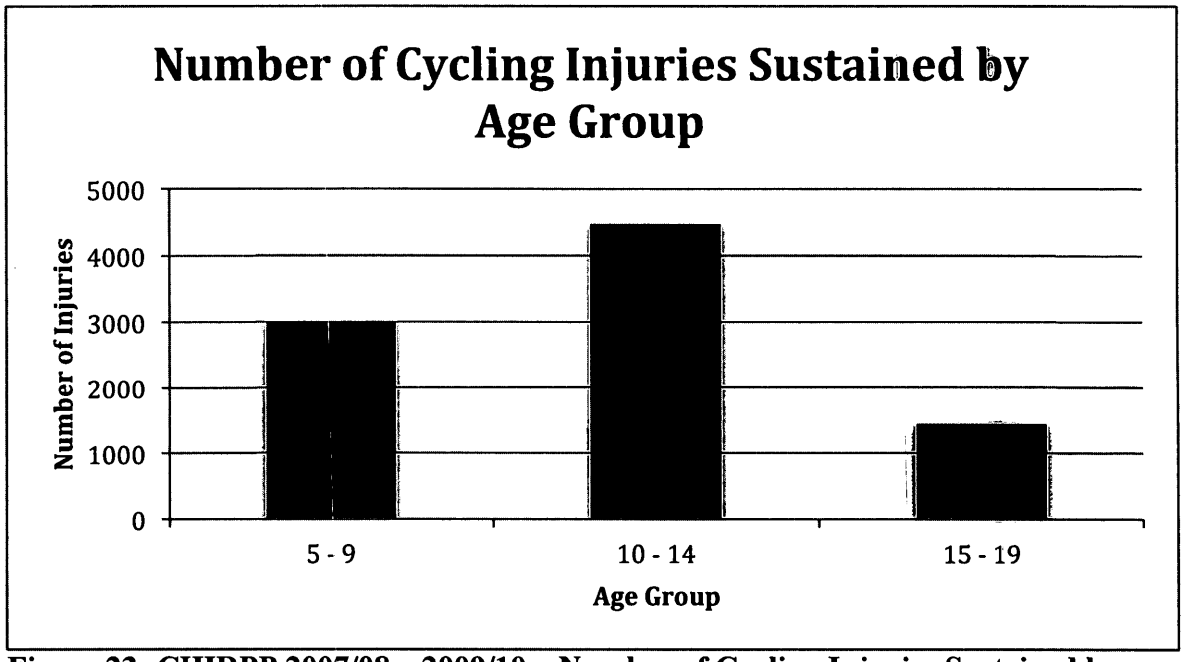

Figure 23: CHIRPP 2007/08 – 2009/10 – Number of Cycling Injuries Sustained by Age Group

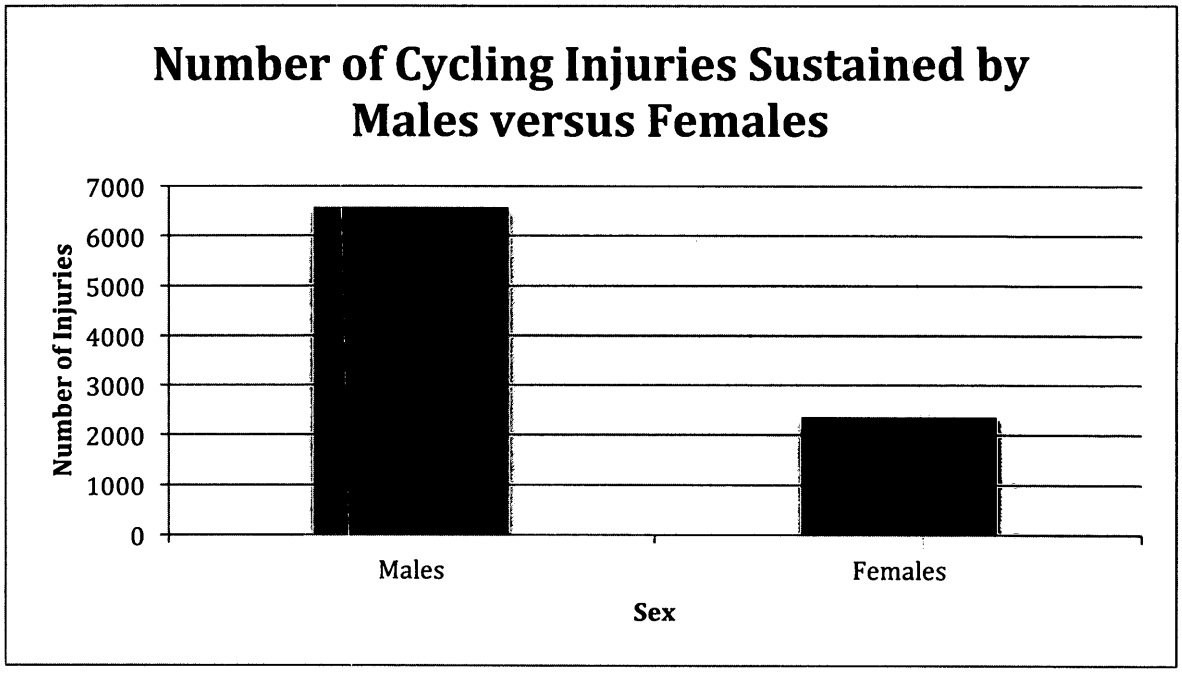

Figure 24: CHIRPP 2007/08 – 2009/10 – Number of Cycling Injuries Sustained by Males versus Females

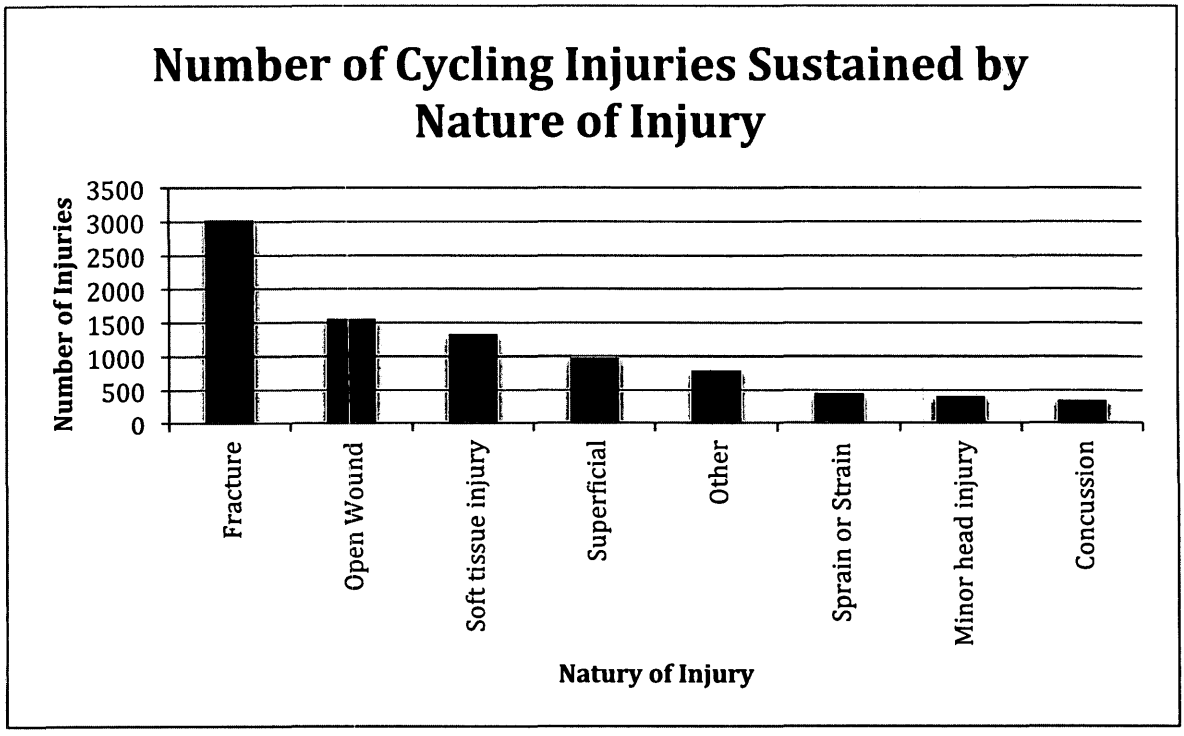

Figure 25: CHIRPP 2007/08 – 2009/10 – Number of Cycling Injuries Sustained by Nature of Injury

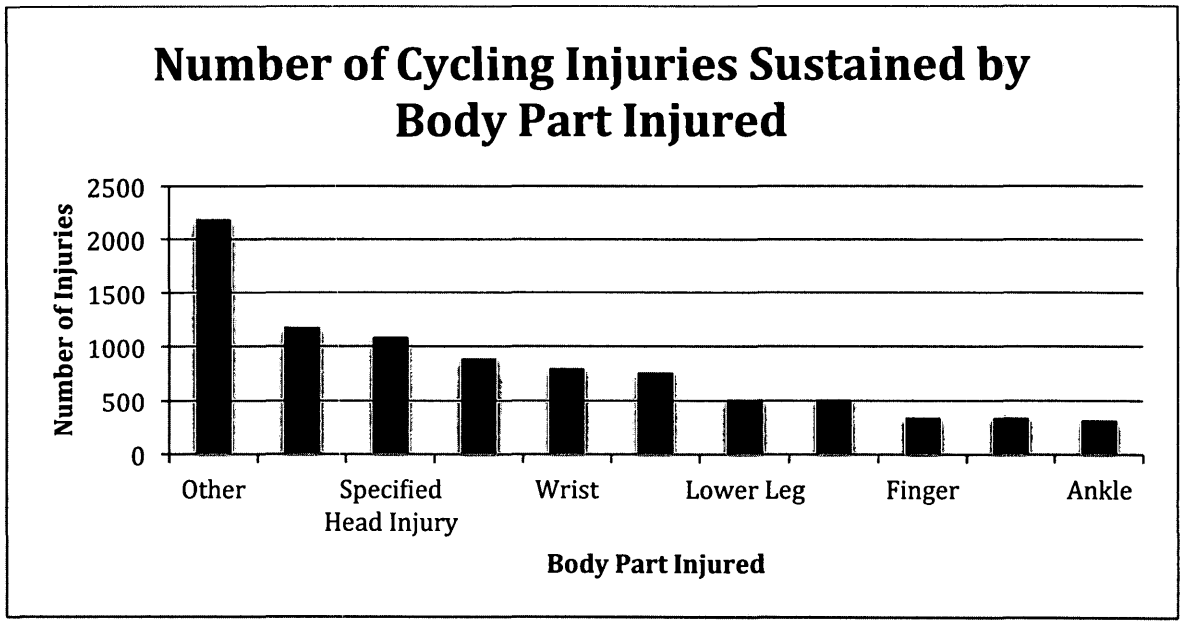

Figure 26: CHIRPP 2007/08 – 2009/10 – Number of Cycling Injuries Sustained by Body Part Injured

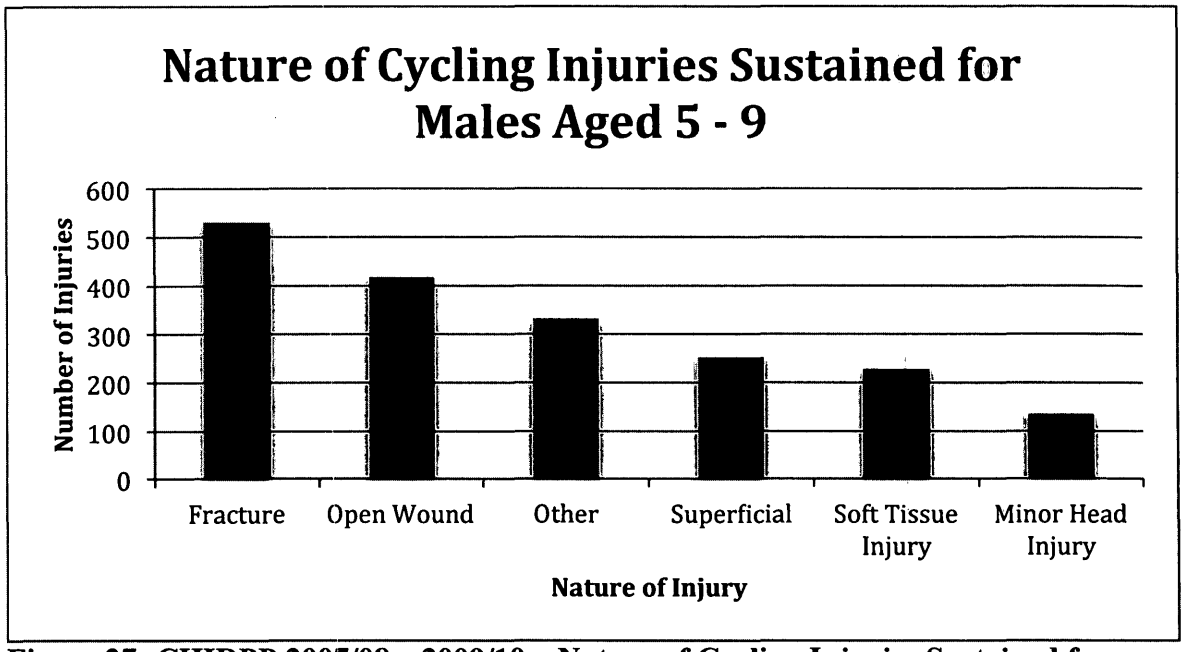

Figure 27: CHIRPP 2007/08 – 2009/10 – Nature of Cycling Injuries Sustained for Males Aged 5 – 9

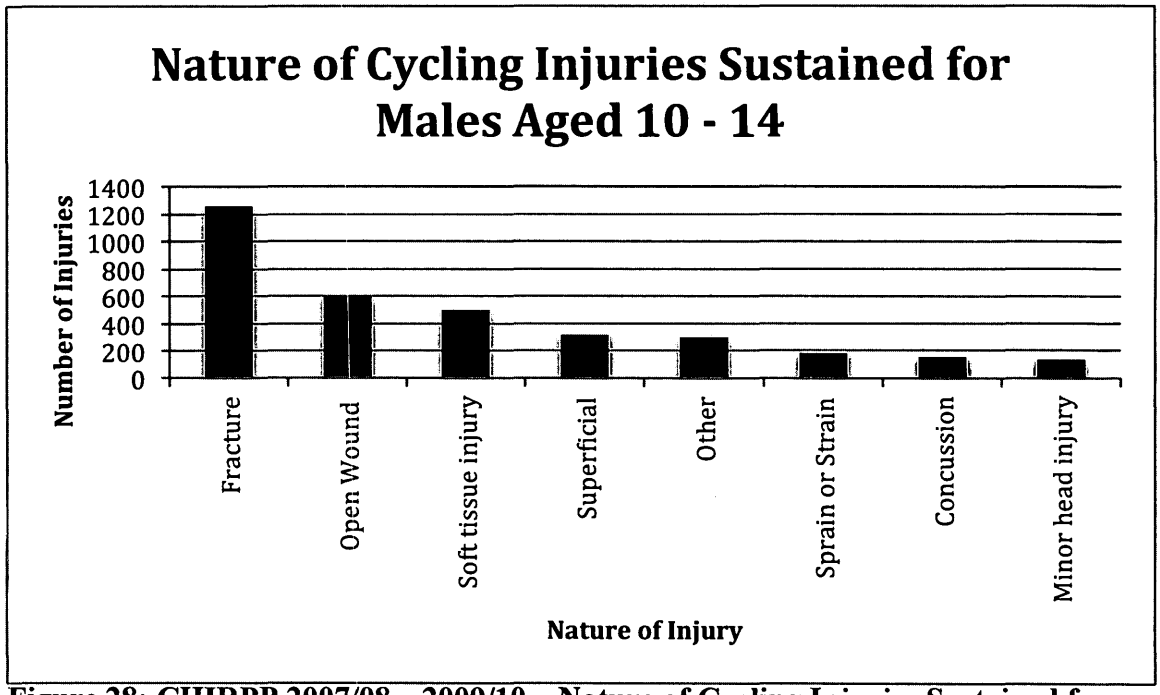

Figure 28: CHIRPP 2007/08 – 2009/10 – Nature of Cycling Injuries Sustained for Males Aged 10 – 14

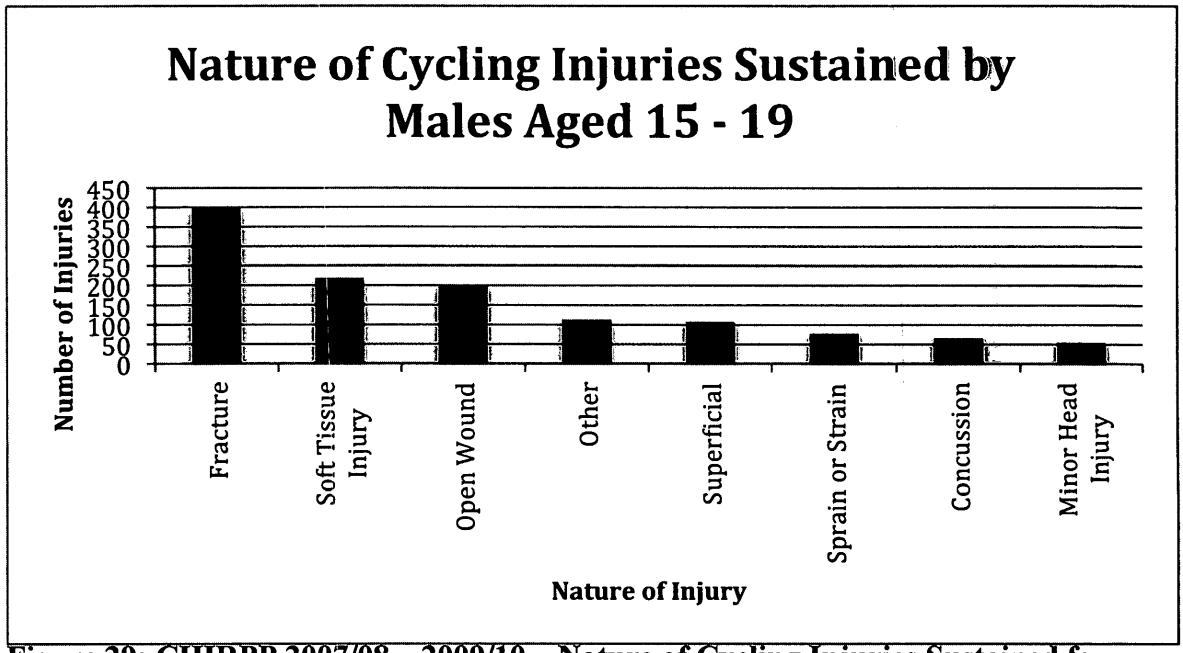

Figure 29: CHIRPP 2007/08 – 2009/10 – Nature of Cycling Injuries Sustained for Males Aged 15 – 19

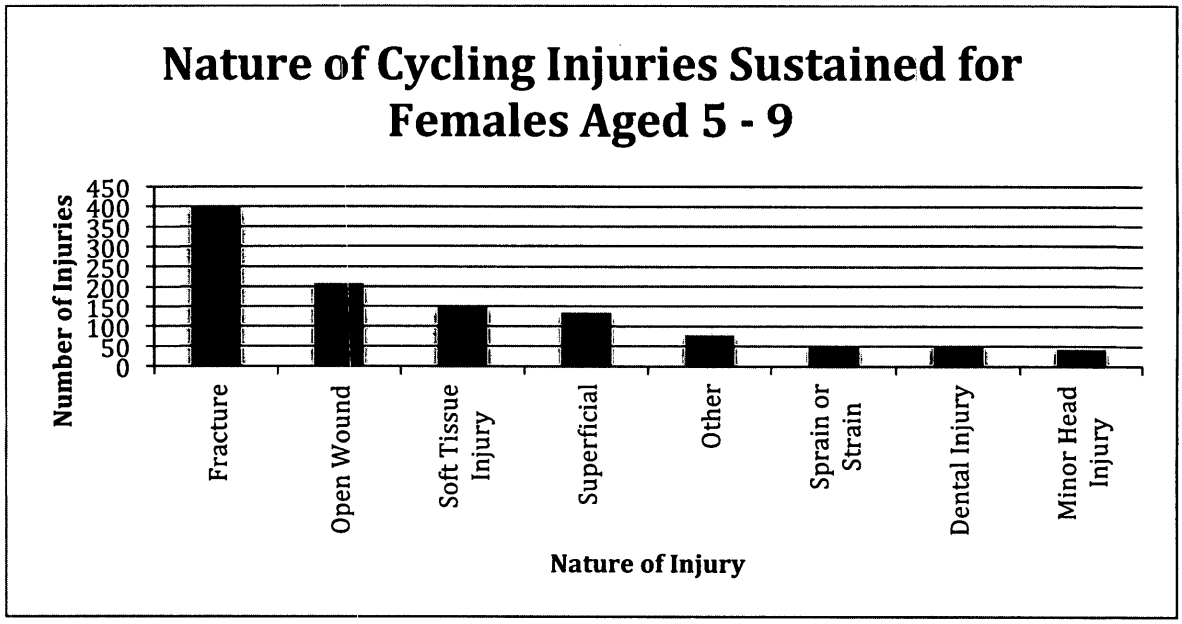

Figure 30: CHIRPP 2007/08 – 2009/10 – Nature of Cycling Injuries Sustained for Females Aged 5 – 9

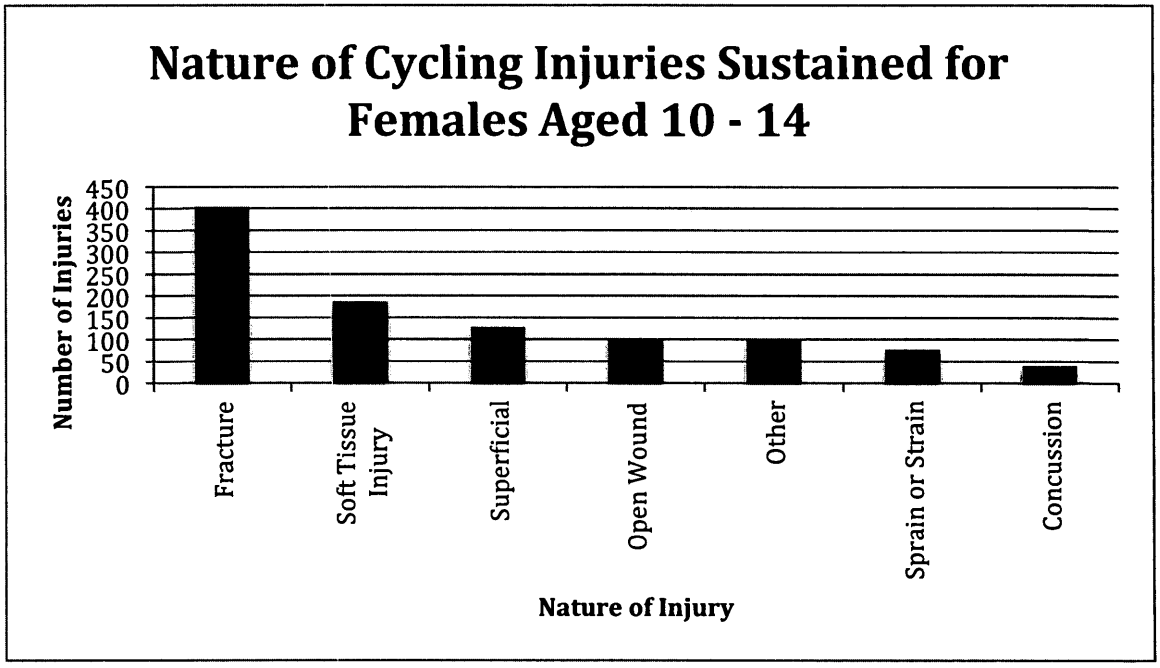

Figure 31: CHIRPP 2007/08 – 2009/10 – Nature of Cycling Injuries Sustained for Females Aged 10 – 14

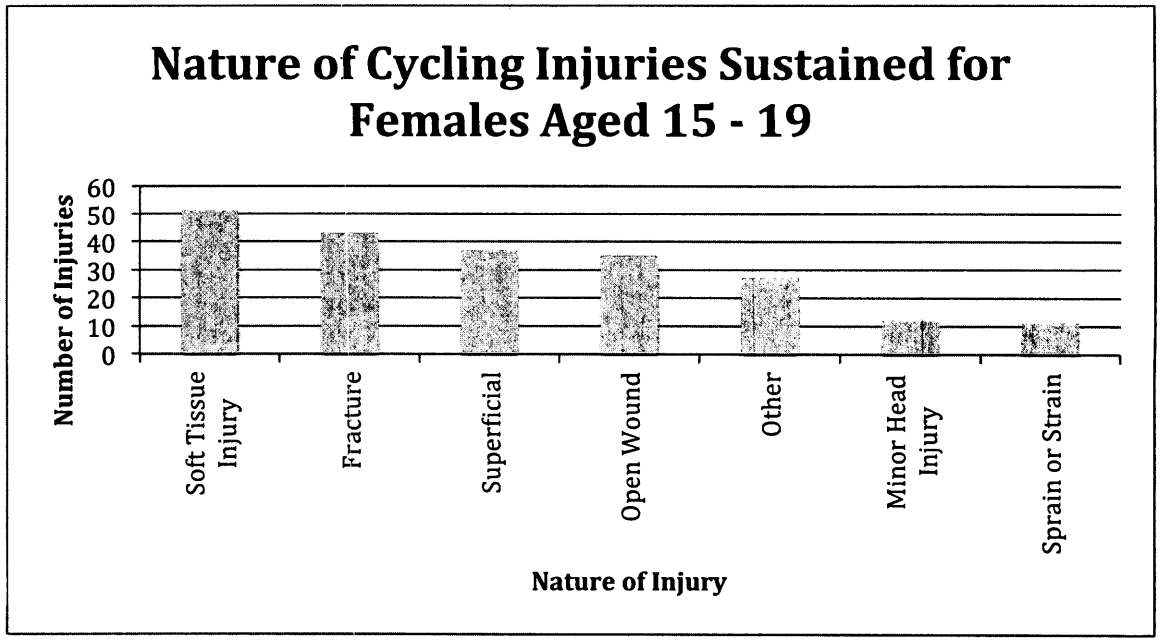

Figure 32: CHIRPP 2007/08 – 2009/10 – Nature of Cycling Injuries Sustained for Females Aged 15 – 19

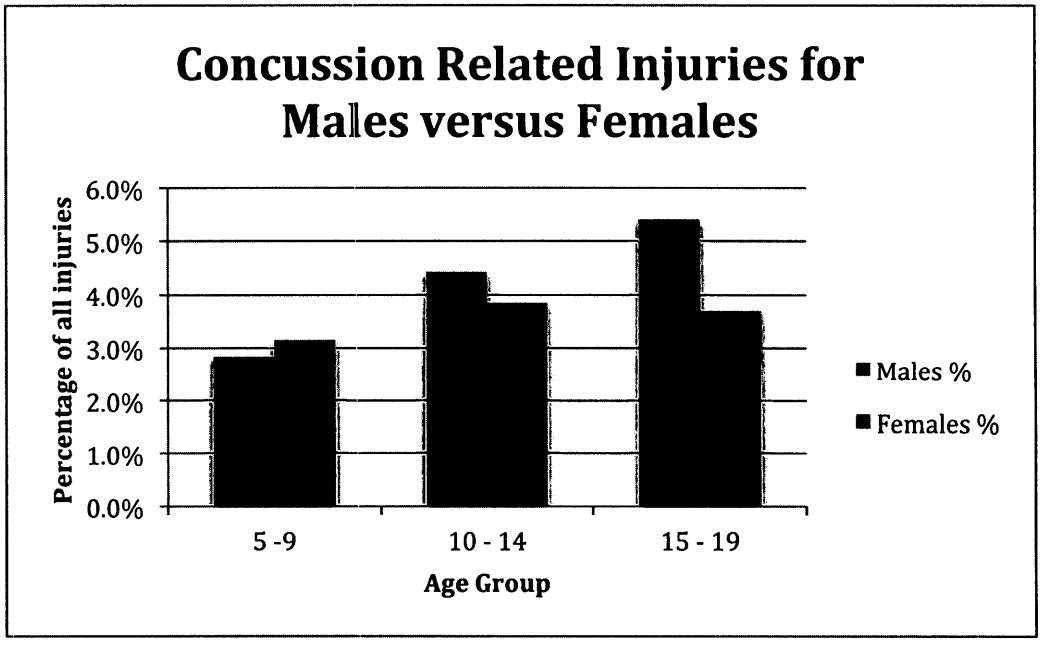

Figure 33: CHIRPP 2007/08 – 2009/10 – Concussion Related Injuries for Males versus Females

Basketball

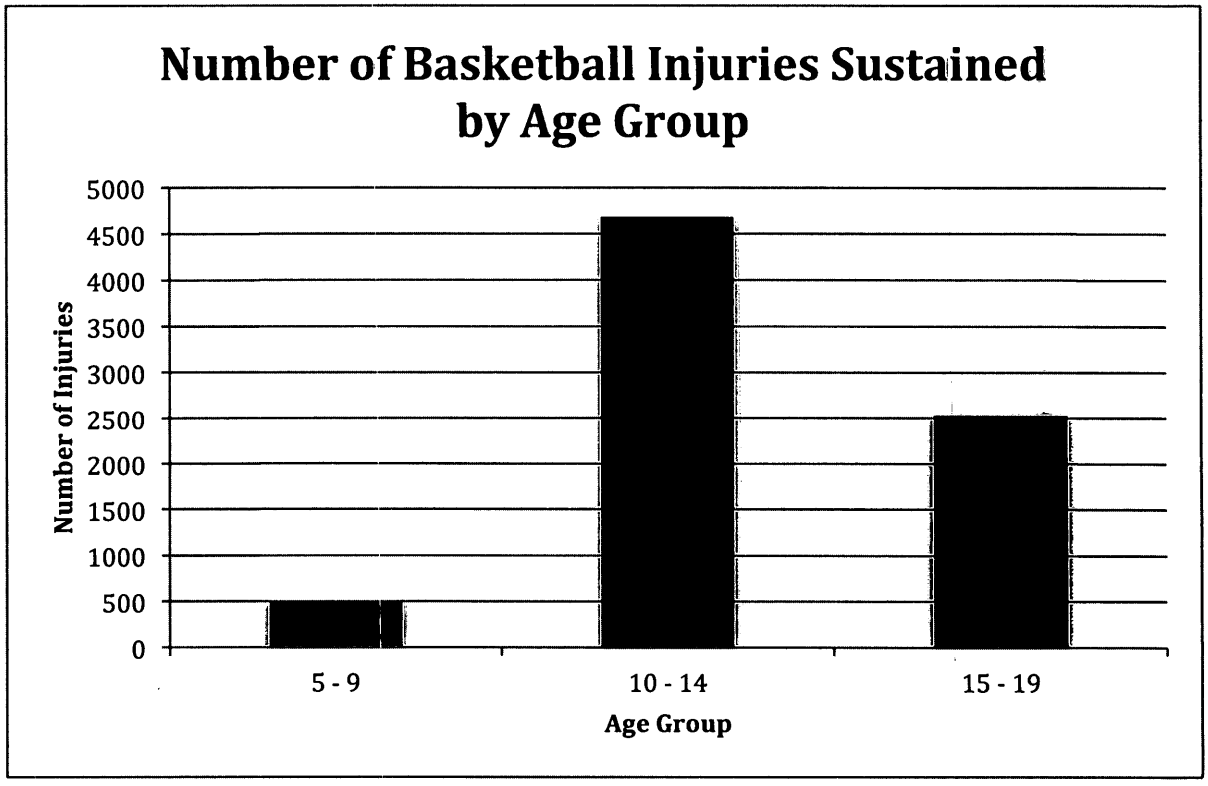

Figure 34: CHIRPP 2007/08 – 2009/10 – Number of Basketball Injuries Sustained by Age Group

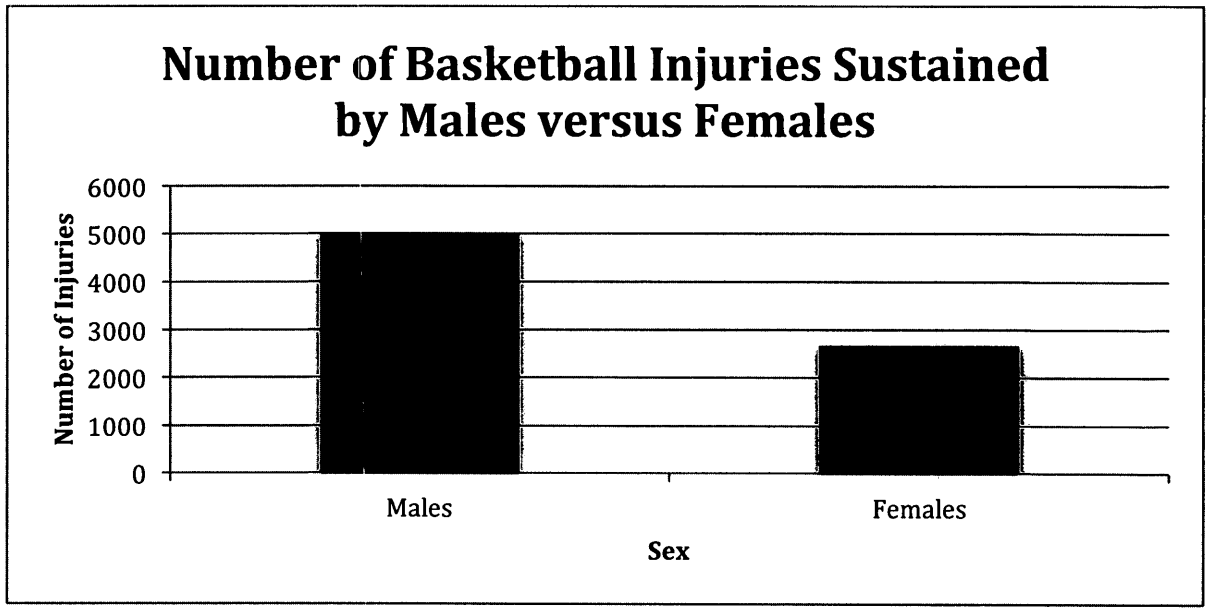

Figure 35: CHIRPP 2007/08 – 2009/10 – Number of Basketball Injuries Sustained by Males versus Females

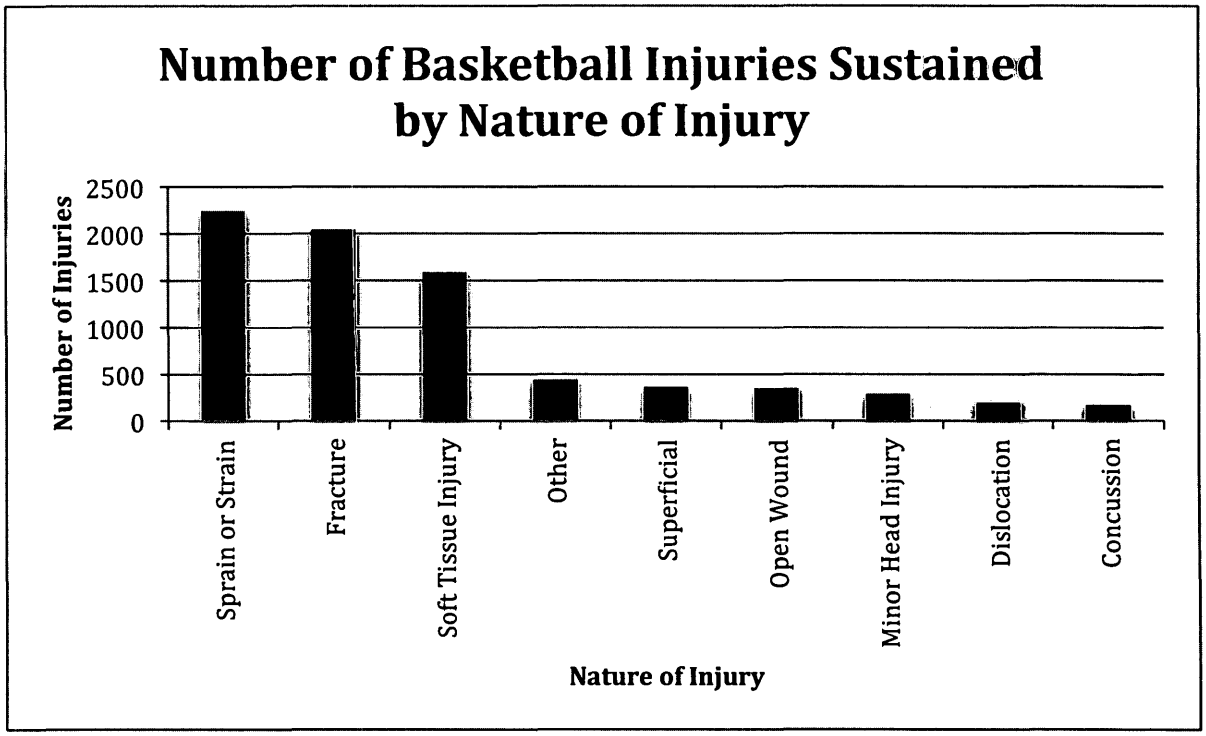

Figure 36: CHIRPP 2007/08 – 2009/10 – Number of Basketball Injuries Sustained by Nature of Injury

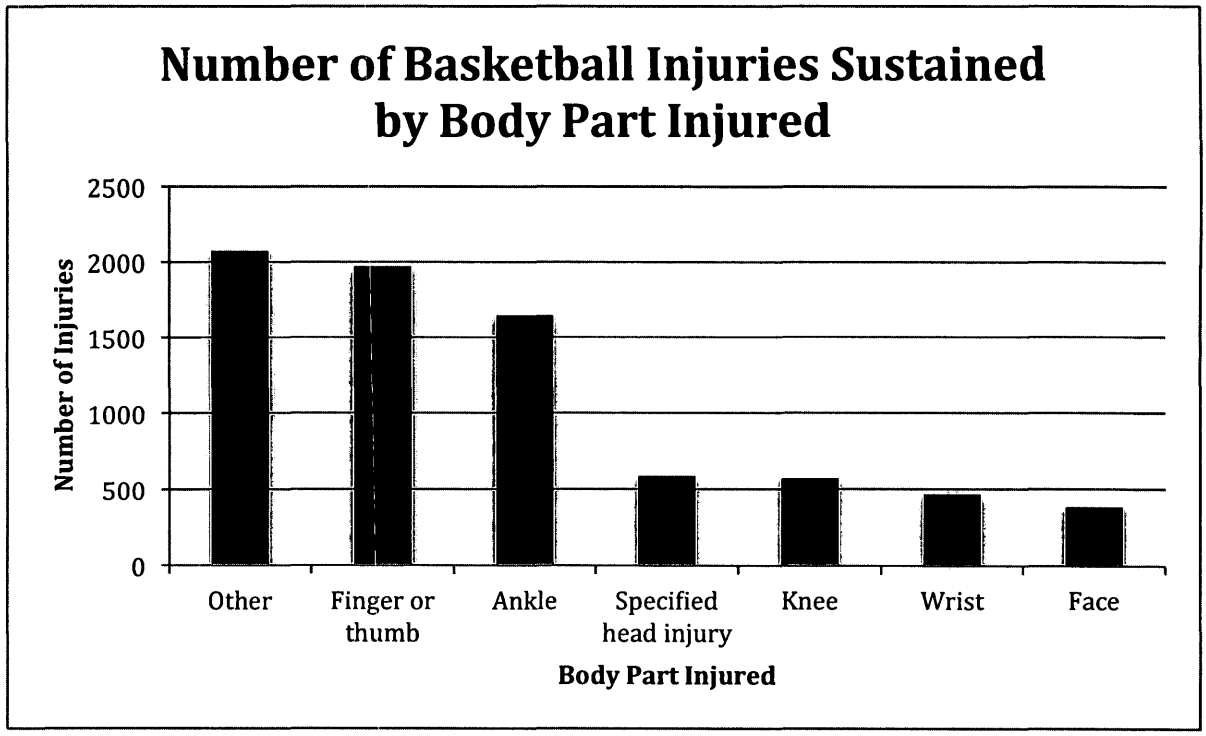

Figure 37: CHIRPP 2007/08 – 2009/10 – Number of Basketball Injuries Sustained by Body Part Injured

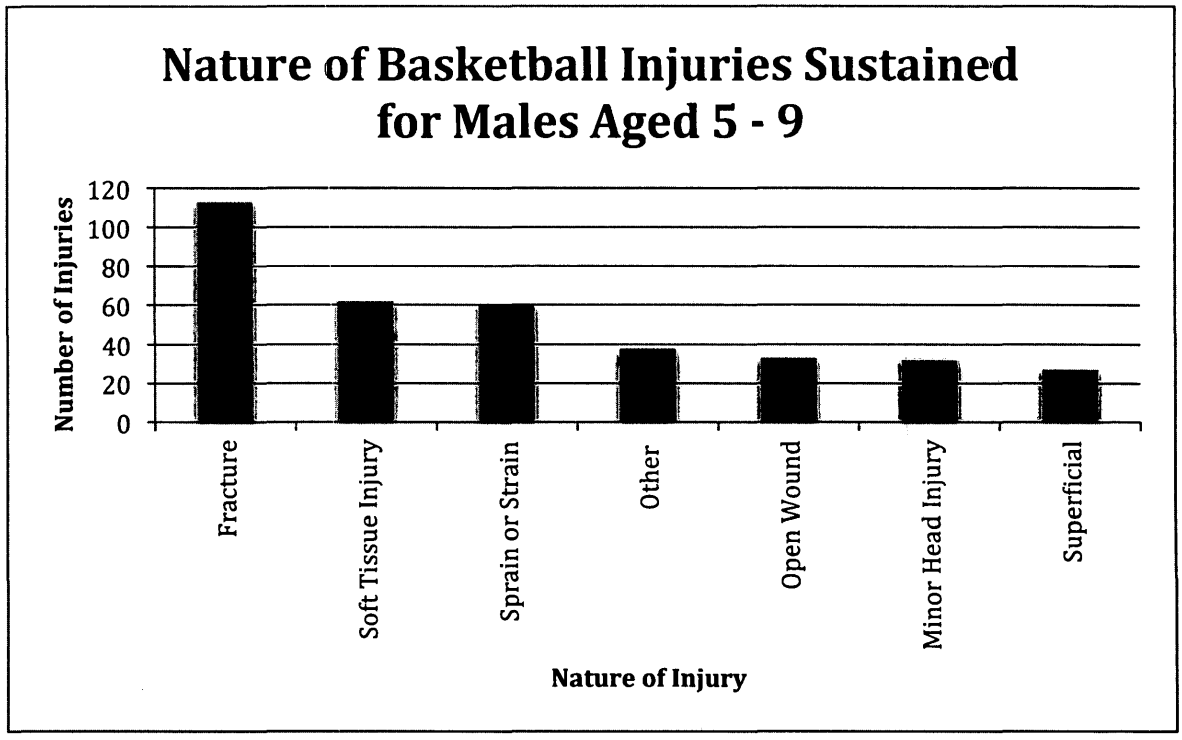

Figure 38: CHIRPP 2007/08 – 2009/10 – Nature of Basketball Injuries Sustained for Males Aged 5 – 9

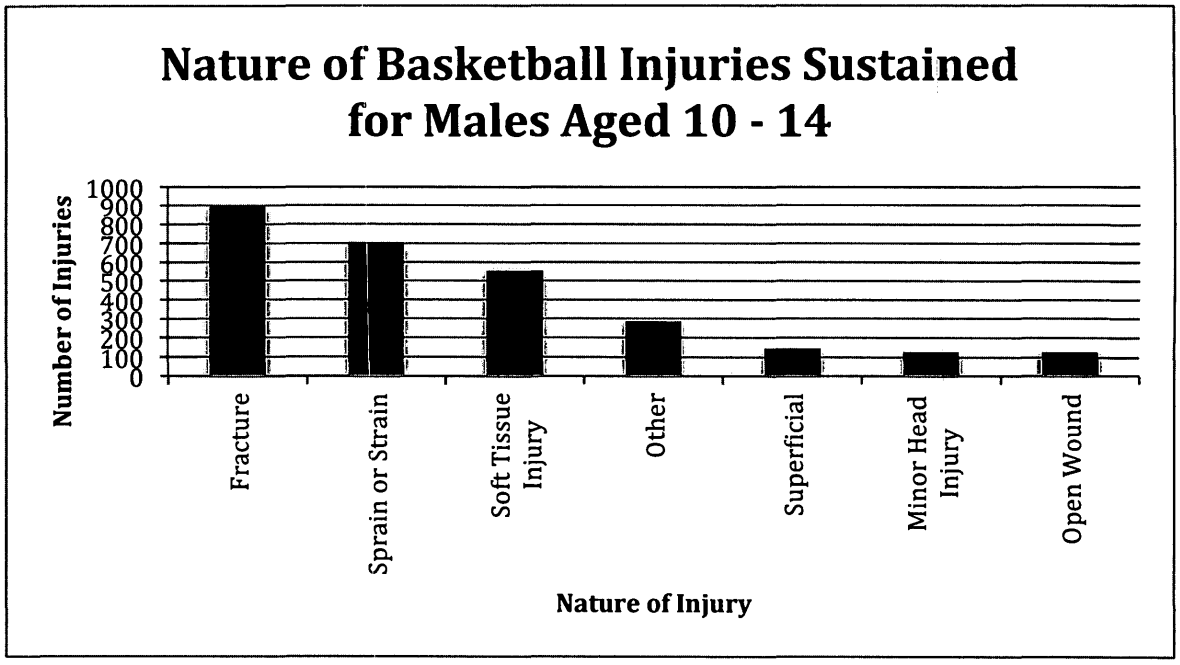

Figure 39: CHIRPP 2007/08 – 2009/10 – Nature of Basketball Injuries Sustained for Males Aged 10 – 14

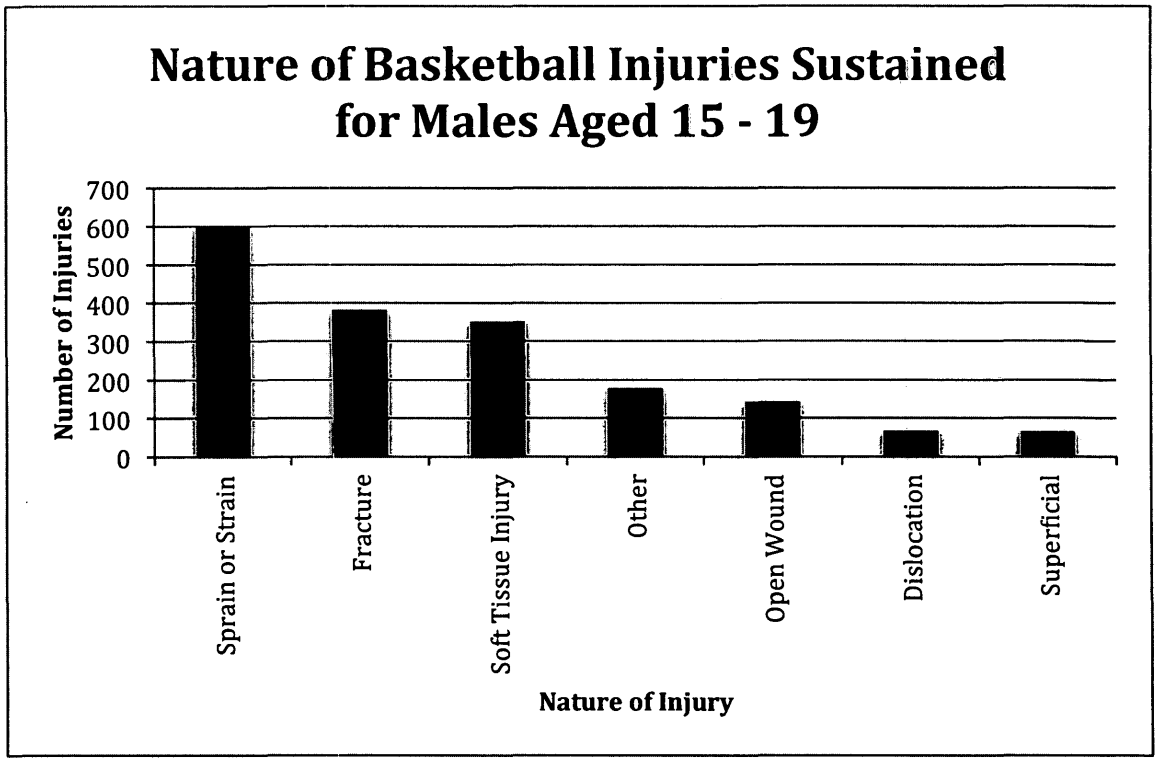

Figure 40: CHIRPP 2007/08 – 2009/10 – Nature of Basketball Injuries Sustained for Males Aged 15 – 19

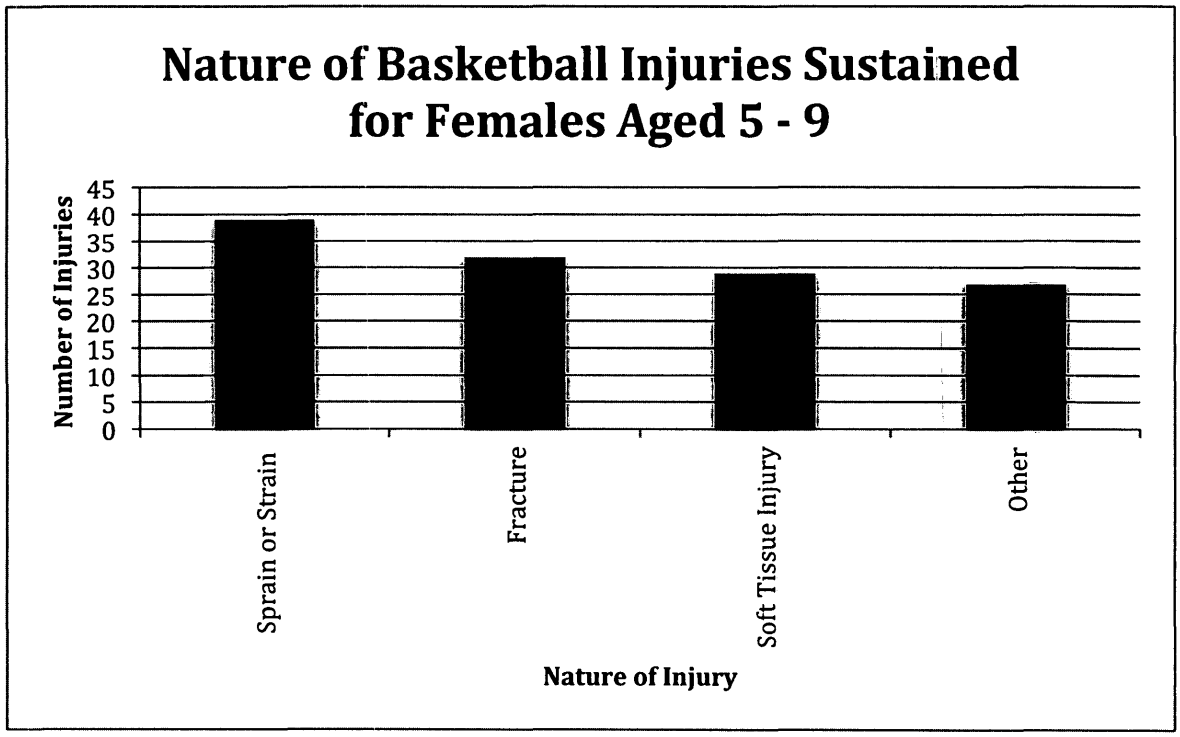

Figure 41: CHIRPP 2007/08 – 2009/10 – Nature of Basketball Injuries Sustained for Females Aged 5 – 9

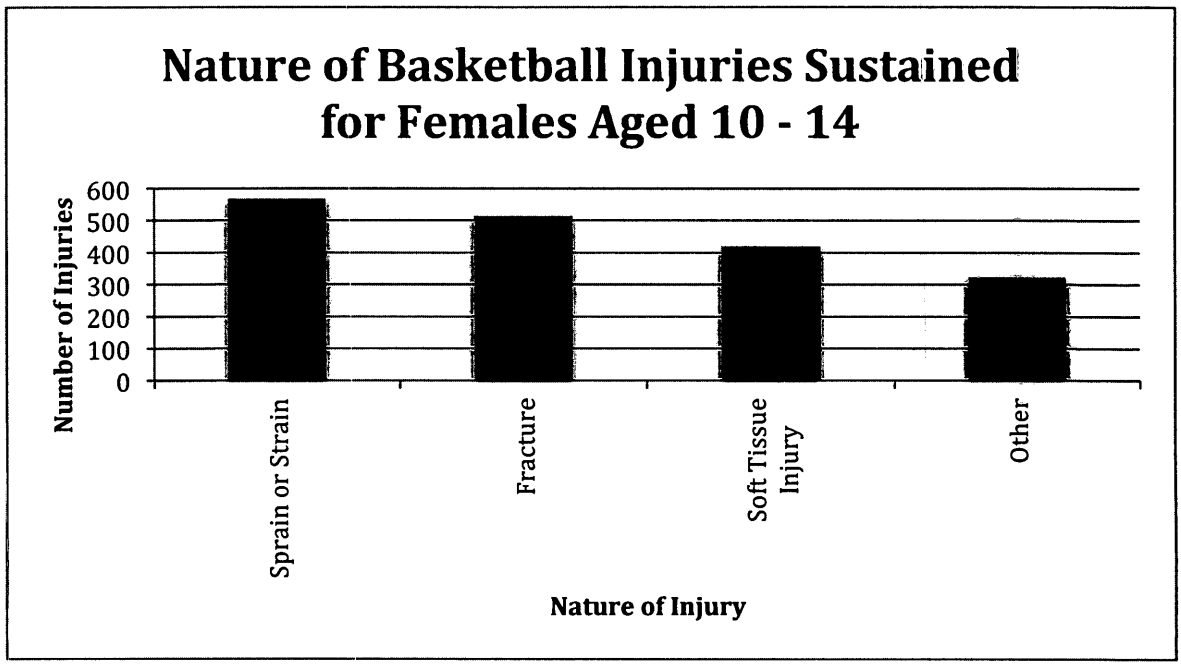

Figure 42: CHIRPP 2007/08 – 2009/10 – Nature of Basketball Injuries Sustained for Females Aged 10 – 14

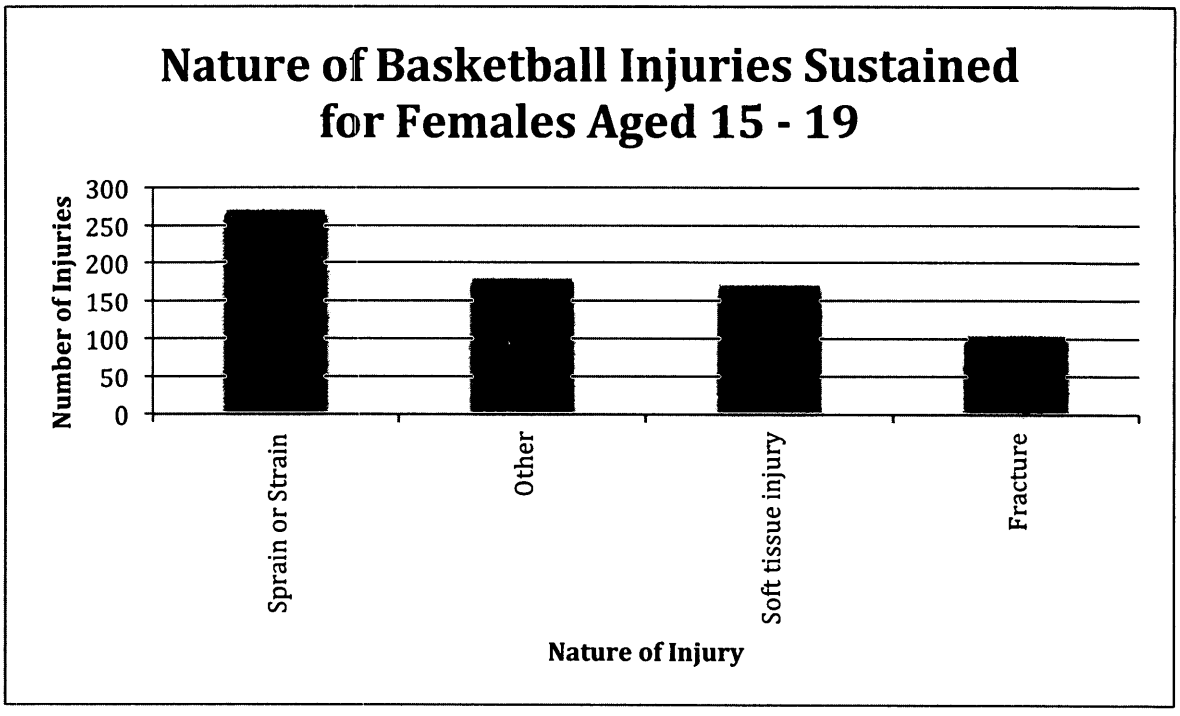

Figure 43: CHIRPP 2007/08 – 2009/10 – Nature of Basketball Injuries Sustained for Females Aged 15 – 19

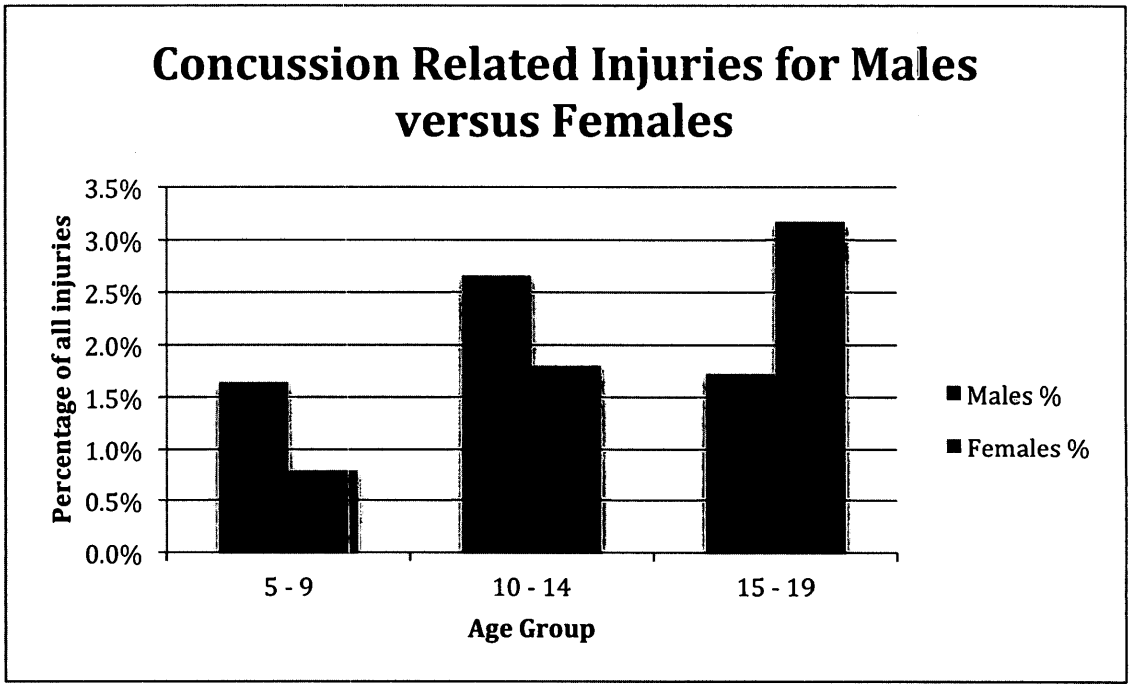

Figure 44: CHIRPP 2007/08 – 2009/10 – Concussion Related Injuries for Males versus Females

Football

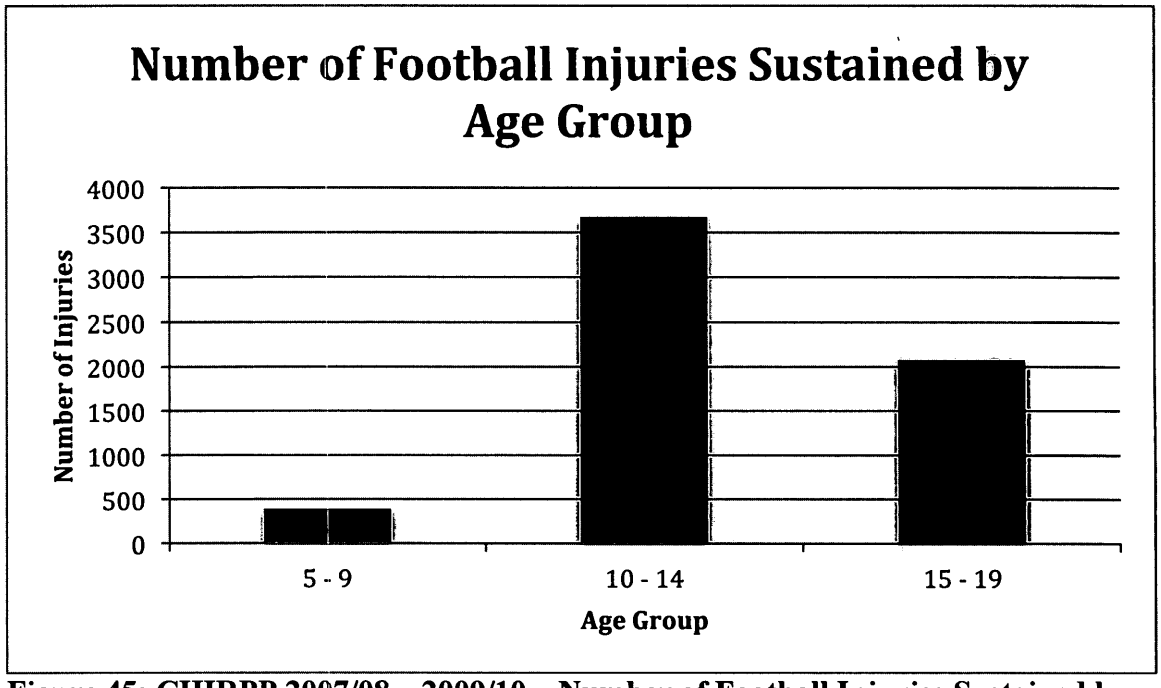

Figure 45: CHIRPP 2007/08 – 2009/10 – Number of Football Injuries Sustained by Age Group

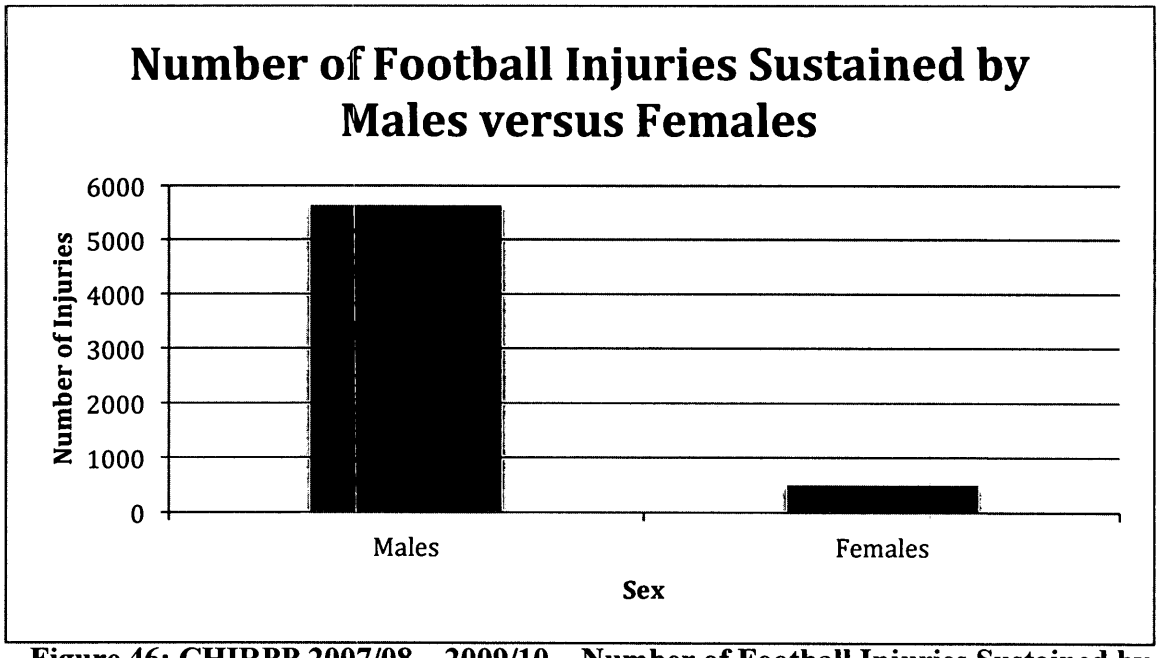

Figure 46: CHIRPP 2007/08 – 2009/10 – Number of Football Injuries Sustained by Males versus Females

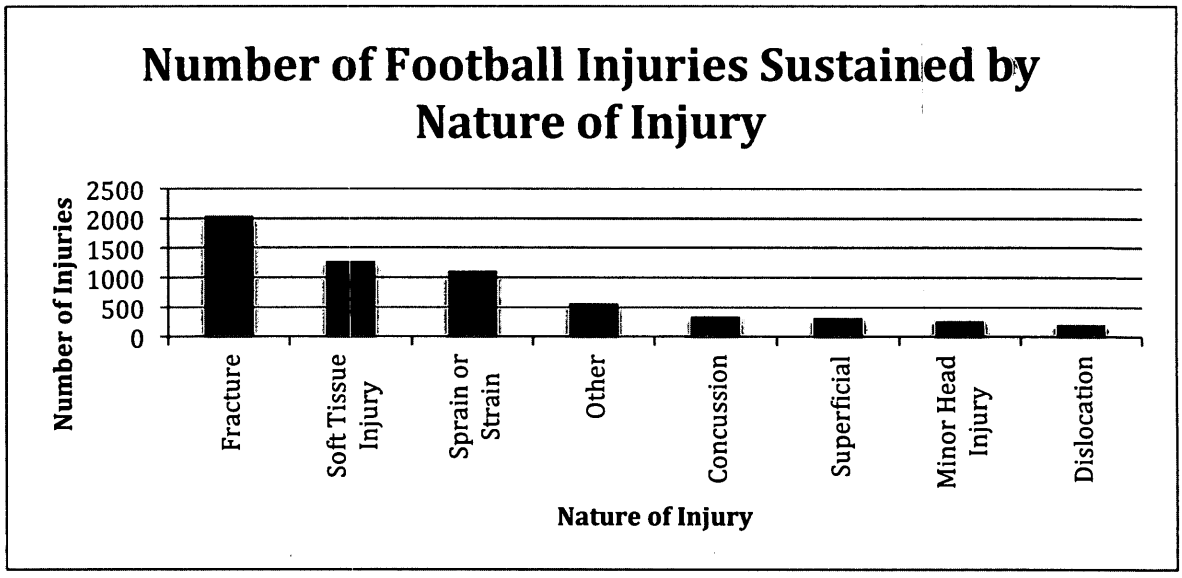

Figure 47: CHIRPP 2007/08 – 2009/10 – Number of Football Injuries Sustained by Nature of Injury

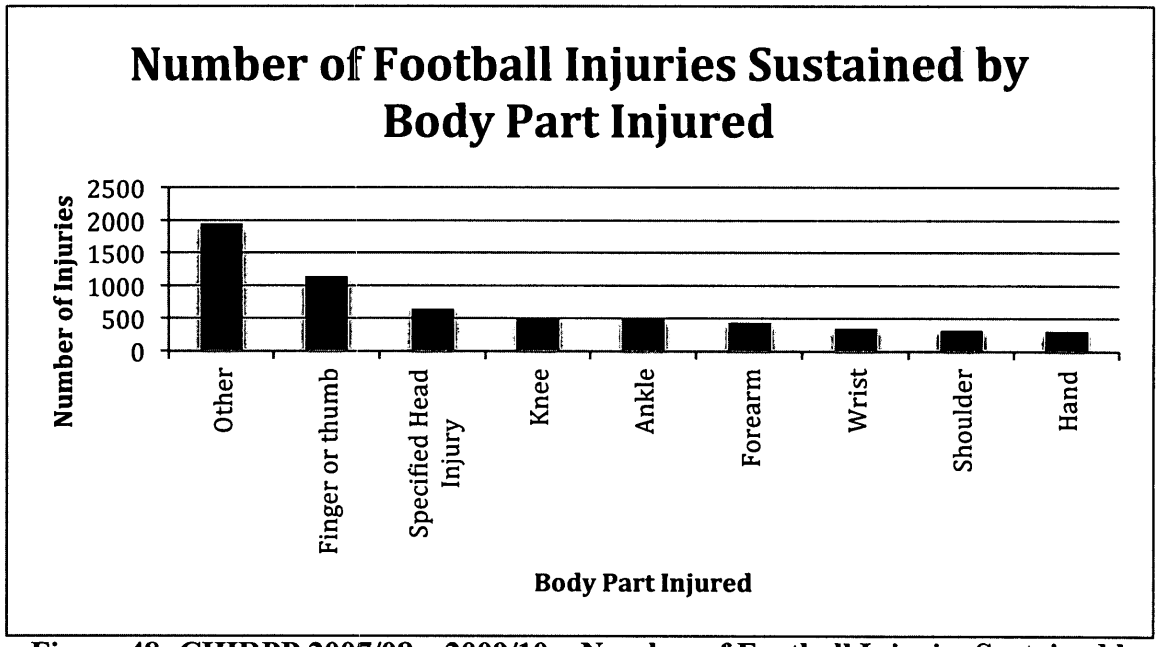

Figure 48: CHIRPP 2007/08 – 2009/10 – Number of Football Injuries Sustained by Body Part Injure

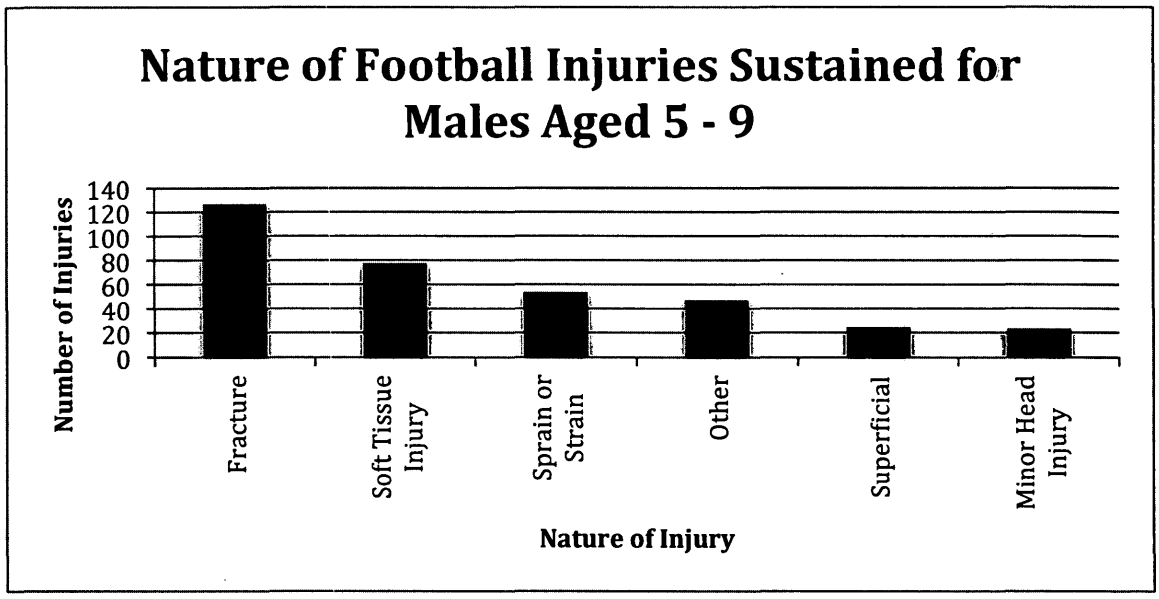

Figure 49: CHIRPP 2007/08 – 2009/10 – Nature of Football Injuries Sustained for Males Aged 5 – 9

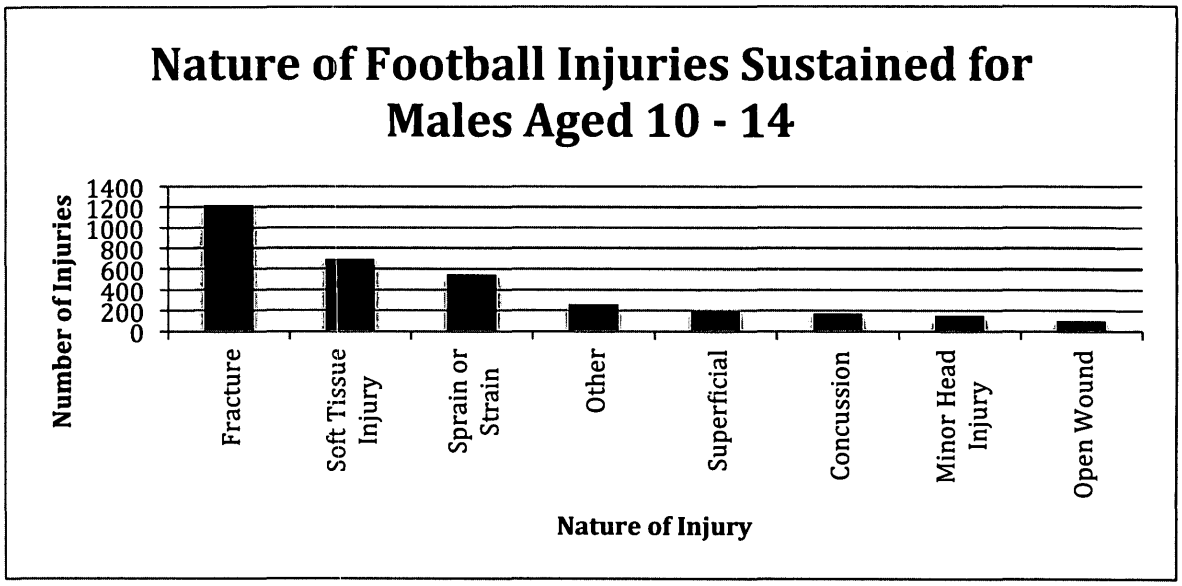

Figure 50: CHIRPP 2007/08 – 2009/10 – Nature of Football Injuries Sustained for Males Aged 10 – 14

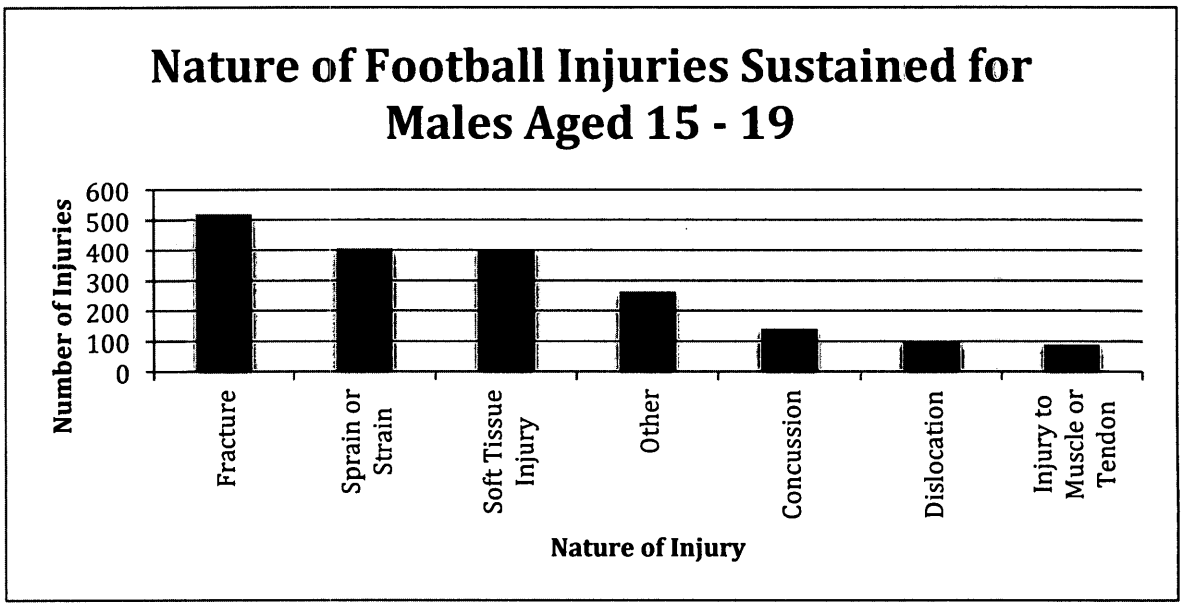

Figure 51: CHIRPP 2007/08 – 2009/10 – Nature of Football Injuries Sustained for Males Aged 15 – 19

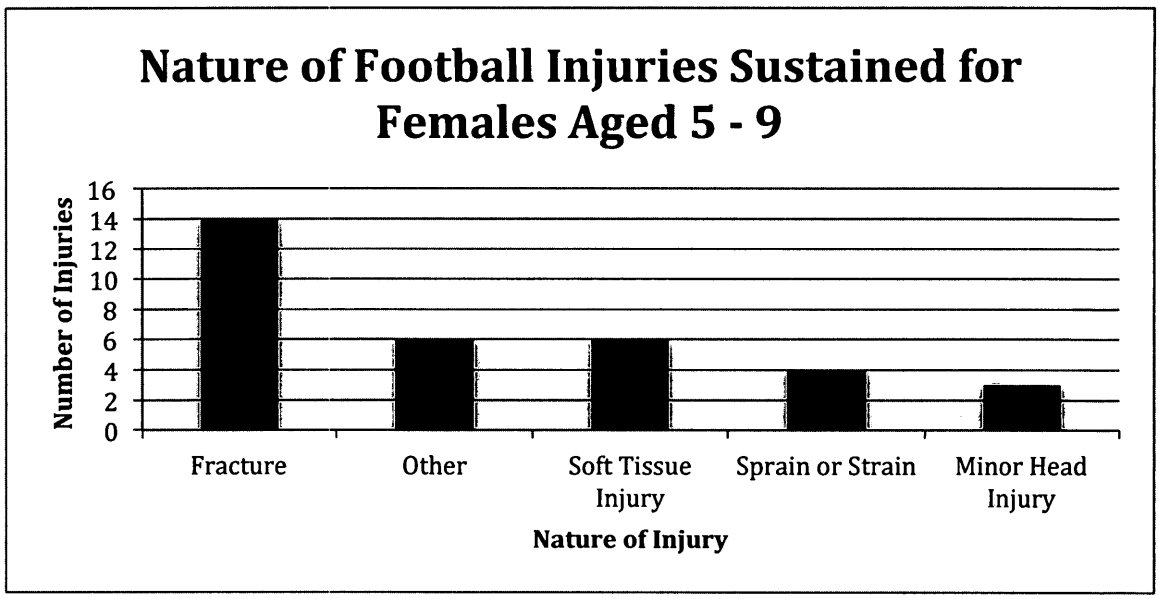

Figure 52: CHIRPP 2007/08 – 2009/10 – Nature of Football Injuries Sustained for Females Aged 5 – 9

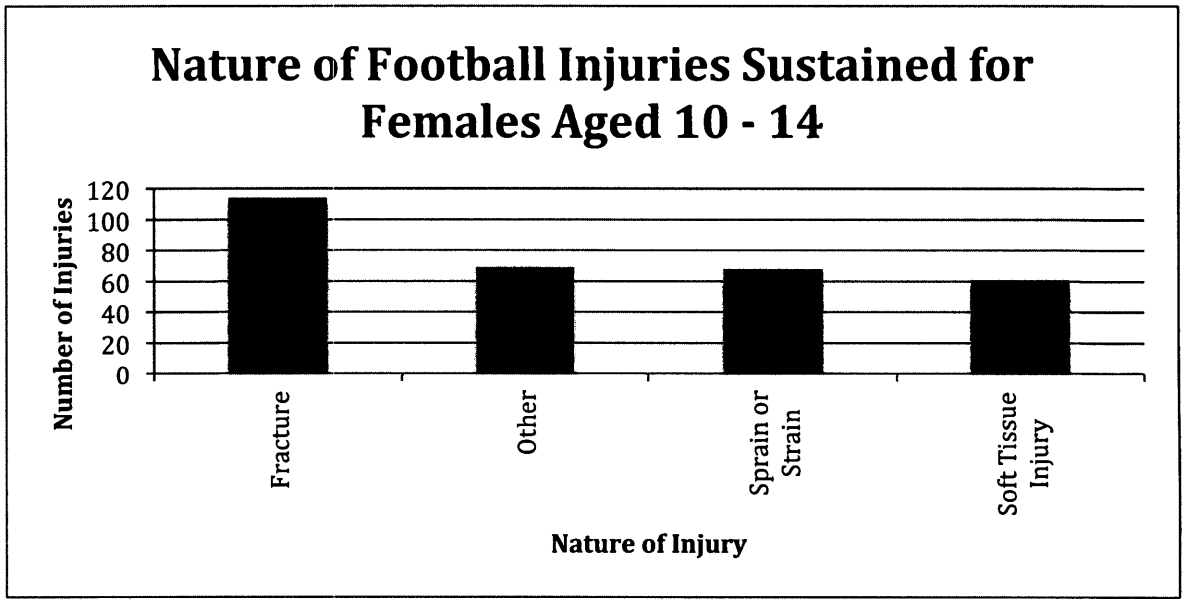

Figure 53: CHIRPP 2007/08 – 2009/10 – Nature of Football Injuries Sustained for Females Aged 10 – 14

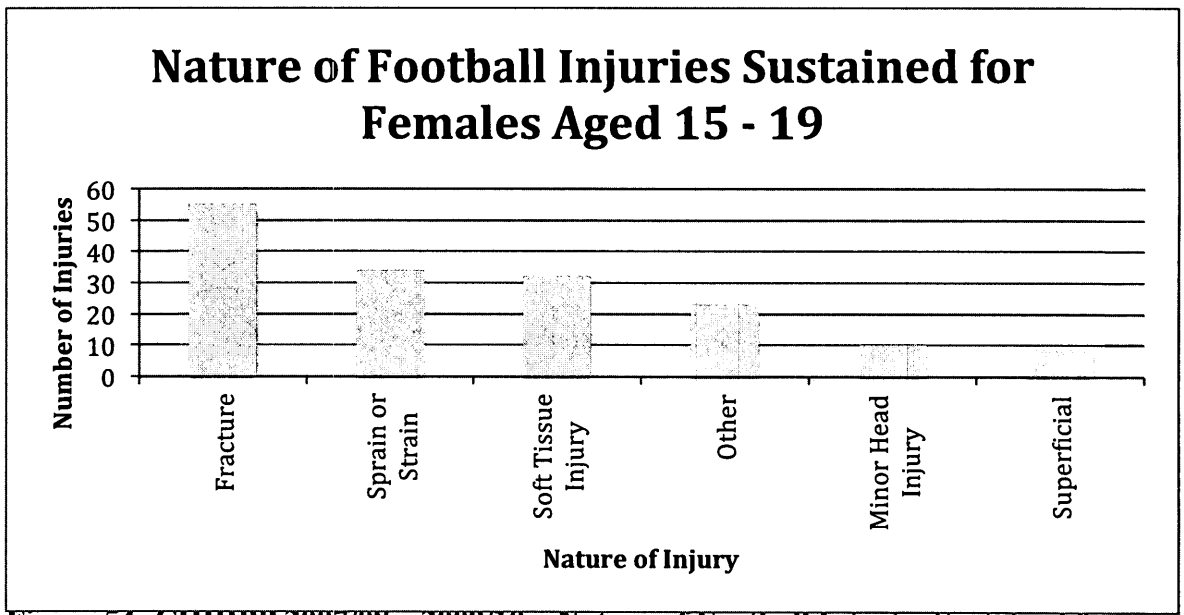

Figure 54: CHIRPP 2007/08 – 2009/10 – Nature of Football Injuries Sustained for Females Aged 15 – 19

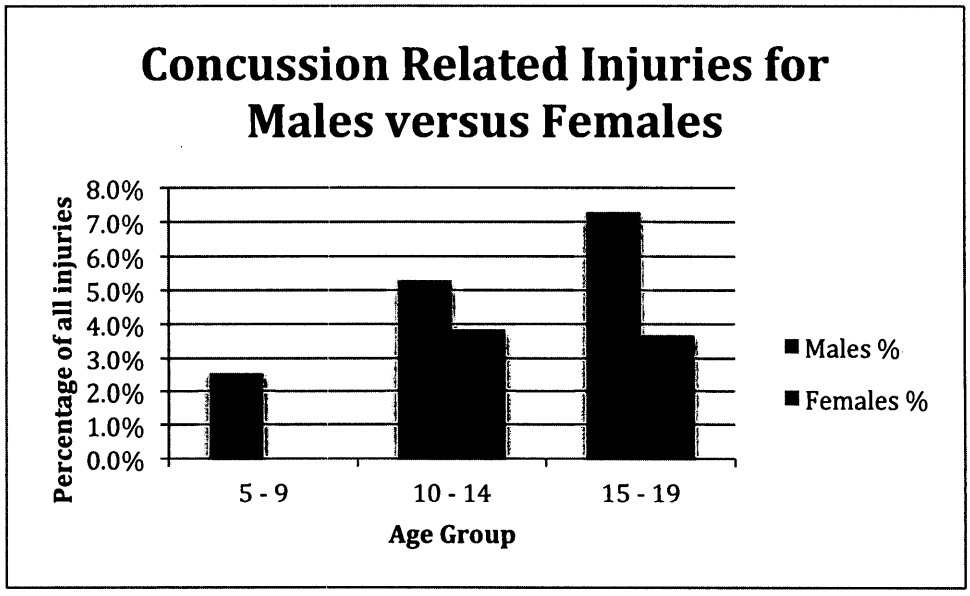

Figure 55: CHIRPP 2007/08 – 2009/10 – Concussion Related Injuries for Males versus Females

Snowboarding

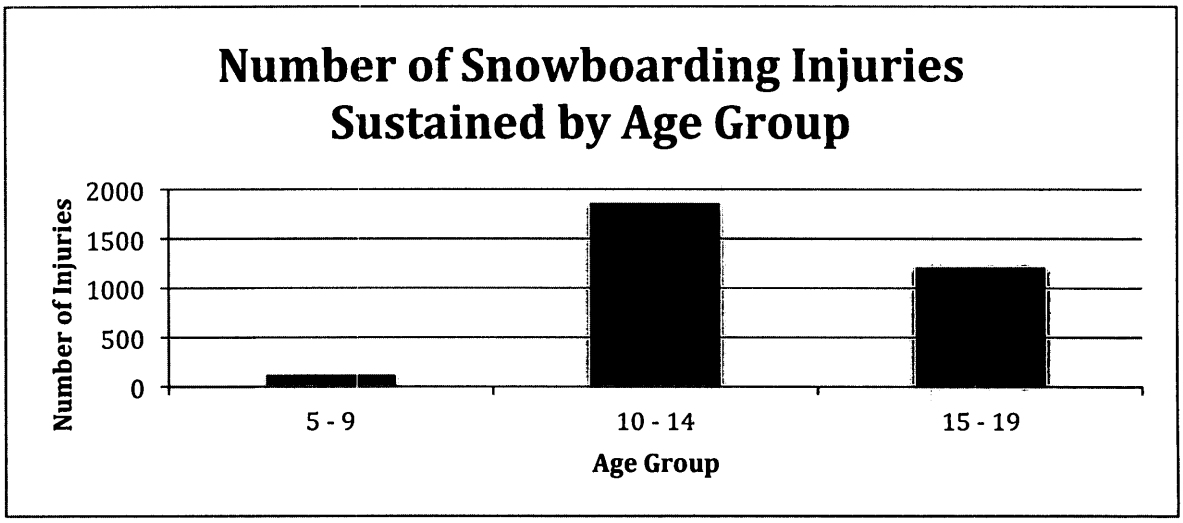

Figure 56: CHIRPP 2007/08 – 2009/10 – Number of Snowboarding Injuries Sustained by Age Group

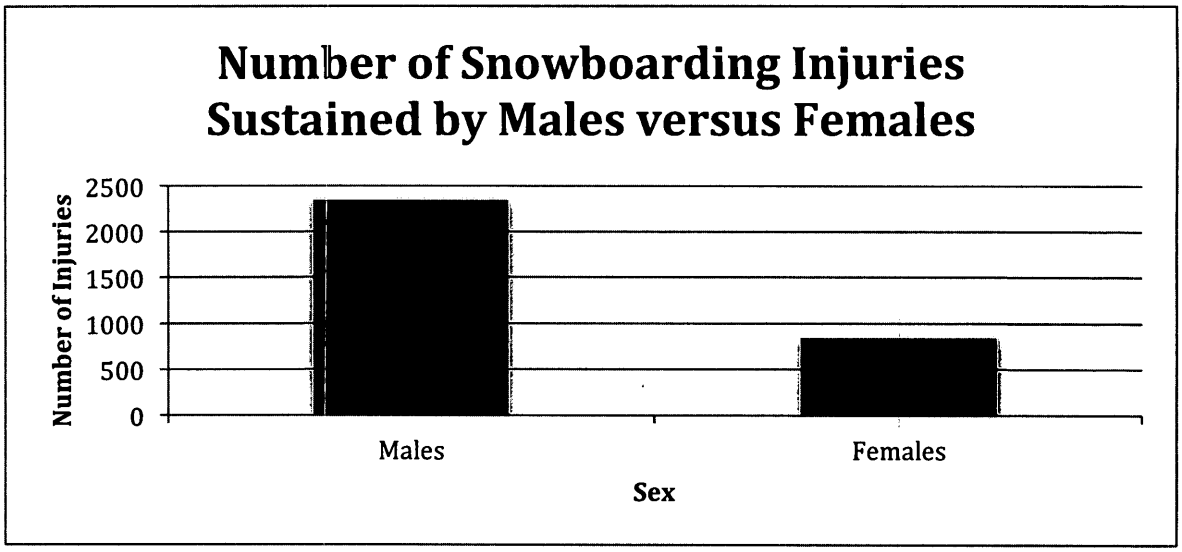

Figure 57: CHIRPP 2007/08 – 2009/10 – Number of Snowboarding Injuries Sustained by Males versus Females

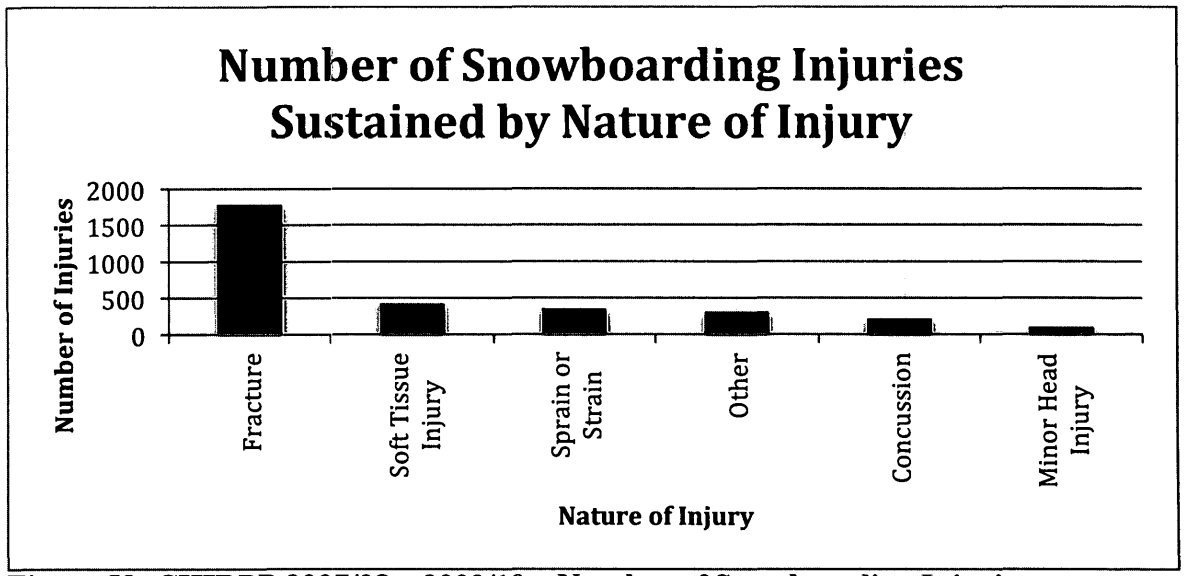

Figure 58: CHIRPP 2007/08 – 2009/10 – Number of Snowboarding Injuries Sustained by Nature of Injury

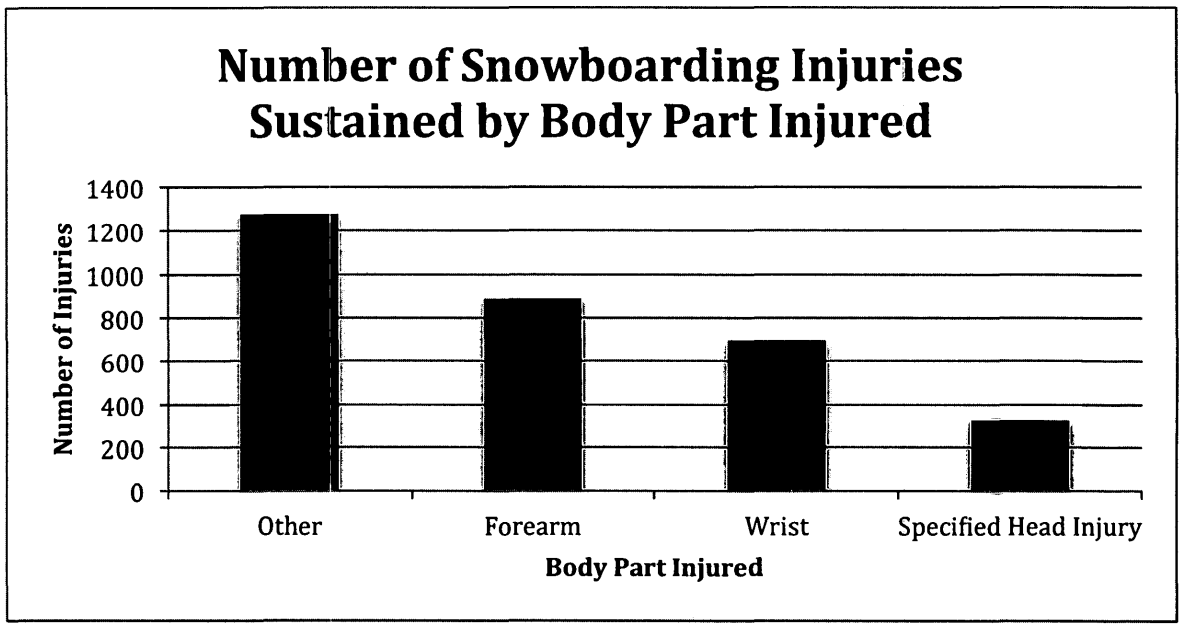

Figure 59: CHIRPP 2007/08 – 2009/10 – Number of Snowboarding Injuries Sustained by Body Part Injured

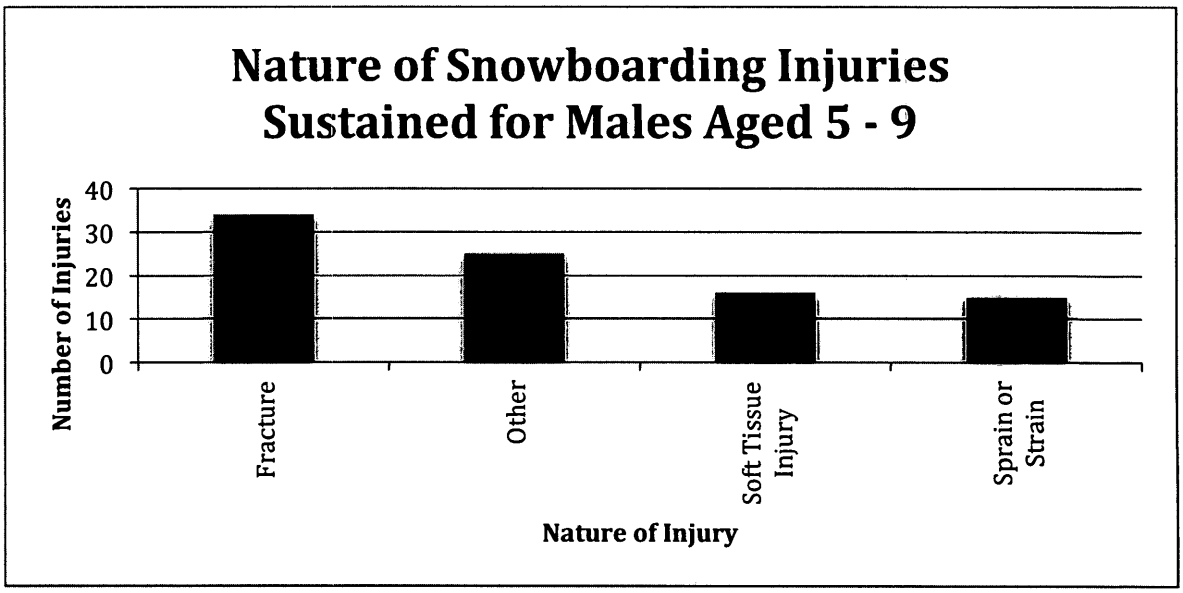

Figure 60: CHIRPP 2007/08 – 2009/10 – Nature of Snowboarding Injuries Sustained for Males Aged 5 - 9

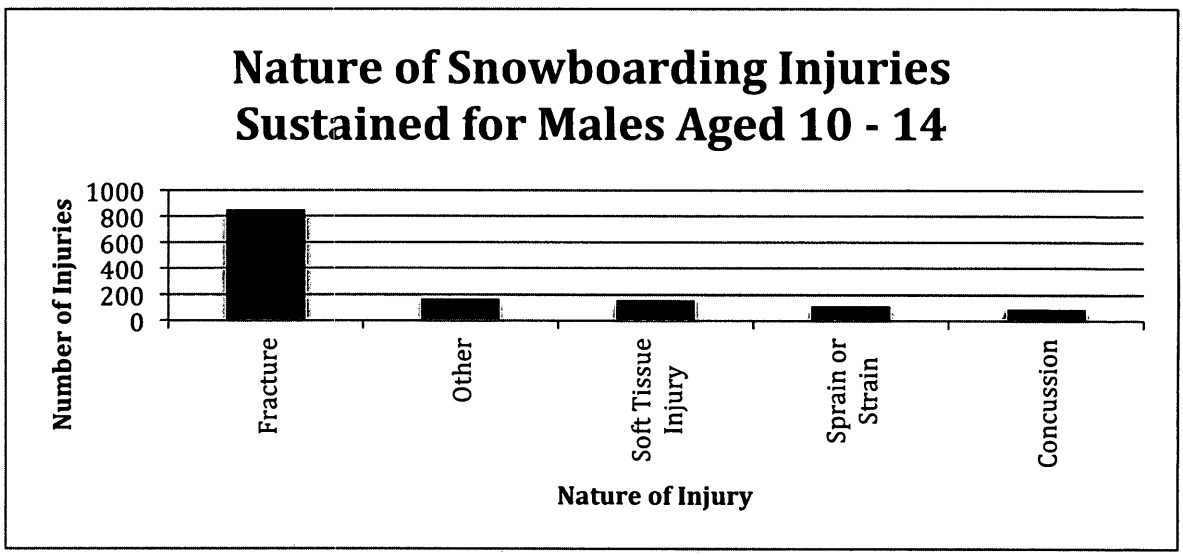

Figure 61: CHIRPP 2007/08 – 2009/10 – Nature of Snowboarding Injuries Sustained for Males Aged 10 – 14

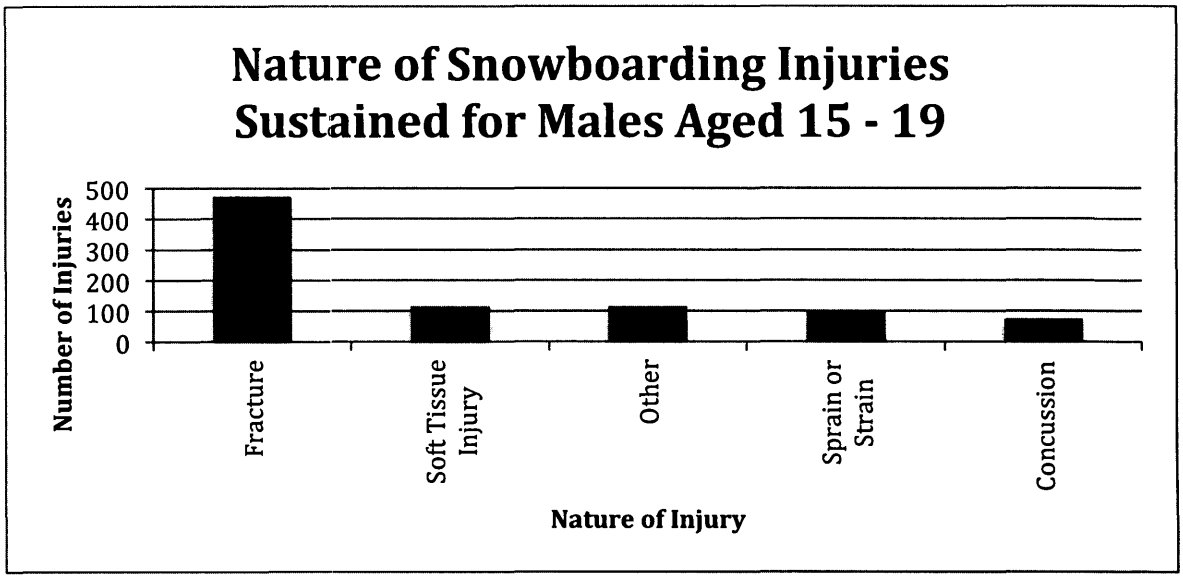

Figure 62: CHIRPP 2007/08 – 2009/10 – Nature of Snowboarding Injuries Sustained for Males Aged 15 – 19

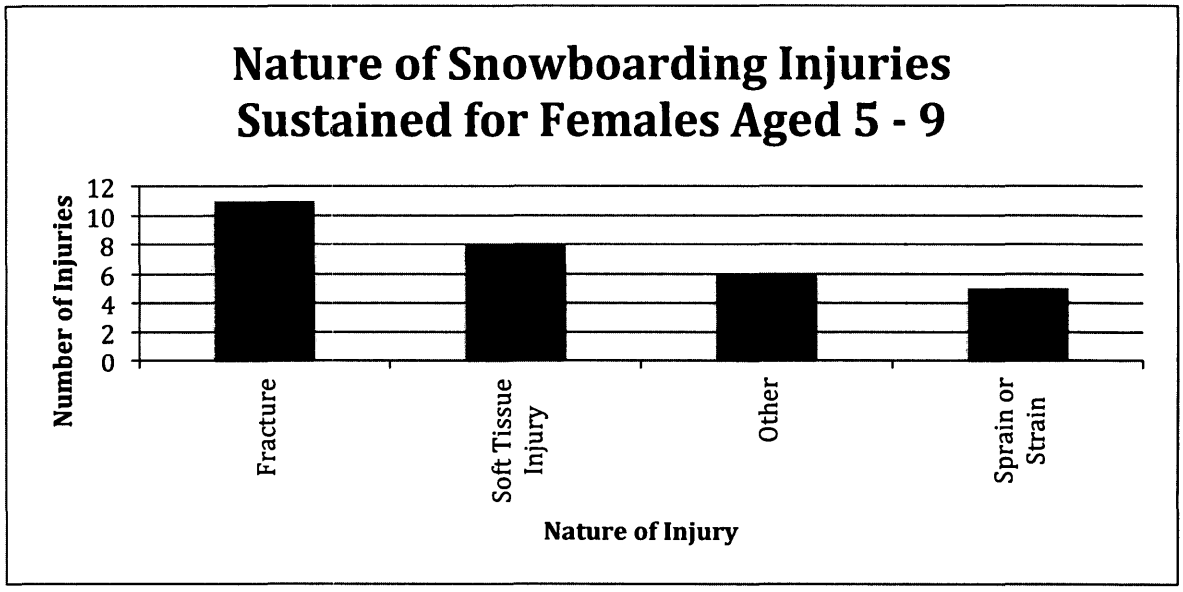

Figure 63: CHIRPP 2007/08 – 2009/10 – Nature of Snowboarding Injuries Sustained for Females Aged 5 – 9

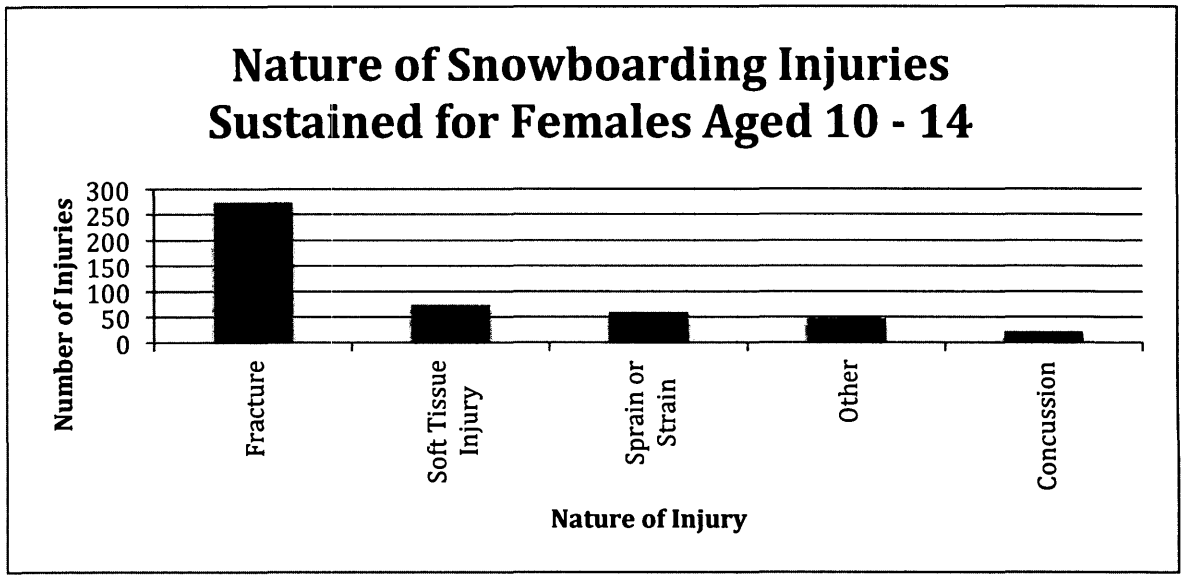

Figure 64: CHIRPP 2007/08 – 2009/10 – Nature of Snowboarding Injuries Sustained for Females Aged 10 – 14

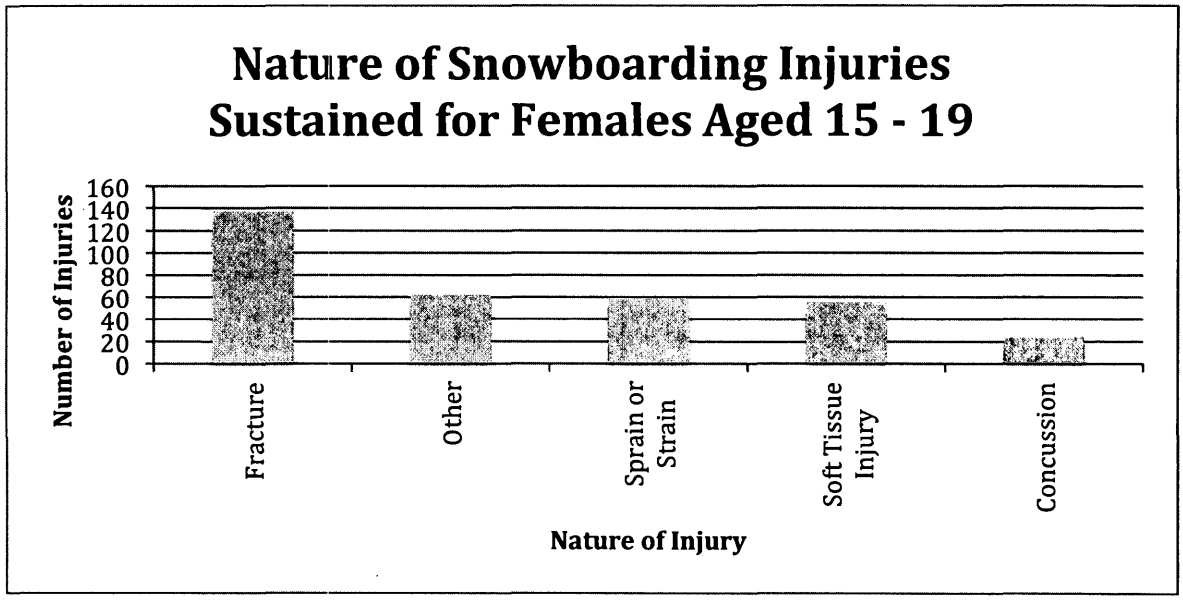

Figure 65: CHIRPP 2007/08 – 2009/10 – Nature of Snowboarding Injuries Sustained for Females Aged 15 – 19

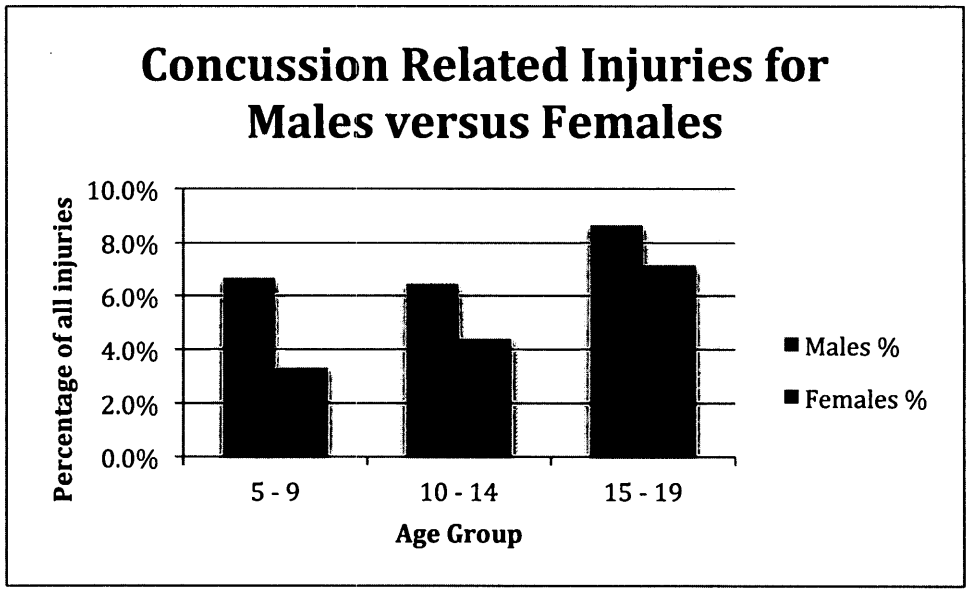

Figure 66: CHIRPP 2007/08 – 2009/10 – Concussion Related Injuries for Males versus Females

Skiing

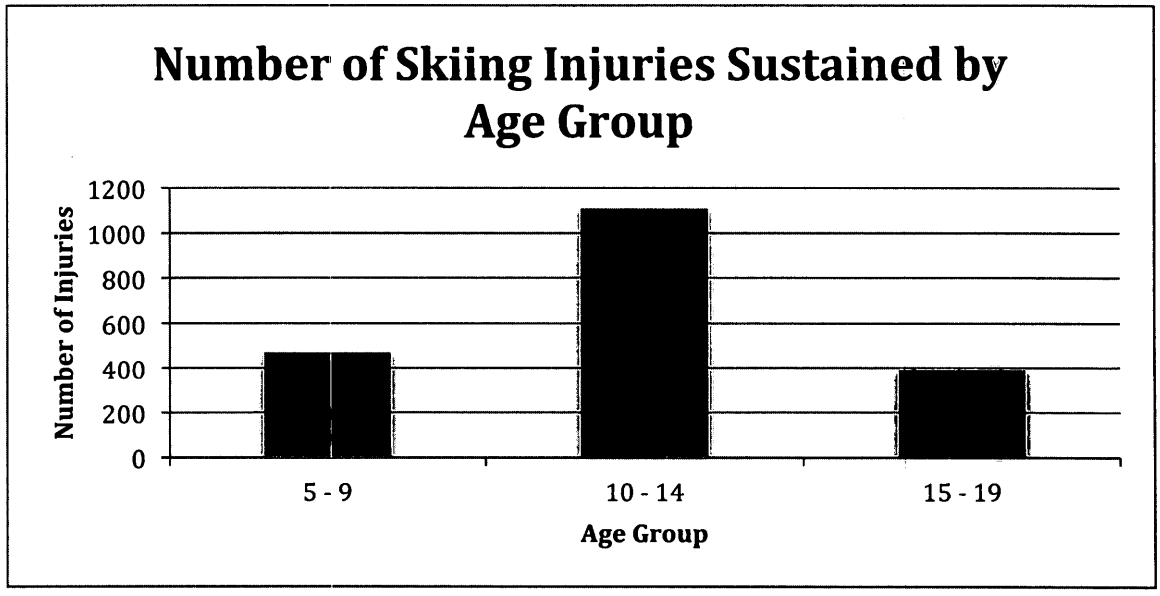

Figure 67: CHIRPP 2007/08 – 2009/10 – Number of Skiing Injuries Sustained by Age Group

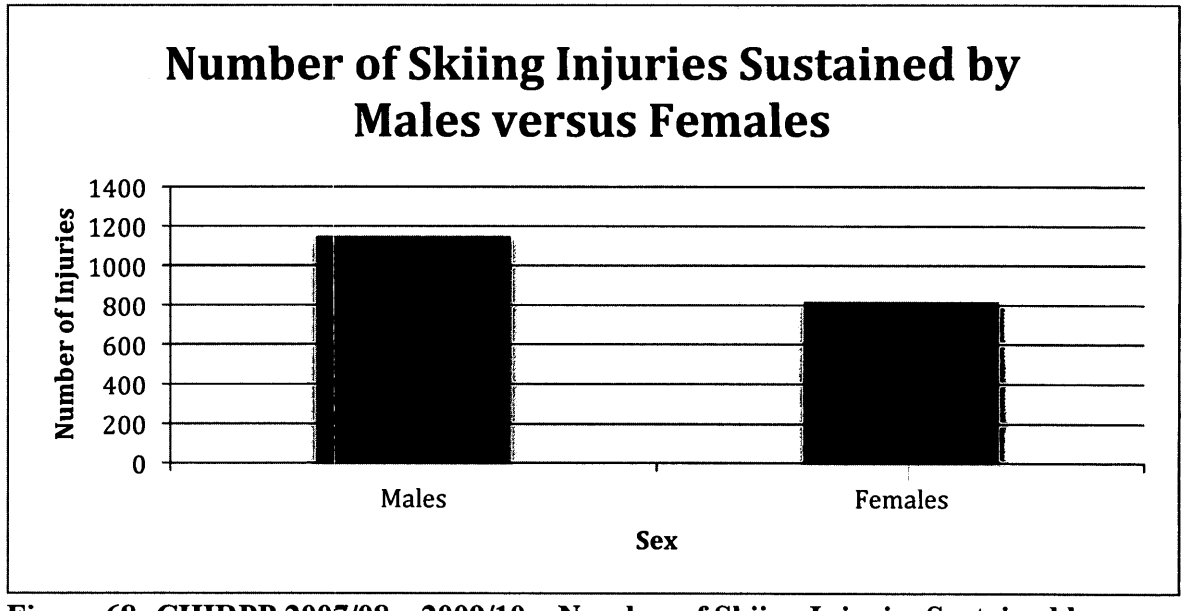

Figure 68: CHIRPP 2007/08 – 2009/10 – Number of Skiing Injuries Sustained by Males versus Females

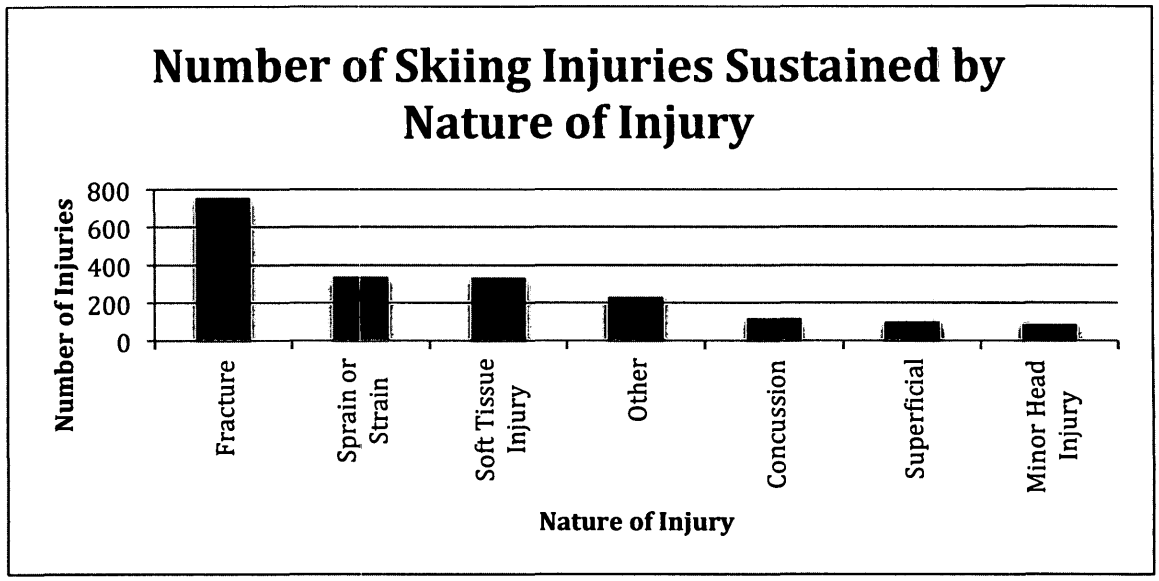

Figure 69: CHIRPP 2007/08 – 2009/10 – Number of Skiing Injuries Sustained by Nature of Injury

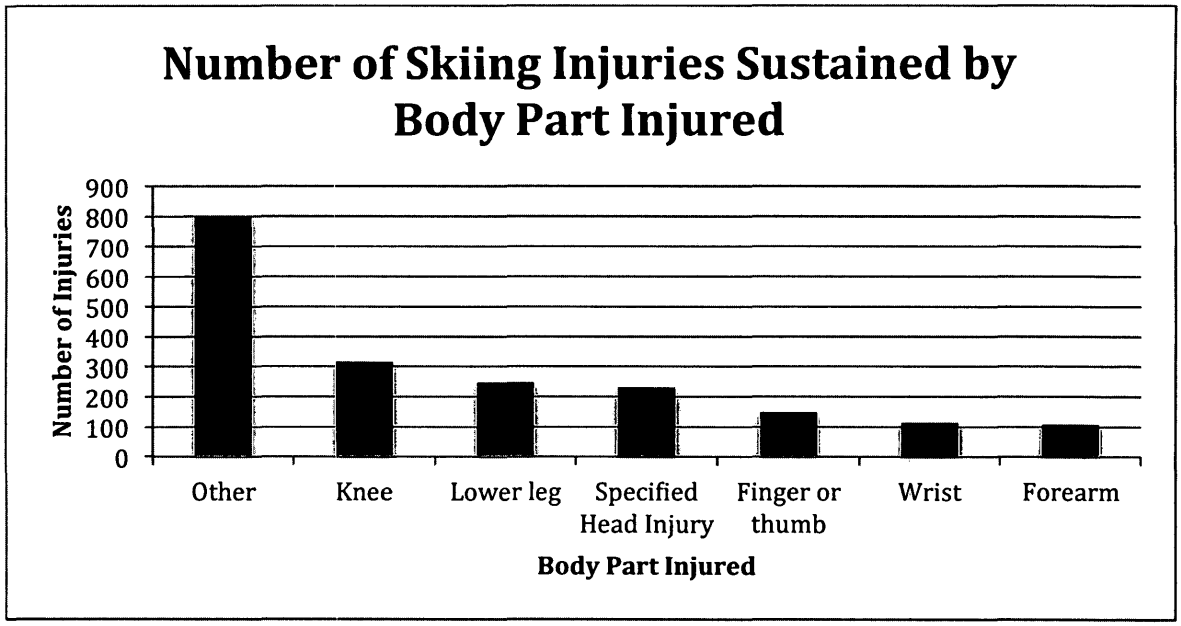

Figure 70: CHIRPP 2007/08 – 2009/10 – Number of Skiing Injuries Sustained by Body Part Injured

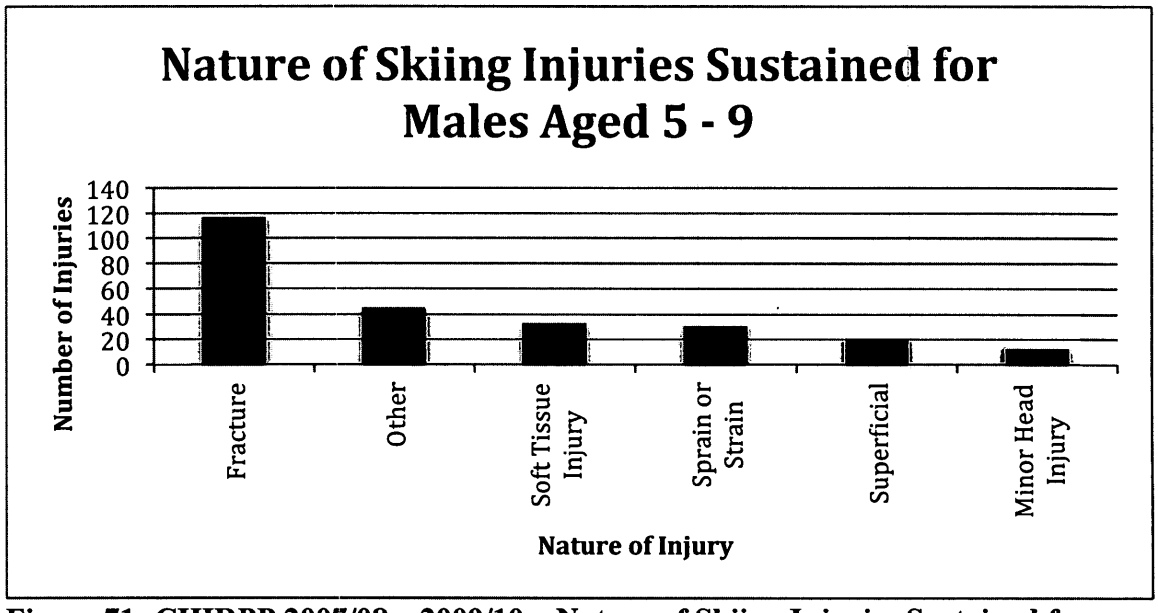

Figure 71: CHIRPP 2007/08 – 2009/10 – Nature of Skiing Injuries Sustained for Males Aged 5 - 9

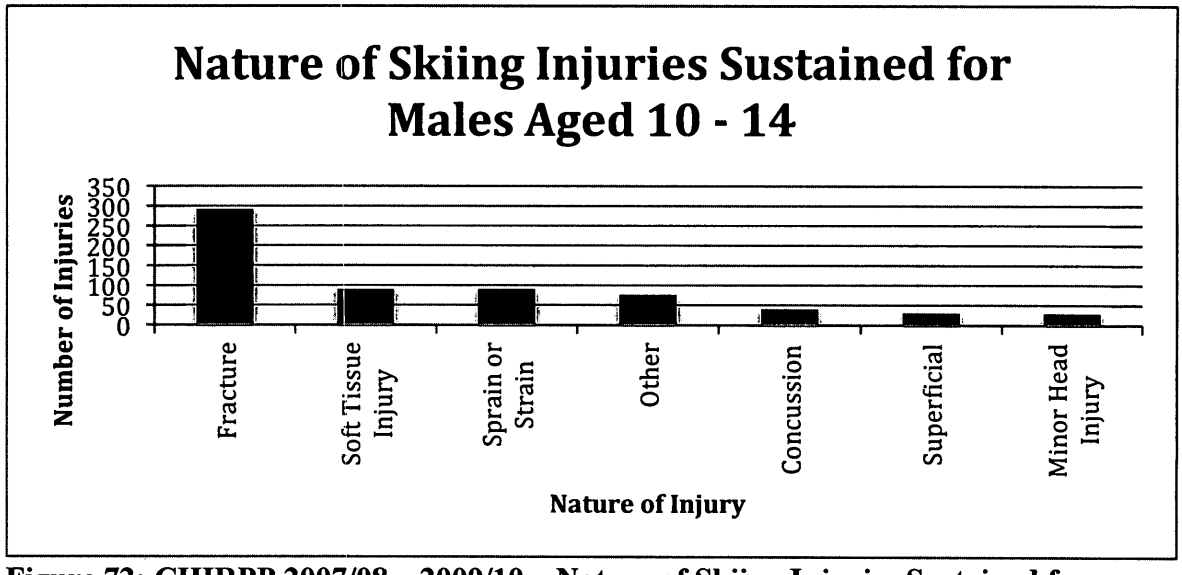

Figure 72: CHIRPP 2007/08 – 2009/10 – Nature of Skiing Injuries Sustained for Males Aged 10 – 14

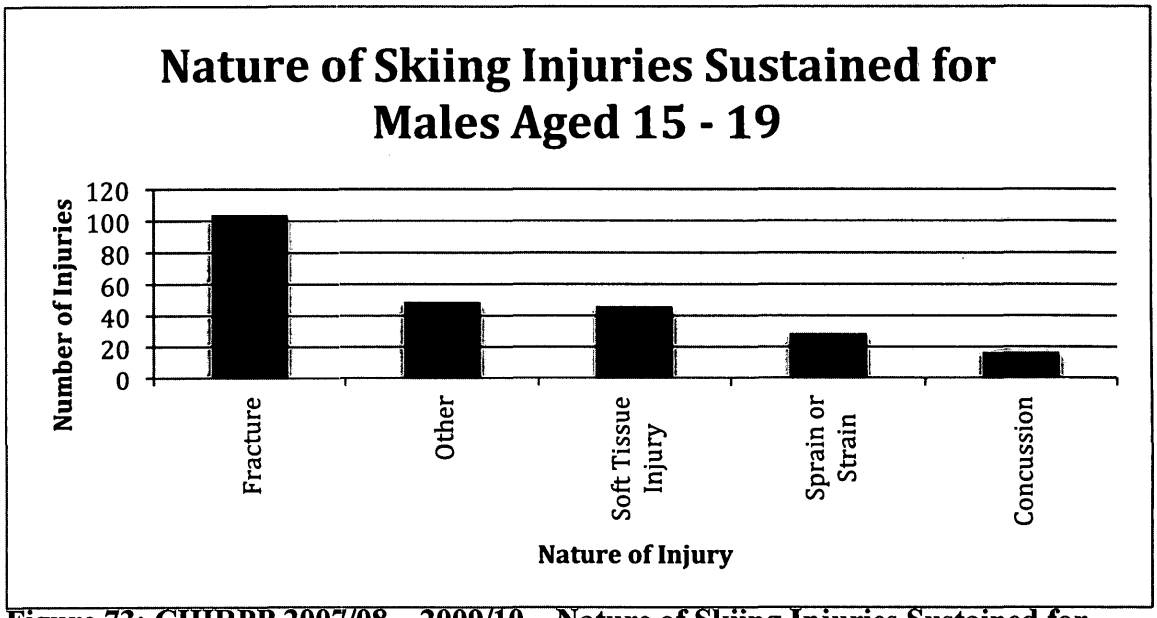

Figure 73: CHIRPP 2007/08 – 2009/10 – Nature of Skiing Injuries Sustained for Males Aged 15 – 19

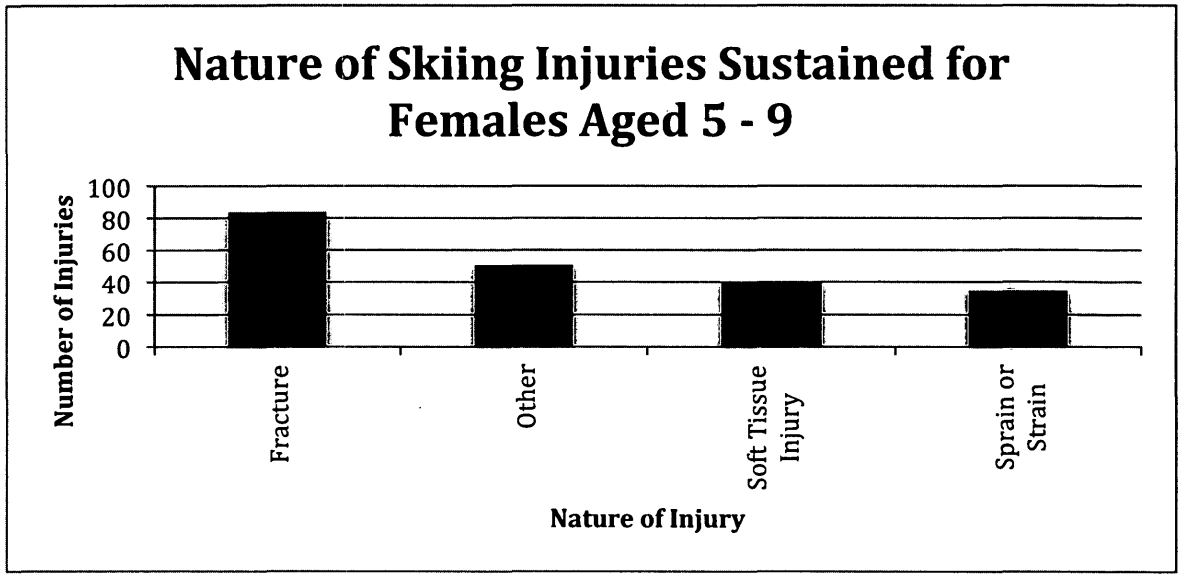

Figure 74: CHIRPP 2007/08 – 2009/10 – Nature of Skiing Injuries Sustained for Females Aged 5 – 9

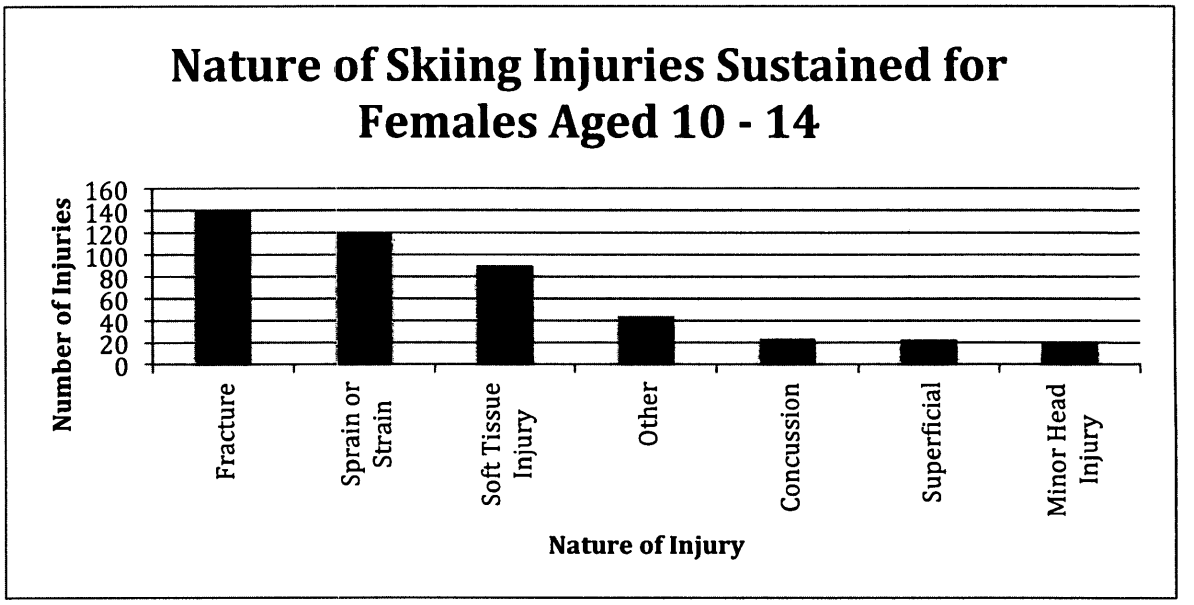

Figure 75: CHIRPP 2007/08 – 2009/10 – Nature of Skiing Injuries Sustained for Females Aged 10 – 14

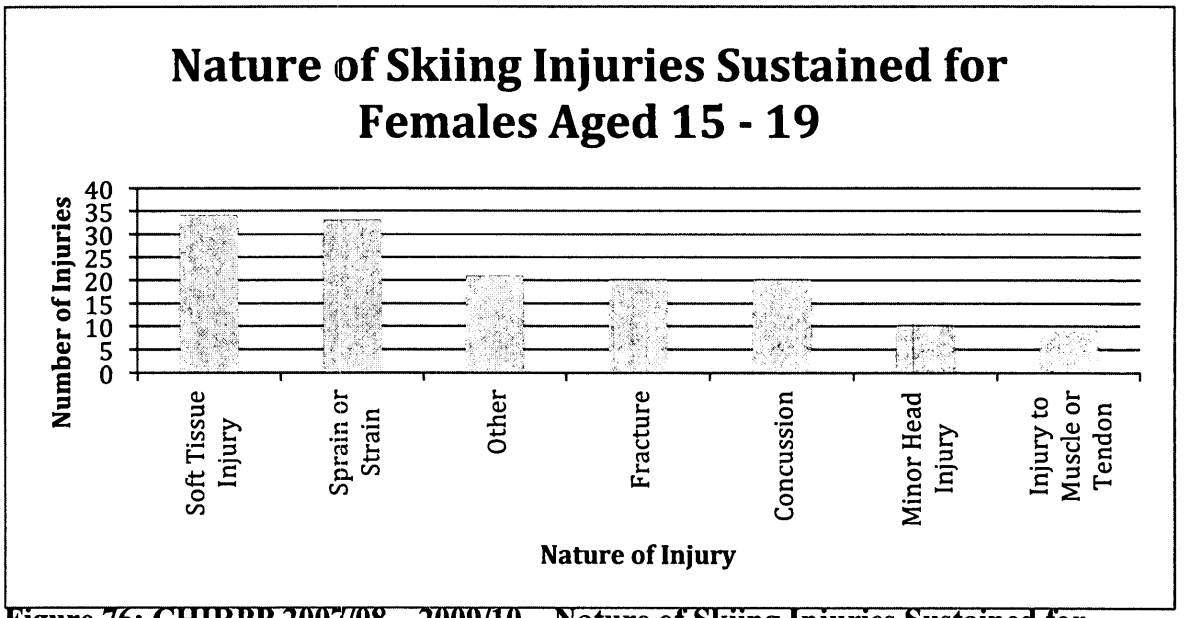

Figure 76: CHIRPP 2007/08 – 2009/10 – Nature of Skiing Injuries Sustained for Females Aged 15 – 19

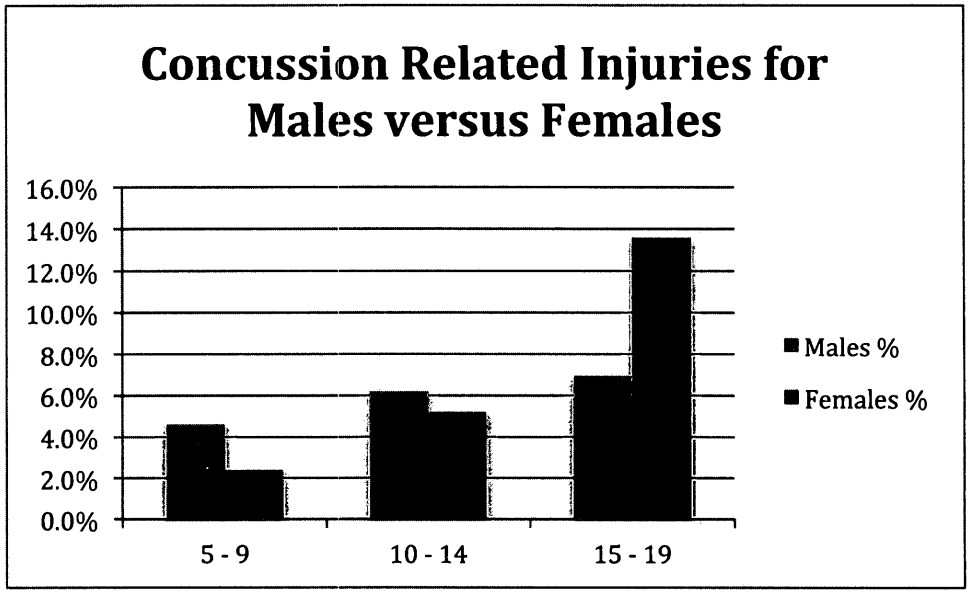

Figure 77: CHIRPP 2007/08 – 2009/10 – Concussion Related Injuries for Males versus Females

Sledding

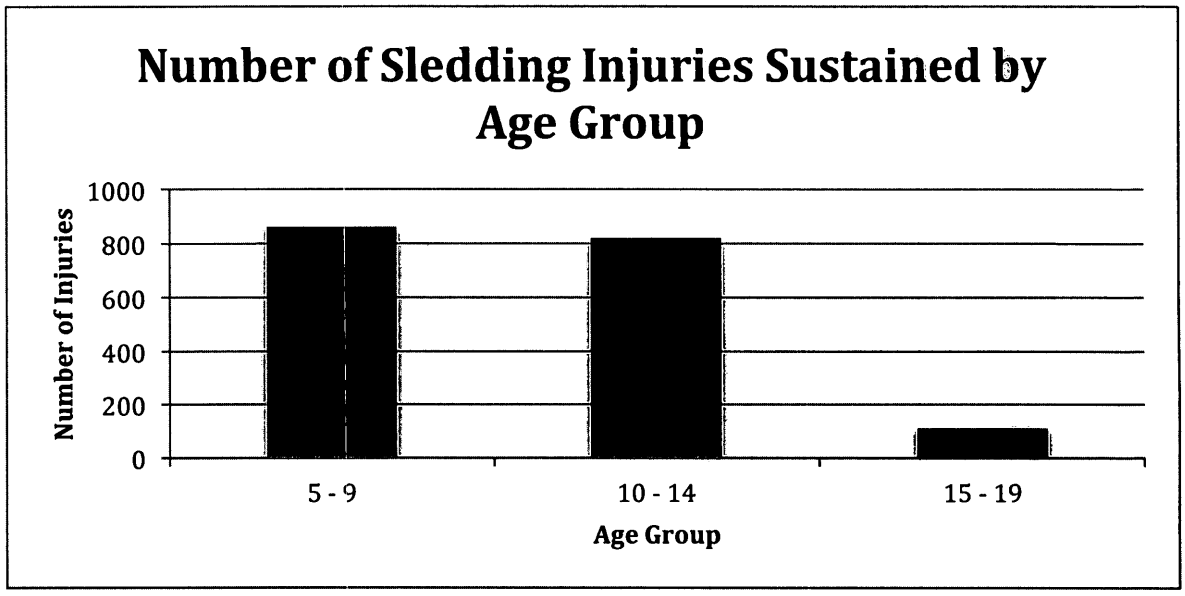

Figure 78: CHIRPP 2007/08 – 2009/10 – Number of Sledding Injuries Sustained by Age Group

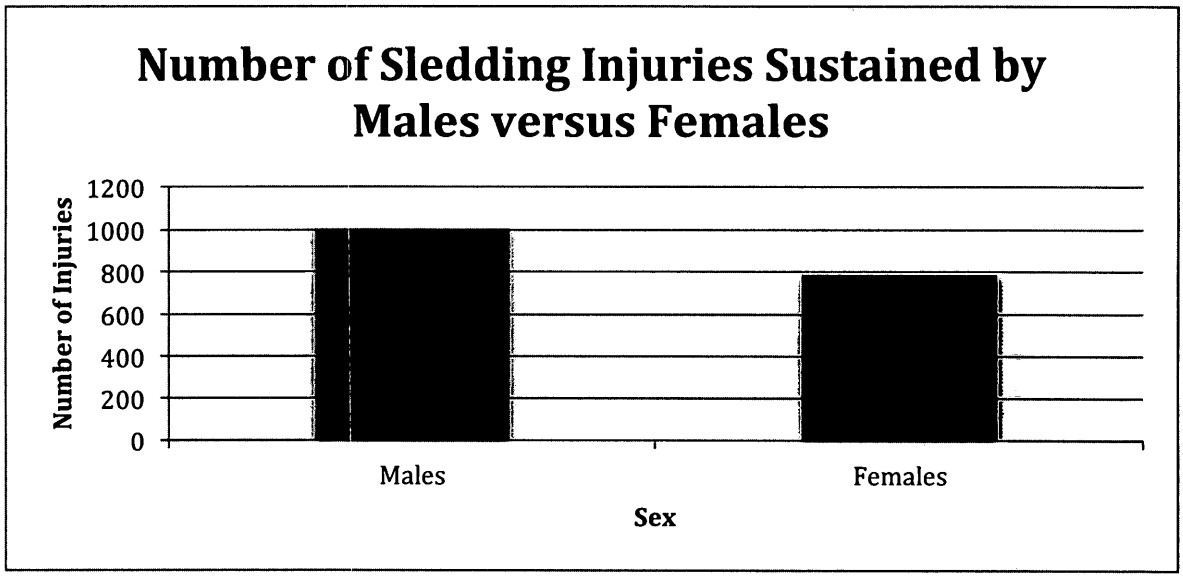

Figure 79: CHIRPP 2007/08 – 2009/10 – Number of Sledding Injuries Sustained by Males versus Females

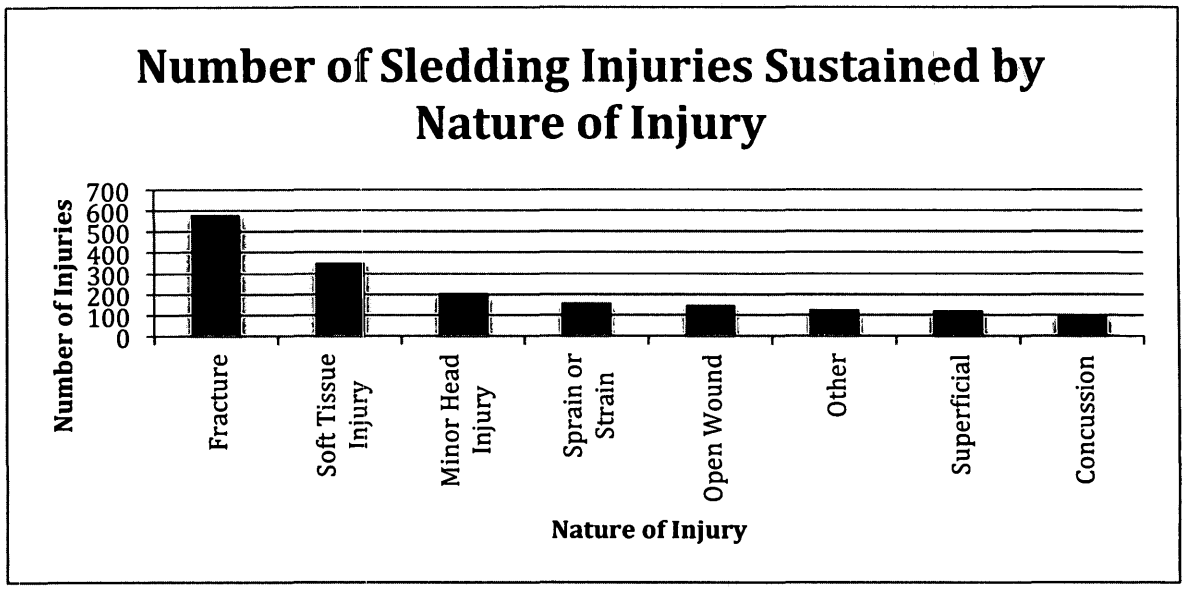

Figure 80: CHIRPP 2007/08 – 2009/10 – Number of Sledding Injuries Sustained by Nature of Injury

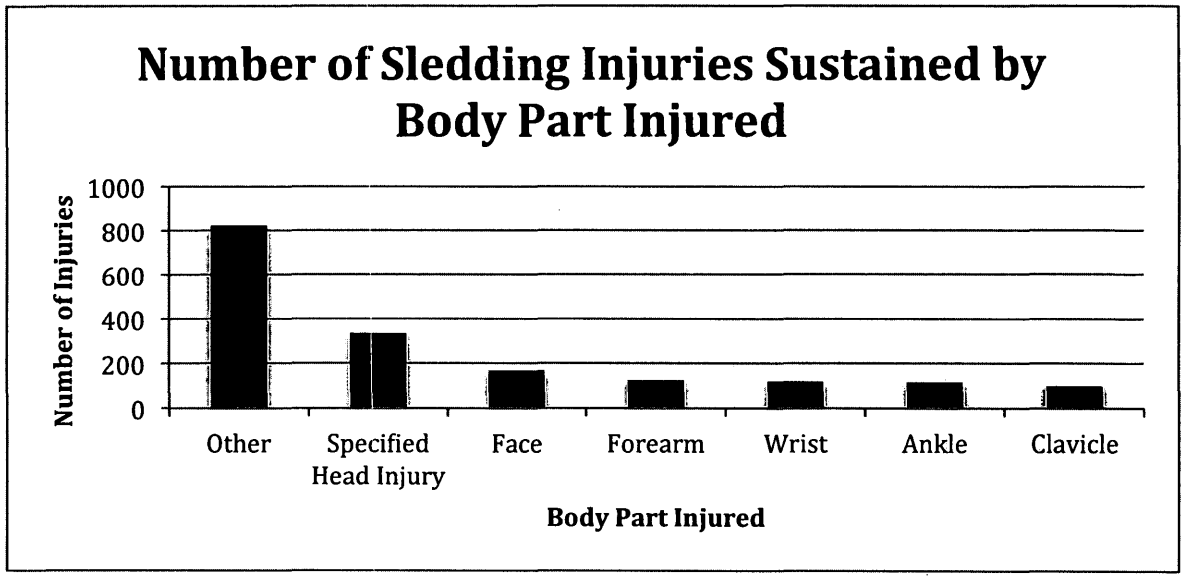

Figure 81: CHIRPP 2007/08 – 2009/10 – Number of Sledding Injuries Sustained by Body Part Injured

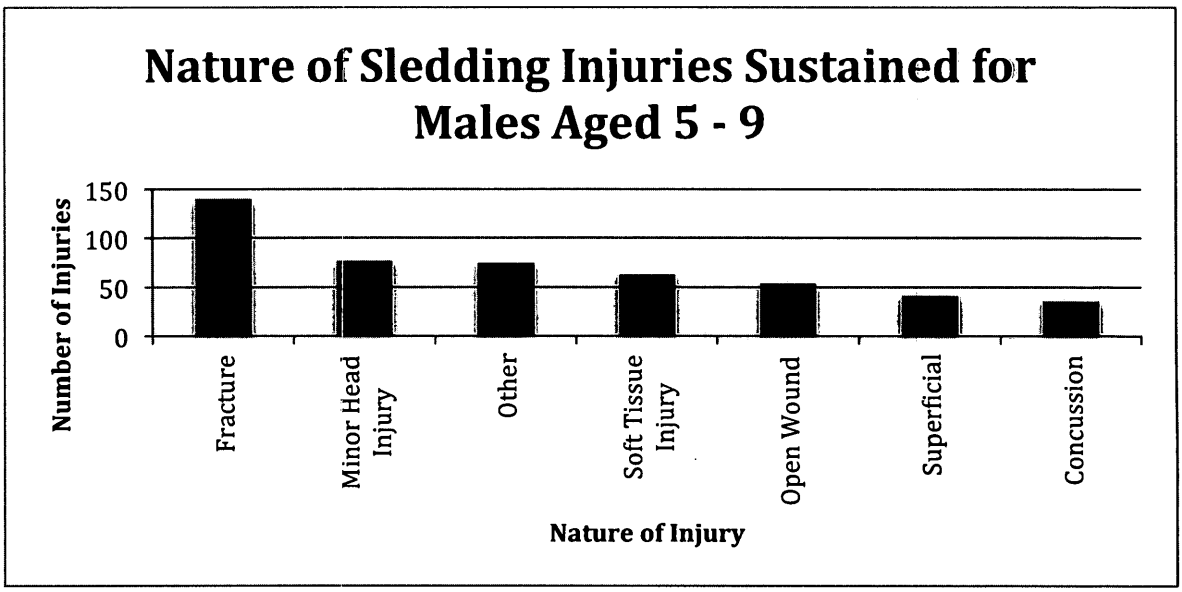

Figure 82: CHIRPP 2007/08 – 2009/10 – Nature of Sledding Injuries Sustained for Males Aged 5 – 9

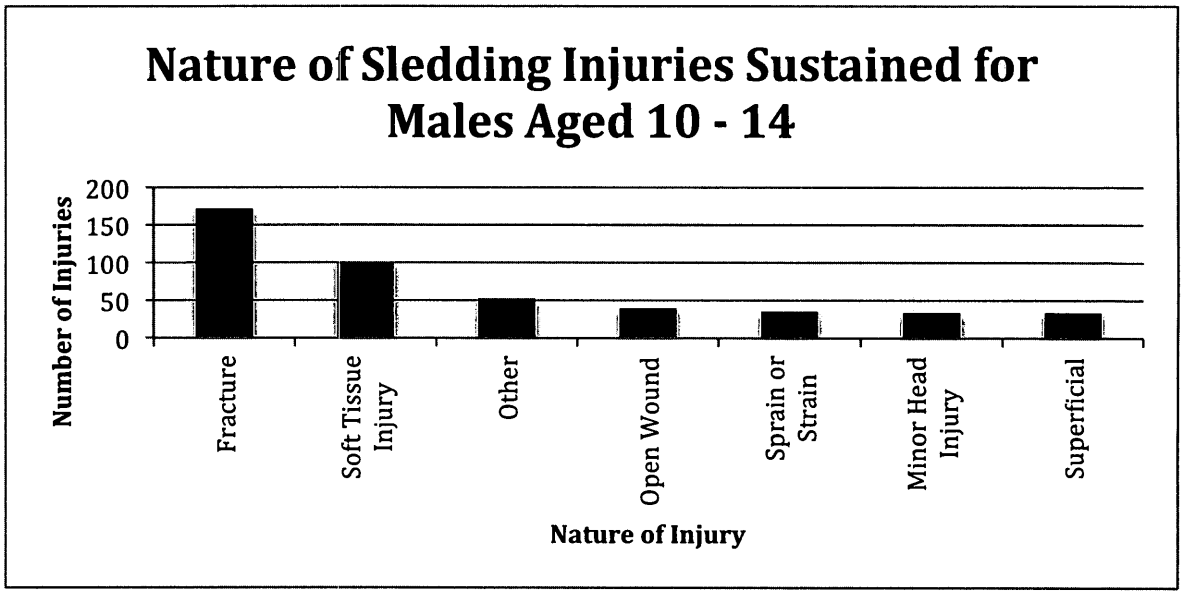

Figure 83: CHIRPP 2007/08 – 2009/10 – Nature of Sledding Injuries Sustained for Males Aged 10 – 14

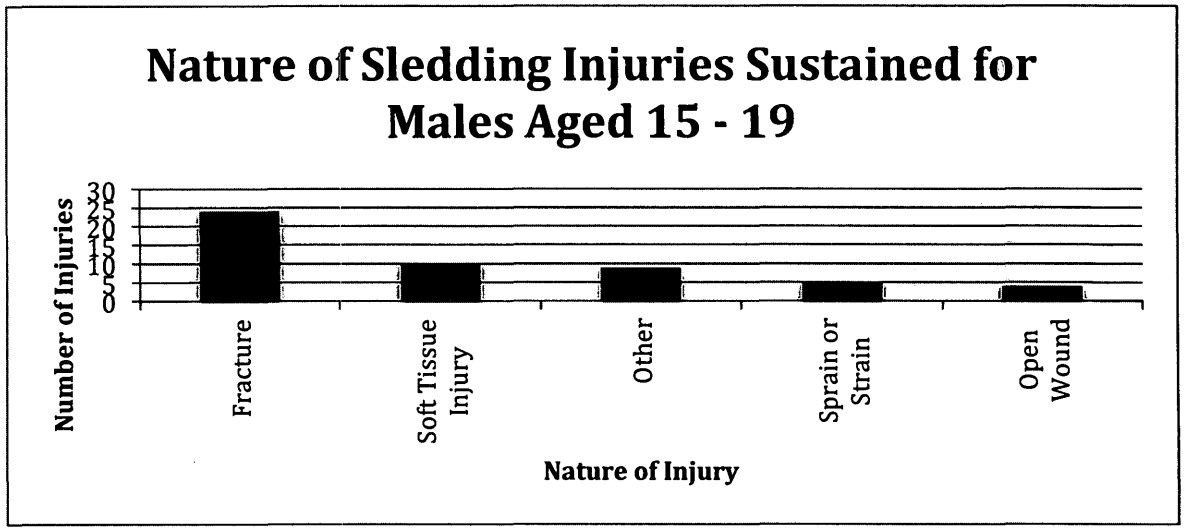

Figure 84: CHIRPP 2007/08 – 2009/10 – Nature of Sledding Injuries Sustained for Males Aged 15 – 19

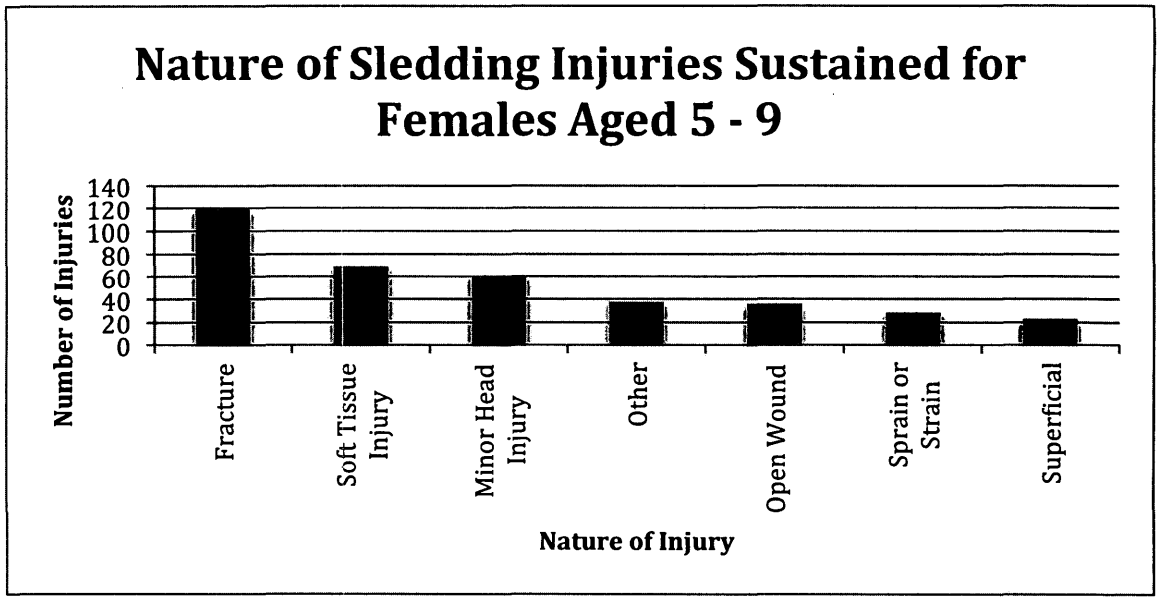

Figure 85: CHIRPP 2007/08 – 2009/10 – Nature of Sledding Injuries Sustained for Females Aged 5 – 9

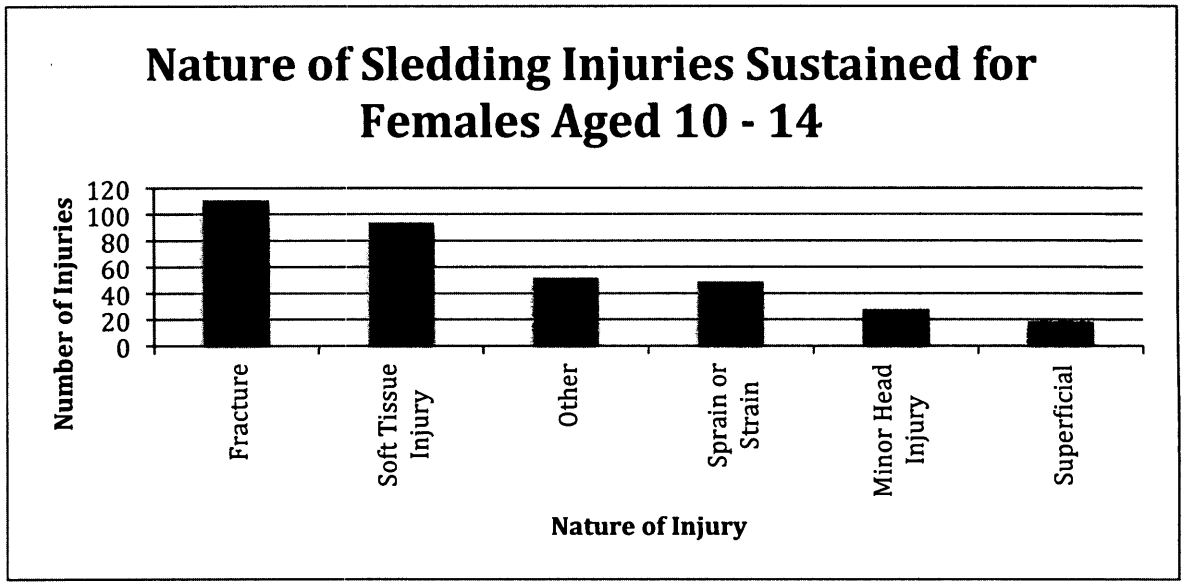

Figure 86: CHIRPP 2007/08 – 2009/10 – Nature of Sledding Injuries Sustained for Females Aged 10 – 14

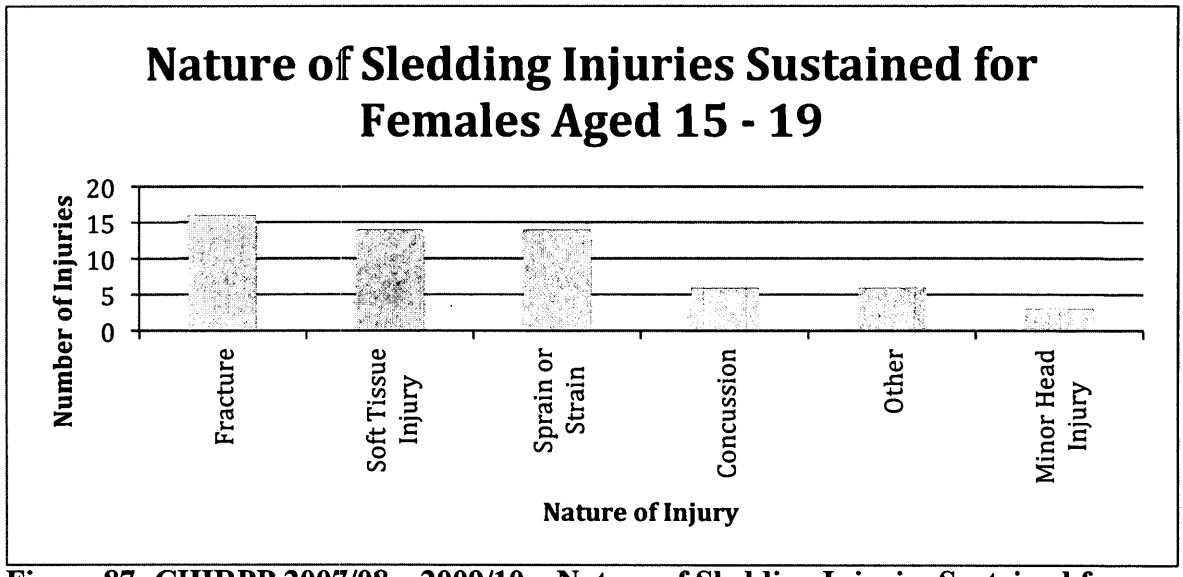

Figure 87: CHIRPP 2007/08 – 2009/10 – Nature of Sledding Injuries Sustained for Females Aged 15 – 19

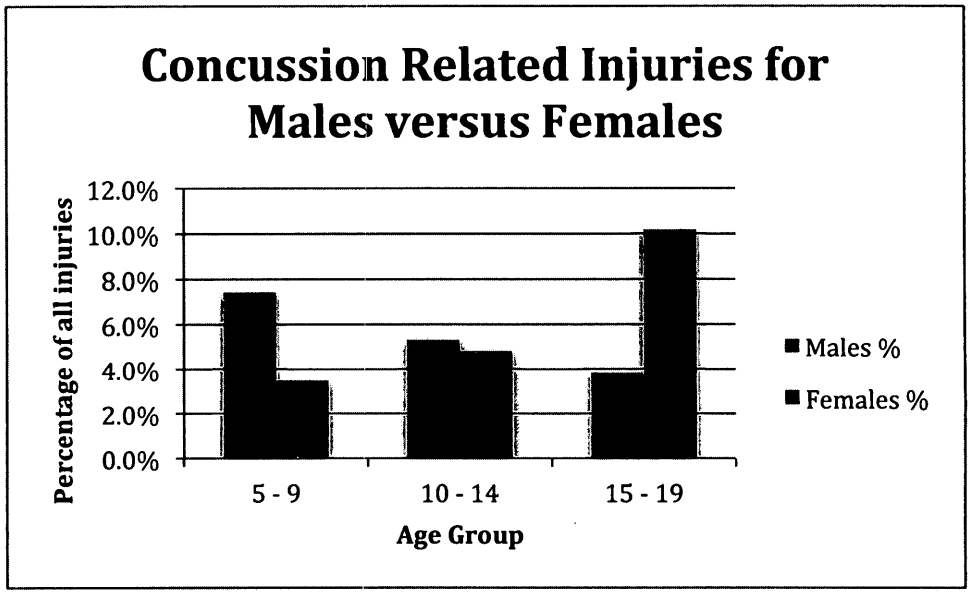

Figure 88: CHIRPP 2007/08 – 2009/10 – Concussion Related Injuries for Males versus Females

Rugby

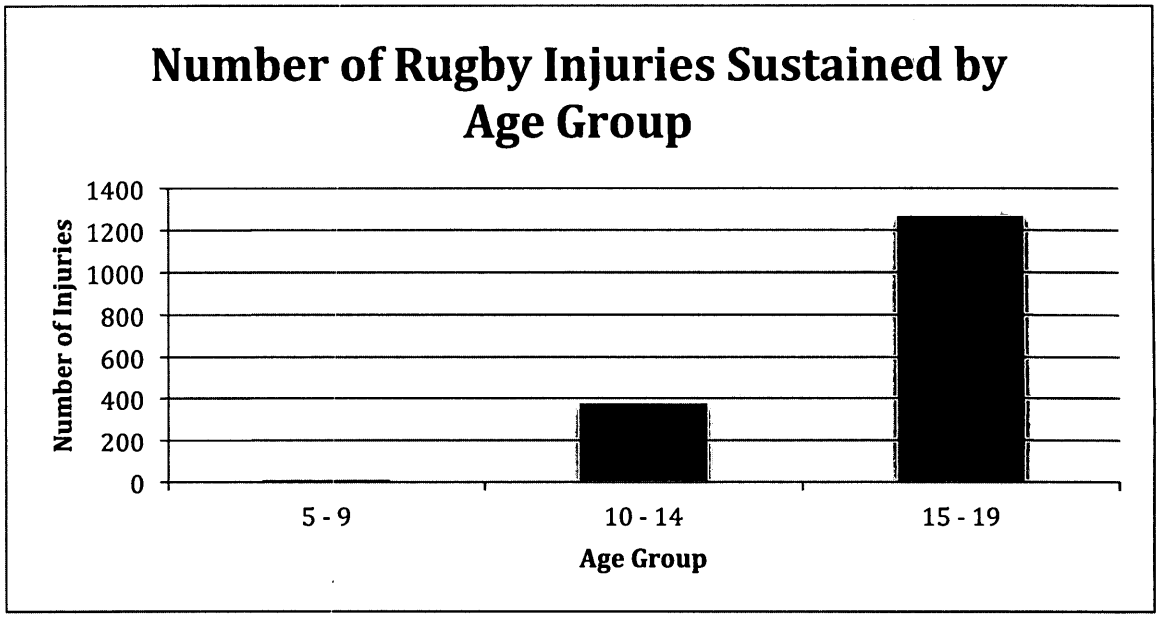

Figure 89: CHIRPP 2007/08 – 2009/10 – Number of Rugby Injuries Sustained by Age Group

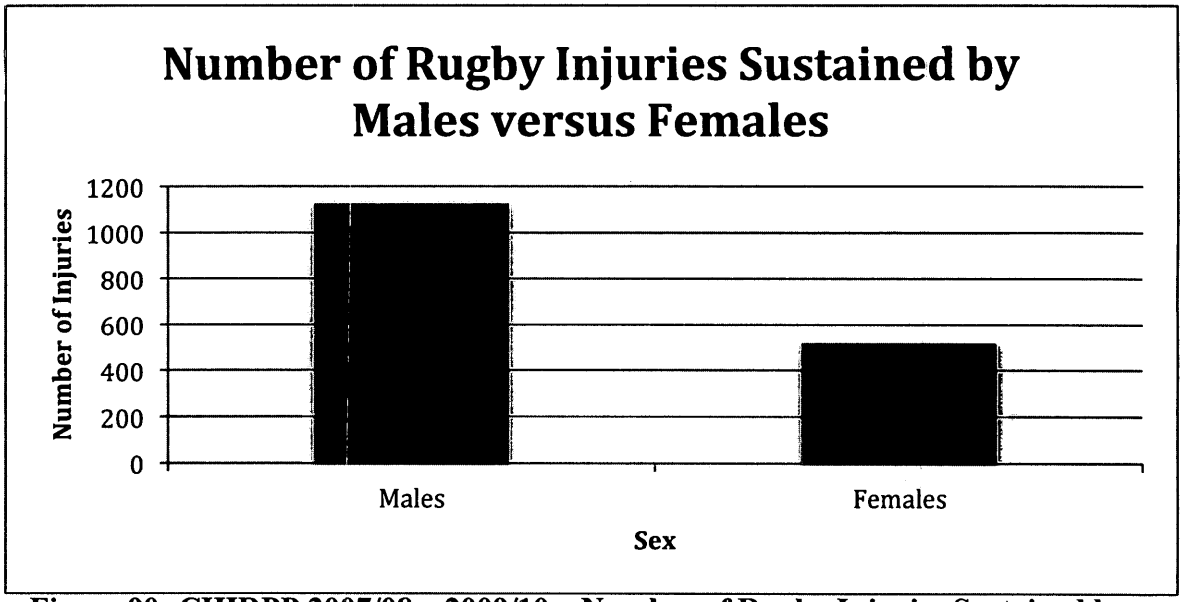

Figure 90: CHIRPP 2007/08 – 2009/10 – Number of Rugby Injuries Sustained by Males versus Females

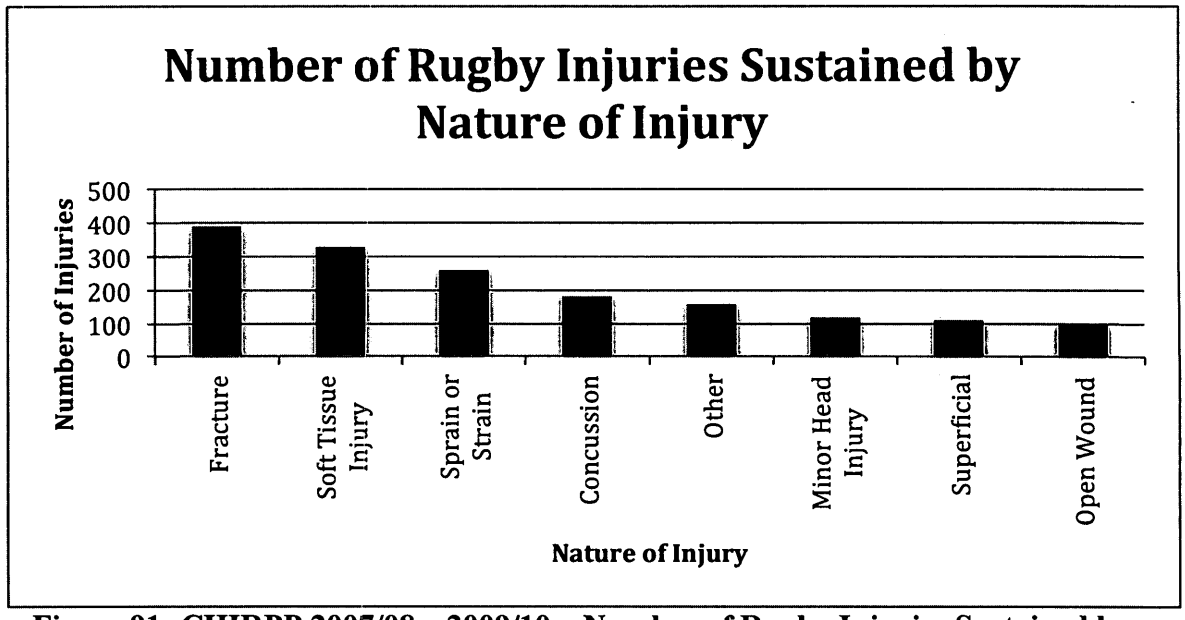

Figure 91: CHIRPP 2007/08 – 2009/10 – Number of Rugby Injuries Sustained by Nature of Injury

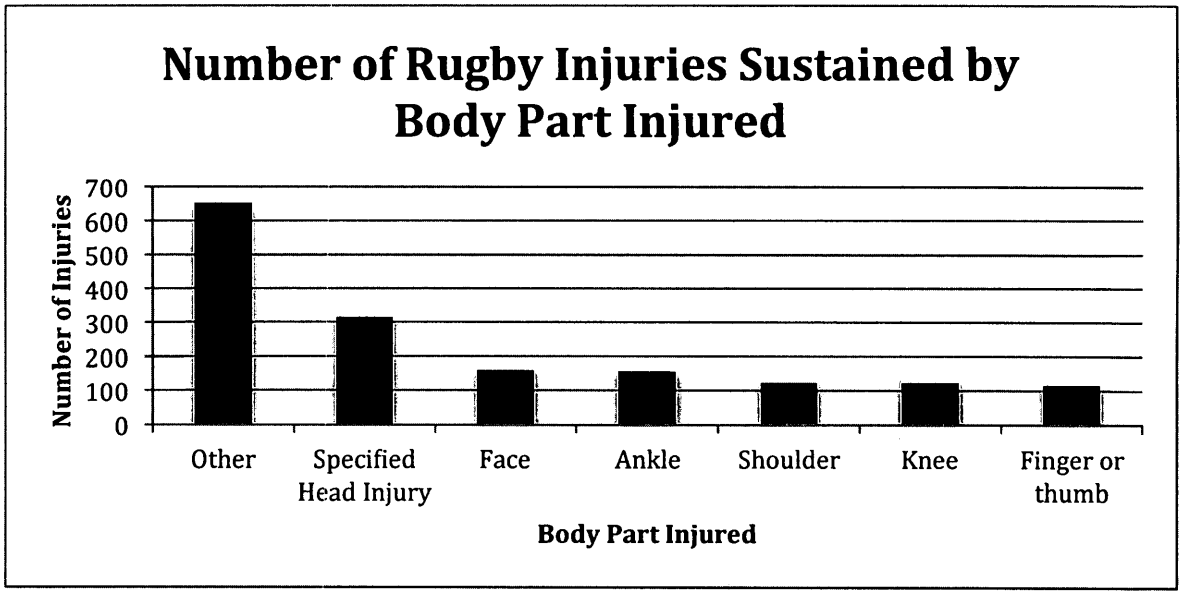

Figure 92: CHIRPP 2007/08 – 2009/10 – Number of Rugby Injuries Sustained by Body Part Injured

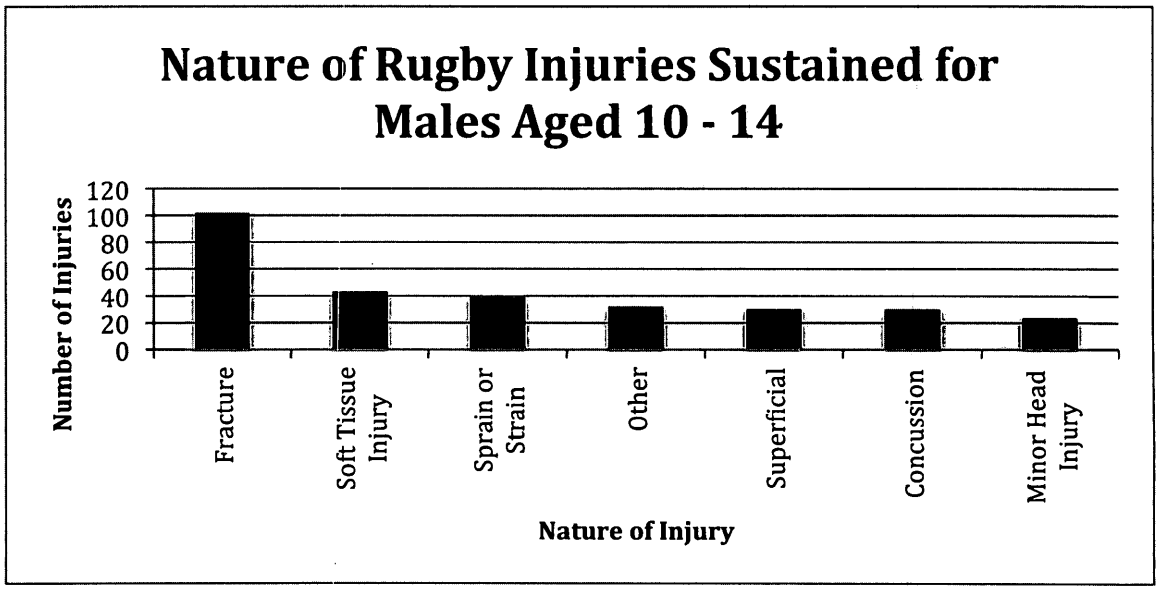

Figure 93: CHIRPP 2007/08 – 2009/10 – Nature of Rugby Injuries Sustained for Males Aged 10 – 14

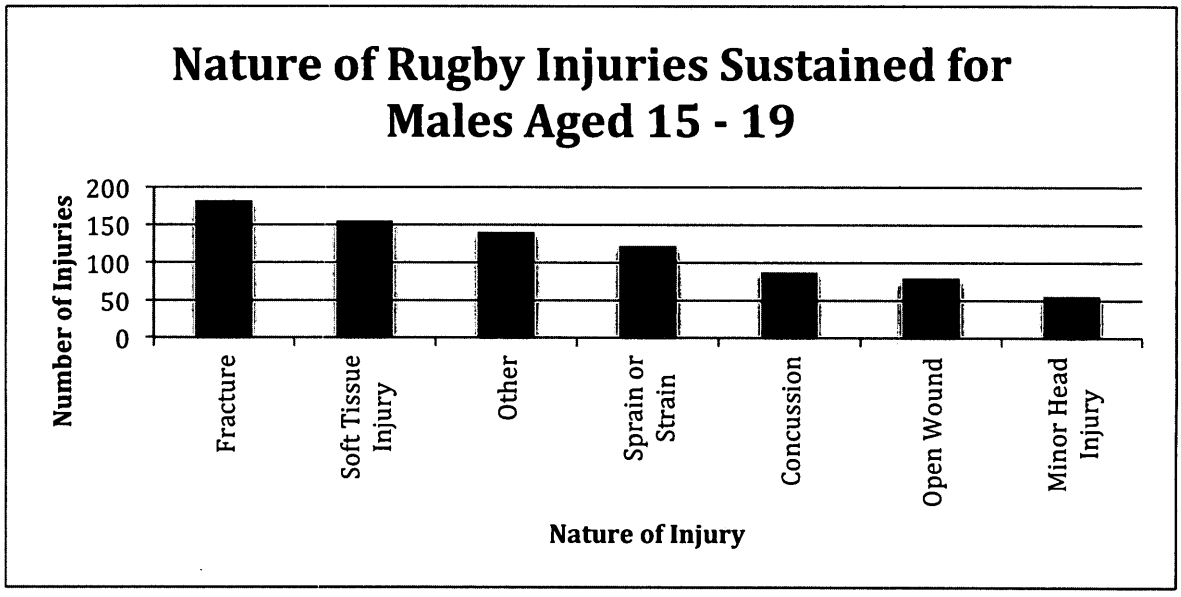

Figure 94: CHIRPP 2007/08 – 2009/10 – Nature of Rugby Injuries Sustained for Males Aged 15 – 19

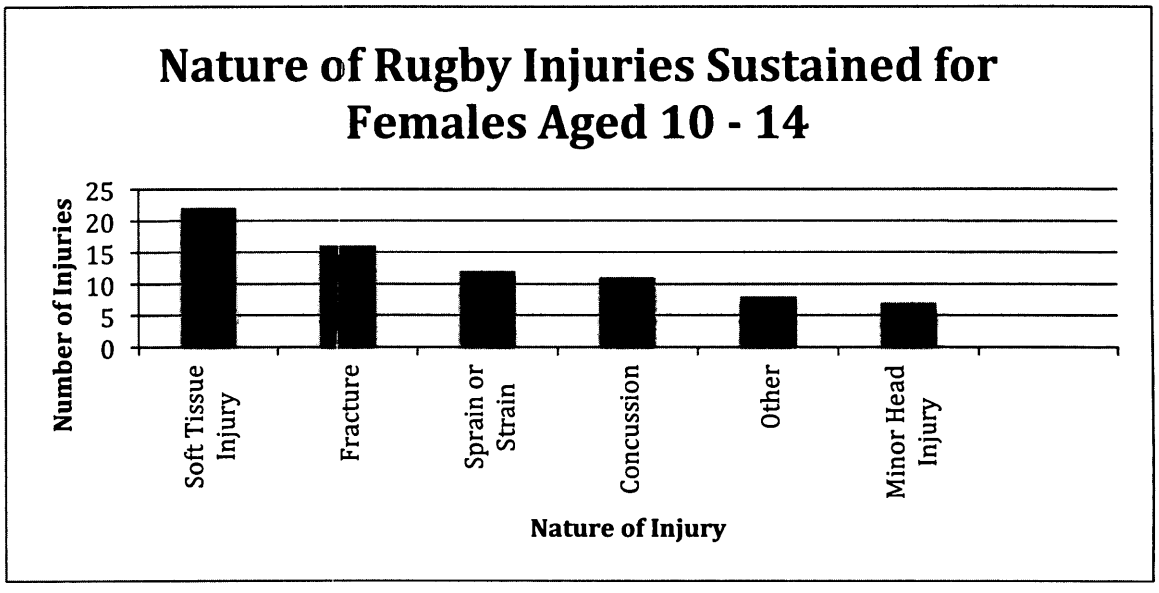

Figure 95: CHIRPP 2007/08 – 2009/10 – Nature of Rugby Injuries Sustained for Females Aged 10 – 14

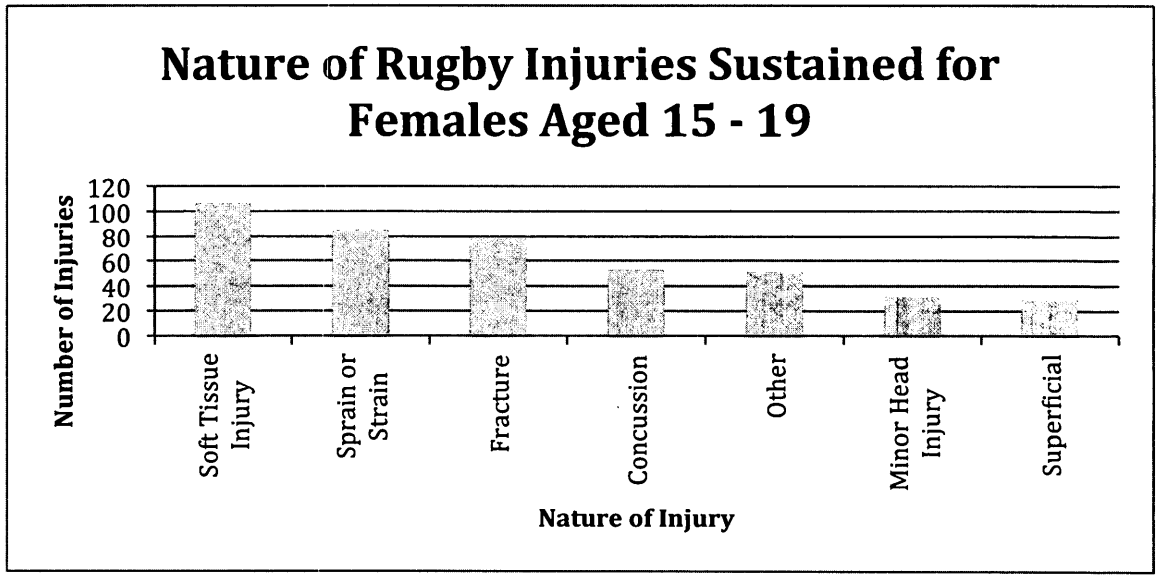

Figure 96: CHIRPP 2007/08 – 2009/10 – Nature of Rugby Injuries Sustained for Females Aged 15 – 19

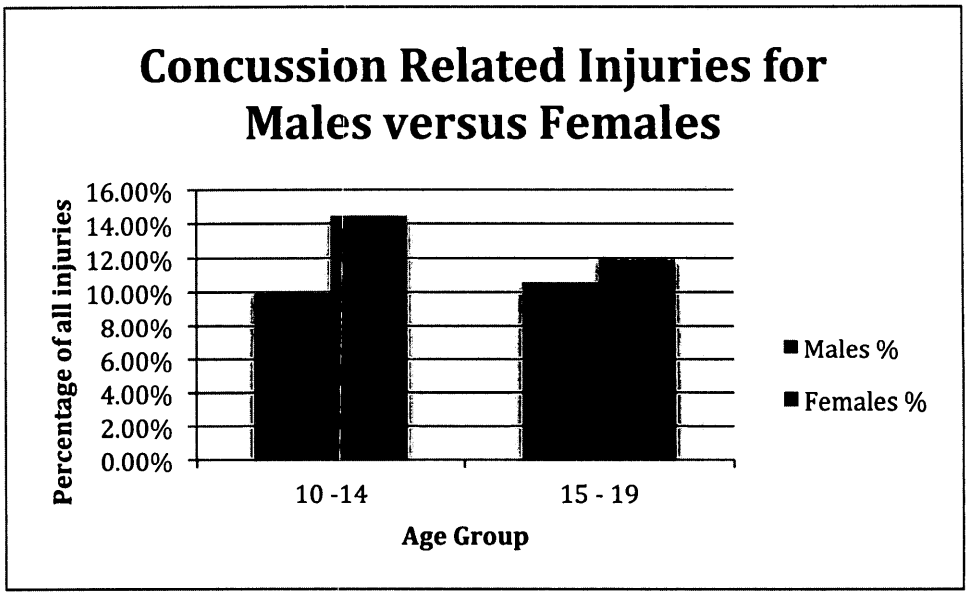

Figure 97: CHIRPP 2007/08 – 2009/10 – Concussion Related Injuries for Males versus Females

Baseball

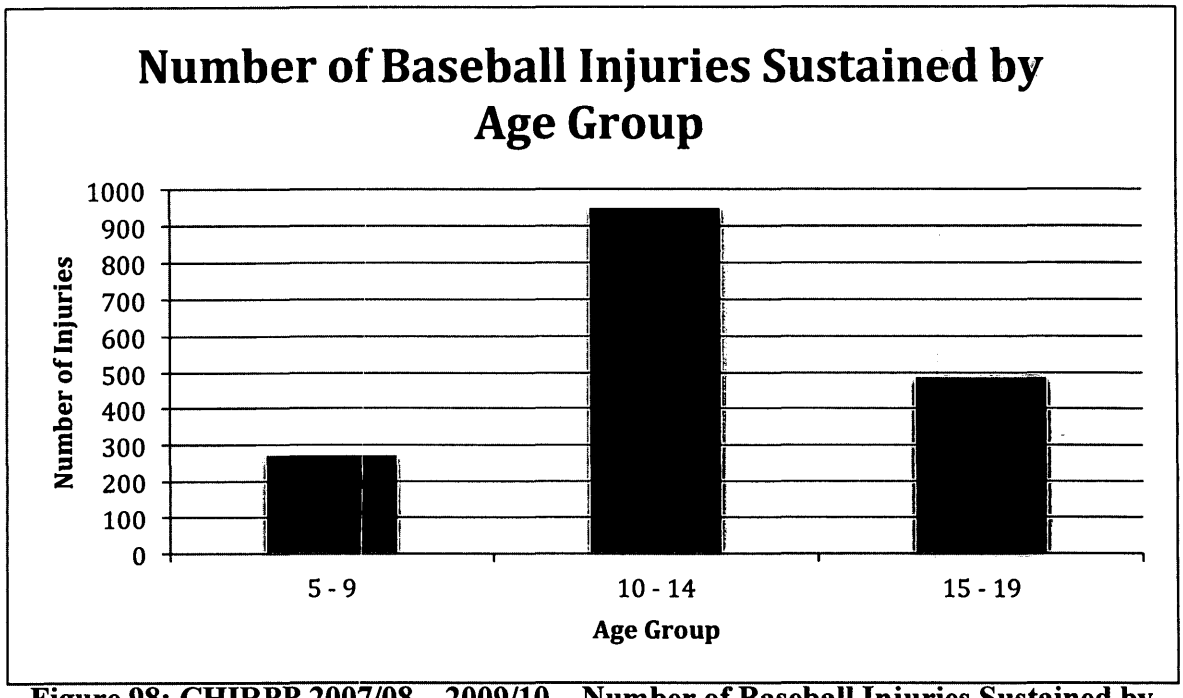

Figure 98: CHIRPP 2007/08 – 2009/10 – Number of Baseball Injuries Sustained by Age Group

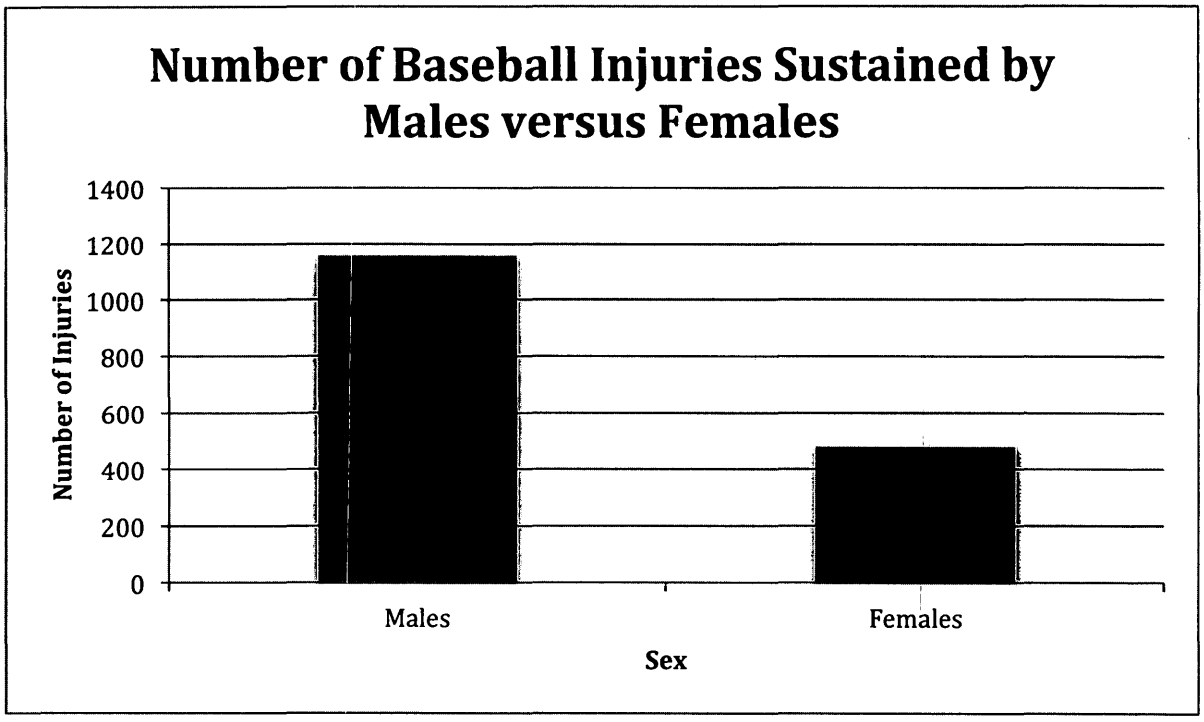

Figure 99: CHIRPP 2007/08 – 2009/10 – Number of Baseball Injuries Sustained by Males versus Females

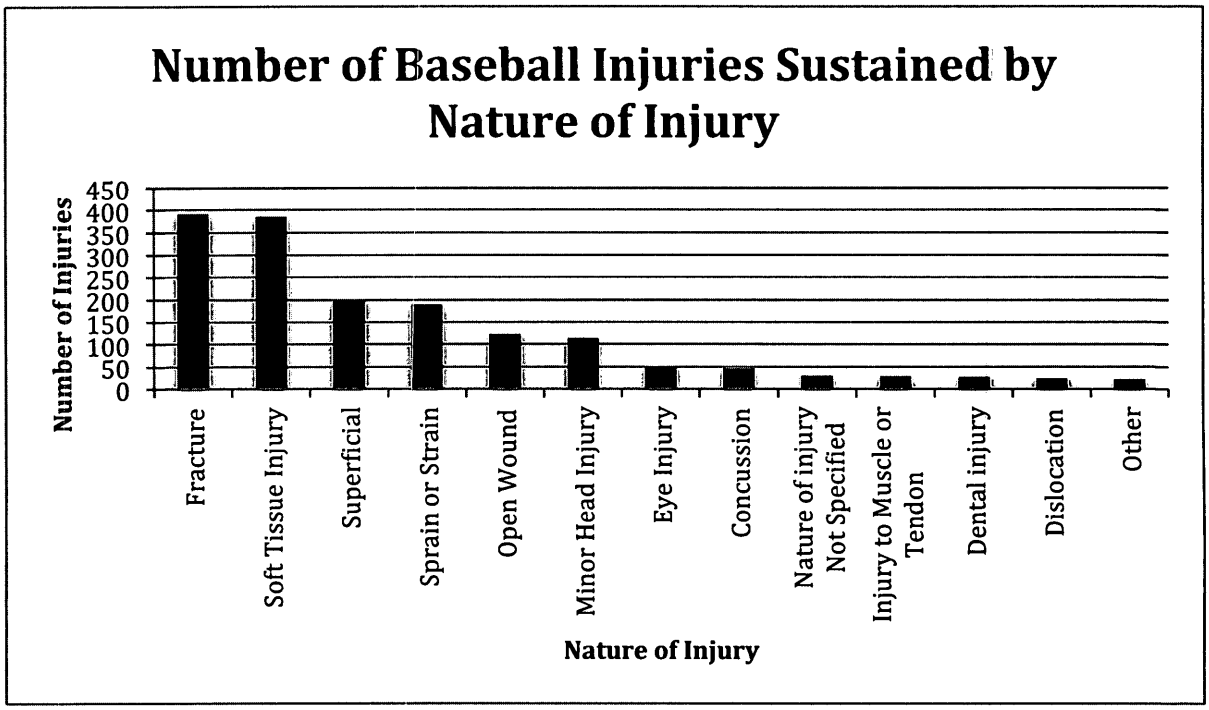

Figure 100: CHIRPP 2007/08 – 2009/10 – Number of Baseball Injuries Sustained by Nature of Injury

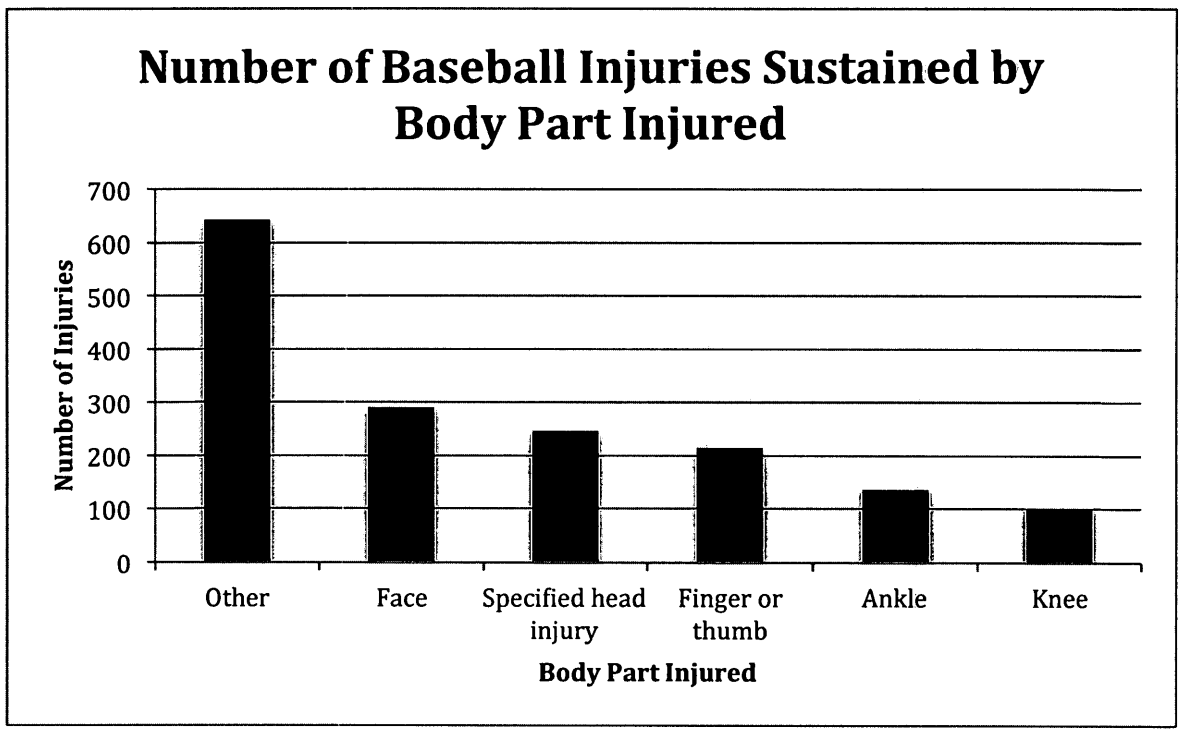

Figure 101: CHIRPP 2007/08 – 2009/10 – Number of Baseball Injuries Sustained by Body Part Injured

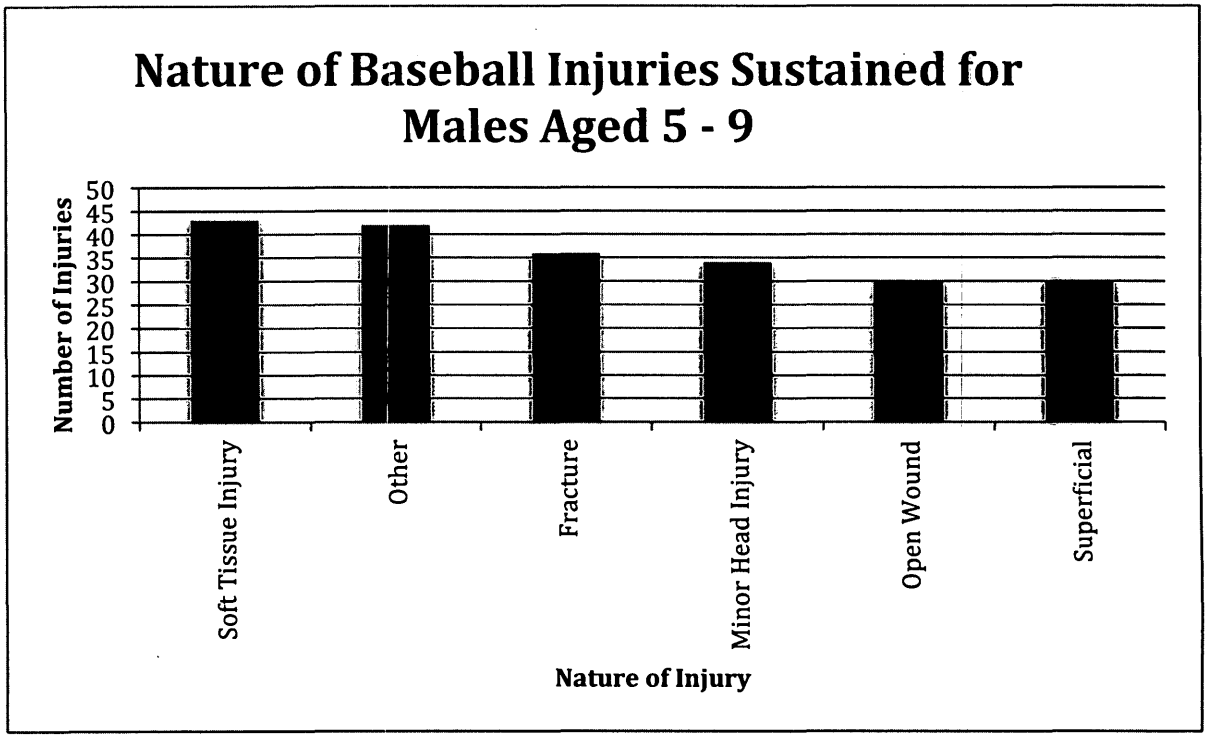

Figure 102: CHIRPP 2007/08 – 2009/10 – Nature of Baseball Injuries Sustained for Males Aged 5 – 9

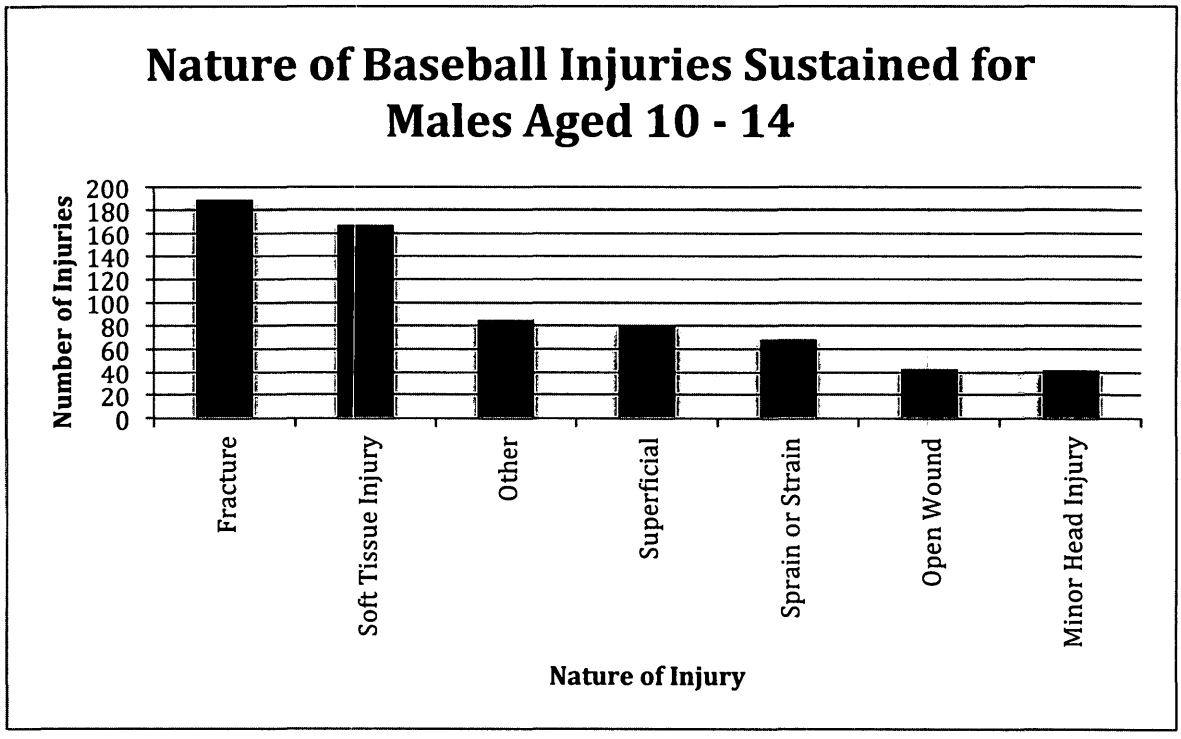

Figure 103: CHIRPP 2007/08 – 2009/10 – Nature of Baseball Injuries Sustained for Males Aged 10 – 14

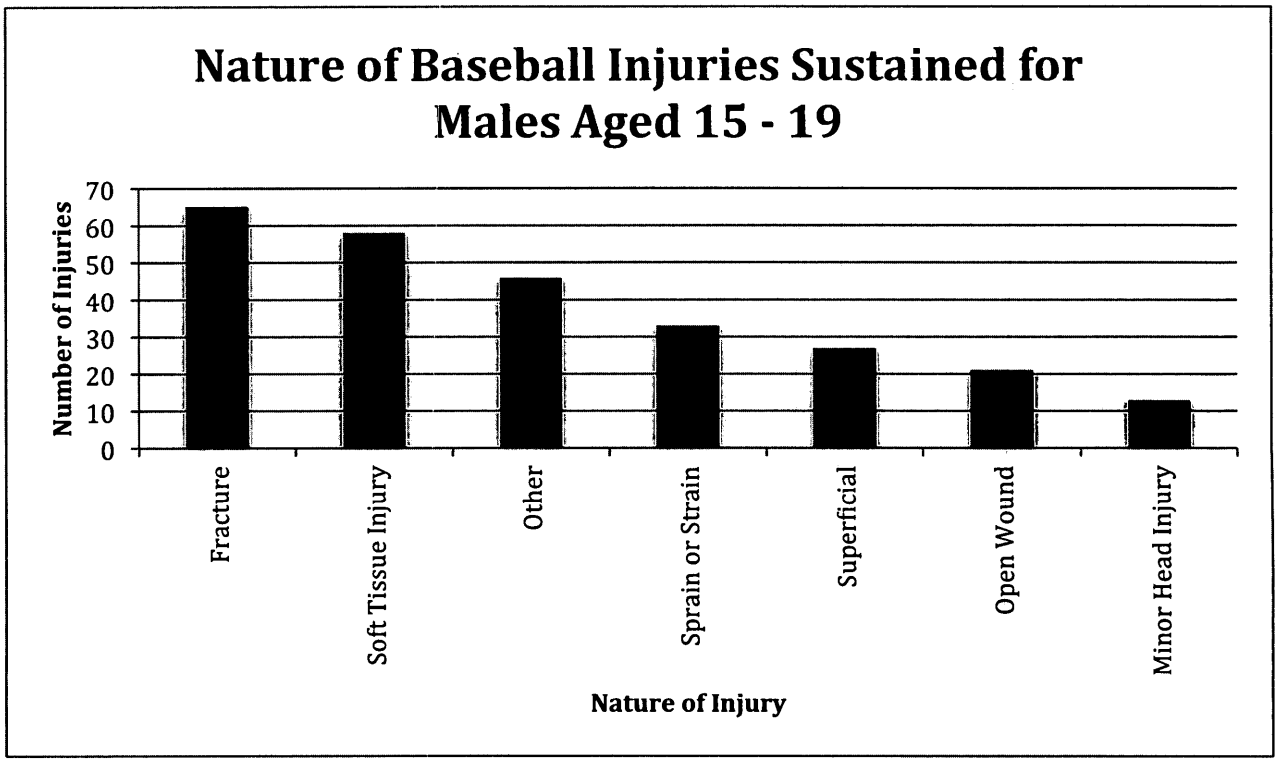

Figure 104: CHIRPP 2007/08 – 2009/10 – Nature of Baseball Injuries Sustained for Males Aged 15 – 19

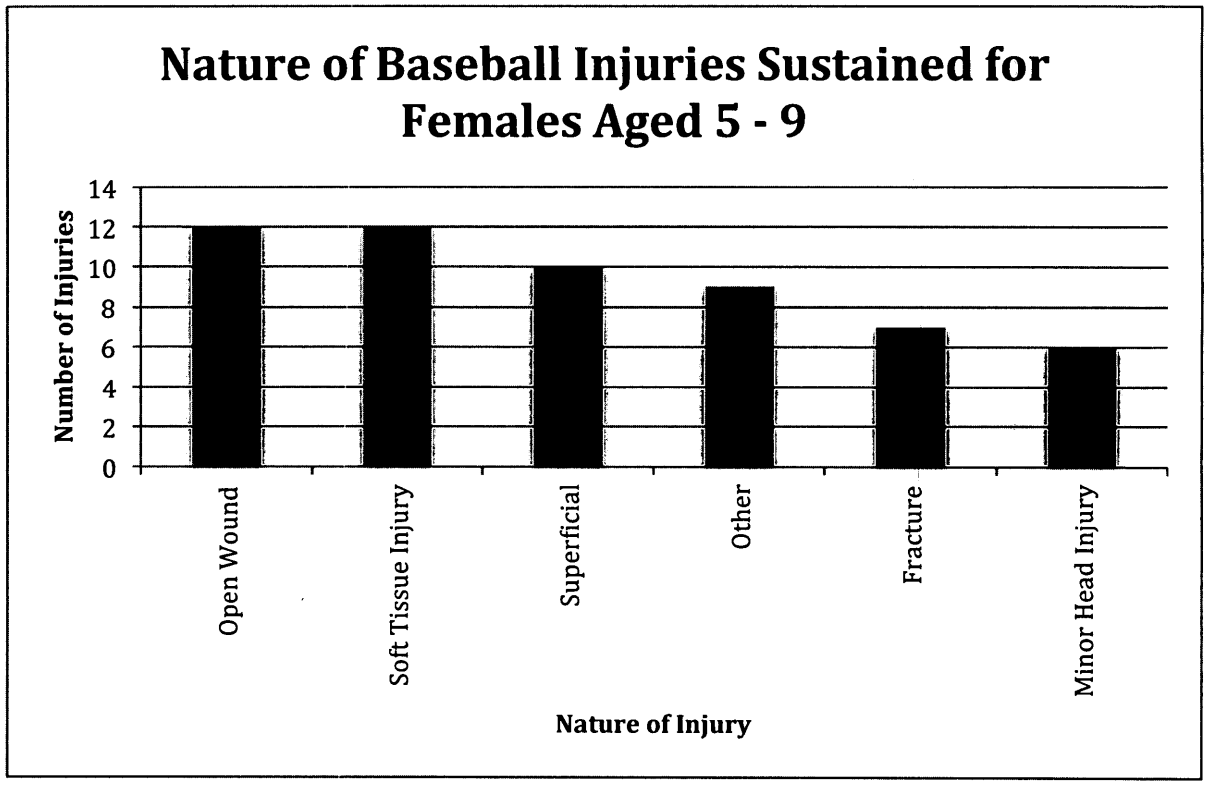

Figure 105: CHIRPP 2007/08 – 2009/10 – Nature of Baseball Injuries Sustained for Females Aged 5 – 9

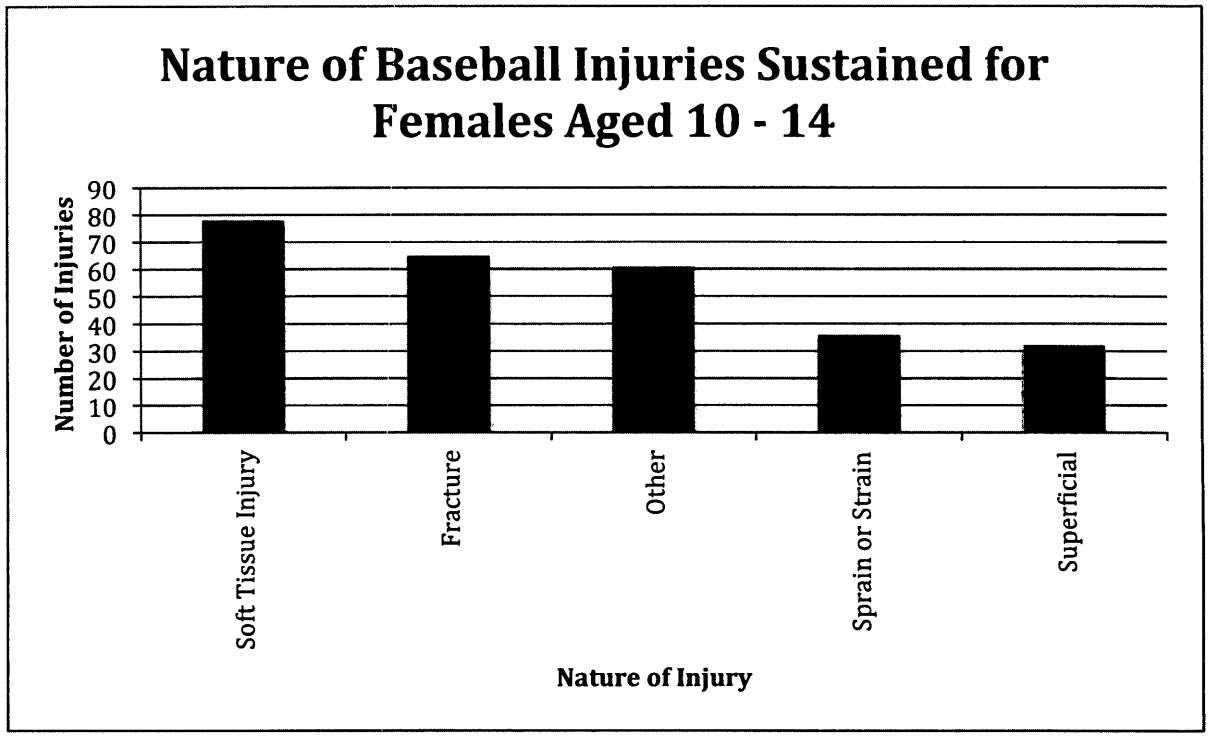

Figure 106: CHIRPP 2007/08 – 2009/10 – Nature of Baseball Injuries Sustained for Females Aged 10 – 14

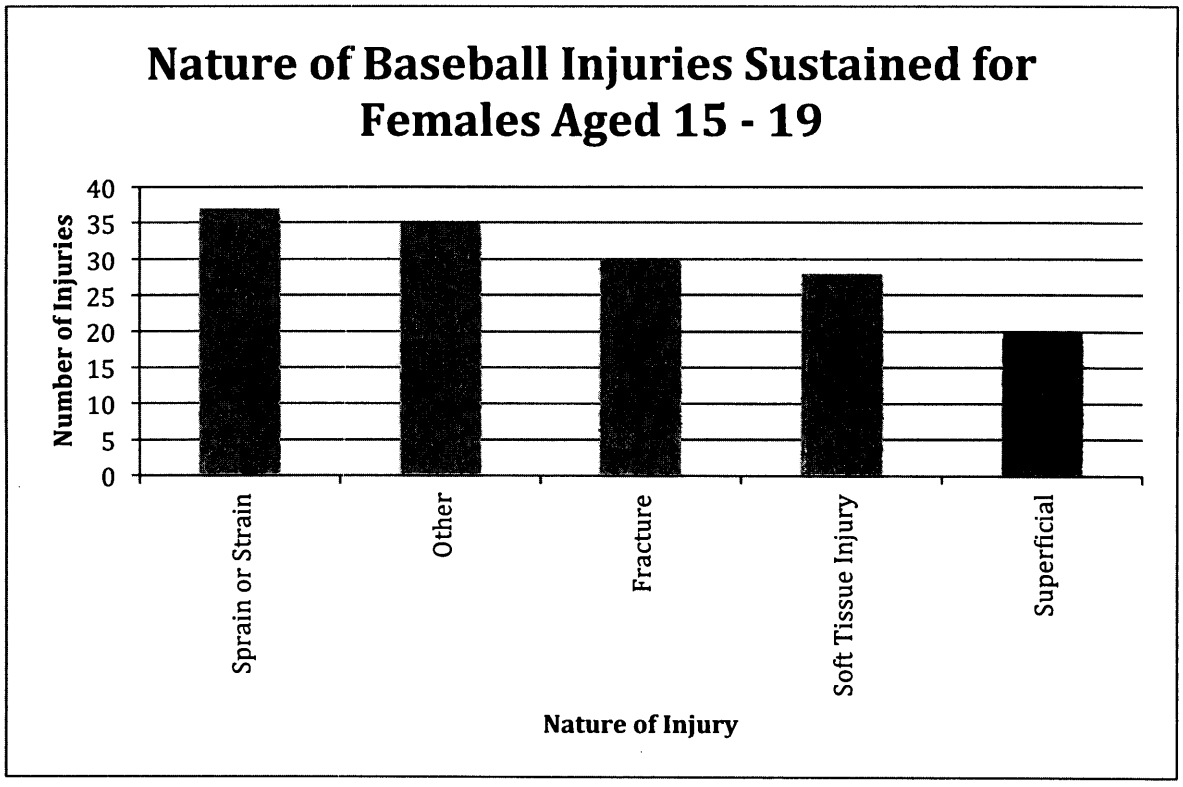

Figure 107: CHIRPP 2007/08 – 2009/10 – Nature of Baseball Injuries Sustained for Females Aged 15 – 19

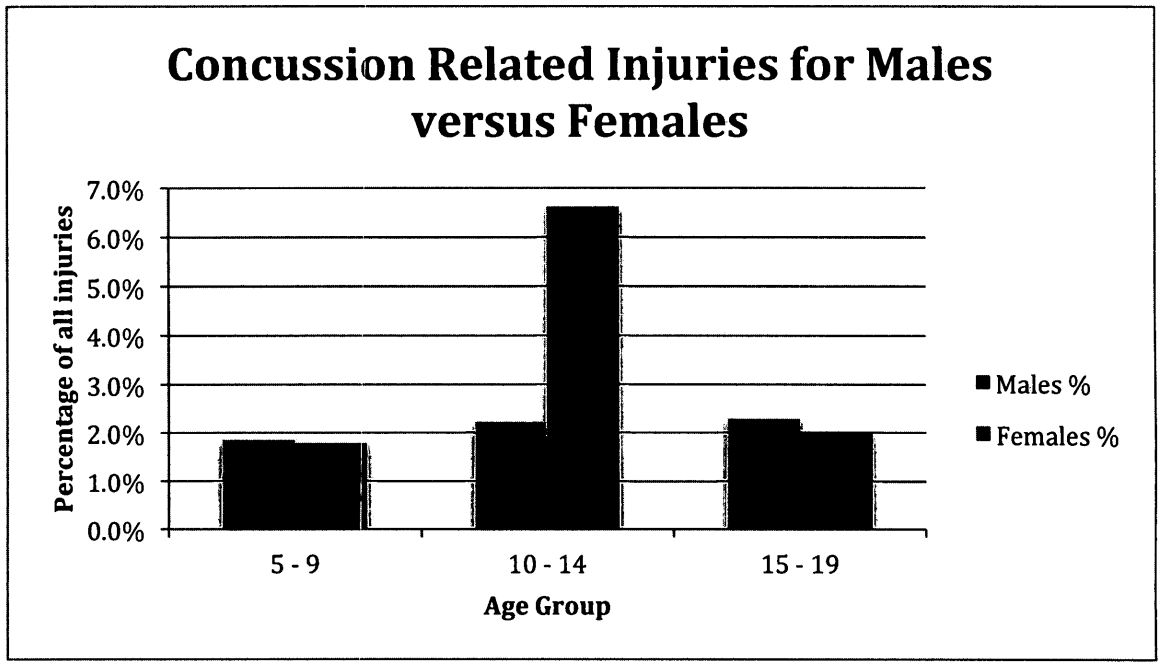

Figure 108: CHIRPP 2007/08 – 2009/10 – Concussion Related Injuries for Males versus Females

Volleyball

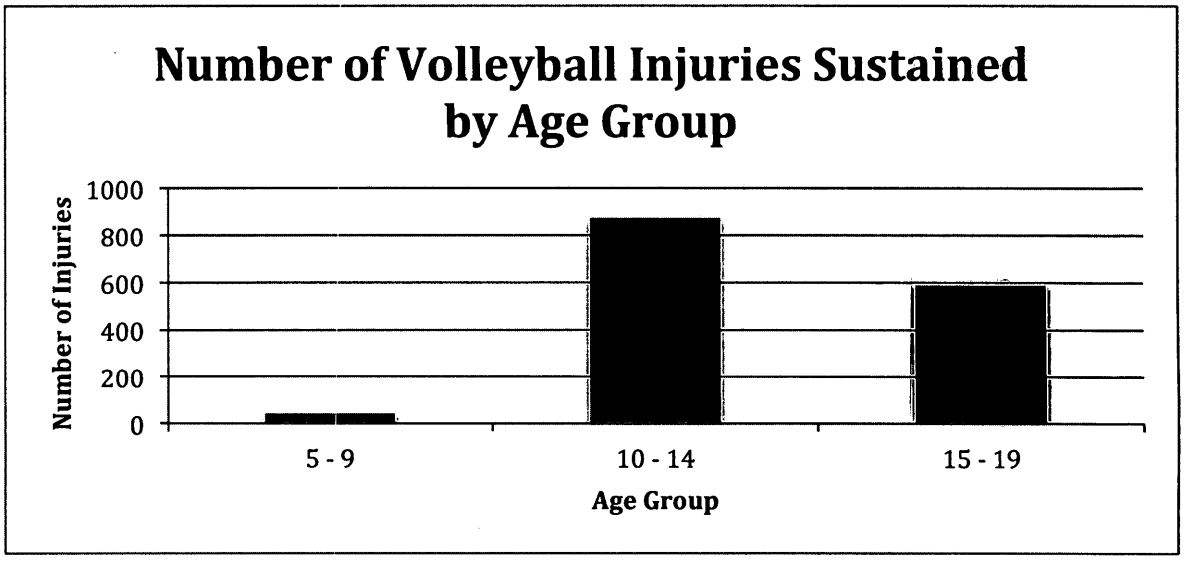

Figure 109: CHIRPP 2007/08 – 2009/10 – Number of Volleyball Injuries Sustained by Age Group

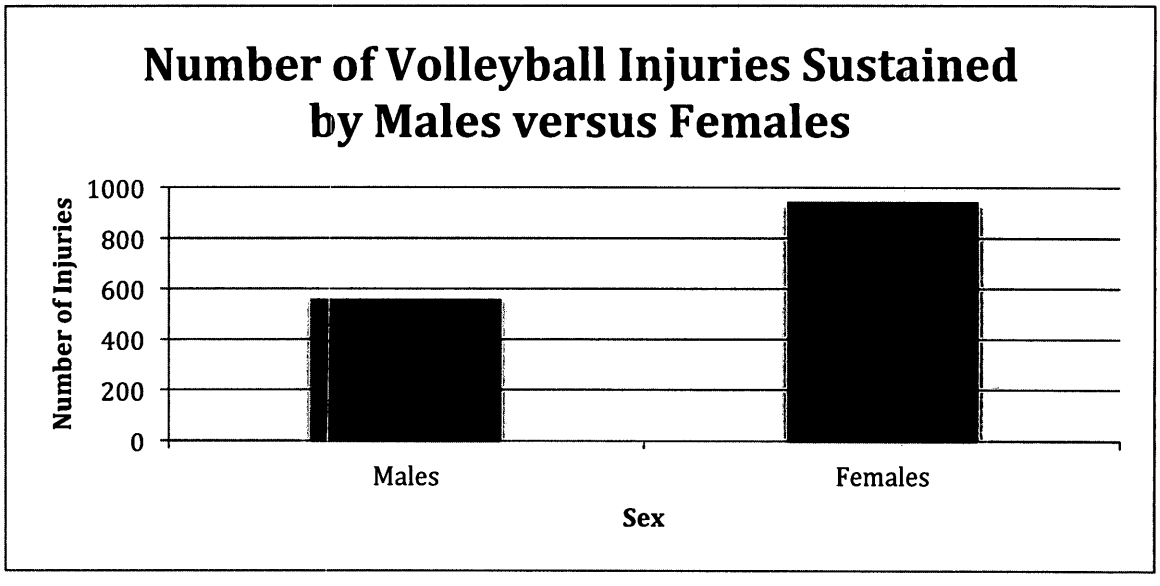

Figure 110: CHIRPP 2007/08 – 2009/10 – Number of Volleyball Injuries Sustained by Males versus Females

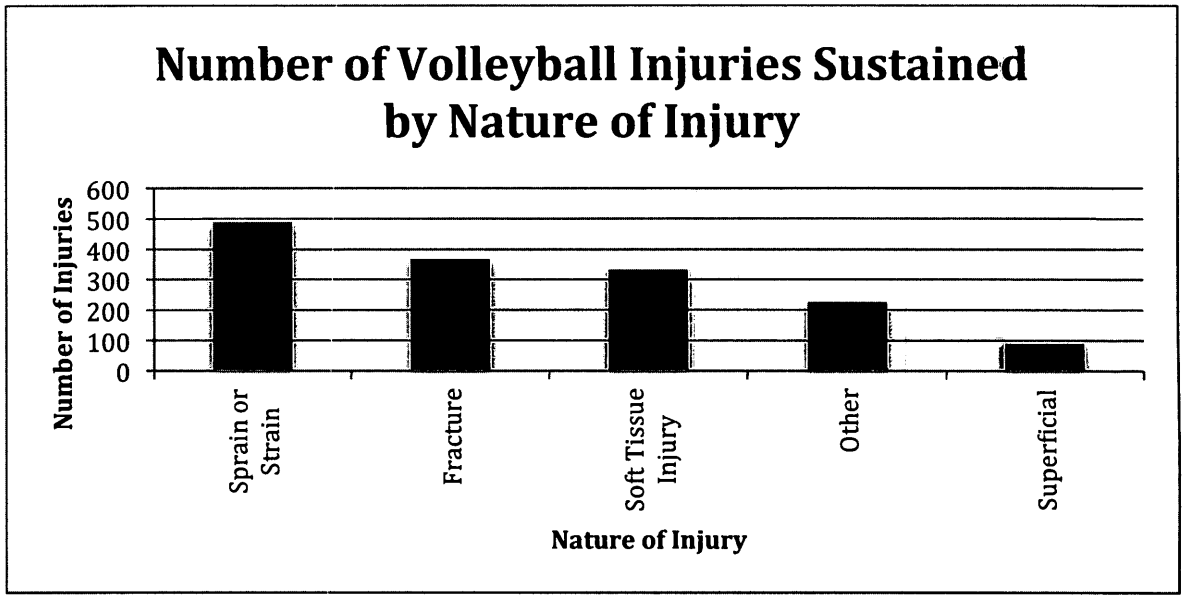

Figure 111: CHIRPP 2007/08 – 2009/10 – Number of Volleyball Injuries Sustained by Nature of Injury

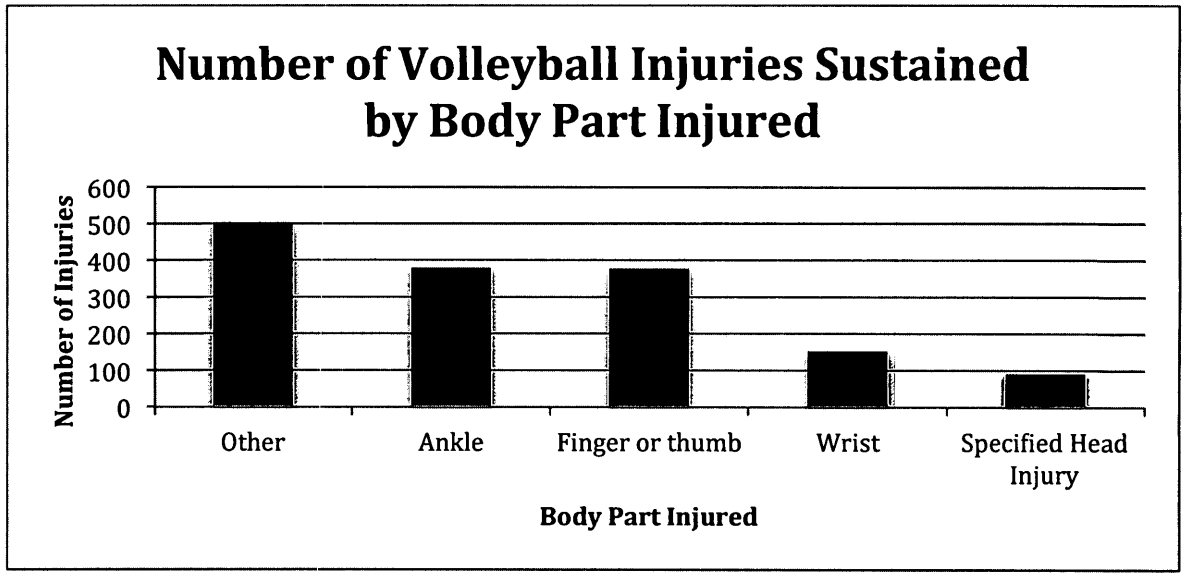

Figure 112: CHIRPP 2007/08 – 2009/10 – Number of Volleyball Injuries Sustained by Body Part Injured

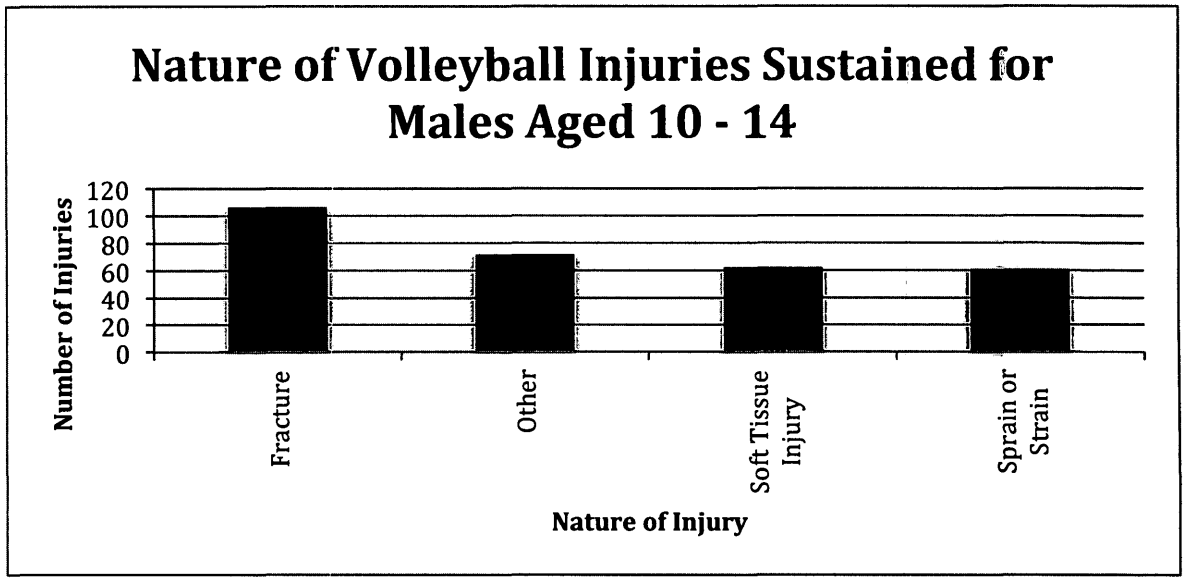

Figure 113: CHIRPP 2007/08 – 2009/10 – Nature of Volleyball Injuries Sustained for Males Aged 10 – 14

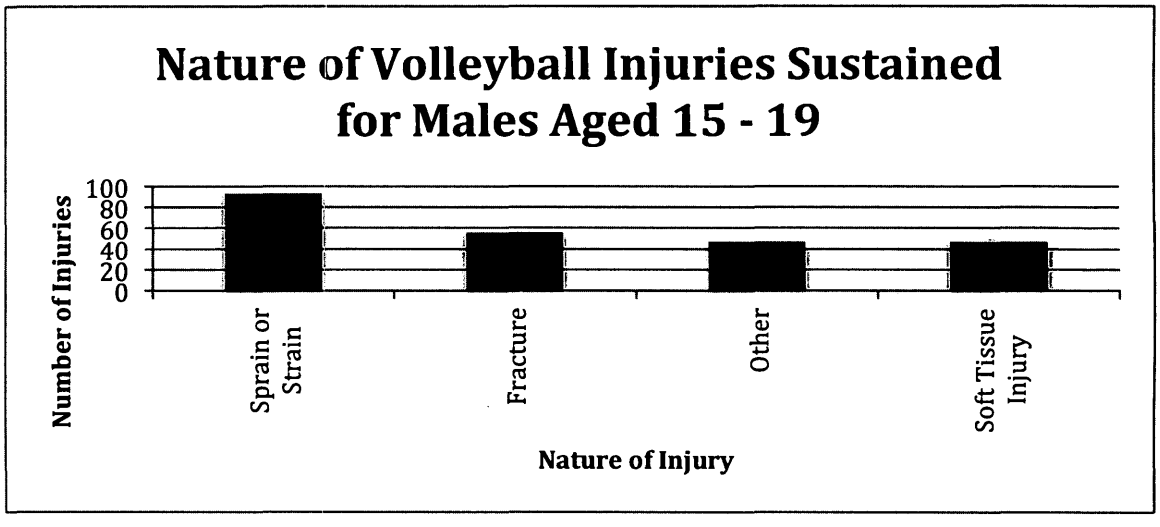

Figure 114: CHIRPP 2007/08 – 2009/10 – Nature of Volleyball Injuries Sustained for Males Aged 15 – 19

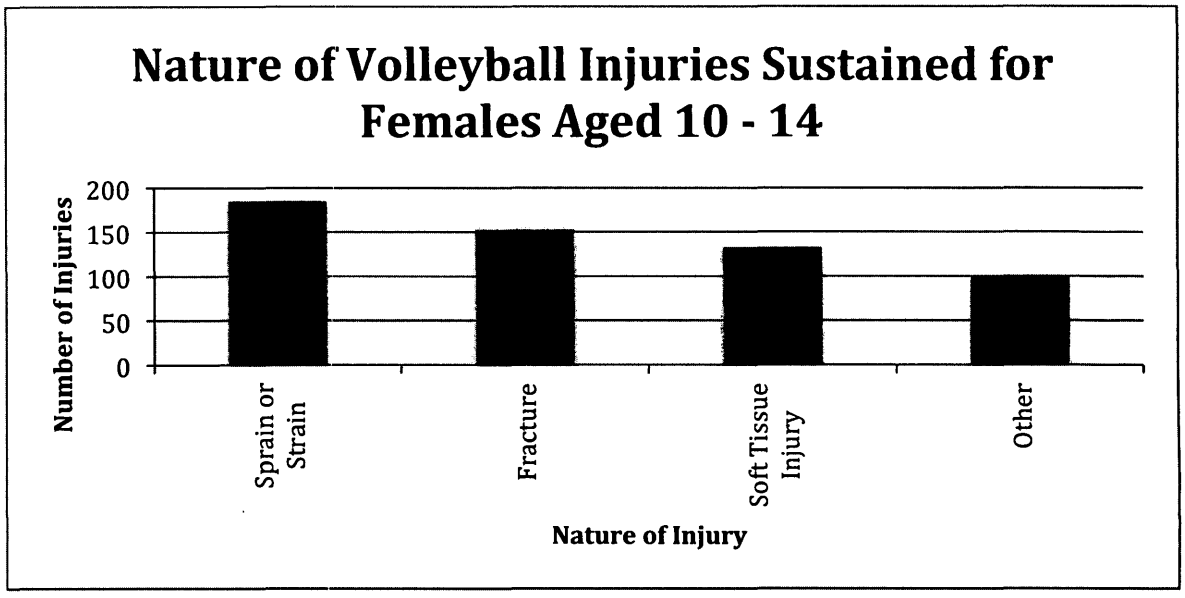

Figure 115: CHIRPP 2007/08 – 2009/10 – Nature of Volleyball Injuries Sustained for Females Aged 10 – 14

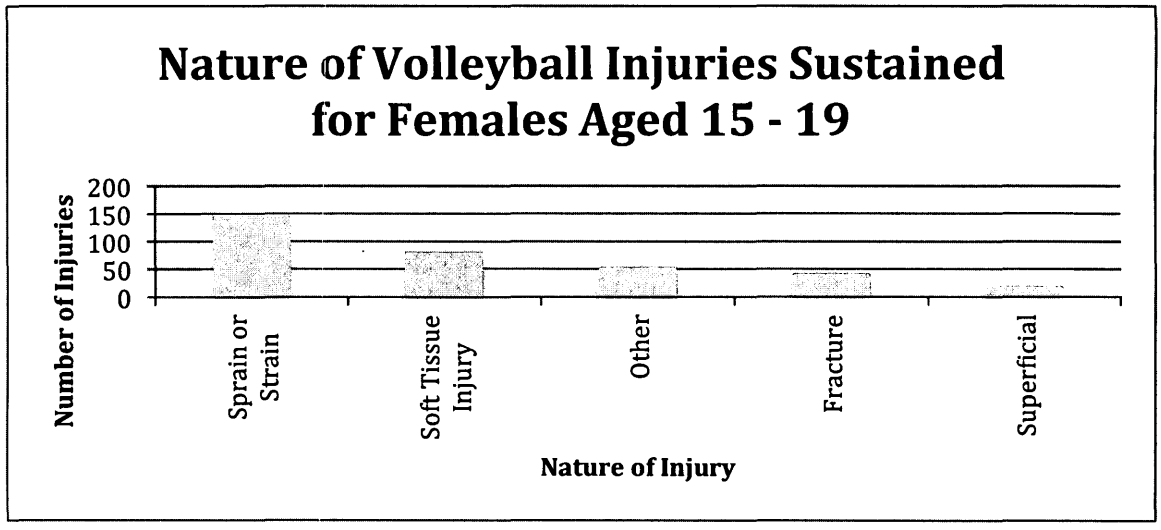

Figure 116: CHIRPP 2007/08 – 2009/10 – Nature of Volleyball Injuries Sustained for Females Aged 15 – 19

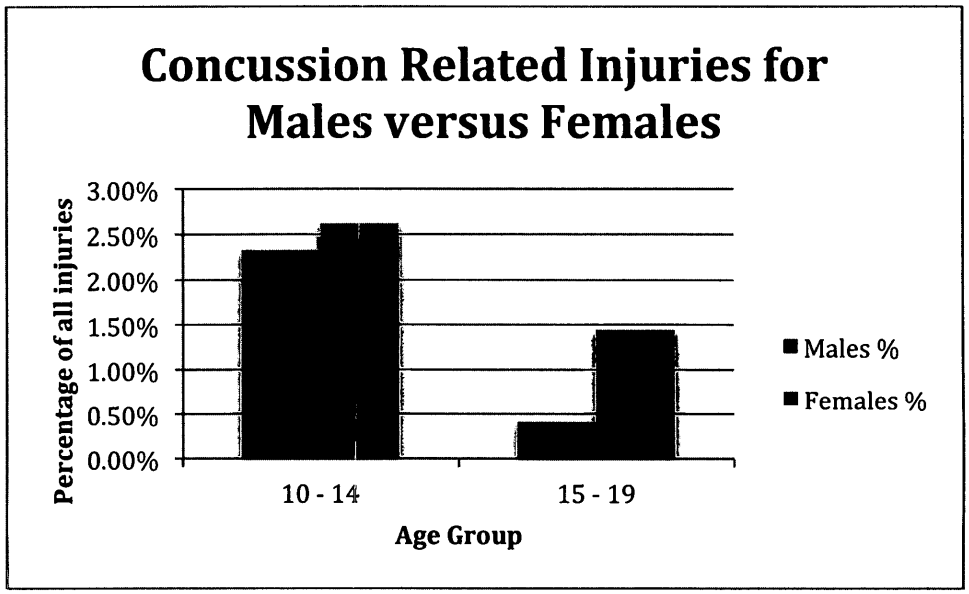

Figure 117: CHIRPP 2007/08 – 2009/10 – Concussion Related Injuries for Males versus Females

Lacrosse

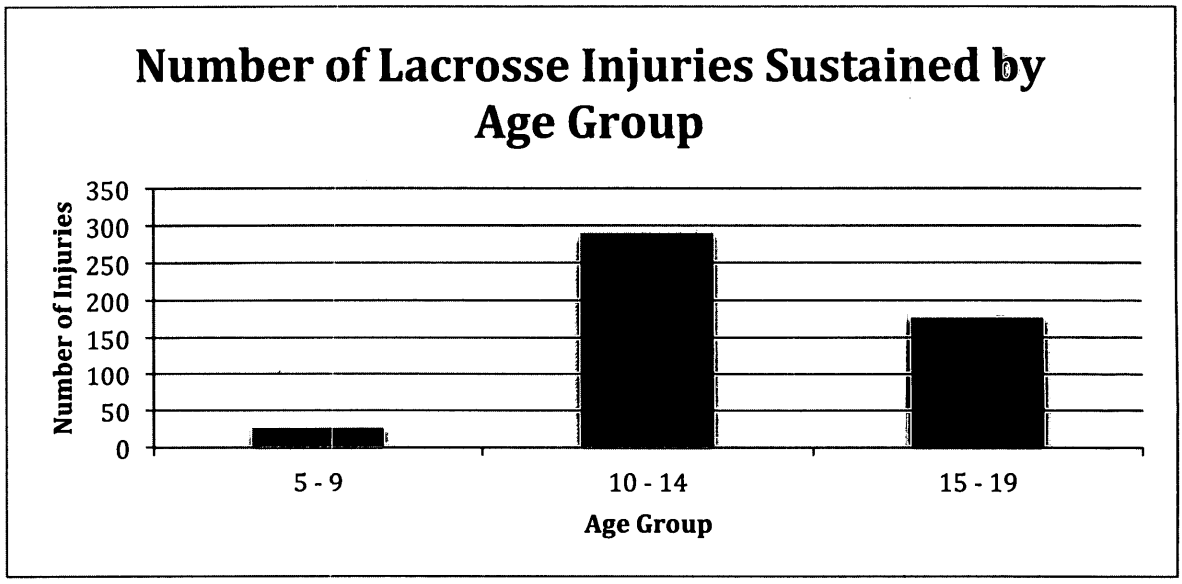

Figure 118: CHIRPP 2007/08 – 2009/10 – Number of Lacrosse Injuries Sustained by Age Group

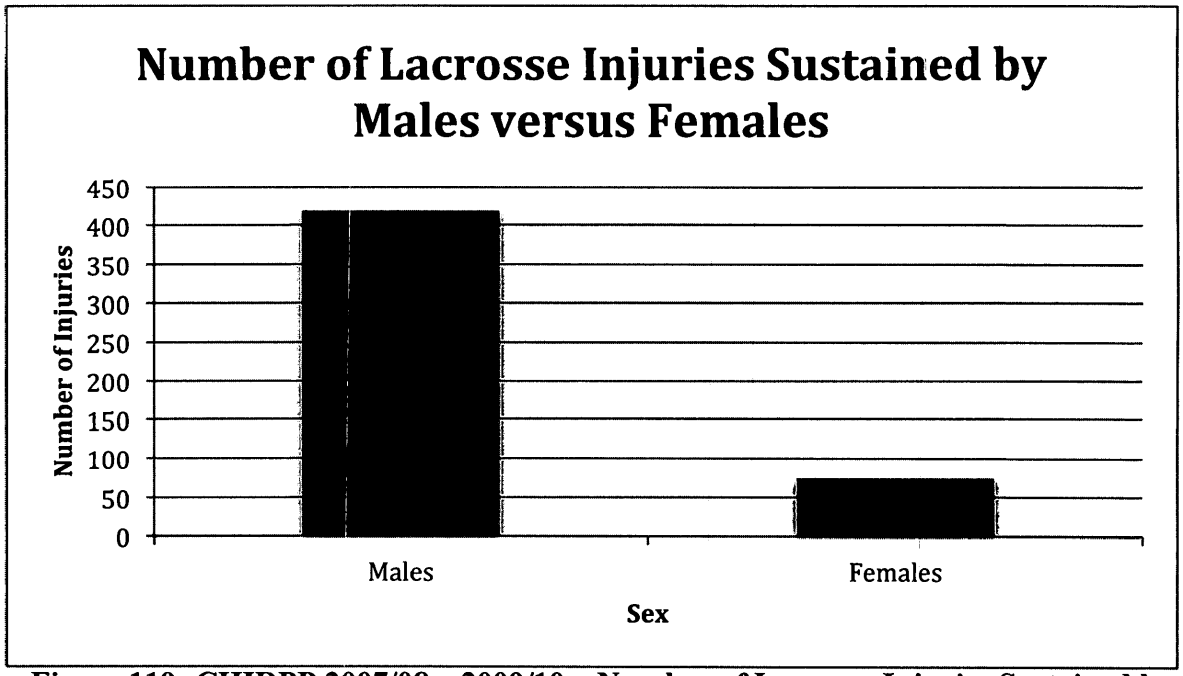

Figure 119: CHIRPP 2007/08 – 2009/10 – Number of Lacrosse Injuries Sustained by Males versus Females

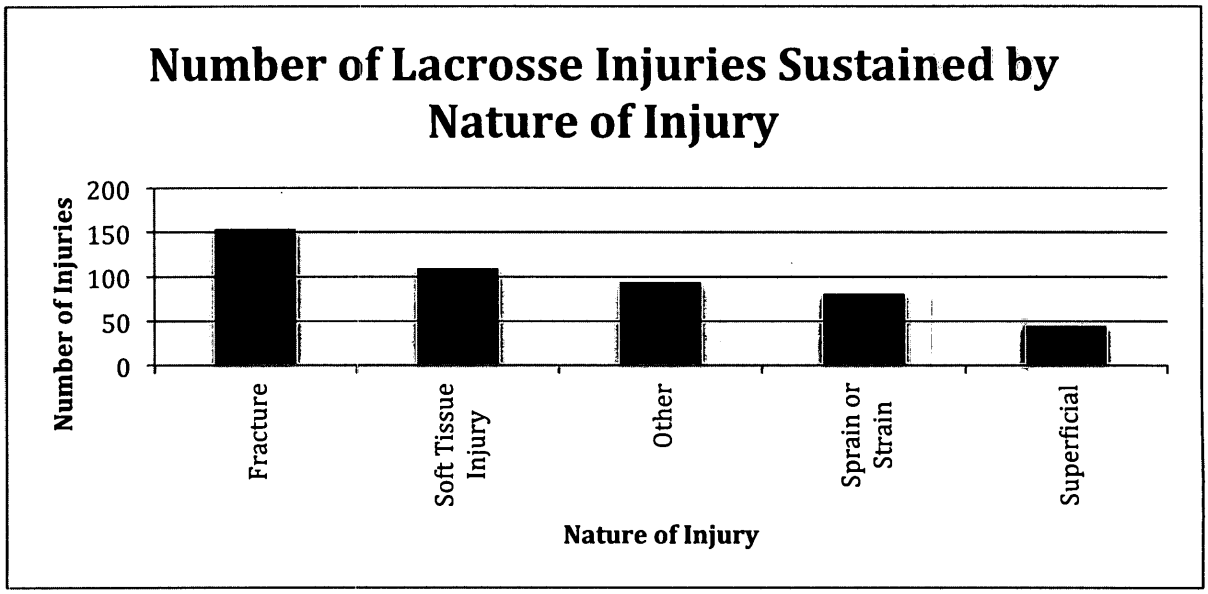

Figure 120: CHIRPP 2007/08 – 2009/10 – Number of Lacrosse Injuries Sustained by Nature of Injury

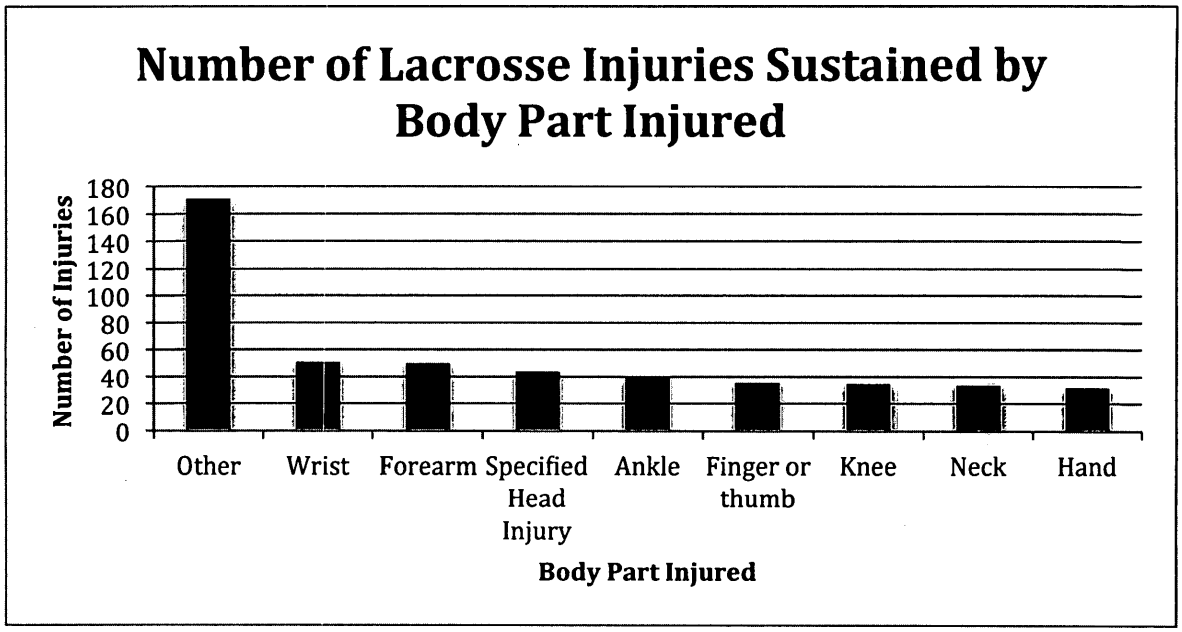

Figure 121: CHIRPP 2007/08 – 2009/10 – Number of Lacrosse Injuries Sustained by Body Part Injured

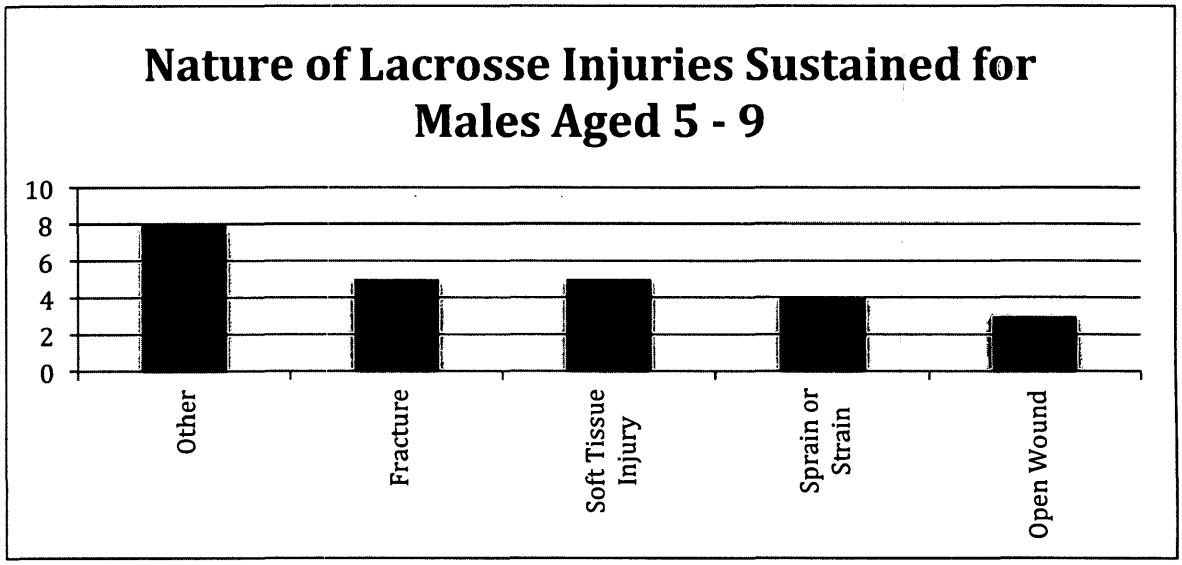

Figure 122: CHIRPP 2007/08 – 2009/10 – Nature of Lacrosse Injuries Sustained for Males Aged 5 – 9

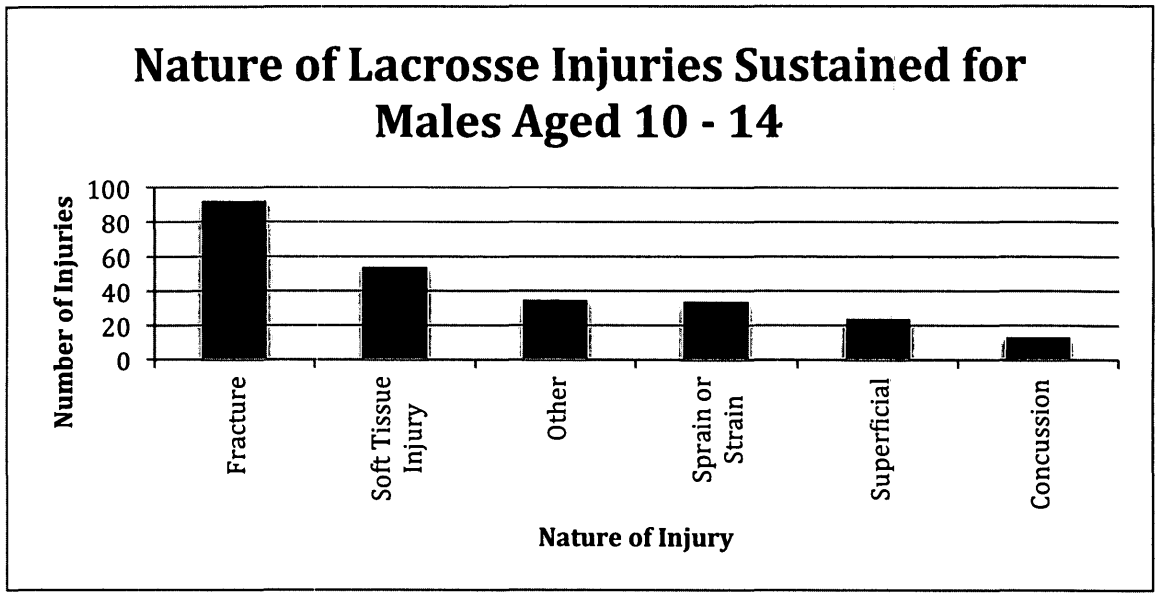

Figure 123: CHIRPP 2007/08 – 2009/10 – Nature of Lacrosse Injuries Sustained for Males Aged 10 – 14

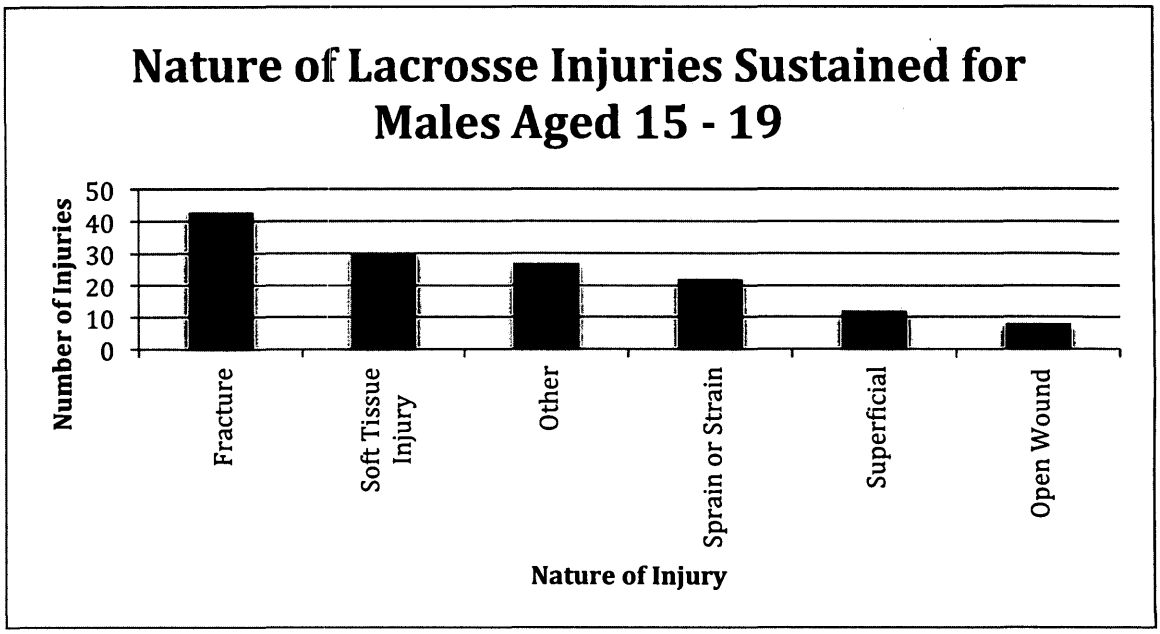

Figure 124: CHIRPP 2007/08 – 2009/10 – Nature of Lacrosse Injuries Sustained for Males Aged 15 – 19

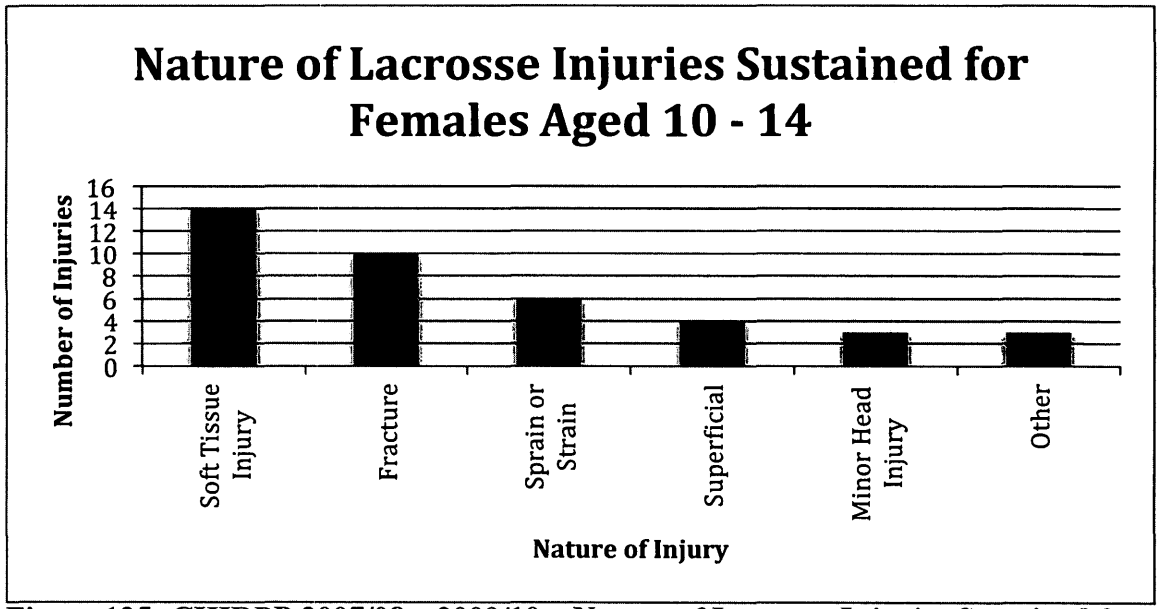

Figure 125: CHIRPP 2007/08 – 2009/10 – Nature of Lacrosse Injuries Sustained for Females Aged 10 – 14

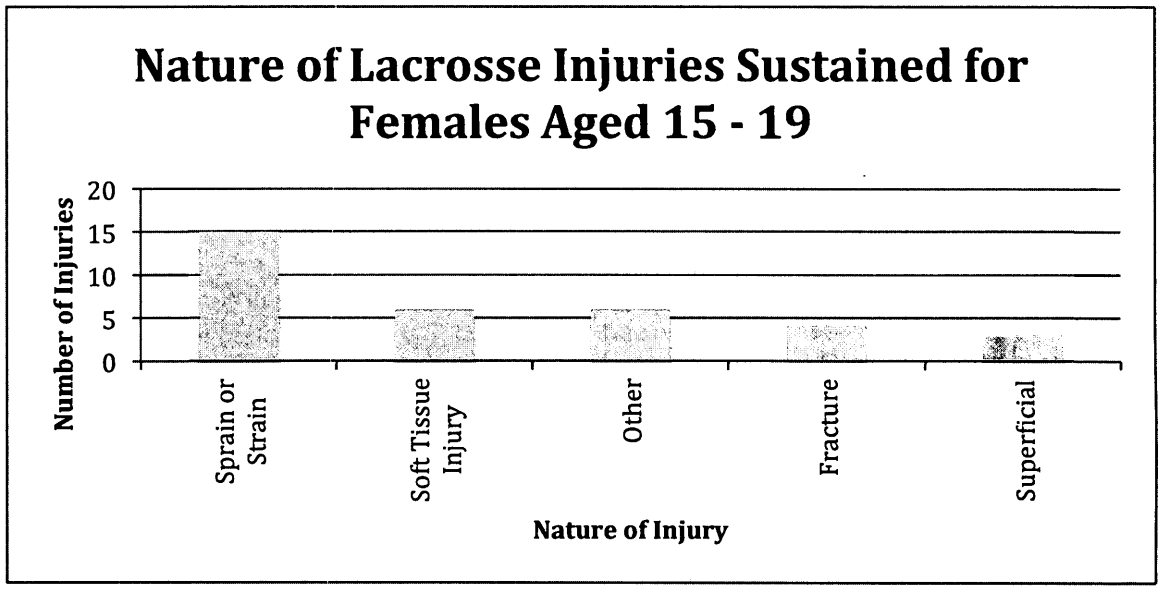

Figure 126: CHIRPP 2007/08 – 2009/10 – Nature of Lacrosse Injuries Sustained for Females Aged 15 – 19

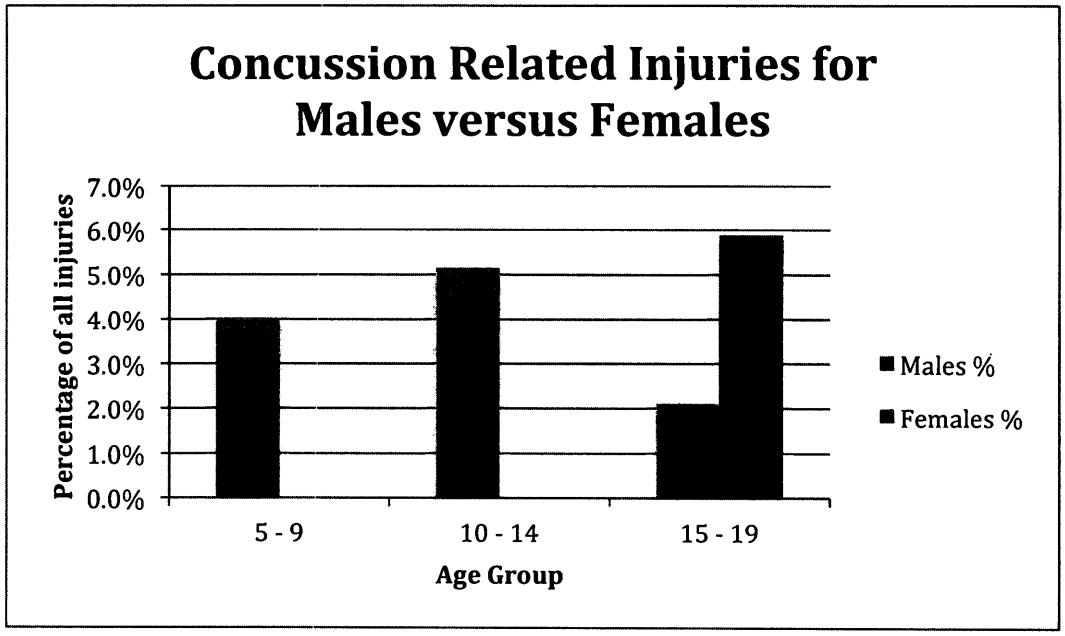

Figure 127: CHIRPP 2007/08 – 2009/10 – Concussion Related Injuries for Males versus Females

Ringette

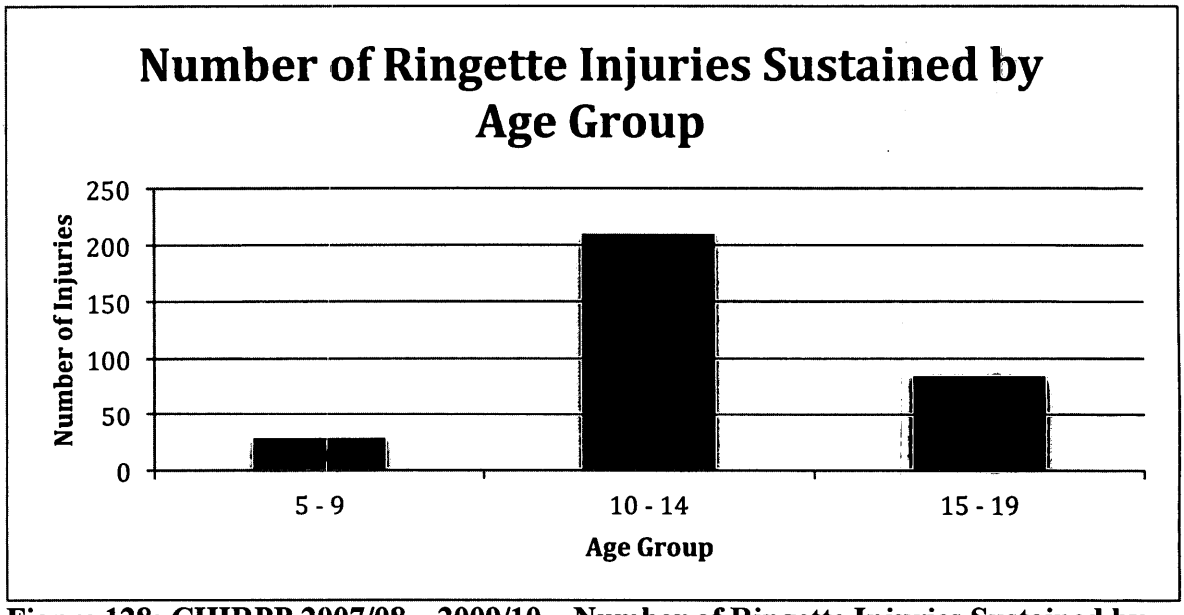

Figure 128: CHIRPP 2007/08 – 2009/10 – Number of Ringette Injuries Sustained by Age Group

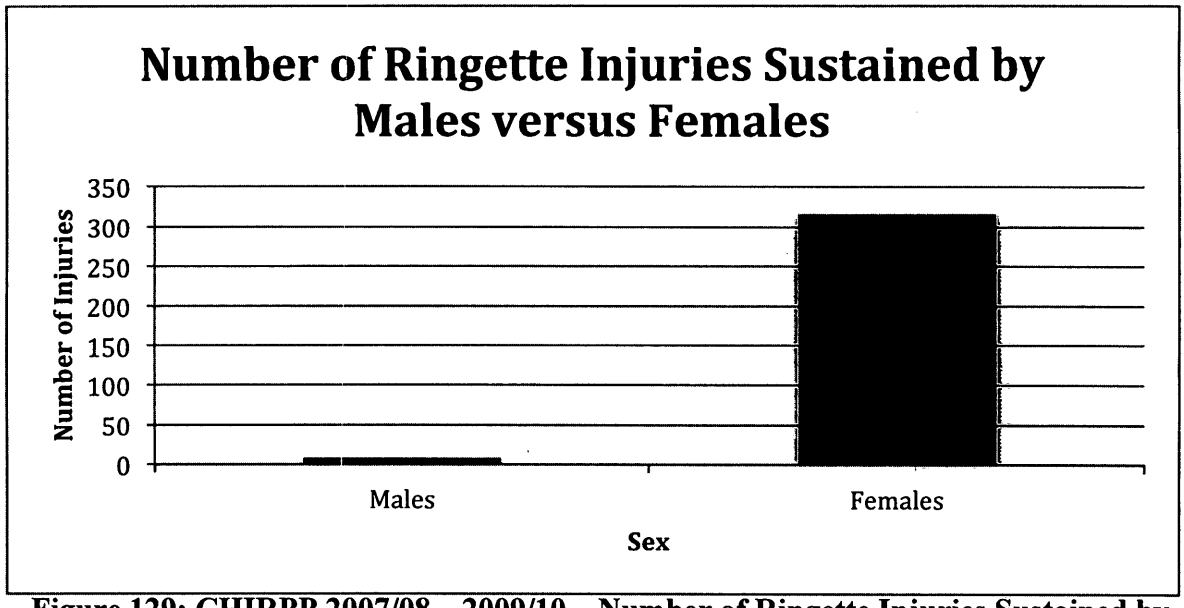

Figure 129: CHIRPP 2007/08 – 2009/10 – Number of Ringette Injuries Sustained by Males versus Females

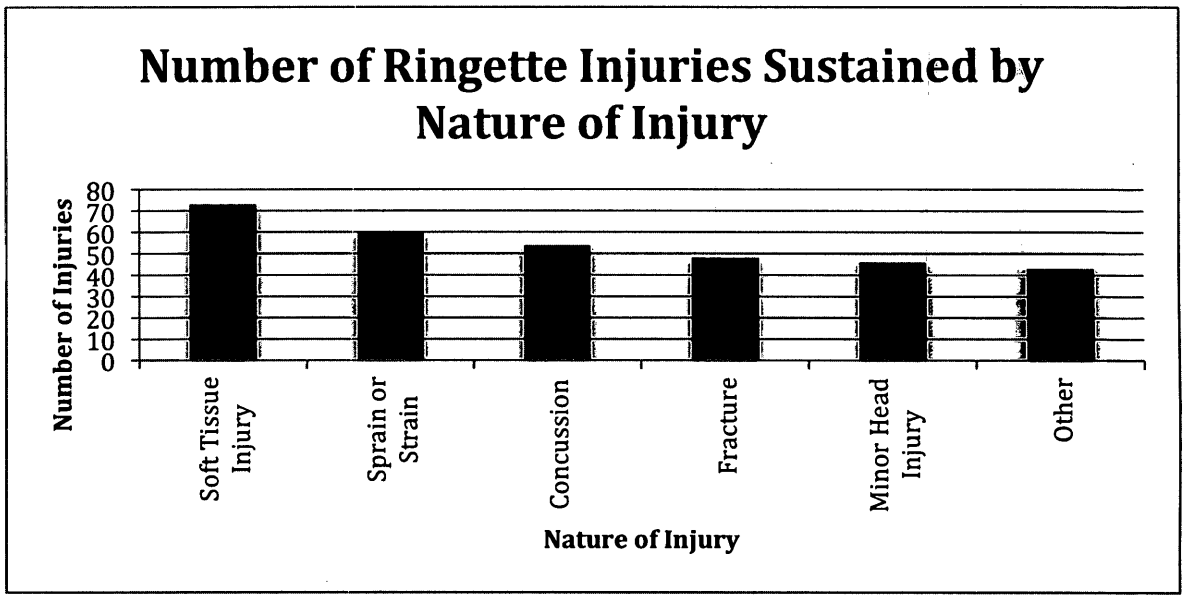

Figure 130: CHIRPP 2007/08 – 2009/10 – Number of Ringette Injuries Sustained by Nature of Injury

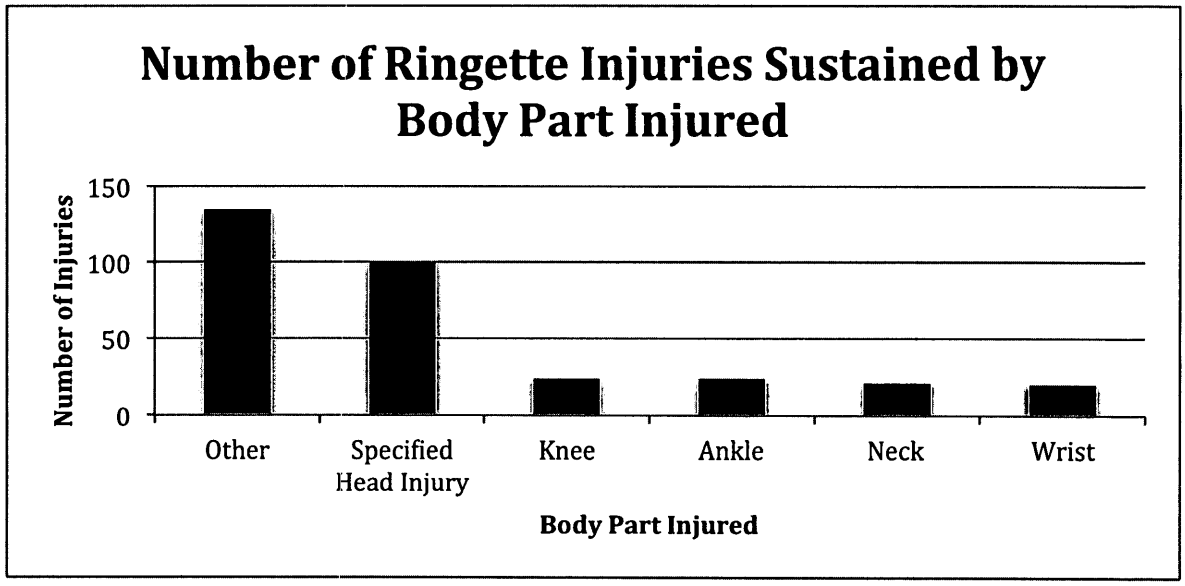

Figure 131: CHIRPP 2007/08 – 2009/10 – Number of Ringette Injuries Sustained by Body Part Injured

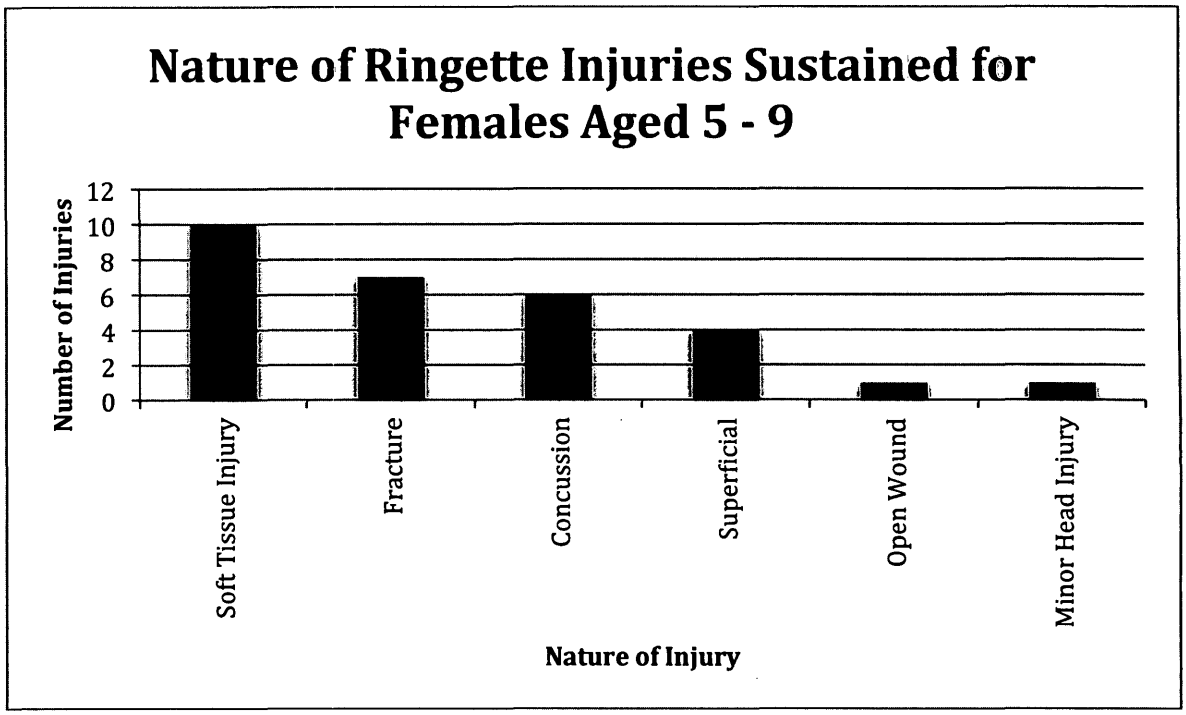

Figure 132: CHIRPP 2007/08 – 2009/10 – Nature of Ringette Injuries Sustained for Females Aged 5 – 9

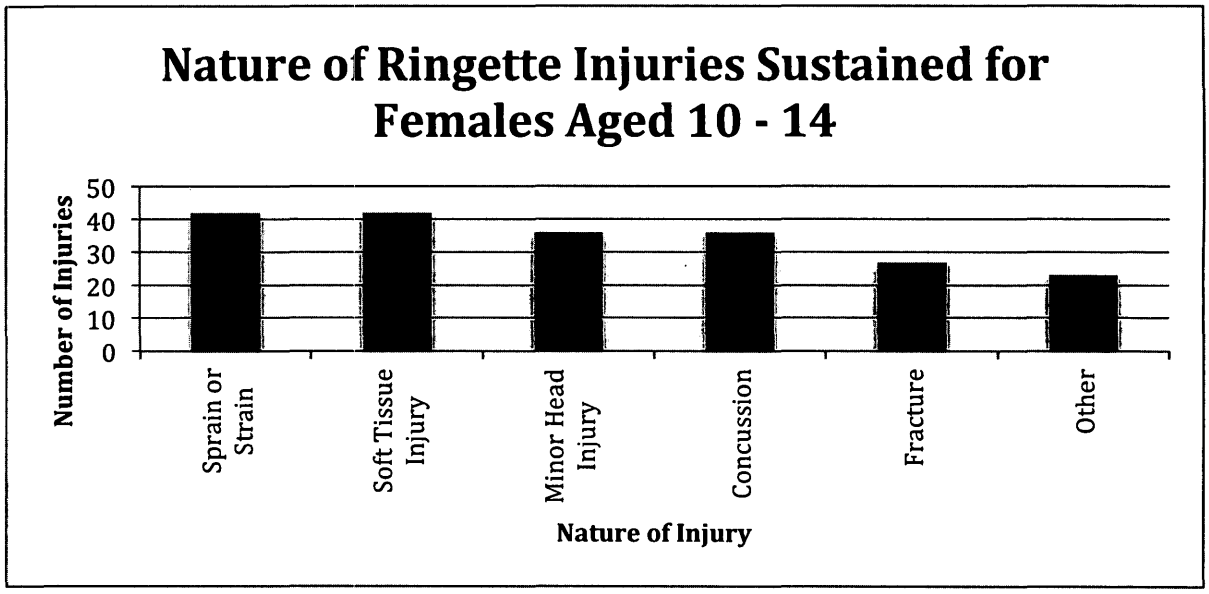

Figure 133: CHIRPP 2007/08 – 2009/10 – Nature of Ringette Injuries Sustained for Females Aged 10 – 14

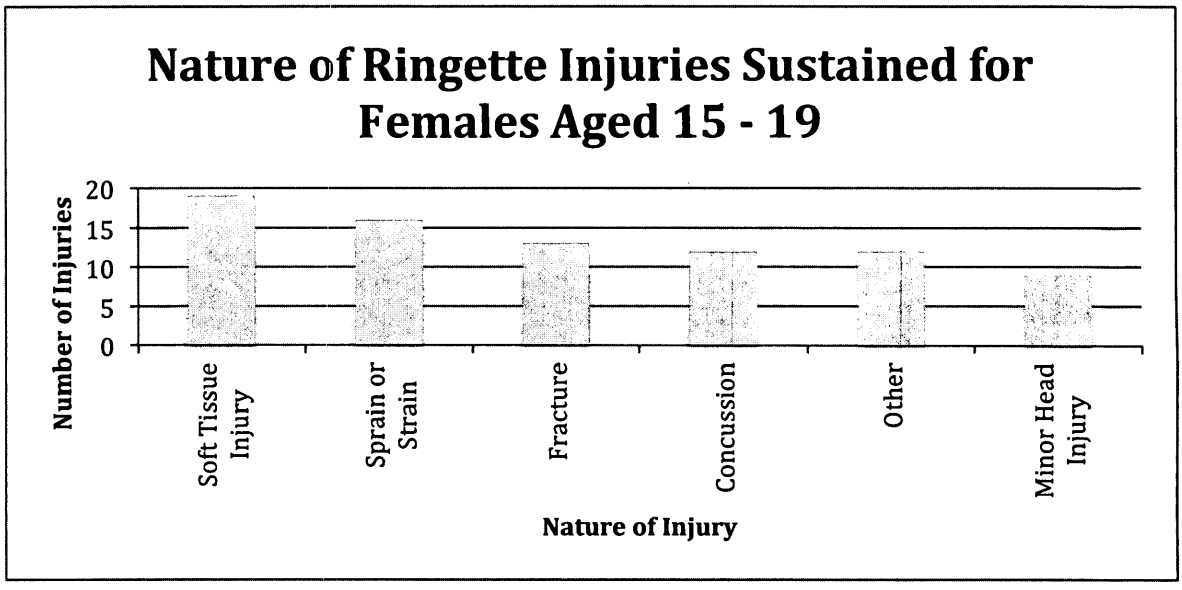

Figure 134: CHIRPP 2007/08 – 2009/10 – Nature of Ringette Injuries Sustained for Females Aged 15 – 19

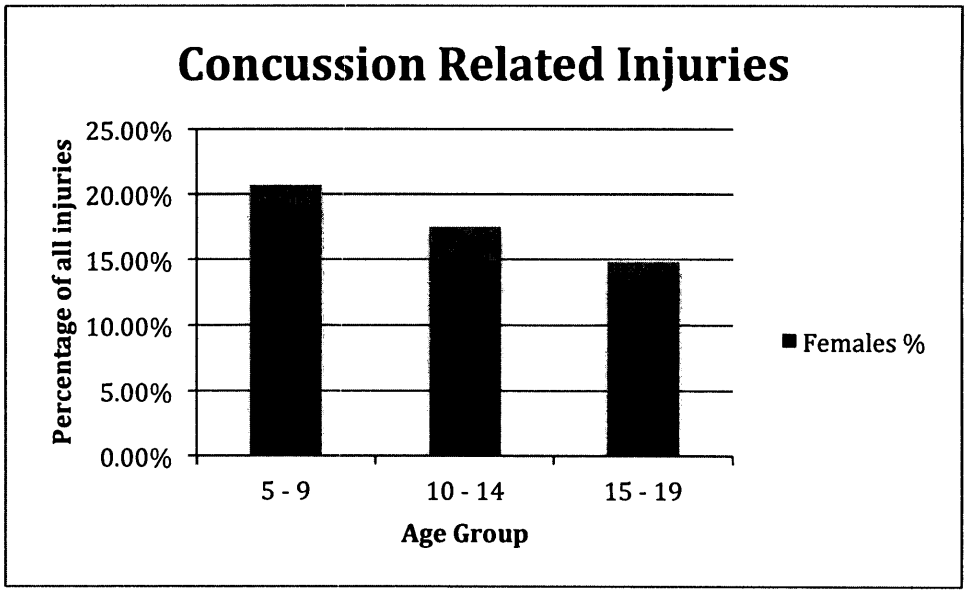

Figure 135: CHIRPP 2007/08 – 2009/10 – Concussion Related Injuries

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