

The Prevalence, Nature and Burden of Sports Injuries Among Amateur Football Players: A Single-Site Prospective Study

Banda Chrispin; Geoffrey Moyo; and Loveness A. Nkhata

The University of Zambia, School of Health Sciences, Physiotherapy Department, Zambia.

Corresponding author: chrisspinb@gmail.com

DOI: <https://doi.org/10.62154/ajsps.2025.06.01013>

Abstract

Football injuries are common and result from a complex interaction of intrinsic and extrinsic risk factors, making injury surveillance essential for guiding prevention strategies, particularly in amateur settings. This prospective cohort study monitored 45 players from City of Lusaka Football Club for six months in the 2024/25 season to determine the prevalence, incidence, and types of injuries experienced. Injury-related data were recorded using standardised surveillance procedures, and descriptive statistics were used to summarise player characteristics and injury patterns, while incidence rates were calculated per 1,000 hours of exposure. The study recorded an injury prevalence of 60% with 43 injuries documented. The overall incidence was 6.09 per 1,000 player-hours (95% CI: 4.27–7.91), consisting of 3.81 per 1,000 player-hours (95% CI: 2.34–5.27) during training and 72.0 per 1,000 player-hours (95% CI: 37.8–106.3) during competition. Most injuries (72.1%) were mild in severity, and the total injury burden was 39.5 days lost per 1,000 hours (95% CI: 34.9–44.1), with a mean burden of 6.5 days per 1,000 hours. Lower-limb injuries predominated, particularly those affecting the ankle and knee, with sprain-ligament injuries accounting for 76.7% of all cases. These findings highlight a substantial injury burden among amateur players and underline the urgent need for continuous, well-structured injury surveillance systems to inform targeted prevention strategies, optimise player welfare, and support safer participation in resource-limited football environments where standardised monitoring remains critically underdeveloped.

Keywords: Amateur, Burden, Football, Incidence, Injury epidemiology, Prevalence, Prevention, Severity.

Introduction

Football is associated with a substantial burden of injuries across different levels of play (Gurau, Gurau, Voinescu, et al., 2023). The inherent risk arises from a combination of intrinsic and extrinsic factors, including the sport's physical demands such as sprinting, jumping, rapid directional changes, and frequent contact (Aiello et al., 2023; Gurau, Gurau, Voinescu, et al., 2023). These reduce player availability, impair performance, and impose financial costs on clubs and players due to medical expenses and lost playing time (Ekstrand et al., 2023; Hespanhol et al., 2015; Waldén et al., 2023). Injury surveillance is therefore essential, enabling systematic recording and analysis of injury patterns to guide evidence-based prevention (Bahr et al., 2020; Waldén et al., 2023). Structured monitoring has facilitated the development of successful preventive programs such as the FIFA 11+ warm-

up program and the Nordic Hamstring protocol (Bizzini & Dvorak, 2015; Silvers-Granelli et al., 2017; van Dyk et al., 2019).

Globally, injury prevalence in football has been well documented, particularly in professional environments where surveillance systems are more established. The UEFA Elite Club Injury Study exemplifies the benefits of long-term, standardised monitoring in understanding injury trends and informing preventive strategies (Ekstrand et al., 2021, 2023). In contrast, surveillance in amateur football is limited, despite amateurs representing the largest proportion of global football participants (Gurau, Gurau, Voinescu, et al., 2023). Reported overall incidence among amateur football ranges widely, from 0.51 to 18.4 injuries per 1,000 hours of exposure (Cezarino et al., 2020; Gurau, Gurau, Voinescu, et al., 2023; Kekelekis et al., 2023) and can reach 43.5 injuries per 1,000 hours in some contexts (Szymiski et al., 2022). These figures highlight the need for robust surveillance in amateur cohorts, where medical support and preventive structures are often lacking.

In sub-Saharan Africa, the body of research on football injuries continues to grow but remains less comprehensive compared to Europe and South America (Cezarino et al., 2020; Kekelekis et al., 2023). Regional studies consistently demonstrate high injury rates, with one study reporting injury incidence as high as 133.4 injuries per 1000h (Owoeye et al., 2017), and it is often linked to limited medical supervision, inadequate implementation of injury prevention programmes, and poor rehabilitation practices (Owoeye et al., 2013, 2014; Sumaila et al., 2016). Injury incidence in both professional and amateur settings, whether in league competition or tournament formats, is high and often influenced by a variety of factors (Chaabeni et al., 2024; Kwakye et al., 2023; Owoeye et al., 2017).

Locally, emerging evidence highlights the burden of injuries in Zambia. A recent study at the Olympic Youth Development Centre (OYDC) reported a prevalence of 31.7%, with contact mechanisms, prior injury history, and competition level as key contributors to the overall injury prevalence (Musonda et al., 2023). The overall absence of longitudinal data hinders the development of tailored prevention and management strategies that account for local conditions, including playing surfaces, training loads, equipment availability, and healthcare access.

Across global, regional, and local settings, amateur football injury types mirror trends seen in professional football (Gurau, Gurau, Voinescu, et al., 2023; Kekelekis et al., 2023; Mandorino et al., 2023a; Owoeye et al., 2017; Szymiski et al., 2022). Lower-limb injuries predominate, with hamstring strains, ankle sprains, knee injuries, and groin injuries among the most frequently reported (Gurau, Gurau, Musat, et al., 2023; Mandorino et al., 2023a; Smpokos et al., 2022). Muscular injuries are particularly common, often attributed to fatigue, inadequate conditioning, and insufficient recovery (Kekelekis et al., 2022; Mandorino et al., 2023a). Regarding mechanisms, injuries are often categorised as contact or non-contact, with muscular and anterior cruciate ligament (ACL) injuries frequently associated with non-contact actions, such as sprinting, cutting, landing, and deceleration (Bengtsson et al., 2018; Ekstrand et al., 2023). Overuse injuries may be underreported in amateur settings due to limited medical follow-up, reliance on self-reporting, and cultural

tendencies to play through pain (Clarsen et al., 2020; Sumaila et al., 2016). Understanding these patterns is essential because amateur players often lack access to medical monitoring, making them more vulnerable to overuse or recurrent injuries, which can result in a prolonged recovery period (Clarsen et al., 2020; Hägglund et al., 2018).

Injury severity, commonly classified according to the time lost, is a widely used measure for estimating injury burden (Fuller, 2006; Verhagen et al., 2024). Amateur players are at higher risk of sustaining severe injuries than professionals (Gurau, Gurau, Voinescu, et al., 2023; Owoye et al., 2013), and when combined with poor rehabilitation and return-to-play protocols, this increases the likelihood of recurrence or secondary injuries, ultimately inflating the overall injury burden (Finch & Cook, 2014; van Beijsterveldt et al., 2014; Waldén et al., 2023). Addressing severity is therefore critical for developing evidence-based prevention and management strategies in amateur football, where injuries can have far-reaching consequences for the players.

To effectively utilise epidemiological data and inform injury prevention in the amateur football context-specific surveillance is essential (Windt et al., 2018). Most existing literature concentrates more on professional European cohorts, creating geographical and competitive-level biases, while prospective surveillance in African amateur football contexts remains sparse. Factors like quality of football pitches, absence of physiological monitoring, and limited medical expertise in low-resource environments further compound injury risk (Sanni et al., 2018; Verhagen et al., 2024). To our knowledge, this is the first prospective, exposure-based surveillance study in Zambian amateur football that aimed to determine the prevalence of football-related injuries among players at the City of Lusaka Football Club. The study recorded injury prevalence, Incidence, nature and burden during the 2024/2025 season for a period of six months across match and training periods, establishing baseline data essential for developing suitable and sustainable injury monitoring within Zambia's amateur football clubs.

Method

Study Design and Setting

This study employed a prospective cohort design, which allowed for the enrollment of players at multiple time points, accommodating mid-season transfers or new registrations (Capili & Anastasi, 2021). The study was conducted over six months during the 2024/25 season, encompassing 22 matches. A total of 45 amateur players from City of Lusaka Football Club, competing in the Provincial/National Division 3 league in Lusaka, Zambia, participated. Recruitment of the players occurred at the start of the season and during the mid-season period to ensure all eligible players were included.

Study Population

All registered players aged 18 years and above who were actively participating in training and matches during the study period at the City of Lusaka Football Club were eligible. Players were required to be registered for the 2024/2025 season and to have participated in at least one training session to be included. Those with pre-existing injuries at baseline were

also included in the study, considering that the study was an open cohort. Players represented all field positions (goalkeepers, defenders, midfielders, and forwards) and trained on average 4 times a week with one competitive match on weekends.

Data Collection Procedures

Data collection followed STROBE guidelines for observational studies (Cuschieri, 2019). A standardised injury surveillance register was used, adapted from consensus statements and the Orchard Classification System (Bahr et al., 2020; Clarsen et al., 2020; Fuller, 2006; Orchard et al., 2024). The injury surveillance register captured the players' demographics at baseline and during the follow-up period, injury characteristics (type, severity, anatomical location, mechanism), occasion to injury (training vs. competition), and type of playing surface (Natural turf, artificial turf and hard/exposed surface), where recorded. A research assistant, a qualified physiotherapist, assisted with data collection during the training days as well as during the matches, with weekly data entry and quality control to minimise missing information, information bias, and recall bias. Regular review meetings ensured consistency and adherence to standardised definitions and coding procedures.

Exposure Measurement

Baseline assessment included prior injury history. Training exposure was calculated as the total number of players present multiplied by the duration of each training session (player-hours). Match exposure was calculated individually for each player based on minutes played, converted into hours. The sum of training and match exposure provided the total exposure for each player and for the team.

Injury Metrics: Prevalence was expressed as the proportion of players reporting at least one injury during the study period. Incidence was calculated as the number of injuries per 1,000 players-hours of exposure, using the formula:

$$\text{Incidence rate} = \text{Number of injuries} / \text{Total exposure hours} \times 1000.$$

Burden was calculated as the product of incidence and mean severity (time-loss days), expressed as injury-days per 1,000 players-hours:

$$\text{Burden} = \text{Total injury days} / \text{Total exposure hours} \times 1000$$

All injuries were classified as first-time or subsequent/recurrent, with subsequent/recurrent injuries defined as injuries occurring in the same player, of the same type and location as the previous injury or injuries occurring in the same player, different type and location, different from the previous injury after full recovery from the previous episode of injury. This standardised approach allows comparison with other football injury surveillance studies and ensures consistency in reporting across different cohorts (Bahr et al., 2020; Fuller, 2006)

Injury Definitions and Categorisation

Injuries were categorised by:

Anatomical location: head/neck, upper extremity, trunk, lower extremity, with further anatomical locations such as hip/groin, knee, ankle, hand, chest.

Injury type: Acute traumatic (sprains, strains, dislocations, contusions/bruises, concussion/head injuries), recurrent (same type and location as previous injury after full recovery), Overuse (gradual onset due to repetitive stress).

Injury severity (time-loss) was categorised based on how long it prevented the player from actively participating in full training and availability for competitive match selection (Mild: 0-7 days, Moderate: 8-27 days, Severe: ≥ 28 days).

Mechanism and contextual factors: Contact vs non-contact, training vs match, and playing surface.

Data Analysis

Data were analysed using STATA version 11.2 (StataCorp, College Station, TX, USA). Descriptive statistics included means $\pm$ standard deviations for continuous variables and frequencies and percentages for categorical variables. Injury incidence rates were calculated per 1,000 player-hours with 95% confidence intervals. Injury burden was quantified using severity-weighted incidence rates, calculated as the product of injury incidence and mean time loss per injury.

Results

Participants' Demographic Characteristics

Forty-five amateur players from City of Lusaka Football Club were enrolled (mean age 21 ± 2.8 years, range 18–30). The majority were aged 18–20 (57.8%, $n=26$), reflecting a youthful cohort. Right-leg dominance was most common (82.2%, $n=37$). Defenders formed the largest positional group (42.2%, $n=19$), followed by midfielders (24.4%, $n=11$), forwards (20.0%, $n=9$), and goalkeepers (13.3%, $n=6$). Most players reported no prior injury (93.3%, $n=42$) during the baseline assessment done to measure exposure based on prior injury history (Table 1). These demographics highlight a predominantly young, right-dominant squad, with defenders forming the largest subgroup. Such characteristics are relevant because age, position, and limb dominance can influence exposure patterns and the anatomical distribution of injuries the players may sustain.

Table 1: The bio-demography information of the players

Variables	Indicators	Frequency (n)	Percent (%)
Age	Mean	21 $\pm$ 2.8	
	Age categories		
	18-20	26	57.8
	21-23	11	24.4
	24-26	6	13.3
	27-30	2	4.4
Dominant leg		45	100
	Right leg	37	82.2
	Left leg	5	11.1

Variables	Indicators	Frequency (n)	Percent (%)
	both	3	6.7
Playing position	Goalkeepers	6	13.3
	Defenders	24	42.2
	Midfielders	11	24.4
	Forwards	9	20
		45	100
Previous injury	No	42	93.3
	Yes	3	6.7
		45	100

The mean age, the frequency distribution and proportion of the dominant leg used by each player, their playing position and previous history of injury.

Injury Prevalence, Incidence and Burden

Across six months, 43 injuries were documented: 27 first-time (62.8%) and 16 recurrent (37.2%). Twenty-seven players sustained at least one injury, giving an overall prevalence of 60.0% (95% CI: 45.7–74.3). Although more injuries occurred during training in absolute numbers, competition carried far greater risk relative to exposure. Matches represented only 3.3% of total hours but accounted for nearly 40% of injuries, underscoring competition as the high-risk context. Total exposure was 7,062 player-hours (training 6,826; competition 236) for 6 months (See summary in table 2).

Table 2 presents a detailed summary of injury prevalence, incidence, and burden, stratified by first-time versus recurrent injuries and exposure type.

	Frequency (n)	Percentage
First-time injuries	27	62.8%
Recurrent/Subsequent injuries	16	37.2%
	43	100
Total		
Prevalence	60 (95% CI: 45.7–74.3 %)	
Total injury incidence rate	6.09/1000 players-hours (95% CI: 4.27–7.91)	
IIR competition	72.0/1000 player-hours (95% CI: 37.8–106.3)	
IIR training	3.81/1000 player-hours (95% CI: 2.34–5.27)	
Total exposure time (hours)	7, 062	
Training	6826	
Competitive games	236	
Total injury burden	39.5 (95% CI: 34.9–44.1)	
Mean	6.5 days	

	Frequency (n)	Percentage
SUMMARY OF FIRST-TIME INJURY OCCURRENCE		
Injury Incidence rate (IR)	3.82 / 1,000 player-hours (95% CI: 2.38 – 5.27)	
IIR competition	42.4 /1000 player-hours (95% CI: 16.1 – 68.6)	
IIR training	2.49 /1000 player hours (95% CI: 1.31 – 3.67)	
First-time injury burden	25.5 (95% CI: 21.8 – 29.2)	

There was a higher prevalence of injuries, with 27 players sustaining at least one injury. IIR was 6.09 per 1000h of football play.

Types and Anatomical Distribution

As shown in Table 3, Most injuries involved the lower limbs (76.7%, n=33), particularly the knee (18.6%, n=8), ankle (16.3%, n=7), and thigh (16.3%, n=7). Sprains dominated (53.5%, n=23), followed by muscle strains (18.6%, n=8) and contusions (9.3%, n=4). This pattern aligns with the high frequency of contact events, such as tackling and situational patterns, such as change of direction.

Table 3: Provides a detailed summary of injury types and their anatomical distribution among the players.

Variables	Indicators	Frequency (n)	Percent (%)
Region	Head	4	9.3
	Chest/Trunk	1	2.3
	Upper Limbs	5	11.6
	Lower Limbs	33	76.7
		43	100
Anatomical location	Ankle	7	16.3
	Chest	1	2.3
	Foot	5	11.6
	Forearm	1	2.3
	Hand	3	7
	Head	4	9.3
	Hip/Groin	5	11.6
	Knee	8	18.6
	Leg	1	2.3
	Thigh	7	16.3
	Wrist	1	2.3
		43	100
Types of Injuries	Abrasions	2	4.7
	Chest Injury	1	2.3
	Contusion/bruises	4	9.3
	Dental-loose tooth	1	2.3

Variables	Indicators	Frequency (n)	Percent (%)
	Head Injuries	3	7
	Sprain-Ligamentous	23	53.5
	Strain-Muscle	8	18.6
	Subluxation	1	2.3
		43	100
Region	Head	4	9.3
	Chest/Trunk	1	2.3
	Upper Limbs	5	11.6
	Lower Limbs	33	76.7
		43	100
Anatomical location	Ankle	7	16.3
	Chest	1	2.3
	Foot	5	11.6
	Forearm	1	2.3
	Hand	3	7
	Head	4	9.3
	Hip/Groin	5	11.6
	Knee	8	18.6
	Leg	1	2.3
	Thigh	7	16.3
	Wrist	1	2.3
		43	100
Types of Injuries	Abrasions	2	4.7
	Chest Injury	1	2.3
	Contusion/bruises	4	9.3
	Dental-loose tooth	1	2.3
	Head Injuries	3	7
	Sprain-Ligamentous	23	53.5
	Strain-Muscle	8	18.6
	Subluxation	1	2.3
		43	100

The lower limbs were the most affected, with the ankle, thigh and knee being the most injured anatomical sites. Ligament sprains accounted for over half of all recorded injuries.

Injury Occasion, Mechanism, Pitch Type and Severity

As table 4 shows, training accounted for 60.5% of injuries (n=26), but match injuries clustered during the fourth quarter of the match (35.3%; n=6), suggesting reduced muscle temperature, sudden return to high-intensity action, or incomplete re-warm-up after a period of rest. Contact mechanisms predominated (74.4%, n=32), mostly opponent-related (72.1%, n=31). Natural turf was the most common surface (76.7%, n=33). Severity was mainly mild (0–7 days lost, 72.1%), with 25.6% moderate and one severe case (2.3%). Player exposure levels were 42.2% low, 22.2% intermediate, and 35.6% high, which may reflect

more players some players did not accumulate training or competitive minutes due to injuries or non-selection in the team for match days. The dominance of contact injuries (74.2% n=32) and clustering of injuries between 46-60 minutes of play suggests two actionable points: (1) interventions to reduce contact risk (e.g., technique or safe tackling) and (2) conditioning strategies to mitigate fatigue through practical, well-structured re-warm-up and other conditioning strategies. The predominance of natural turf injuries may reflect the ground that was commonly used as well as the state of the playing surface.

Table 4: Provides a detailed summary of injury occasions, mechanisms, playing surfaces, severity, and exposure levels.

variables	indicators	frequency (n)	percent (%)
Occasion to Injury	Competition	17	39.5
	Training	26	60.5
		43	100
Time of injury (during competition)	First Quarter	2	11.8
	Second Quarter	3	17.6
	Third Quarter	3	17.6
	Fourth Quarter	6	35.3
	Fifth Quarter	1	5.9
	Sixth Quarter	2	11.8
		17	100
Mechanism	Noncontact	11	25.6
	Contact	32	74.4
		43	100
An event associated with the mechanism	Acceleration/Deceleration	5	11.6
	Jumping/Landing/Pivoting	3	7
	Opponent (contact)	31	72.1
	Object (contact)	1	2.3
	Overstretching	3	7
		43	100
Type of playing surface	Natural turf	33	76.7
	Artificial turf	4	9.3
	Hard ground	6	14
		43	100
Severity (total injuries)	Mild	31	72.1
	Moderate	11	25.6
	Severe	1	2.3
		43	100
Exposure time	Low exposure	19	42.2
	Intermediate Exposure	10	22.2
	High Exposure	16	35.6
		45	100

More injuries occurred in training, with the majority being contact injuries with opponents, and occurred on a natural grass playing surface.

The results reveal a consistent epidemiological profile with over half the squad sustaining injuries. Competition carried disproportionately higher risk relative to exposure. Lower-limb sprains and strains were most common, driven largely by contact, and most injuries were mild, but collectively caused significant time loss. These findings provide the foundation for the discussion, where prevention strategies should focus on match play, contact situations, and game management strategies.

Discussion

This prospective six-month surveillance of 45 amateur football players produced three key epidemiological findings with direct implications for injury prevention. First, injury prevalence was high, with 60.0% of players sustaining at least one injury ($n=27/45$), with a total of 43 injuries recorded. Second, exposure-adjusted incidence rates showed a marked contrast between competition and training (Total IIR 6.09/1,000 player-hours; competition 72.0/1,000 h; training 3.81/1,000 h), although match exposure accounted for only a small proportion of total hours (236 of 7,062 h). Third, injuries predominated in the lower limbs (76.7%), and were mostly sprains (53.5%), with most events contact-related and with a notable clustering during the fourth quarter of match play (46-60 minutes).

The higher injury incidence during matches compared to training aligns with findings from large-scale football surveillance studies that consistently report higher injury rates in competition than in training (Chaabeni et al., 2024; Ekstrand et al., 2023; Kekelekis et al., 2023). In line with our study, as an example, Frisch et al. (2011) reported a very high injury prevalence (74%) among the players, with competition incidence (13.60/1000 player-hours) far exceeding training incidence (1.96/1000 player-hours). The contrast is epidemiologically meaningful: a relatively small amount of match exposure accounts for a disproportionate share of injuries. Such evidence underscores the need for match-specific prevention strategies, particularly given the high intensity, frequent contact and tactical demands of competition. Nonetheless, caution is warranted, as wide confidence intervals in a relatively small cohort and limited competition exposure may have inflated competition incidence estimates (Redelings et al., 2012). Beyond match exposure, training quality is equally important in reducing injury risk. Inadequate conditioning and suboptimal warm-up routines heighten the vulnerability to both contact and non-contact injuries (González-Devesa et al., 2021; Windt & Gabbett, 2017), while training load alone should not be considered in isolation, as other contextual factors also shape injury risk patterns (Impellizzeri et al., 2020). In this regard, insufficient training specificity, such as limited emphasis on agility, change of direction, eccentric strength, contact preparedness or known injury prevention practices, can predispose players to match-specific injury mechanisms (Frisch et al., 2011; Mandorino et al., 2023b; Owoeye et al., 2014). Striking the balance is therefore essential as undertraining leaves the players unprepared for competitive demands, whereas overtraining increases physical strain, with both extremes elevating injury risk (Frisch et al., 2011; Gabbett, 2016, 2020).

The injury profile, mainly involving lower limb ligament and muscular injuries, aligns with previous research identifying the lower limb (hip, thigh, knee, and ankle) as the most vulnerable region in football, at both amateur and professional levels (Bello et al., 2020; Gurau, Gurau, Voinescu, et al., 2023; Kekelekis et al., 2023; Robles-Palazón et al., 2022). In our study, the contact-related mechanism accounted for 74.4% of injuries, consistent with Bello et al. (2020), who reported 67.2% of contact-related injuries were primarily linked with rough tackles. By contrast, Gurau, Gurau, Musat, et al. (2023), in their systematic review, found 54.4% of injuries were non-contact among amateur players, highlighting variability across cohorts and the type of tissue mostly affected. Nonetheless, non-contact injuries, though fewer in our study (25.6%), remain clinically significant. They are often muscular in nature and typically associated with sprinting, deceleration, or changes of direction (Kekelekis et al., 2022). Taken together, this variability reflects a dual pattern of injury mechanisms, illustrating how the dynamic and biomechanical demands of football expose the lower limb both to external forces through contact and to intrinsic stresses through rapid movements (Aiello et al., 2023). Consequently, the predominance of contact injuries underscores the need for prevention strategies that integrate safe tackling techniques, improved decision-making, and comprehensive conditioning programs combining neuromuscular warm-ups, eccentric strength training, effective load management, and technical coaching for high-risk actions such as landing, cutting, and tackling.

The burden metrics highlight the practical consequences of injuries for the team's overall performance. Although most injuries were mild (72.1%), the mean time-loss of 6.5 days and overall burden of 39.5 days per 1000h indicate a substantial cumulative impact on player availability. The study by Weishorn (2023) reported an injury burden of 60.6 days lost per 1000 hours, higher than in our cohort, but similarly underscores the considerable impact of injuries, particularly among younger amateur players. By comparison, the UEFA Elite Club Injury Study reported lower recurrence rates and more structured rehabilitation outcomes in professional cohorts (Hägglund et al., 2018), while a study by Gurau, Gurau, Musat, et al., (2023) reported a higher recurrence rate among amateur players in comparison to professional players. This likely reflects the greater availability of medical resources and physiotherapy support in elite clubs, underscoring the role of structured rehabilitation in reducing injury burden. These findings in our study emphasise that injury prevention and management should address both frequency and severity, as minor but frequent injuries can disrupt squad stability as much as less common severe injuries (Verhagen et al., 2024). The sizeable proportion of recurrent and subsequent injuries (37.2%) suggests challenges with rehabilitation quality, return-to-play (RTP) decision-making, and continuity of care, which are often reported in resource-constrained amateur settings (Mandorino et al., 2023b; Sumaila et al., 2016). For instance, Sumaila et al. (2016) reported self-management to be common among the players after an injury due to a lack of medical personnel, such as physiotherapists, a theme frequently observed in amateur football clubs. This can compromise rehabilitation quality and lead to poor RTP outcomes. High recurrence may therefore reflect inadequate rehabilitation and load progression, poor adherence to

rehabilitation protocols, or limited access to physiotherapy (Gabbett, 2020; Sumaila et al., 2016; Waldén et al., 2023). These findings highlight the need for structured RTP frameworks and consistent rehabilitation monitoring to minimise avoidable re-injury.

The concentration of injuries early in the second half supports evidence linking injuries to reductions in muscle temperature, fatigue-related technique breakdown, and the transition from halftime to high-intensity activity (González-Devesa et al., 2021; Sanchez-Sanchez et al., 2024; Smith et al., 2016). Similarly, Chaabeni et al. (2024) reported a higher injury incidence after 60 minutes of play during competitive matches, reinforcing the role of accumulated fatigue and physiological decline in elevating risk as matches progress. Implementing structured re-warm-ups during halftime and improving conditioning and rotation strategies may mitigate this vulnerability (González-Devesa et al., 2021). The predominance of injuries on natural turf likely reflects its widespread use in this cohort rather than a causal effect. While surface-injury relationships remain mixed in the literature, pitch quality and maintenance consistently emerge as important risk modifiers, especially in limited resource settings (Calloway et al., 2019; Gould et al., 2023; Windt & Gabbett, 2017). A systematic review and meta-analysis by Kuitunen et al. (2023) on playing surfaces reported overall injury incidence to be lower on artificial turf compared to natural grass, though they argued that injury risk cannot be used as an argument against artificial turf. This suggests that clubs should therefore prioritise regular inspection and maintenance to reduce hazards and irregularities that may elevate injury risk regarding the type of playing surface being used.

Overall, these findings reinforce the importance of ongoing injury surveillance in amateur environments, where structured monitoring systems are often lacking despite high participation rates. Surveillance not only quantifies injury patterns but also provides actionable evidence to guide prevention strategies, inform resource allocation, support data-driven coaching and medical decision making. The insights from this study highlight areas for intervention, including match-specific preparation, structured warm-up and re-warm-up protocols, load management, rehabilitation quality, and pitch maintenance, that can collectively reduce injury incidence and burden in amateur football.

Conclusion

This six-month prospective surveillance study highlights a substantial injury burden within an amateur football club, characterised by high prevalence, a marked competition–training incidence gap, and a predominance of lower-limb injuries. The clustering of injuries around halftime, the sizeable proportion of recurrent or subsequent injuries, all underscore the multifactorial nature of injury risk in resource-constrained settings. These findings point to clear opportunities for targeted prevention, including structured warm-up and re-warm-up routines, improved conditioning and load management, enhanced rehabilitation and return-to-play processes. Strengthening surveillance systems at the amateur level is essential for monitoring trends, informing decision-making, and implementing sustainable injury prevention strategies. Collectively, the results of this study provide locally relevant

evidence to guide clubs, coaches, and medical personnel in reducing injury incidence and burden, which would ultimately support safer participation and improve overall team performance.

Recommendations

- Club medical staff should implement continuous injury surveillance using a standardised reporting and coding system.
- League and association bodies should support clubs through centralised injury registers to ensure uniform data collection.
- Structured warm-up and re-warm-up routines should be consistently implemented before training and matches, with adherence monitored.
- Return-to-play decisions should follow objective criteria based on reliable, standardised assessment methods.
- Pitch quality should be regularly monitored, including factors such as surface condition, grass height and thickness, and footwear compatibility.
- Future studies should include larger samples across multiple clubs to enhance the generalisability of findings.

Strengths and Limitations

This study's strengths include its prospective design, exposure-based incidence and burden calculations, and detailed categorisation by type, mechanism, timing, and surface. It also provides rare data from a low-resource amateur setting. We acknowledge limitations that constrain generalisability and causal inference. First, single-club sampling limits external validity but does provide practical evidence for individual clubs to adopt systematic injury surveillance programs. Second, the sample size is modest, and the small competition exposure inflates competition incidence estimates (wide CIs), so inference about competition vs training should be cautious. Third, injuries were recorded by a single physiotherapist, improving consistency but potentially introducing detection bias (some injuries may be under- or over-recorded). Fourth, prior injury history was self-reported during baseline assessment and, therefore, is subject to recall or information bias, but does paint a clear picture of the importance of objective and systematic data collection of injuries in real time. Fifth, we did not measure biomechanical, physiological or psychosocial risk factors (e.g., strength testing, objective workload signals), limiting causal analysis. Finally, the observational design precludes the determination of the effectiveness of any preventive measures. These limitations highlight the need for multi-site, larger studies incorporating objective load monitoring, independent injury verification, and the use of various injury prevention programs.

Ethics

The study adhered to the ethical principles of research as outlined in the Declaration of Helsinki. The study design was reviewed and approved by the University of Zambia Health Sciences Research Ethics Committee (**Protocol ID 2023270236**). All registered players were

given an equal opportunity to participate in the study and voluntarily provided written consent before being enrolled in the study, with no potential bias or effect on their normal training and team selection. All players' information was kept confidential, with a Player Identification Number (PIN) used to maintain some form of anonymity.

Acknowledgements

The authors give thanks to the club, the participating players and the research assistant. The acknowledgement is also extended to the University of Zambia, Faculty of Health Sciences and the Department of Physiotherapy.

Funding

No external funding was provided for this study.

Conflict of interest

There is no conflict of interest associated with the study.

Data availability

Data is available upon reasonable request.

References

- Aiello, F., Impellizzeri, F. M., Brown, S. J., Serner, A., & McCall, A. (2023). Injury-Inciting Activities in Male and Female Football Players: A Systematic Review. *Sports Medicine*, 53(1), 151–176. <https://doi.org/10.1007/s40279-022-01753-5>
- Bahr, R., Clarsen, B., Derman, W., Dvorak, J., Emery, C. A., Finch, C. F., Häggglund, M., Junge, A., Kemp, S., Khan, K. M., Marshall, S. W., Meeuwisse, W., Mountjoy, M., Orchard, J. W., Pluim, B., Quarrie, K. L., Reider, B., Schwellnus, M., Soligard, T., ... Chamari, K. (2020). International Olympic Committee consensus statement: Methods for recording and reporting of epidemiological data on injury and illness in sport 2020 (including STROBE Extension for Sport Injury and Illness Surveillance (STROBE-SIIS)). *British Journal of Sports Medicine*, 54(7), 372–389. <https://doi.org/10.1136/bjsports-2019-101969>
- Bello, B., Sa'Ad, U., Ibrahim, A., & Mamuda, A. (2020). Pattern and risk factors of sport injuries among amateur football players in Kano, Nigeria. *Human Movement*, 21(4), 61–68. <https://doi.org/10.5114/hm.2020.93425>
- Bengtsson, H., Ekstrand, J., Waldén, M., & Häggglund, M. (2018). Muscle injury rate in professional football is higher in matches played within 5 days since the previous match: A 14-year prospective study with more than 130 000 match observations. *British Journal of Sports Medicine*, 52(17), 1116–1122. <https://doi.org/10.1136/bjsports-2016-097399>
- Bizzini, M., & Dvorak, J. (2015). FIFA 11+: An effective programme to prevent football injuries in various player groups worldwide—a narrative review. *British Journal of Sports Medicine*, 49(9), 577–579. <https://doi.org/10.1136/bjsports-2015-094765>
- Calloway, S. P., Hardin, D. M., Crawford, M. D., Hardin, J. M., Lemak, L. J., Giza, E., Forsythe, B., Lu, Y., Patel, B. H., Osbahr, D. C., Gerhardt, M. B., Mandelbaum, B. R., & Baldwin, W. W. (2019). Injury Surveillance in Major League Soccer: A 4-Year Comparison of Injury on Natural Grass Versus

- Artificial Turf Field. *The American Journal of Sports Medicine*, 47(10), 2279–2286. <https://doi.org/10.1177/0363546519860522>
- Capili, B., & Anastasi, J. K. (2021). Overview: Cohort Study Designs. *The American Journal of Nursing*, 121(12), 45–48. <https://doi.org/10.1097/01.NAJ.0000803196.49507.08>
- Cezarino, L. G., Grüninger, B. L. D. S., & Scattone Silva, R. (2020). Injury Profile in a Brazilian First-Division Youth Soccer Team: A Prospective Study. *Journal of Athletic Training*, 55(3), 295–302. <https://doi.org/10.4085/1062-6050-449-18>
- Chaabeni, A., Kalai, A., Saad, H. B., Zerguini, Y., Tabben, M., Chamari, K., & Jellad, A. (2024). *Injury incidence and associated factors among soccer players during the 2021 African Cup of Nations competition* (No. 13:392). F1000Research. <https://doi.org/10.12688/f1000research.148161.1>
- Clarsen, B., Bahr, R., Myklebust, G., Andersson, S. H., Docking, S. I., Drew, M., Finch, C. F., Fortington, L. V., Harøy, J., Khan, K. M., Moreau, B., Moore, I. S., Møller, M., Nabhan, D., Nielsen, R. O., Pasanen, K., Schwellnus, M., Soligard, T., & Verhagen, E. (2020). Improved reporting of overuse injuries and health problems in sport: An update of the Oslo Sport Trauma Research Center questionnaires. *British Journal of Sports Medicine*, 54(7), 390–396. <https://doi.org/10.1136/bjsports-2019-101337>
- Cuschieri, S. (2019). The STROBE guidelines. *Saudi Journal of Anaesthesia*, 13(Suppl 1), S31–S34. https://doi.org/10.4103/sja.SJA_543_18
- Ekstrand, J., Bengtsson, H., Waldén, M., Davison, M., Khan, K. M., & Hägglund, M. (2023). Hamstring injury rates have increased during recent seasons and now constitute 24% of all injuries in men's professional football: The UEFA Elite Club Injury Study from 2001/02 to 2021/22. *British Journal of Sports Medicine*, 57(5), 292–298. <https://doi.org/10.1136/bjsports-2021-105407>
- Ekstrand, J., Spreco, A., Bengtsson, H., & Bahr, R. (2021). Injury rates decreased in men's professional football: An 18-year prospective cohort study of almost 12 000 injuries sustained during 1.8 million hours of play. *British Journal of Sports Medicine*, 55(19), 1084–1091. <https://doi.org/10.1136/bjsports-2020-103159>
- Finch, C. F., & Cook, J. (2014). Categorising sports injuries in epidemiological studies: The subsequent injury categorisation (SIC) model to address multiple, recurrent and exacerbation of injuries. *British Journal of Sports Medicine*, 48(17), 1276–1280. <https://doi.org/10.1136/bjsports-2012-091729>
- Frisch, A., Urhausen, A., Seil, R., Windal, T., Agostinis, H., Croisier, J. L., & Theisen, D. (2011). Influence of practice characteristics on injury risk in young athletes. *British Journal of Sports Medicine*, 45(4), 349. <https://doi.org/10.1136/bjsm.2011.084038.110>
- Fuller, C. W. (2006). Consensus statement on injury definitions and data collection procedures in studies of football (soccer) injuries. *British Journal of Sports Medicine*, 40(3), 193–201. <https://doi.org/10.1136/bjsm.2005.025270>
- Gabbett, T. J. (2016). The training—injury prevention paradox: Should athletes be training smarter and harder? *British Journal of Sports Medicine*, 50(5), 273–280. <https://doi.org/10.1136/bjsports-2015-095788>
- Gabbett, T. J. (2020). How Much? How Fast? How Soon? Three Simple Concepts for Progressing Training Loads to Minimize Injury Risk and Enhance Performance. *Journal of Orthopaedic & Sports Physical Therapy*, 50(10), 570–573. <https://doi.org/10.2519/jospt.2020.9256>
- González-Devesa, D., Vaquera, A., Suárez-Iglesias, D., & Ayán-Pérez, C. (2021). The Efficacy of Re-Warm-Up Practices during Half-Time: A Systematic Review. *Medicina*, 57(9), 976. <https://doi.org/10.3390/medicina57090976>
- Gould, H. P., Lostetter, S. J., Samuelson, E. R., & Guyton, G. P. (2023). Lower Extremity Injury Rates on Artificial Turf Versus Natural Grass Playing Surfaces: A Systematic Review. *The American Journal of Sports Medicine*, 51(6), 1615–1621. <https://doi.org/10.1177/03635465211069562>

- Gurau, T. V., Gurau, G., Musat, C. L., Voinescu, D. C., Anghel, L., Onose, G., Munteanu, C., Onu, I., & Iordan, D. A. (2023). Epidemiology of Injuries in Professional and Amateur Football Men (Part II). *Journal of Clinical Medicine*, 12(19), 6293. <https://doi.org/10.3390/jcm12196293>
- Gurau, T. V., Gurau, G., Voinescu, D. C., Anghel, L., Onose, G., Iordan, D. A., Munteanu, C., Onu, I., & Musat, C. L. (2023). Epidemiology of Injuries in Men's Professional and Amateur Football (Part I). *Journal of Clinical Medicine*, 12(17), 5569. <https://doi.org/10.3390/jcm12175569>
- Hägglund, M., Waldén, M., Bengtsson, H., & Ekstrand, J. (2018). Re-injuries in Professional Football: The UEFA Elite Club Injury Study. In V. Musahl, J. Karlsson, W. Krutsch, B. R. Mandelbaum, J. Espregueira-Mendes, & P. d'Hooghe (Eds.), *Return to Play in Football* (pp. 953–962). Springer Berlin Heidelberg. https://doi.org/10.1007/978-3-662-55713-6_74
- Hespanhol, L. C., Barboza, S. D., van Mechelen, W., & Verhagen, E. (2015). Measuring sports injuries on the pitch: A guide to use in practice. *Brazilian Journal of Physical Therapy*, 19(5), 369–380. <https://doi.org/10.1590/bjpt-rbf.2014.0110>
- Impellizzeri, F. M., Menaspà, P., Coutts, A. J., Kalkhoven, J., & Menaspà, M. J. (2020). Training Load and Its Role in Injury Prevention, Part I: Back to the Future. *Journal of Athletic Training*, 55(9), 885–892. <https://doi.org/10.4085/1062-6050-500-19>
- Kekeleakis, A., Kounali, Z., Kofotolis, N., Clemente, F. M., & Kellis, E. (2023). Epidemiology of Injuries in Amateur Male Soccer Players: A Prospective One-Year Study. *Healthcare*, 11(3), 352. <https://doi.org/10.3390/healthcare11030352>
- Kekeleakis, A., Manuel Clemente, F., & Kellis, E. (2022). Muscle injury characteristics and incidence rates in men's amateur soccer: A one season prospective study. *Research in Sports Medicine*, 0(0), 1–14. <https://doi.org/10.1080/15438627.2022.2122827>
- Kuitunen, I., Immonen, V., Pakarinen, O., Mattila, V. M., & Ponkilainen, V. T. (2023). Incidence of football injuries sustained on artificial turf compared to grass and other playing surfaces: A systematic review and meta-analysis. *eClinicalMedicine*, 59, 101956. <https://doi.org/10.1016/j.eclinm.2023.101956>
- Kwakye, S. K., Mostert, K., Garnett, D., & Masenge, A. (2023). Risk factors associated with football injury among male players from a specific academy in Ghana: A pilot study. *Scientific Reports*, 13(1), 8070. <https://doi.org/10.1038/s41598-023-34826-0>
- Mandorino, M., Figueiredo, A., Gjaka, M., & Tessitore, A. (2023a). Injury incidence and risk factors in youth soccer players: a systematic literature review. Part I: epidemiological analysis. *Biology of Sport*, 40(1), 3–25. <https://doi.org/10.5114/biolsport.2023.109961>
- Mandorino, M., Figueiredo, A., Gjaka, M., & Tessitore, A. (2023b). Injury incidence and risk factors in youth soccer players: a systematic literature review. Part II: Intrinsic and extrinsic risk factors. *Biology of Sport*, 40(1), 27–49. <https://doi.org/10.5114/biolsport.2023.109962>
- Musonda, G., Mweshi, M. M., & Nkhata, L. A. (2023). *Prevalence and commonly sustained injuries among male football players at the Olympic Youth Development Centre in Lusaka, Zambia*. 29–35. <https://doi.org/10.21617/jprm2023.516>
- Orchard, J. W., Rio, E., Crossley, K. M., Orchard, J. J., & Mountjoy, M. (2024). Orchard Sports Injury and Illness Classification System (OSIICS) Version 15. *Journal of Sport and Health Science*, 13(4), 599–604. <https://doi.org/10.1016/j.jshs.2024.03.004>
- Owoeye, Akinbo, S., Olawale, O., Tella, B., & Ibeabuchi, N. (2013). Injury prevention in football: Knowledge and behaviour of players and availability of medical care in a Nigerian youth football league. *South African Journal of Sports Medicine*, 25(3), 77–80. <https://doi.org/10.7196/sajsm.471>
- Owoeye, Akinbo, S. R. A., Tella, B. A., & Olawale, O. A. (2014). Efficacy of the FIFA 11+ Warm-Up Programme in Male Youth Football: A Cluster Randomised Controlled Trial. *Journal of Sports Science & Medicine*, 13(2), 321–328.

- Owoeye, O. B. A., Aiyegbusi, A. I., Fapojuwo, O. A., Badru, O. A., & Babalola, A. R. (2017). Injuries in male and female semi-professional football (soccer) players in Nigeria: Prospective study of a National Tournament. *BMC Research Notes*, 10(1), 133. <https://doi.org/10.1186/s13104-017-2451-x>
- Redelings, M., Sorvillo, F., V. Smith, L., & Greenland, S. (2012). Why Confidence Intervals Should be Used in Reporting Studies of Complete Populations. *The Open Public Health Journal*, 5(1), 52–54. <https://doi.org/10.2174/1874944501205010052>
- Robles-Palazón, F. J., López-Valenciano, A., De Ste Croix, M., Oliver, J. L., García-Gómez, A., Sainz De Baranda, P., & Ayala, F. (2022). Epidemiology of injuries in male and female youth football players: A systematic review and meta-analysis. *Journal of Sport and Health Science*, 11(6), 681–695. <https://doi.org/10.1016/j.jshs.2021.10.002>
- Sanchez-Sanchez, J., Clemente, F. M., Ramirez-Campillo, R., & Rodríguez-Fernández, A. (2024). Elastic Bands During Half-Squats as A Re-Warm-Up Strategy for Youth Soccer Players' Performance. *Journal of Sports Science & Medicine*, 23(4), 843–851. <https://doi.org/10.52082/jssm.2024.843>
- Sanni, D., Ede, C., & Fashina, A. (2018). A study on the effects of inadequate sport equipment and facilities on sports development and academic performance in primary schools: A case study of Bwari area council of Abuja-Nigeria. 1, 4–8. <https://doi.org/10.14419/je.v1i1.13946>
- Silvers-Granelli, H. J., Bizzini, M., Arundale, A., Mandelbaum, B. R., & Snyder-Mackler, L. (2017). Does the FIFA 11+ Injury Prevention Program Reduce the Incidence of ACL Injury in Male Soccer Players? *Clinical Orthopaedics & Related Research*, 475(10), 2447–2455. <https://doi.org/10.1007/s11999-017-5342-5>
- Smith, M. R., Zeuwts, L., Lenoir, M., Hens, N., De Jong, L. M. S., & Coutts, A. J. (2016). Mental fatigue impairs soccer-specific decision-making skill. *Journal of Sports Sciences*, 34(14), 1297–1304. <https://doi.org/10.1080/02640414.2016.1156241>
- Sumaila, F. G., Zakari, M. K., & Sulaiman, S. S. (2016). *Prevalence of Sport Injuries and Patterns of Management among Amateur Footballers in Tarauni Local Government Area*. 1(2).
- Szymiski, D., Krutsch, V., Achenbach, L., Gerling, S., Pfeifer, C., Alt, V., Krutsch, W., & Loose, O. (2022). Epidemiological analysis of injury occurrence and current prevention strategies on international amateur football level during the UEFA Regions Cup 2019. *Archives of Orthopaedic and Trauma Surgery*, 142(2), 271–280. <https://doi.org/10.1007/s00402-021-03861-9>
- van Beijsterveldt, A.-M., Steffen, K., Stubbe, J. H., Frederiks, J. E., van de Port, I. G. L., & Backx, F. J. G. (2014). Soccer Injuries and Recovery in Dutch Male Amateur Soccer Players: Results of a Prospective Cohort Study. *Clinical Journal of Sport Medicine*, 24(4), 337. <https://doi.org/10.1097/JSM.0000000000000028>
- van Dyk, N., Behan, F. P., & Whiteley, R. (2019). Including the Nordic hamstring exercise in injury prevention programmes halves the rate of hamstring injuries: A systematic review and meta-analysis of 8459 athletes. *British Journal of Sports Medicine*, 53, bjsports-2018. <https://doi.org/10.1136/bjsports-2018-100045>
- Verhagen, E., Clarsen, B., van der Graaff, L., & Bahr, R. (2024). Do not neglect injury severity and burden when assessing the effect of sports injury prevention interventions: Time to paint the whole picture. *British Journal of Sports Medicine*, 58(20), e108215. <https://doi.org/10.1136/bjsports-2024-108215>
- Waldén, M., Mountjoy, M., McCall, A., Serner, A., Massey, A., Tol, J. L., Bahr, R., D'Hooghe, M., Bittencourt, N., Della Villa, F., Dohi, M., Dupont, G., Fulcher, M., Janse Van Rensburg, D. C. (Christa), Lu, D., & Andersen, T. E. (2023). Football-specific extension of the IOC consensus statement: Methods for recording and reporting of epidemiological data on injury and illness in sport 2020. *British Journal of Sports Medicine*, bjsports-2022-106405. <https://doi.org/10.1136/bjsports-2022-106405>
- Weishorn, J., Jaber, A., Trefzer, R., Zietzschmann, S., Kern, R., Spielmann, J., Renkawitz, T., & Bangert, Y. (2023). How Does Age Affect Injury Characteristics in Young Elite Footballers?—A Prospective

Cohort Study of a German Youth Academy. *Journal of Clinical Medicine*, 12(21), 6938.
<https://doi.org/10.3390/jcm12216938>

Windt, J., & Gabbett, T. J. (2017). How do training and competition workloads relate to injury? The workload—injury aetiology model. *British Journal of Sports Medicine*, 51(5), 428–435.
<https://doi.org/10.1136/bjsports-2016-096040>