

**DIETARY INTAKE AND FATIGUE SYMPTOMS  
AMONG FOOTBALL PLAYERS IN THE UGANDA PREMIER  
LEAGUE CLUBS BASED IN KAMPALA DISTRICT**

**BY**

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**A DISSERTATION SUBMITTED IN PARTIAL FULFILLMENT OF THE  
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## **DECLARATION**

I, Lumbuye Linika registration number 18/U/GMSO/19480/PD, declare that this is my original work and to my understanding has never been submitted anywhere in any university for the award of a degree or any other academic qualification.

Signature: .....

Date: .....

## APPROVAL

The undersigned certify that we have read and hereby recommend for acceptance of Kyambogo University a research dissertation entitled, **“Dietary intake and fatigue symptoms among football players in the Uganda premier league clubs based in Kampala district”** documented by Lumbuye Linika registration number 18/U/GMSO/19480/PD under our supervision.

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## **DEDICATION**

I dedicate this project to the following people:

My mother, Ms. Namuddu Hadijjah for her support and belief she has put in me to pursue my further studies. Ms. Sylvia Mulema Nakato for the encouragement she has constantly given me to never give up until I accomplished what I set my mind to accomplish. Ms. Nanyunja Sharifa for the care and affection whenever I felt drained and wanted to give up, she was always willing to listen and counsel me back to my senses. Mr. Ssemogerere Twaha for his continuous advice and moral support that has kept me going even when situations were tough.

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## ACRONYMS

AHS- Alberta Health Services

ATT- Athletic Therapy Today

CAF- Confederation of African Football

DOMS- Delayed Onset Muscle Soreness

EIMD- Exercise-Induced Muscle Damage

FAO- Food and Agriculture Organisation

FIFA- Federation of International Football Association

FNGF- FIFA Nutrition Guide for Football

FUFA- Federation of Uganda Football Associations

NA- Nutrition for Athletes

NF- Nutrition for Football

SDA- Sports Dietitians Australia

UEFA- Union of European Football Associations

UPL- Uganda Premier League

## TABLE OF CONTENTS

<b>DECLARATION</b> .....	<b>i</b>
<b>APPROVAL</b> .....	<b>ii</b>
<b>DEDICATION</b> .....	<b>iii</b>
<b>ACKNOWLEDGEMENTS</b> .....	<b>iv</b>
<b>ACRONYMS</b> .....	<b>v</b>
<b>TABLE OF CONTENTS</b> .....	<b>vi</b>
<b>ABSTRACT</b> .....	<b>xii</b>
<b>CHAPTER ONE</b> .....	<b>1</b>
<b>INTRODUCTION</b> .....	<b>1</b>
1.1 Background to the study .....	1
1.2 Problem Statement .....	3
1.3 General objective of the study .....	4
1.4 Specific objectives of the study .....	4
1.5 Research questions and Hypothesis .....	4
1.5.1 Research questions .....	4
1.5.2 Research Hypotheses .....	5
1.6 Significance of the study .....	5
1.7 Theoretical Frame work .....	6
1.8 Conceptual Framework .....	7
1.9 Assumptions .....	9
1.10 Operational definitions of terms .....	10
<b>CHAPTER TWO</b> .....	<b>11</b>
<b>LITERATURE REVIEW</b> .....	<b>11</b>
2.0 Introduction.....	11
2.1 Dietary intake of football players.....	11
2.2 Timing of dietary intake.....	13

2.3 Nutritional status of football players.....	16
2.3.1 Influence of dietary intake on football players' nutritional status.....	17
2.3.2 Impact of nutritional status on performance: .....	17
2.4 Fatigue symptoms experienced by football players.....	18
2.4.1 Characteristics of fatigue symptoms .....	19
2.4.2 Measurement tools for football players' fatigue symptoms .....	21
2.4.3 Impact of fatigue on football performance .....	21
2.4.4 Impact of dietary intake on fatigue symptoms.....	22
2.4.5 Recommended dietary intake to delay and overcome fatigue symptoms.....	23
2.5 Supplement usage among football players.....	25
2.5.1 Effect of supplements on football players' performance.....	26
<b>CHAPTER THREE .....</b>	<b>29</b>
<b>METHODOLOGY .....</b>	<b>29</b>
3.0 Introduction.....	29
3.1 Research design.....	29
3.2 Variables .....	29
3.3 Location of the study.....	29
3.4 Study Population.....	30
3.5 Sampling procedure and Sampling size .....	30
3.6 Research Instruments and Tools .....	31
3.6.1 Questionnaire .....	31
3.6.2 Key informant interview guide .....	32
3.6.3 Tanita Bio-electric impedance analyser (BIA) .....	32
3.7 Validity and Reliability of the instruments .....	33
3.7.1 Validity.....	33
3.7.2 Reliability.....	33
3.8 Data collection procedure .....	34
3.9 Data analysis and presentation.....	35

3.10 Ethical considerations .....	35
<b>CHAPTER FOUR.....</b>	<b>37</b>
<b>RESULTS AND DISCUSSION .....</b>	<b>37</b>
4.0 Introduction.....	37
4.1 Presentation of findings of the study.....	37
4.2 Socio-demographic information of football players .....	38
4.2.1 Socio demographic information of Team managers .....	41
4.3 Interviews with team managers.....	42
4.4 Nutritional status of football players.....	43
4.5 Dietary intake of football players.....	46
4.5.1 Meal types among the football players .....	46
4.5.2 Food Consumption Frequency .....	48
4.5.3 Timing of football players’ meals.....	51
4.5.4 Football players’ dietary strategy on match days .....	53
4.5.5 Nutritional supplements intake by the football players on match days .....	54
4.6 Fatigue symptoms experienced by football players .....	56
4.6.1 Periods when football players experience fatigue symptoms on match days .....	57
4.7 Relationship between Dietary Intake and Fatigue Symptoms reported by Football Players.....	59
<b>CHAPTER FIVE .....</b>	<b>63</b>
<b>SUMMARY, CONCLUSION AND RECOMMENDATIONS.....</b>	<b>63</b>
5.0 Introduction.....	63
5.1 Summary of the findings.....	63
5.1.2 Findings on the nutritional status of football players in UPL clubs.....	64
5.1.3 Findings on the common food types eaten by football players.....	64
5.1.4 Findings on timing of football players meals in the UPL .....	65
5.1.5 Findings on fatigue Symptoms experienced by UPL football players.....	67
5.1.6 Relationship between dietary intake and fatigue symptoms .....	68
5.2 Conclusion .....	68

5.3 Recommendations.....	68
5.3.1 Recommendations for practice and policy change .....	68
5.3.2 Recommendations for further research .....	69
<b>REFERENCES.....</b>	<b>70</b>
<b>Appendix I: Introduction Letter.....</b>	<b>82</b>
<b>Appendix II: Approval from TASO Review Board.....</b>	<b>83</b>
<b>Appendix III: Consent forms.....</b>	<b>84</b>
<b>Appendix IV: GENERAL QUESTIONNAIRE .....</b>	<b>86</b>
<b>Appendix V: Interview guide for Team Managers.....</b>	<b>93</b>
<b>Appendix VI: Approval email sent to clubs .....</b>	<b>94</b>

## LIST OF TABLES

Table	Page
Table 4.1 Ownership of football clubs.....	38
Table 4.2: Socio-demographic characteristics of the players .....	39
Table 4.3: Socio demographic information of team managers .....	41
Table 4.4: Anthropometric Measurements and Body Composition of Players .....	45
Table 4.5: Meal Types of Football Players .....	47
Table 4.6: Players' Food Frequency Intake per week.....	50
Table 4.7: Players' Dietary Intake before, during and after the match.....	52
Table 4.8: Energy drink intake of football players .....	55
Table 4.9: Periods when Players experienced Fatigue Symptoms on match day .....	57
Table 4.10: Dietary Intake before the match and Fatigue Symptoms during and after the match ....	60
Table 4.11: Dietary Intake during the match and Fatigue Symptoms reported during and after the match.....	61

## LIST OF FIGURES

Figure	Page
Fig. 1: 1 A conceptual framework showing relationship between dietary intake and fatigue symptoms .....	8
Fig 4.1: Football Player's Nutritional Supplement Intake .....	54
Fig 4.2: Percentage of Football Players who experience Fatigue Symptoms.....	59

## ABSTRACT

Football players dietary intake and body composition plays a great role in their performance. However, fatigue symptoms affect the performance of football players on match days. This research was conducted to investigate the correlation between dietary intake and fatigue symptoms among football players in the Uganda Premier League. A descriptive cross-sectional study was conducted involving 214 football players and eight team managers. Data on dietary intake (food frequency, timing of meals, hydration and supplements), fatigue symptoms (muscle pulls, thirst, reduced flexibility, dizziness, reduced running speed) and anthropometric measurements (height, weight, body fat percentage, BMI) were collected through self-administered questionnaires, key informant interviews and bio impedance machine respectively. The study indicated that a significant proportion of football players (80%) exhibited inadequate pre-match dietary intake primarily characterized by lack of a balanced diet and insufficient fluid consumption. Moreover, 87% of the participants reported experiencing fatigue symptoms, including muscle pulls, thirst, and reduced flexibility. Statistical analysis revealed a strong association between inadequate balanced diet and both muscle pulls ( $p=0.031$ ) and reduced flexibility ( $p=0.041$ ). These findings underscore the critical role of dietary intake timing, particularly balanced diet, in mitigating fatigue and optimizing performance among Ugandan football players.

# CHAPTER ONE

## INTRODUCTION

### 1.1 Background to the study

Football is widely recognized as the world's most popular sport, with over 256 million individuals participating worldwide, according to the FIFA big count survey of 2006 (Pablo et al., 2014). In recent years, significant advancements in sports sciences, particularly in football, have been undertaken to enhance football player performance. Research studies related to football have predominantly focused on three key areas: the physiological demands of the game (Bernardini et al., 2010), the anthropometric characteristics and physiological capabilities of football players (Carling et al., 2010), and the utilization of energy substrates during training and match play (Mohr et al., 2006).

As a result of these studies (Mohr et al., 2006; Bernardini et al., 2010) specific nutritional recommendations have been developed for football players. These guidelines aim to optimize performance during competitions, facilitate recovery, maintain an appropriate body weight, and minimize the risk of injury and illness (Burke et al., 2006). Proper dietary intake has been identified as crucial in supporting the health and performance of football players (Garcia et al., 2012). Providing adequate energy and fluid intake, along with the use of supplements, have been linked to optimizing preparation, performance, and recovery among players (Laquale, 2009; UEFA, 2018). Moreover, players' body composition is significantly associated with daily dietary intake of players (Rollo & Loon, 2018).

Despite the advancements in sports sciences and nutritional recommendations, fatigue remains a significant challenge in the football world (Nutrition for Football, 2010). Fatigue in football is characterized by a decline in peak velocity and altered kinematic components, affecting motor and perceptual processing (Knicker, Renshaw, Oldham et al., 2011; Jimenez et al., 2016). These effects can be exacerbated by the presence of opponents and the pressure of match results (Knicker et al., 2011). Fatigue symptoms include a decline in work rate after intense exercise bursts, impaired

repeated sprints ability, agility, and leg strength (Res, 2014). Techniques such as throwing, passing, hitting, and kicking the ball can also be affected (Rampinini et al., 2016; Res, 2014). Fatigue in football is linked to central and peripheral factors, influencing muscle activity and energy production (Rampinini et al., 2016).

Although fatigue symptoms are often anecdotal, time-motion analysis can assess fatigue during a match. Studies have identified three stages in which fatigue occurs: after short intense periods in both halves, in the initial phase of the second half due to lower body temperatures, and towards the end of the match (Mohr et al., 2005). Additionally, low glycogen concentrations in muscle fibres and dehydration caused by humid environments have been associated with fatigue and its impact on player performance (Mohr et al., 2005). Some research findings suggest that failure to adjust dietary intake according to the needs of football players during training and matches can lead to negative energy balance and progressive fatigue (O'Brien, Collins et al., 2019). For instance, Gaelic football players in Ireland consumed less carbohydrate than recommended which significantly affecting their performance during matches (Morhr, 2014).

Research over the past decade identifies several types of fatigue neuromuscular, metabolic, and perceptual that manifest following a match and can persist for up to 72 hours, varying based on physical load, football player position, and individual conditioning (Nédélec et al., 2012; Silva et al., 2018). The intensity of sprints and jumps in a game lead to micro-damage in the muscle fibres and reduced neural drive, both of which impair explosive movements required in performance (Borges et al., 2019). Glycogen restoration varies, but typical recovery extends to 48-72 hours, with research demonstrating that football players with higher training loads experience less rapid glycogen replenishment (Nédélec et al., 2012). Football players also report subjective perceptions of fatigue, often evaluated through measures such as the Rating of Perceived Exertion (RPE) and post-match soreness levels. High RPE scores immediately after matches reflect the intense physiological demands experienced, and soreness, particularly in the quadriceps and hamstrings, remains elevated up to 48 hours post-match (Rampinini et al., 2015). Studies demonstrate that active recovery,

coupled with a carbohydrate-protein intake post-match, enhances glycogen synthesis and alleviates DOMS by 24-48 hours (Rey et al., 2018).

While there have been studies focusing on dietary intake and fatigue among long-distance runners Matt Fitzgerald (2015) in Kenya based on the impact of Kenyan foods, limited documentation is available concerning dietary practices and fatigue symptoms among football players in the region, and more specifically in Uganda. A study by Muwonge, Zavuga, Kabenge et al., (2017) revealed low usage of nutritional supplements among Ugandan athletes compared to athletes in other countries. Football in Uganda has the Uganda Premier League as the highest level of competition for any football player in Uganda. The league has 16 football teams that qualify from the Federation of Uganda Football Association Big League (FUFA, 2021). Several teams get to represent the country in the continental competition of the African Champions League. But the performance of the Ugandan teams in the African Champions League has been worrying. Only KCCA FC after a long time managed to go beyond the group stages (FUFA, 2021). This has led to many questions about the challenging factors affecting the performance of the Ugandan football teams at the continental level. Due to scarcity of studies seeking to answer this phenomenon, there is a gap and a need for the current study; an investigation into "dietary intake and fatigue symptoms among football players in the Uganda Premier League clubs based in Kampala district."

## **1.2 Problem Statement**

Fatigue in football refers to the decline of peak velocity and altered kinematic components of displacement, velocity, and acceleration (Knicker, Renshaw, Oldham et al., 2011). Matches induce accumulated fatigue, primarily caused by the depletion of muscle glycogen stores, muscle damage, dehydration, and central fatigue (Res, 2014). Such fatigue results in a deterioration of players' performance due to physiological and psychological strain (Jiménez et al., 2016). To control fatigue and restore energy effectively, a proper and well-planned diet is essential (Russell et al., 2017).

Bbosa (2022) established that Ugandan football players are inadequately prepared to compete at optimal levels concerning their physical, psychological, and nutritional state. Despite the

importance of diet in managing fatigue to enhance performance, limited research has been conducted on dietary intake among football players nationally and regionally. Therefore, the present research aimed at establishing the relationship between dietary intake and fatigue symptoms among Ugandan football players.

### **1.3 General objective of the study**

The purpose of the study was to determine the relationship between dietary intake and fatigue symptoms experienced during and after the match among football players in the Uganda Premier League [UPL] in Kampala district.

### **1.4 Specific objectives of the study**

1. To determine the nutritional status among football players in the Uganda Premier League clubs.
2. To examine the dietary intake of football players in the Uganda Premier League.
3. To determine fatigue symptoms commonly experienced by football players during and after matches in the Uganda Premier League.
4. To establish the relationship between dietary intake and fatigue symptoms of football players in the Uganda Premier League.

### **1.5 Research questions and Hypothesis**

#### **1.5.1 Research questions**

The study was guided by the following research questions:

1. What is the nutritional status of the football players in the Uganda Premier League?
2. What are the dietary intake practices before, during and after the matches of football players in the Uganda Premier League?
3. What are the fatigue symptoms reported during and after the matches by football players in the Uganda Premier League?

### **1.5.2 Research Hypotheses**

It was hypothesized that there would be no significant relationship between dietary intake and fatigue symptoms among football players in the Uganda Premier League.

#### **Specific hypothesis**

There would be no significant relationship between type of dietary intake and fatigue symptoms among players in Uganda Premier League.

There would be no significant relationship between timing of dietary intake and fatigue symptoms among players in Uganda Premier League.

### **1.6 Significance of the study**

The study findings may be used by football players to improve their dietary intake before, during, and after football matches. This will have a positive impact on the dietary intake of football players in the Uganda Premier League.

Coaches and managers may use the findings of this study to recommend appropriate timing of meals and quality diets to football players for better performance and recovery after matches. This will enable them prepare the football players using recommended dietary intake that promotes their performance.

FUFA may use the information generated from this study to recommend sport nutritionists/dietitians on technical teams (team managers) in Ugandan football. This recommendation will increase the supervision and appropriate dietary intake given to football players in the Uganda Premier League.

The findings of this study may contribute to the knowledge base for other related researches. Further research may be carried out basing on the findings of this study. This will help to build a knowledge base and references from the African continent and the world at large.

## **1.7 Theoretical Frame work**

The Health Belief Model (HBM) is widely employed in conceptual frameworks for health behaviour research. It explains the change and maintenance of health-related behaviours and guides health behaviour interventions (Victoria et al., 2008). Its primary constructs include perceived susceptibility (one's belief in the likelihood of acquiring the condition), perceived severity (one's belief in the seriousness of the condition), perceived benefits (one's belief in the positive outcomes of the action), perceived barriers (one's belief in the ease of taking action), cues to action (events motivating action), and self-efficacy (confidence in one's ability to perform the action) (Baranowski, Cullen & Thompson et al., 2003; Glanz, Rimer & Lewis, 2008).

The Health Belief Model posits that people will take health-related action, such as increasing low-fat dairy intake, if they believe it can help them avoid negative conditions like weight gain. Therefore, individuals with positive expectations of avoiding negative health conditions through recommended actions are more likely to take such actions for their benefit.

Football players' dietary needs differ from those of ordinary individuals, with higher energy requirements obtained primarily from carbohydrate sources (Nutrition for Football [NFF], 2010). Timely carbohydrate intake provides adequate fuel to football players, reducing fatigue, sustaining performance, and promoting recovery (Sports Dietitians Australia [SDA], 2016). Additionally, post-exercise recovery and repair emphasize protein intake for football players (SDA, 2016; Alberta Health Services [AHS], 2018; Hubert, Aleksandra et al., 2020). For maximizing performance, healthy eating for football players includes consumption of both macronutrients and micronutrients. Micronutrients in the form of vitamins and minerals assist in breaking down macronutrients and support various biological processes (Russell et al., 2017). Water is also essential for all football players, as it supports bodily functions and sustains performance (Athletic Therapy Today [ATT], 2009; Rawson et al., 2017).

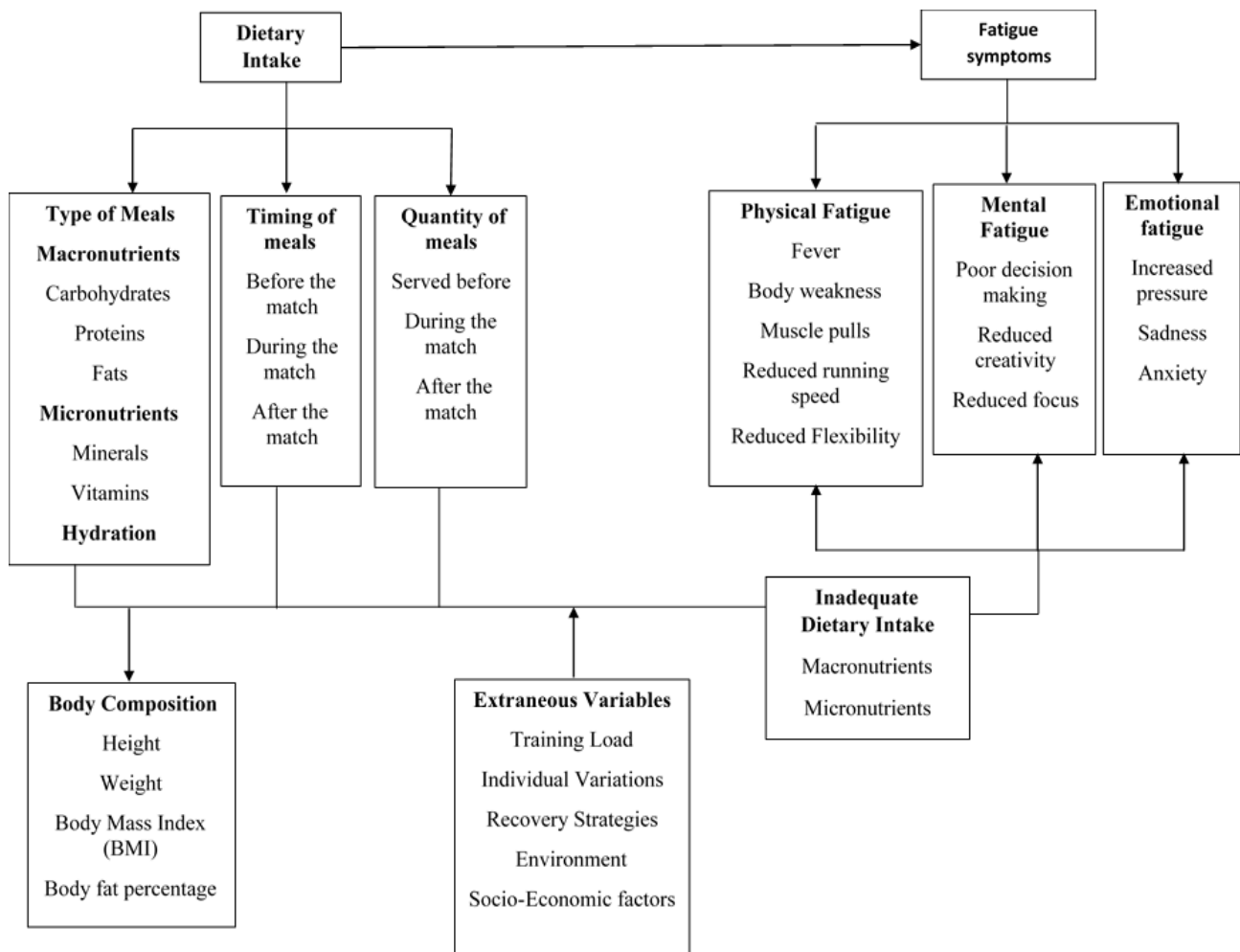
Fatigue resulting from the depletion of muscle glycogen stores poses a significant challenge for football players during matches. It leads to, muscle damage, dehydration, and central fatigue (Res, 2014). Therefore, timely and nutritionally appropriate diets play a crucial role in aiding preventing fatigue among football players and promote recovery from fatigue.

### **1.8 Conceptual Framework**

Football players' performance and recovery heavily rely on their dietary intake and nutrition. Adequate dietary intake provides the necessary energy levels, nutrients, and recovery support. However, inadequate or poorly balanced diets may lead to fatigue symptoms, affecting football players' performance. This conceptual framework aims to illustrate the relationship between dietary intake and fatigue symptoms among football players.

Dietary Intake is the independent variable, encompassing macronutrients, micronutrients, hydration, timing of meals, and meal quantity. Macronutrients, such as carbohydrates, proteins, and fats, play essential roles in muscle function, glycogen replenishment, muscle repair, and hormone production (Thomas et al., 2016; Tachtsis et al., 2018). Micronutrients, including vitamins and minerals, influence fatigue symptoms and overall performance (Silva et al., 2018; Delanghe et al., 2020). Adequate hydration through water and electrolytes is crucial for cognitive function, muscle performance, and fatigue reduction (Thomas et al., 2016). Proper timing and quality of meals can limit fatigue levels by enhancing glycogen replenishment and energy levels (Russell et al., 2019; Kerksick et al., 2018).

Fatigue symptoms are the dependent variable, expressed through physical fatigue, mental fatigue, and emotional fatigue. Physical fatigue manifests as lack of energy, reduced stamina, and muscle weakness. Mental fatigue involves reduced cognitive function and difficulty in concentration, while emotional fatigue is observed through mood swings, irritability, and decreased motivation among football players.



**Fig. 1: 1 A conceptual framework model showing the relationship between dietary intake and fatigue symptoms adopted from Mukhayer, Borne et al., (2013)**

Mediating factors, such as nutrient utilization, efficient digestion, absorption, and metabolism, influence fatigue symptoms by optimizing performance and delaying the effects of fatigue (Pyne et al., 2017). These factors relate to the utilization of nutrients and calories obtained from the dietary intake enabling football players to perform during matches.

Extraneous factors in this study include training load, individual variations (metabolic rate, body composition, genetics, and age), and recovery strategies. High training loads can increase fatigue symptoms, highlighting the need for proper nutrition to support recovery (Kreher, 2016). Individual variations underscore the importance of personalized dietary strategies (Russell et al., 2019). Recovery strategies, including sufficient sleep and stress reduction, can attenuate fatigue symptoms (Nédélec et al., 2015).

External factors, such as environmental conditions (temperature, altitude), and travel schedule, can influence fatigue levels and may require specific adaptations in dietary intake (Nédélec et al., 2013). Social economic factors for example educational background, income levels, religion too influence the dietary intake of football players which has an effect on their performance.

The outcomes of appropriate dietary intake can lead to optimal performance through high energy levels, enhanced stamina, and improved focus. Enhanced recovery is achieved through efficient muscle repair and decreased risk of injury. Improved general well-being of football players is evidenced by a positive mood, motivation, and overall health.

Understanding the relationship between dietary intake, fatigue symptoms, and moderating variables bears significance in developing tailored nutrition strategies to optimize performance and recovery while ensuring the overall well-being of football players.

## **1.9 Assumptions**

The assumptions of the study were;

- All football players were at the same level of fitness because they train on the same days and engage in the same competitions. Therefore, similar fitness levels are expected from all football players in the various clubs
- All football players in the Uganda Premier League wore appropriate attire used on match days. Temperature regulation plays great role in on set of fatigue symptoms used on match days.
- All players that completed primary had spent seven (7) years in school; those who completed secondary had spent 13 years in school; players who had completed university had spent 15+ years while players with less than seven years in school represented primary school drop outs.

### **1.10 Operational definitions of terms**

**Dietary intake:** type, quantity and timing of foods, fluids and supplements consumed by football players.

**Fatigue symptoms:** impaired performance in exercise exhibited by symptoms such as dizziness, muscle pulls, stitches, body weakness, thirst, reduced running speed, heavy body, reduced flexibility and muscle soreness.

**Football Players:** male football players in the Uganda Premier League that participated in the competition of 2019/2020 based in Kampala district.

**Nutritional Status:** refers to the anthropometric measurements and body composition of players namely the height, weight, Body Mass index (BMI), and Fat Percentage.

**Snack:** is a meal served to football players in between the main meals of the day.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.0 Introduction**

This chapter presents a review of related literature done in accordance to study objectives and organized under the following sub topics; dietary intake of football players, timing of dietary intake, nutritional status of football players, fatigue symptoms experienced by football players and supplement usage among football players.

#### **2.1 Dietary intake of football players**

The recommended dietary intakes of football players before, during, and after matches, as well as the importance of these guidelines in enhancing their overall performance and well-being were investigated. The dietary intake of football players is of utmost importance, as it furnishes the requisite energy to fuel rigorous physical activity, while also sustaining stamina and endurance throughout matches. Furthermore, appropriate nutrients facilitate muscle recovery, mitigating fatigue and the likelihood of injury (Nutrition for football, 2010).

The performance of football players is influenced by dietary intake (Res, 2014). The dietary requirements of football players are shaped by their tastes and preferences, which have a strong link to eating practices that are indicative of food selection (Larson et al., 2012). Additionally, Pablo et al. (2014) underscored that the substantial impact of the family environment on dietary intake, particularly on adolescents. As a result, this factor should be taken into account when designing and executing dietary interventions for football players.

Preceding a match, football players are advised to consume carbohydrates. Carbohydrates serve as the primary energy source for football players. Research indicates that a high-carbohydrate diet before a match can enhance glycogen reserves in muscles, thereby elevating endurance and overall performance (Achten & Jeukendrup, 2016). Sufficient protein intake is equally important since it is essential for muscle repair and growth. A study by Phillips (2017) underscores the significance of

pre-match protein consumption in preventing muscle breakdown during strenuous physical activity. Dietary fats are necessary for the absorption of fat-soluble vitamins (A, D, E, and K). These vitamins play various roles in overall health and athletic performance (Tangney & Jones, 2013). Certain types of fats, such as omega-3 fatty acids found in fish and flaxseed, have anti-inflammatory properties. Inflammation can impair recovery and performance, making these fats beneficial (Calder, 2017).

Proper hydration is vital to prevent dehydration during matches, and maintaining optimal fluid levels is achieved through the consumption of water and electrolyte-rich beverages (Maughan & Shirreffs, 2018). During matches, football players should ingest suitable carbohydrates to sustain energy levels. Consuming carbohydrates in the form of sports drinks or easily digestible snacks enables football players to maintain their energy throughout matches (Currell & Jeukendrup, 2018). Adequate hydration during matches is crucial in preventing performance decline and minimizing the risk of heat-related ailments (Goulet, 2018).

Post-match protein intake is imperative for muscle recovery and adaptation. The immediate consumption of protein-rich foods or supplements after matches can assist in optimizing recovery (Tipton & Witard, 2017). Replenishing glycogen reserves post-match is pivotal for expediting recovery. Studies suggest that the consumption of carbohydrates in the post-match meal accelerates the recovery process for football players (Jentjens & Jeukendrup, 2018). Vegetables provide complex carbohydrates for sustained energy and fibre for digestive health. They also contain anti-inflammatory compounds that aid in recovery from training and matches (Nieman, Henson, Angela et al., 2007). Football players are encouraged to continue prioritizing rehydration after matches to counteract fluid losses (Sawka et al., 2017). Certain vegetables like cucumbers and lettuce have high water content, contributing to hydration, which is crucial for performance and recovery, especially during training sessions (Maughan et al., 2008).

The dietary intake of football players before, during, and after matches plays a pivotal role in maximizing their performance and overall well-being. Adequate consumption of carbohydrates, protein, and hydration before, during, and after matches ensures sustained energy levels, minimizes injury risk, and promotes swift recovery. Adhering to these guidelines can significantly enhance a football player's capacity to perform optimally and maintain a high level of athletic excellence. Studies conducted mostly are across several European countries providing valuable insights into the relationship between dietary intake and fatigue symptoms, highlighting how specific dietary intake and nutrient deficiencies contribute to the prevalence of fatigue. However, the dietary intake and nutritional challenges in African countries case in point Uganda differ significantly due to cultural, economic, and agricultural factors, such as food security issues and nutrient deficiencies, which could influence fatigue symptoms differently. Currently, there is a noticeable gap in research addressing the link between dietary intake and fatigue in African populations, leaving a critical need for localized data to better understand how these unique factors contribute to fatigue. Conducting a similar study in Africa would be essential for developing targeted nutritional interventions and addressing fatigue-related health concerns in a context that reflects the continent's distinctive dietary and socio-economic landscape.

## **2.2 Timing of dietary intake**

The temporal aspects of dietary intake play a pivotal role in optimizing the performance and recovery of football players during matches. The strategic alignment of nutrient consumption ensures the availability of requisite energy and endurance for optimal on-field performance. This section aims to delve into the recommended temporal framework for dietary intake among football players prior to, during, and post matches, along with the underlying significance of these guidelines in augmenting their athletic prowess and overall well-being.

The imperative nature of temporal dietary intake for football players merits careful consideration. The apt timing of nutrient consumption not only guarantees adequate energy reservoirs during matches but also fosters muscle recuperation and minimizes the susceptibility to fatigue and injuries.

The judicious timing of nutrient intake also lends support to post-match recuperation, thereby diminishing the risk of delayed onset muscle soreness (DOMS) and fortifying overall performance.

For each football player, a tailored, periodized, and pragmatic dietary plan, collaboratively developed with their coach and endorsed by sports nutrition experts, proves instrumental in performance optimization (Burke, Castell, & Casa et al., 2019). Malcolm Cox (2014) underscored the equivalence of a football player's diet to fundamental skills such as their first touch on the ball, passing, and shooting ability. He further emphasized that the common notion among players, believing that a carbohydrate-rich diet the day prior to a significant match would suffice for 90 minutes of energy sustenance, is fallacious. In reality, players should engage in carbohydrate loading several days ahead of the match to amass the energy reserves necessary for match-day application. Malcolm (2014) advocated depleting the body's carbohydrate stores during the initial two days of the week, followed by a gradual augmentation of carbohydrate intake as match day approaches. Starchy options such as whole-grain breads, pasta, rice, and potatoes effectively cater to these carbohydrate requisites.

Preceding a match, football players necessitate a pre-match meal that assumes pivotal importance in furnishing sustained energy throughout the match. Carbohydrates should be ingested three to four hours prior to the match to optimize glycogen reserves (Bettonviel et al., 2019). This timeframe allows for ample digestion and absorption, thwarting any discomfort during gameplay. An additional pre-match snack is recommended, involving the consumption of a carbohydrate-rich, low-fat and low-fibre snack 30 minutes to 1 hour before the match, thereby further bolstering energy levels and enhancing performance (Couto et al., 2018).

In the course of a match, a halftime nutritional plan warrants implementation. Football players are encouraged to partake of carbohydrates and fluids during halftime to reinvigorate glycogen reserves and sustain hydration levels (Russell et al., 2019). Sports drinks or easily digestible snacks are likewise suggested for this purpose.

Subsequent to a match, an immediate post-match meal should comprise a blend of carbohydrates and protein to initiate the recovery process and foster muscle repair among football players (Impey et al., 2018). If a comprehensive meal is not immediately accessible, a post-match recovery snack is advised. Football players should indulge in a recovery snack rich in carbohydrates and protein within 30 minutes of the match's conclusion, thereby catalysing the recovery process (Close et al., 2020). Recovery meals and snacks ought to feature carbohydrates for fuel, a measure of protein for muscle repair and development, and substantial fluid and electrolyte content to offset fluid losses (Sport Dietitians Australia, 2016).

The temporal aspect of dietary intake before, during, and after matches—profoundly influences football players' performance and recovery. Meticulously timed nutrient consumption ensures the presence of ample energy reserves for sustained match performance and facilitates post-match recovery, mitigating the vulnerability to injuries and exhaustion. Adherence to the recommended pre-match meal, snack, and post-match nutritional protocols stands to optimize football players' athletic performance and overall well-being.

While extensive research has been conducted in European countries exploring the impact of meal timing on football player performance, a similar level of investigation is notably absent from the African continent, particularly in Uganda. This disparity presents a significant gap in knowledge that could potentially hinder the optimization of football player performance and recovery. Given the unique climatic conditions, dietary intake, and training regimens prevalent in Africa, it is imperative to conduct tailored research to establish evidence-based guidelines for meal timing strategies that cater to the specific needs of Ugandan football players. Such research would not only contribute to enhancing football player performance but also provide valuable insights for sports nutritionists and coaches working with Ugandan football players.

### **2.3 Nutritional status of football players**

The performance of football players is profoundly influenced by their body composition and anthropometric characteristics. Attaining the prescribed body composition and anthropometric benchmarks holds paramount importance in optimizing athletic capabilities and overall field performance. This section endeavours to investigate the recommended anthropometric attributes for football players, the significance of adhering to the advised dietary intake for body composition, and the ramifications of these anthropometric attributes on player performance.

For enhanced speed, agility, and endurance, football players are generally counselled to maintain a relatively modest body fat percentage (Hillman, 2019). Research demonstrates that elite male football players typically exhibit body fat percentages spanning from 6% to 10%, whereas elite female players register percentages ranging from 14% to 20% (Silva et al., 2016; Leite et al., 2018).

The possession of adequate muscle mass is integral to generating power, strength, and explosiveness on the field. The optimal muscle mass quotient varies contingent on the player's position; nevertheless, football players across the spectrum are generally advised to engage in strength training to enhance their muscle-to-fat ratio (Stølen et al., 2018).

Height and weight among football players can be contingent on their designated positions. In a general sense, offensive and defensive positions may encompass players with elevated body weight, thereby excelling in physical confrontations. Conversely, more agile positions might be occupied by players of lesser weight, rendering them nimbler (Eirale et al., 2016). The strategic reduction of non-essential body fat holds the potential to heighten both muscular and cardiorespiratory endurance. Occupying endurance-centric positions such as the wings, which involve extensive running and sprinting, necessitates players to maintain low body fat and a correspondingly lower BMI (Hillman, 2019).

### **2.3.1 Influence of dietary intake on football players' nutritional status**

Attaining and sustaining the recommended body composition for football players is contingent upon prudent dietary intake. A well-structured diet ensures the ingestion of essential nutrients that facilitate muscle development, body fat reduction, and overall performance.

Macronutrient equilibrium is pivotal for football players. A focal point for football players rests on achieving a judicious protein intake to support muscle growth and repair, moderated carbohydrate consumption to fuel high-intensity exertion, and a prudent inclusion of healthy fats to uphold overall well-being (Ranchordas et al., 2017).

Maintaining adequate hydration assumes paramount importance for optimal body composition. Dehydration poses potential detriments to both performance and body composition through its adverse impact on muscle function and recovery (Maughan et al., 2017).

The temporal dimension of nutrient intake, particularly in proximity to training sessions, emerges as indispensable for the maximization of muscle protein synthesis and recuperation. The strategic consumption of a balanced meal or snack prior to and following training exerts a considerable influence on the body composition of football players (Aragon & Schoenfeld, 2017).

### **2.3.2 Impact of nutritional status on performance:**

Attaining an optimized body composition, characterized by a lower body fat percentage and appropriate muscle mass, contributes substantively to the augmentation of speed and agility on the field. This attribute empowers football players to swiftly alter their course and excel in one-on-one scenarios (Dalen et al., 2016).

The maintenance of a lean body composition yields a favourable enhancement in aerobic capacity and endurance, affording football players the capability to sustain high-intensity endeavours throughout the entirety of the match (Nikolaidis et al., 2018). Positively impacting the players'

capacity for explosive movements, encompassing actions like jumping, tackling, and shooting, is the possession of adequate muscle mass and strength (Figueiredo et al., 2019).

The anthropometric characteristics recommended for football players, which encompass body fat percentage, muscle mass, height, and weight, wield a significant influence over on-field player performance. The achievement and upholding of these attributes mandate a proper dietary intake, foregrounding the need for nutrient equilibrium, hydration, and judicious nutrient timing. Football players who accord primacy to their body composition through meticulous nutritional practices are poised to experience heightened speed, agility, endurance, and strength, ultimately culminating in a comprehensive elevation of overall game performance.

Despite the growing recognition of the pivotal role of nutrition in football players performance, a comprehensive understanding of the nutritional status of football players in Uganda remains limited. While European countries have invested in extensive research to assess the nutritional needs and deficiencies of football players, the unique dietary challenges and cultural factors prevalent in Uganda necessitate a tailored approach. By conducting thorough assessments of the nutritional status of Ugandan football players, this research can help identify specific nutrient deficiencies which can later be used to develop targeted interventions to optimize performance, reduce the risk of injuries, and improve overall health. This research would provide valuable insights for sports nutritionists, coaches, and policymakers working to enhance the well-being and competitiveness of Ugandan football players.

#### **2.4 Fatigue symptoms experienced by football players**

Fatigue, a prevalent occurrence in sports, including football, exerts significant ramifications on player performance. Defined as an impairment in performance induced by exercise (Knicker, Renshaw, Oldham et al., 2011), fatigue holds particular relevance in the context of football a physically demanding sport that exacts a substantial toll on players' energy reserves (Jonnalagadda, Rosenbloom, & Skinner, 2001). Beyond manifesting as mere physical exhaustion, football players

encounter fatigue that substantially influences their performance due to the sport's multifaceted physiological, metabolic, physical, and psychological demands (Polito et al., 2017).

Gaining insight into the attributes of fatigue symptoms and utilizing suitable assessment tools can substantially contribute to the formulation of effective strategies for managing player workload and optimizing performance. The objective of this literature review is to comprehensively explore the diverse dimensions of fatigue encountered by football players, delve into the tools harnessed for fatigue assessment, and elucidate the ways in which fatigue exerts its impact on the overarching performance of football players.

#### **2.4.1 Characteristics of fatigue symptoms**

The manifestation of fatigue symptoms among football players can encompass a variety of expressions, impacting diverse facets of their physical and mental well-being. Researchers have discerned distinct attributes characterizing the fatigue symptoms prevalent among football players, which encompass the following:

Foremost among these is physical fatigue, the most conspicuous form experienced by football players. It engenders a reduction in muscle strength, diminished movement speed, and compromised agility. Concomitantly, players may articulate sensations of heaviness, soreness, and general discomfort during and subsequent to matches or strenuous training sessions (Girard et al., 2016).

The demands of football extend beyond the physical realm, encompassing cognitive rigor. Cognitive fatigue exacts its toll on decision-making acumen, reaction times, and the focal point of attention. Football players may grapple with the challenge of preserving tactical acumen and rendering strategic choices under the influence of cognitive fatigue (Ric et al., 2017).

Intrinsic to football's competitive landscape is the weight of pressure and high-stakes scenarios, which can precipitate emotional fatigue among football players. This may manifest as mood

fluctuations, irritability, diminished motivation, and a prevailing sense of mental exhaustion (Hoffman et al., 2018). Sleep disruptions frequently punctuate the experiences of football players, arising from factors such as travel, late matches, or elevated training loads. Such disturbances in sleep patterns foster an elevated susceptibility to fatigue and precipitate a comprehensive deterioration in performance (Juliff et al., 2017).

Several types of fatigue symptoms manifest after the match which can include neuromuscular, metabolic, and perceptual that manifest following a match and can persist for up to 72 hours, varying based on physical load, player position, and individual conditioning (Silva et al., 2018; Nédélec et al., 2012). Neuromuscular fatigue is prevalent post-match and is often assessed through countermovement jump (CMJ) performance, which reflects the muscle's power output and recovery rate. Studies indicate that maximal voluntary contraction (MVC) and CMJ measures significantly drop immediately after a game, often recovering within 24-48 hours (Rago et al., 2019). The type of fatigue here is multifactorial, including both central (nervous system) and peripheral (muscle) components. The intensity of sprints and jumps in a game leads to micro-damage in the muscle fibres and reduced neural drive, both of which impair explosive movements required in performance (Borges et al., 2019).

Metabolic fatigue is attributed to the depletion of muscle glycogen and accumulation of metabolic byproducts like lactate and ammonia, impacting aerobic and anaerobic performance post-match. The high-intensity intermittent nature of soccer demands substantial energy, leading to glycogen depletion, especially in fast-twitch muscle fibres (Andersson et al., 2016). Glycogen restoration varies, but typical recovery extends to 48-72 hours, with research demonstrating that players with higher training loads experience less rapid glycogen replenishment (Nédélec et al., 2012).

Players also report subjective perceptions of fatigue, often evaluated through measures such as the Rating of Perceived Exertion (RPE) and post-match soreness levels. High RPE scores immediately

after matches reflect the intense physiological demands experienced, and soreness, particularly in the quadriceps and hamstrings, remains elevated up to 48 hours post-match (Rampinini et al., 2015).

#### **2.4.2 Measurement tools for football players' fatigue symptoms**

The evaluation of fatigue in football players has given rise to a range of methods and tools. These resources furnish invaluable insights into the physiological and psychological states of players, thereby aiding coaches and sports scientists in making well-informed decisions. Some widely employed tools to gauge fatigue among football players encompass:

The Rating of Perceived Exertion (RPE), a subjective approach wherein players assign a numerical value to their perceived effort during training or matches. It serves as a pragmatic and easily deployable tool to monitor training session intensity and regulate player workload (Alexiou & Coutts, 2018). The utilization of heart rate monitors stands prevalent in assessing the cardiovascular response of football players during both training sessions and matches. Departures from established baseline heart rate patterns can potentially serve as indicators of fatigue (Impellizzeri et al., 2019). An alternative avenue entails the examination of specific blood biomarkers, including lactate and creatine kinase levels. The insights garnered from these analyses contribute to discerning the physiological fatigue and recovery status of football players (Andersson et al., 2020). Cognitive fatigue, an integral facet, can be quantified through diverse psychomotor tests gauging reaction times, attentional focus, and decision-making capacities (Huijgen et al., 2018).

#### **2.4.3 Impact of fatigue on football performance**

Fatigue possesses the potential to exert substantial influence over the performance of football players, impacting both individual players and the collective dynamics of the team. Numerous investigations have illuminated the adverse effects of fatigue on diverse facets of performance. Physical fatigue is causative of diminished running velocities, compromised jumping capabilities, and an overall reduction in physical output during matches, subsequently culminating in a decline in on-field performance (Dupont et al., 2017).

Cognitive fatigue impairs the decision-making process, resulting in suboptimal judgment, sluggish responses, and a curtailed tactical awareness on the field (Silva et al., 2018). The scope of fatigue's impact extends beyond mere performance, as it engenders an escalation in the susceptibility to injuries among football players. Fatigued muscles, in conjunction with compromised cognitive function, contribute to faulty movements and a heightened vulnerability to injuries (Malone et al., 2018).

Manifesting in intricate ways, fatigue amongst football players can imperil the preservation of effective communication and coordination. This transpires as a diminution in team cohesion and synchronization on the field (Hader et al., 2021). The multifaceted nature of football players' fatigue endows it with considerable implications for performance. Symptoms of physical, cognitive, and emotional fatigue have the potential to encroach upon football players' abilities and their capacity for sound decision-making during training and matches. By harnessing pertinent tools to gauge fatigue, coaches and sports scientists are better equipped to regulate football player workload, enhance recovery processes, and elevate overall performance. A discernment of the distinct attributes of fatigue and its repercussions will contribute to the formulation of robust fatigue management strategies in the realm of football.

#### **2.4.4 Impact of dietary intake on fatigue symptoms**

In alignment with the evolving training load, football players are necessitated to adapt their dietary and fluid consumption. During intensive training periods, a carbohydrate-rich diet becomes imperative, furnishing the necessary fuel to mitigate fatigue, sustain performance, and expedite recovery.

A balanced diet provides the necessary carbohydrates, fats, and proteins for energy production during training and matches, ensuring optimal performance (Burke, Hawley et al., 2011). Football demands players to partake in high-intensity activities throughout the duration of a match. A diet

that strikes equilibrium supplies the requisite energy provisioning, empowering players to maintain performance thresholds and defer the advent of fatigue (Ranchordas et al., 2017).

Carbohydrates, wielding the mantle of the primary fuel source for football players, manifest as pivotal. Adequate carbohydrate intake before a match culminates in the replenishment of glycogen stores in both muscles and the liver, consequently endowing readily accessible energy during the course of the game (Russell et al., 2017).

Adequate protein intake from a balanced diet supports muscle repair, growth, and overall recovery, which is crucial for football players to build and maintain muscle mass (Philips et al., 2011). Protein intake before a match helps provide amino acids that can be readily available as a source of energy during the game (Tipton et al., 2004).

Concurrently, a requisite adherence to proper hydration emerges as a cornerstone, playing an instrumental role in preserving fluid equilibrium and forestalling dehydration's potential adverse effects ranging from dampened performance to an augmented perception of fatigue. An optimal uptake of fluids prior to and during the match is of paramount importance for football players (Maughan et al., 2016).

#### **2.4.5 Recommended dietary intake to delay and overcome fatigue symptoms**

Strategically planning pre-match nutrition is imperative for football players. Approximately 3-4 hours prior to the match, they should partake in a carbohydrate-rich meal, encompassing options such as pasta, rice, or potatoes. This culinary choice serves to bolster glycogen stores, thereby bolstering sustained energy reserves throughout the duration of the game (Stellingwerff, 2018). Augmenting the pre-match meal with measured protein content contributes amino acids essential for muscle upkeep and repair (Naughton et al., 2016). Notably, ensuring adequate hydration constitutes a crucial pre-match element. With the aim of optimal fluid balance, players should endeavour to consume around 500 ml of water or sports drinks approximately 2-3 hours prior to the commencement of the match (Maughan et al., 2017).

Amidst the unfolding match, partaking in carbohydrate-rich snacks or availing of sports drinks during halftime stands as a pertinent strategy. This proactive approach helps sustain blood glucose levels and concurrently forestalls the onset of fatigue (Kasper et al., 2019). An indispensable facet lies in replenishing electrolytes, including sodium and potassium, which are shed through perspiration. The restoration of these electrolytes is pivotal for sustaining proper muscle function and forestalling cramping (Tavares et al., 2018).

Following the match, expeditious replenishment of glycogen stores assumes primacy. Consumption of carbohydrate-rich foods or beverages within the initial 30-minute window post-game lays the foundation for the recovery process (Krustrup et al., 2016). The inclusion of protein within the post-match repast serves as a catalyst for muscle recovery and repair (Beelen et al., 2017). The key focal points for recovery-oriented dietary intake entail the replenishment of carbohydrate stores and the optimization of muscle protein synthesis, orchestrated through the timely administration of adequate protein (Res, 2014). Equally paramount is the restoration of fluid balance post-match to counteract fluid losses incurred through perspiration (Maughan et al., 2016).

The significance of dietary intake in influencing the fatigue experienced by football players is manifest. A judicious nutrition regimen before, during, and after the match constitutes a pivotal cornerstone for optimizing energy levels, augmenting endurance, and mitigating the vulnerability to injuries. Carbohydrates function as the principal fuel source for players, while protein assumes a pivotal role in facilitating muscle recovery and repair (Burke et al., 2011). Adequate hydration emerges as a linchpin for maintaining fluid equilibrium and fending off fatigue-inducing dehydration (Maughan et al., 2017). The adherence to the stipulated dietary intake guidelines affords football players the means to defer and surmount fatigue, culminating in an elevated performance trajectory and an overarching sense of well-being.

While fatigue is a common challenge among football players, the specific manifestations and underlying causes of fatigue symptoms in Ugandan football players may differ from those observed

in European counterparts. Factors such as climate, training intensity, dietary intake, and cultural practices can influence the experience of fatigue. By conducting research on fatigue symptoms in Ugandan football players, researchers can gain a deeper understanding of the factors contributing to fatigue, identify potential risk factors, and develop strategies to mitigate its impact on performance. This research would provide valuable insights for coaches, sports medicine professionals, and policymakers working to improve the well-being and performance of Ugandan football players.

## **2.5 Supplement usage among football players**

Supplementation becomes a requisite only under circumstances of inadequate diet or following the diagnosis of a deficiency, such as iron or calcium insufficiency. These deficiencies affect the performance of football players hence the need for supplements. Football, as a physically exacting sport, necessitates players to exhibit peak performance levels during arduous matches. To align with these rigorous requisites, football players frequently resort to dietary and energy supplements as a means of amplifying their performance, accelerating recovery, and mitigating fatigue. The focal intent of this literature review is to comprehensively delve into the spectrum of recommended energy supplements tailored for football players. It is designed to encapsulate their distinctive attributes and underscore their significance in magnifying performance capabilities and efficaciously managing the onset of fatigue.

An exemplar among these energy supplements is Creatine monohydrate, a compound that has undergone extensive scrutiny and gained popularity among athletes, including football players. Its potency lies in its capacity to augment energy production during bouts of high-intensity exertion. By replenishing adenosine triphosphate (ATP), the cellular epicentre of energy currency, Creatine monohydrate propels high-intensity exercise (Burke et al., 2004). It has been empirically substantiated to yield enhancements in strength, power output, and muscle mass among football players, ultimately translating into an elevated overall performance benchmark.

In the realm of performance augmentation, Caffeine emerges as a well-recognized stimulant, renowned for its potential to ameliorate focus, alertness, and endurance. Football players are prone to resort to caffeine supplementation as a catalyst for both cognitive and physical amplification during matches and training sessions (Graham et al., 1992). The veracity of studies underscores that moderate caffeine consumption can substantially retard the onset of fatigue and concomitantly heighten exercise performance, rendering it an asset of paramount worth for football players.

The amino acid Beta-alanine assumes a pivotal role in acid buffering within muscles during instances of high-intensity activities. Facilitated by an augmentation in muscle carnosine levels, Beta-alanine effectively stymies muscle fatigue, furnishing football players with the capacity to sustain peak performance over protracted time spans (Sale et al., 2009).

Meanwhile, Branched-Chain Amino Acids (BCAAs), encompassing leucine, isoleucine, and valine, emerge as indispensable essentials. Their scope extends to encompass muscle protein synthesis facilitation, attenuation of muscle protein breakdown, and facilitation of muscle recovery (Pennings et al., 2004). Football players often integrate BCAA supplementation as a measure to buttress muscular health, thereby circumventing the spectre of muscle fatigue and associated injuries.

In the context of energy provisioning, carbohydrates reign supreme for football players. In the realm of prolonged and strenuous physical activity, carbohydrates assume the mantle of a primary energy source. Their role extends to the replenishment of glycogen reserves within muscles (Burke et al., 2011). The strategic consumption of carbohydrates prior to, during, and post matches or training sessions aligns with the goal of sustaining energy levels and by extension, elevating performance capabilities (Burke et al., 2011).

### **2.5.1 Effect of supplements on football players' performance**

A substantial body of research has exhaustively delved into the realm of recommended dietary and energy supplements, with findings consistently underscoring their favourable impact on the performance of football players:

Exemplifying this impact, Creatine supplementation has emerged as a pivotal intervention, correlating with enhanced sprint performance and acceleration. This augmentation translates into an expanded coverage of ground and a heightened efficacy in executing explosive manoeuvres. Creatine supplementation has further manifested in amplified vertical jump heights, furnishing players with a distinct advantage for executing actions such as heading the ball and prevailing in aerial challenges (Burke et al., 2004).

In a parallel vein, the efficacy of Caffeine is demonstrably consequential. Evidential foundations substantiate its capacity to engender improvements in reaction time and the precision of decision-making (Graham et al., 1992; Smith et al., 2003; Nieuwenhoven et al., 2004). Such enhancements equip football players to render swift and meticulous judgments amidst the rapidity of high-tempo scenarios on the field.

The integration of recommended dietary and energy supplements delineates a pivotal role in engendering an elevation in the performance calibre of football players. This realm encompasses supplements such as Creatine, caffeine, beta-alanine, BCAAs, and carbohydrates, each underscored by empirical validation in augmenting endurance, strength, cognitive acuity, and overall performance. The spectrum of benefits is far-reaching, encompassing the amelioration of fatigue offsetting mechanisms. By virtue of endowing rapid energy replenishment, buffering lactic acid, replenishing glycogen reserves, and forestalling central fatigue, these supplements become powerful instruments in the arsenal of football players. The strategic and judicious incorporation of these supplements paves the way for players to unlock their performance potential and manifest as paragons of accomplishment on the field.

The use of supplements to enhance football players performance has become increasingly prevalent, but the evidence supporting their efficacy and safety varies widely. While some studies have investigated the effects of supplements on European football players, the unique physiological and environmental factors in Uganda necessitate a tailored approach. By conducting research on the use

of supplements among Ugandan football players, this research can evaluate the potential benefits and risks associated with different supplement types, identify any nutrient deficiencies that may be addressed through supplementation, and develop evidence-based guidelines for their use. This research would contribute to optimizing football player performance, minimizing health risks, and ensuring that Ugandan football players have access to safe and effective nutritional support.

## **CHAPTER THREE**

### **METHODOLOGY**

#### **3.0 Introduction**

This chapter presents the description of procedures related to; Research Design, Variables, Location of the study, Study Population, Sample Size and Sample Procedure, Research Instruments and Tools, Validity and Reliability, Data collection procedure, Data Analysis and Presentation and Ethical Considerations.

#### **3.1 Research design**

This study utilized a descriptive cross-sectional research design. Data collection occurred at a singular time point, and the researcher did not manipulate the variables. In the descriptive research design, the data related to the dietary intake and fatigue symptoms of football players was collected. The focus was solely on gathering football players' perspectives regarding their dietary intake and fatigue symptoms. A quantitative approach facilitated data collection and analysis, yielding numerical data that was subsequently subjected to applicable statistics.

#### **3.2 Variables**

The independent variables included the dietary intake, comprising of meal type, food combinations, and meal timing, along with the body composition of football players. On the other hand, the dependent variables included fatigue symptoms (muscle pulls, thirst, reduced flexibility, dizziness, reduced running speed).

#### **3.3 Location of the study**

The study was conducted within Kampala district, situated in the Central Region of Uganda. Positioned at coordinates 0.32 latitude and 32.58 longitudes, the city stands at an elevation of 1223 meters above sea level. Kampala is positioned to the north of Lake Victoria and is divided into five distinct divisions namely: Kampala Central, Kawempe, Makindye, Nakawa, and Rubaga. Kampala district was selected because this is where majority of the clubs in the Uganda Premier League are

based. Six out of the 16 clubs in the UPL are based in Kampala and the other 12 are distributed in other districts.

### **3.4 Study Population**

The target population comprised football players from teams within the Uganda Premier League. Specifically, out of the 16 clubs participating in the Uganda Premier League, six (6) clubs found in Kampala were selected using stratified sampling using a multi stage sampling technique. Each club consisted of 38 players each, implying a total of 608 football players. Additionally, eight (8) team managers from these six clubs were also selected using purposive sampling, contributing to a combined population count of 616 individuals.

### **3.5 Sampling procedure and Sampling size**

The selection of clubs for the study was carried out using multistage sampling. There are 16 clubs in the UPL distributed across the country. In the first stage, Kampala district with six clubs was selected as the primary sampling unit. In stage two, all six clubs in Kampala district were categorized based on their ownership that is, three institutionally-owned, two community-owned, and one privately-owned club in the UPL. Purposive sampling was further used to ensure representation from each ownership category. All 38 players from the six clubs were included in the study making a total of 228. In stage three, from the selected clusters (ownership types), purposive sampling was used to select the eight team managers to interview from the different clubs as shown in table 3.1.

The sample size was determined using a sample size calculator from calculator.net which uses the finite population formula. The 16 clubs in the UPL each having 38 players totalling up to 608 players. The confidence level was set at 95%, margin error at 5, the population proportion was set at 50 with a population size of 608. Therefore 236 participants were selected from 608 as shown in Table 3:1. The six clubs in the Kampala cluster presented 228 players when the eight managers are added, the total was 236 as recommended by the sample size calculator.

**Table 3.1 Sample size of the study**

<b>Content</b>	<b>Number</b>	<b>Type of sampling</b>	<b>Managers</b>	<b>Number selected</b>	<b>Type of sampling</b>
Total clubs in the UPL	16	Purposively considered all			
Kampala	6	Purposively included all the six clubs irrespective of their ownership	36	8	Purposive
Selection of players in different clubs (including both licensed and academy players)	No of players	Type of sampling	Managers	Number selected	Type of sampling
Club A (institutionally owned)	38	All included	8	2	Purposive sampling
Club B (institutionally owned)	38	All included	8	1	Purposive sampling
Club C (institutionally owned)	38	All included	4	1	Purposive sampling
Club D (communally owned)	38	All included	8	2	Purposive sampling
Club E (community owned)	38	All included	4	1	Purposive sampling
Club F (privately owned)	38	All included	4	1	Purposive sampling
<b>Total</b>	<b>228</b>		<b>36</b>	<b>8</b>	

**Source: Primary data**

### 3.6 Research Instruments and Tools

The main study instrument was a questionnaire used to generate data from football players. A key informant interview guide was also used to obtain key information from the team managers.

Anthropometric measurement and body composition of football players were determined by the Tanita bio-electric impedance analyser (BIA) machine.

#### 3.6.1 Questionnaire

The questionnaire (Appendix IV) comprised both structured and semi-structured questions and was divided into sections. It was designed to gather socio-demographic information about the football players, dietary intake (including common food types, meal timing, food frequency, and dietary diversity), and information regarding the experienced fatigue symptoms. The football players'

dietary intake was determined by the household dietary diversity scores (HDDS) (Section D in the questionnaire) tool (Swindale. A., & Bilinsky, P., 2006). The tool has a range of 0 to 10 food groups: (i) grains, white roots, and tubers, along with plantains; (ii) pulses (beans, peas, and lentils); (iii) nuts and seeds; (iv) dairy; (v) meat, poultry, and fish; (vi) eggs; (vii) dark green leafy vegetables; (viii) other vitamin A-rich fruits and vegetables; (ix) other vegetables, and (x) other fruits. If the respondent (football player) consumed any of the foods in the group in the previous 24 hours, he would be given a score of 1, and if not, the score would be 0. The scores were summed to obtain the total diversity score for each player. The DDSs were then categorized as follows: a dietary diversity score (DDS) of  $\leq 3$  groups indicated low diversity, 4-5 groups medium diversity, and a DDS of  $\geq 6$  groups was indicative of high dietary diversity (FAO & FHI 360, 2016). The questionnaire was validated through conducting a pilot study using some clubs from the FUFA Big League football competition.

### **3.6.2 Key informant interview guide**

Data was collected from team managers regarding their information on dietary intake and fatigue symptoms among football players. This interview guide (Appendix V) served to gather data concerning meal timing, causes of fatigue symptoms, and common fatigue symptoms experienced by football players. The tool was developed with consultations and guidance from the research supervisors. The interview was conducted during the Uganda Premier League Season of 2020/2021.

### **3.6.3 Tanita Bio-electric impedance analyser (BIA)**

For the assessment of football players' nutritional status, the Tanita scale (a bio-impedance analyser) was employed. This equipment enabled the determination of body mass index (BMI) and body composition parameters. The height of each participant was measured to the nearest 0.1 cm using a non-stretch tape measure placed against a wall. Subsequently, the respondents' age, sex, and height were inputted into the TANITA scale.

### **3.7 Validity and Reliability of the instruments**

#### **3.7.1 Validity**

The validation of the questionnaire was accomplished by having two supervisors review the questionnaire. Their scrutiny aimed to identify any potential issues of completeness and data collection errors. The assessment resulted in a content validity index of 0.9, aligning with the standard criteria for excellent content validity. An instrument displaying content validity should possess I-CVIs of 0.78 or higher (Shi, J., Mo, X., & Sun, Z., 2012).

To ensure the validity of the interview guide, a multi-step approach was adopted. Initial steps included discussions of the questions with research supervisors. Subsequently, the interview questions were subjected to rank ordering, a process involving the assessment of question importance. Questions of greater significance were positioned at the beginning of the interview, followed by those of lesser priority (Smith, Johnson & Lee, 2022).

The Tanita Bio-electric impedance analyser was validated because it was obtained from Japan and Tanita Corporation is known for making extremely high-quality electronic scales. It has also been used by Samounda & Langlet (2022) in their fat assessment study as they compared it to an x-ray.

#### **3.7.2 Reliability**

To establish questionnaire reliability, a pilot sample was pre-tested among football players in the FUFA Big League, the second division of Ugandan football, specifically within Kampala. These sample questionnaires were distributed to selected players, and their responses, reviewed by supervisors and peers, aligned with the study's objectives.

For the key informant interview guide, reliability was enhanced through member checking. Summarized findings were shared with the informants, whose feedback corroborated the accuracy and comprehensiveness of the collected data.

To ensure the reliability of the Tanita machine, an electric bio-impedance tool which was calibrated used to measure body composition, measures were taken. These included maintaining a stable power supply, cleaning the machine's plates, and ensuring that each player stood on the Tanita monitor barefoot. A secure electrical signal was transmitted from four metal electrodes through the feet to the legs and abdomen, solidifying the machine's reliability. The bio-impedance tool machine was used in a study about body fat assessment among the youth (Samounda & Langlet, 2022).

The researcher also gained proficiency in operating the Tanita body scale and conducted a pretest of the questionnaire with football players from the FUFA Big League. Additionally, the reliability of data collected via the Tanita scale and questionnaire guide was reinforced through the training of two research assistants. These assistants were oriented about the study's objectives and underwent three days of training, encompassing measurement procedures, data recording, and storage techniques.

### **3.8 Data collection procedure**

Data was collected in Kampala district through a survey. During data collection, participants were given clear explanations of the study's significance and their role as participants. The data from the football players was collected using a self-administered questionnaire which the researcher supervised and this took approximately 15-20 minutes per respondent.

Interviews were conducted after coaching sessions, with eight (8) team managers participating. The interviews lasted around 25-30 minutes each. Team managers were briefed about the research purpose, assured of confidentiality, and encouraged to provide candid responses. The collected interview data was hand written due to the preference of the interviewees. In the process of recording and analysing data, data was organized based on the study objectives.

Using TANITA bio-impedance machine data were collected data before football players engaged in training sessions. Players were instructed to empty their bladders and stand barefoot on the Tanita scale wearing only shorts and vests. Participants, who were barefoot, then stood on the TANITA

scale, which employed bio-impedance analysis. The scale provided readings of the participant's body mass index and total body fat percentage, which were duly recorded. The Tanita machine facilitated efficient and precise monitoring of body composition, ensuring rapid and accurate results. The research was conducted during the competitive season of the Uganda Premier League 2020/2021. The data was collected before the match to ensure all players were under the same condition without interference of external variables. This helped to ensure the validity of the data collected. Also, the football players had removed all heavy clothing and accessories. Recommendations were made for the football players to carry out the measurements before eating.

### **3.9 Data analysis and presentation**

Quantitative data underwent analysis employing SPSS Version 20, encompassing computations of frequencies, percentages, means, and standard deviations. Football player anthropometric and body composition measurements, timing of meals, occurrence of fatigue symptoms were analysed using these computations. To ascertain the potential association between dietary intake and fatigue symptoms (i.e., independence or correlation of variables), Chi-Square tests of association were conducted. A significance threshold of  $<0.05$  was established to assess statistical significance at 95% confidence level.

Qualitative data from key informant interviews was analysed using thematic analysis which involves identifying and analysing recurring themes or patterns in the data.

The data was presented in form of tables and graphs.

### **3.10 Ethical considerations**

An introductory letter from the Department of Sport Science at Kyambogo University (Appendix I) and approval from the TASO Review Board (Appendix II) protocol #TASOREC/034/2020-UG-REC-009 were obtained to authorize the study. The approval process also involved securing consent from the CEOs of the football clubs through email communication (Appendix IV). The

researcher personally visited the clubs to seek permission from club managers, coordinate schedules for participation, and seek the consent of football players (Appendix III).

Confidentiality and anonymity were guaranteed by emphasizing to participants that the collected data was solely for research purposes. Special index numbers were assigned to each club while collecting bio-impedance data, ensuring that identification of football players and clubs was only feasible for the principal researcher. This numbering system was also implemented in the questionnaires, adding an extra layer of confidentiality.

During interviews with team managers, the researcher documented key information from their responses to safeguard the identity of clubs, players, and team managers from anyone except the principal researcher.

## **CHAPTER FOUR**

### **RESULTS AND DISCUSSION**

#### **4.0 Introduction**

This chapter contains presentations, data analysis and discussion of data organized according to study objectives. The general objective of the study was to determine the relationship between dietary intake and fatigue symptoms experienced among football players during and after a match in the Uganda Premier League [UPL] in Kampala district. The four research objectives set up in chapter one is as follows;

1. To determine the nutritional status of football players in the Uganda Premier League clubs.
2. To examine the dietary intake of football players in the Uganda Premier League.
3. To determine fatigue symptoms commonly experienced by football players during and after matches in the Uganda Premier League.
4. To establish the relationship between dietary intake and fatigue symptoms of football players in the Uganda Premier League.

#### **4.1 Presentation of findings of the study**

In this chapter, the data analysis and discussion are organized according to the study's objectives.

The initial number of the study participants was 236 that was determined using a sample size calculator including both football players and team managers. Due to the dropout rate of some participants, data was collected from 214 participants as football players and eight team managers totalling to 222 participants. As a result, a response rate of 97% was achieved. The 14 football players that dropped out were with the Uganda national football team playing continental football. The outbreak of COVID-19 also posed challenges in accessing some football players.

**Table 4.1 Ownership of football clubs**

<b>Ownership</b>	<b>Number of clubs</b>	<b>Expected Participants</b>	<b>Actual Participants</b>
Institutional	3	114	109
Community	2	76	69
Private	1	38	36
<b>Total</b>	<b>6</b>	<b>228</b>	<b>214</b>

*Source: Primary data*

The data collection process involved distributing questionnaires to 214 football players. Data was collected using interviews with the eight team managers. Among the distributed questionnaires (a total of 38 per club), approximately 180 (84%) were fully answered and returned. Through the interaction with team managers from the different clubs, it was revealed that clubs owned by institutions had access to different resources like fields, had partnerships with different companies whereas teams owned by the community and private investors struggled to meet some dietary demands from the players.

#### **4.2 Socio-demographic information of football players**

This section presents the results and discussion derived from the collection and analysis of socio-demographic information to uncover commonalities among football players and team managers. The socio-demographic dimensions investigated encompassed football players' age, marital status, religion, dependents, number of dependents, and the years spent in education. The findings are shown in Table 4.2. This information was necessary to understand what influences the dietary intake of football players.

In relation to age, slightly more than half (57%) football players were between 21-25 years of age and the mean (SD) age of the football players was  $22\pm 2.9$ . This could be due to the fact Uganda Premier League clubs predominantly recruit football players from secondary schools and universities, as indicated by all team managers. The findings of the study relate with those of Karen

(2019), who stated that football players reach their peak performance in football at the age of 25-29 hence the Uganda premier league players are within the performing age of their football career.

**Table 4.2: Socio-demographic characteristics of the players**

<b>Characteristic</b>	<b>N (%)</b>
<b>Age of players (Years)</b>	
Mean (SD) age of players	22±2.9
16- 20	61 (29.6)
21-25	118 (57.3)
26-30	26 (12.6)
30+	1 (0.5)
<b>Marital status</b>	
Single	164 (79.6)
Married	28 (13.6)
Cohabiting	10 (4.9)
Widow	2 (1)
Divorced	1 (0.5)
Widow	1 (0.5)
<b>Religion</b>	
Moslems	81 (39.3)
Catholics	63 (30.6)
Anglicans	36 (17.5)
Born Again Christians	20 (9.7)
Humanity	4 (1.9)
SDA	2 (1)
<b>Players with dependents</b>	
Yes	126 (61.2)
No	80 (38.8)
<b>Number of dependents</b>	
Mean (SD) no. of dependents	1.45±0.7
1-3	84 (66.7)
4-6	27 (21.4)
7+	15 (11.9)
<b>Time spent in School</b>	
Mean (SD) no. of years spent in school	3.29±0.67
Primary dropout	2 (1)
Primary	20 (9.7)
Secondary	101 (49)
University	83 (40.3)

*Source: Primary data N= 214*

Also, Christopher and Emmanuel (2010) reported a mean age of 24.4 ( $SD\pm 4.1$ ) among 30 senior professional players. The recommended age of 24 years for a reserve minimum salary player in Major League Soccer USA. While in the Uganda Premier League, this has not yet been established. Table 4.2 further reveals that the majority 163 (76%) of football players were single, with 30 (14%) being married, and 11 (5%) in cohabiting relationships. This could be explained by the observation that majority of football players were young, 25 years and below.

A higher proportion of football players identified as Muslims 84 (39%) compared to Catholics 66 (31%). Data from interviews with team managers who revealed that many football players often attended Muslim and Catholic secondary schools.

With the majority of players (67%) having one to three dependents and a smaller subset (12%) supporting over seven dependents, socioeconomic responsibilities can significantly influence their engagement in football and dietary habits (Smith & Doe, 2020). High dependency rates may lead to increased financial strain, impacting both time commitment and resources available for optimal dietary intake.

Educational background further influences dietary and lifestyle choices among players. In this sample, 49% completed secondary school and 40.3% attained university education, suggesting a potential correlation between educational level and better health and nutrition practices (Johnson & Roberts, 2018). In contrast, the small proportion of primary school dropouts (1%) may face more significant socioeconomic challenges that affect career development and health management within their football careers (Brown & Green, 2019).

A notable observation from the socio-demographic data of Uganda Premier League (UPL) team managers is the significant gender disparity. The overwhelming majority of managers are male, with only two females holding such positions. This stark imbalance reflects broader societal gender roles and opportunities in Uganda, where women are often underrepresented in leadership positions, particularly in male-dominated sports like football.

#### 4.2.1 Socio demographic information of Team managers

**Table 4.3: Socio demographic information of team managers**

Characteristics	N(%)
<b>Gender</b>	
Male	6
Female	2
<b>Age</b>	
20-25	-
26-30	1(12.5)
31-35	4 (50)
40+	3(37.5)
<b>Qualification level</b>	
Certificate	1(12.5)
Diploma	3(37.5)
Degrees	4(50)
Masters	-

*Source: primary data N= 8*

In terms of age, the UPL managers appear to be relatively young, with a significant proportion falling within the 31-35 age range. This suggests a preference for younger, potentially more energetic and innovative individuals to lead teams. However, it's important to note that a diverse age range among managers can bring a wealth of experience and different perspectives to the role.

The educational qualifications of UPL managers are varied, with degrees and diplomas being the most common. Notably, no manager holds a master's degree, which might indicate a potential gap in higher-level strategic thinking and leadership skills. While a degree or diploma can provide a solid foundation, advanced qualifications can equip managers with a broader range of tools and knowledge to navigate the complexities of modern football management.

### **4.3 Interviews with team managers**

In a series of interviews with eight team managers from six different football clubs, insights were gathered on the nutritional practices and challenges faced in supporting player performance. The clubs represented a mix of institutional ownership, community initiatives, and private investments driven by a passion for football.

The team managers shared that their primary source of talent comes from secondary schools and universities, with many players scouted during national competitions and university leagues. "We often rely on the talent coming from schools; it's where we find many of our players," one manager explained. Despite their responsibilities in overseeing various club activities, including player development, they highlighted challenges in accurately measuring players' body composition. "We only measure weight because we lack the necessary equipment and personnel to assess body composition properly," stated another manager.

When discussing dietary provisions, managers from institutionally owned and privately owned clubs mentioned that they could only provide meals on match days. Foods typically offered included maize products, matooke, wheat, meat, beans, groundnuts, vegetables, and fruits like bananas and watermelon. However, they noted that the contracted hotels were responsible for meal selections, as they lacked professional nutritionists on their technical teams. "The chefs don't always consider what our players need to maintain energy levels during matches," one manager remarked.

In contrast, community club managers expressed greater difficulties in providing adequate dietary intake due to financial constraints. "Funds are not always readily available, which limits our ability to meet players' nutritional needs," one community manager stated. Despite these challenges, all managers ensured that players had a meal at least one hour before games and provided snacks and fruits during matches whenever possible.

When asked about the relationship between diet and performance, all managers acknowledged that they believed diet plays a crucial role. However, they admitted to lacking the knowledge or skills to optimize their players' diets for better performance. Six of the eight managers specifically requested that the football governing body organize training courses to help them better understand nutrition's impact on player performance.

Regarding the causes of fatigue symptoms among players, the managers unanimously identified inadequate rest as the primary issue. "Due to low pay, many players have to work jobs at night after training during the day, which really limits their recovery time," one manager explained. They also noted that sexual activity was discouraged, especially in the two weeks leading up to matches, to help maintain fitness levels. Additionally, players often struggled with poor dietary choices due to poverty and a lack of guidance from dietitians.

The managers described various fatigue symptoms observed in players, including slow running, frequent muscle pulls, constant thirst, misplaced passes, and unforced errors. "We often see players struggling to recognize teammates or experiencing stitches, especially those on the wings," said one manager. They agreed that rest was the best remedy for fatigue but had mixed opinions on the role of diet in recovery. While six managers felt that diet could expedite recovery, two were sceptical, believing that a player's fitness was more crucial. Nonetheless, strategies were in place to ensure adequate hydration and the availability of fruits like bananas and watermelon during matches.

Three of the eight managers reported providing energy drinks, such as Riham Rock Boom, Sting, and Red Bull, based on player preferences. Two managers from institutional clubs also noted that they offered chocolates, apples, and snacks during the matches to ensure players received sufficient calories to sustain their performance.

#### **4.4 Nutritional status of football players**

The nutritional status of the football players was assessed through anthropometric measurements and body composition analysis. Anthropometric measurements were conducted based on height,

weight, and Body Mass Index (BMI). The body composition of the football players was determined by assessing parameters such as fat percentage, fat mass, free fat mass and total body water. The results of these assessments are presented in Table 4.3.

As shown in Table 4.3 the average height of the football players was  $173.3 \pm 6$  cm, with the majority (58%) falling within the height range of 171-180 cm. Only two (2%) football players had a height of 190 cm or more. Comparative analysis demonstrated that Uganda Premier League football players were on average shorter than those in the French Ligue One players, whose mean (SD) height was  $182.1 (\pm 5.8)$  according to Christopher et al., (2010). This height could affect their performance in football especially in aerial duels with other clubs on the continent who select taller football players.

The mean weight of football players was  $70.1 \pm 6.9$  kg, with more than half (54%) weighing between 61-70 kg. Only two football players weighed above 90 kg in weight. Comparatively, UPL football players had a lower mean weight in comparison to French Ligue One football players whose mean (SD) weight was  $76.8 (\pm 5.8)$  (Christopher et al., 2010), as well as football players in the United Kingdom whose mean (SD) weight was  $83.2 (\pm 7.5)$  (Sutton et al., 2009). Team managers revealed that the body weight of football players was unmonitored throughout the season. They highlighted lack of equipment in the clubs and personnel to periodically carry out the body weight tests.

The average Body Mass Index (BMI) of football players was  $23.3 \pm 1.8$ . The majority 186 (87%) had a normal BMI, while 26 (12%) were overweight or obese (combined), with only one player identified as underweight. These findings were consistent with prior studies on elite football players from Iran, where football players exhibited a BMI of  $23.25 \pm 1.4$ , and the Bundesliga, where BMI was  $23.2 \pm 1.1$  (Bloomfield et al., 2005). This BMI relates to their training routine where team managers emphasized that the football players train physically hard for different games they play. This could be resulting from intense physical training football players in the Uganda Premier League go through.

**Table 4.4: Anthropometric Measurements and Body Composition of Players**

<b>Body component</b>	<b>N (%)</b>
<b>Height of the players</b>	
Mean (SD) height of players	173±6.0
150-160 cm	7(3.4)
161-170 cm	61(29.6)
171-180 cm	119 (57.8)
181-190 cm	17(8.2)
191cm+	2 (1)
<b>Weight of the players</b>	
Mean (SD) weight of players	70.1±6.9
50-60 kg	11(5.3)
61-70 kg	111(53.9)
71-80 kg	70(34)
81-90 kg	12(5.8)
91kg +	2(1.0)
Mean age (years) of players	22±2.9
<b>Body Mass index (kg/m<sup>2</sup>)</b>	
Mean (SD) BMI	23.3±1.8
≤ 18.49 (underweight)	1(0.5)
18.50-24.99 (normal)	180(87.4)
≥ 25.00 (Overweight and obese)	25(12.1)
<b>Body composition of the players</b>	
	Mean (SD)
Fat percentage	9.2 ±3.7
Fat mass	7.0 ±7.2
Free fat mass	62.8 ±8.5
Muscle mass	59.5 ±5.9
Total body water	44.8 ±4.1

*Source: Primary data N=214*

The study findings revealed that the average fat percentage of football players was 9.2±3.7, which meets the recommended range of 6%-13% for optimal performance (National Strength and

Conditioning Association, 2017; Fletcher, 2020). However, this fat percentage was lower than that observed in Montenegrin players  $10.15 \pm 2.68$  (Gaardasevic et al., 2019). The emphasis on a leaner body composition among Uganda Premier League football players by team managers reflects their preference for enhancing agility, speed, and overall performance. Reduced nonessential body fat is known for its positive effects on muscular and cardiorespiratory endurance among football players. According to the interviews with all eight team managers, consideration of football players' body composition in scouting is examined with differing preferences for playing positions. Goalkeepers possessing a higher proportion of fat tissue were preferred, while outfield football players were sought after for their lean body builds, contributing to the agility and strength demanded by their respective roles. Hillman (2019) football players occupying endurance centric positions such as wings need to maintain low body fat.

Notably, only three out of six clubs conducted anthropometric measurements at the start of the season, with only two-thirds of the clubs consistently monitoring players' nutritional status and body composition throughout the season. This trend could be explained by the lack of professional sports scientists on technical teams of clubs in Uganda Premier League.

#### **4.5 Dietary intake of football players**

The study examined when football players ate their meals, consumed fluids, and took supplements. Furthermore, it looked at football players' meal habits by considering how often they ate at specific times and how diverse their diets were.

##### **4.5.1 Meal types among the football players**

The research investigated meal types of football players in the Uganda Premier League. Football players' meal patterns were investigated to determine whether their meal types promoted performance. The meal types investigated included three main meals of the day that is breakfast, lunch and supper including snacks. The findings are presented in Table 4.4.

Malcom (2014) a football player's diet is as important as their first touch on the ball. A significant portion of players maintained regular meal habits, with breakfast (88%), lunch (98%), and supper (84%) being the dietary mainstays throughout the week. Additionally, 36% of football players included daily snacks in their dietary routines. Currell et al., (2018) consumption of sports drinks and easily digestible snacks help to maintain football players' energy levels throughout the match. Clubs were reported by all team managers to provide breakfast and lunch on both match and training days, while the players managed their supper. This arrangement might have an impact on their glycogen reserves and the onset of fatigue symptoms.

Nearly all (98%) of the football players received lunch from their clubs, which aligned with the prevalent afternoon scheduling of most Uganda Premier League matches. This practice followed guidelines that suggested breakfast for midday matches, lunch for late afternoon games, and early dinner for fixtures occurring in the late evening. Burke et al., (2019) football players need periodized and pragmatic dietary plans endorsed by sports nutrition experts to enhance their performance.

**Table 4.5: Meal Types of Football Players**

<b>Meal</b>	<b>Frequency in a Week</b>				
	<b>Daily n (%)</b>	<b>4 days n (%)</b>	<b>3 days n (%)</b>	<b>Once n (%)</b>	<b>Never n (%)</b>
Breakfast	181 (87.9)	12 (5.8)	12 (5.8)	1(0.5)	0
Lunch	201 (97.6)	4 (2.4)	0	0 (0.0)	0
Supper	173 (84.0)	19 (9.2)	10 (4.9)	0 (0.0)	4(1.9)
Snacks	74 (35.9)	50 (24.3)	48 (23.3)	9(4.4)	25(12.1)

**Source: Primary data N=214**

However, interactions with the team managers revealed that club chefs prepared the football players meals without adequate consideration for the energy requirements of football players in relation to the caloric content of the food. This was in contrast with Burke et al., (2019) football player dietary plan needs to collaboratively developed with a coach and endorsed by a sports nutrition expert. This oversight could affect the players' energy needs and actual nourishment, potentially contributing to

fatigue symptoms. All eight team managers revealed that the clubs did not have the capacity to monitor of meal types of football players due to socio economic factors. Furthermore, six of the eight team managers stated that the catering departments within Uganda Premier League clubs lacked professionals certified in sports nutrition, creating a significant gap in the comprehensive nutritional support provided to football players.

#### **4.5.2 Food Consumption Frequency**

The research focused on how often Uganda Premier League football players ate different types of foods and their intake of nutrients. Here are the key findings has shown in Table 4.5.

Regarding carbohydrate intake, the study found that maize and its products were the most commonly consumed sources, with 58% of football players reporting daily consumption. Wheat and its products were consumed by 50% of players, while millet and sorghum had the lowest daily consumption at 11%. This preference for maize over wheat and sorghum might be due to cultural factors in the Kampala context. Carbohydrates enhance glycogen reserves in muscles hence elevating endurance and overall performance of football players (Acten et al., 2016). On average, 74 out of 214 (35%) football players consumed carbohydrates daily. This could be the reason majority of football players in the Uganda Premier League were affected by fatigue symptoms as few of them consumed carbohydrates daily.

In terms of protein, beans and peas were the primary sources, reported by 71% of players. Milk and eggs were also popular choices. This aligns with Drewnowski's (2010) study, which identified eggs, dry beans, and legumes as cost-effective protein sources, possibly explaining their high consumption. Fish and pork had the lowest daily intake, potentially due to higher costs for fish and religious prohibitions against pork consumption (stemming from Islamic and SDA faiths). Table 4.5 reveals that few football players consumed fish which is locally expensive. Proteins are essential in muscle repair and growth (Philips, 2017). On average 87 out of 214 (41%) football players consumed proteins daily. This trend limits the ability of the football players to recover from fatigue

symptoms as proteins play a key role in preventing muscle breakdown during strenuous physical activity like playing football (Philips, 2017).

Fruit consumption predominantly consisted of fruit juices, bananas, and watermelons as daily staples, while pineapple had the lowest daily intake. Bananas and watermelons were popular due to their readily availability and traditional use as refreshments during and after football matches.

Most players (69%) limited their fat intake (butter or cheese) to manage their weight and maintain an optimal physique for better performance. Fats are a dense source of energy during prolonged physical activity like football matches; the body relies on stored fat as an energy source, helping football players maintain their stamina (Jeukendrup & Gleeson, 2019).

The lack of planned and monitored dietary plans of football players in the Uganda Premier League makes it hard for football players to utilize the benefits of fats. Furthermore, Omega-3 fatty acids found in fish and flaxseed have anti-inflammatory properties. Inflammation can impair recovery and performance, making these fats beneficial (Calder, 2017).

Majority (89%) of football players reported daily water consumption to control dehydration and fatigue symptoms. Proper hydration during matches helps prevent dehydration (Maughan et al., 2018). Hydration is essential for post-exercise recovery. It aids in the removal of waste products from muscles and helps transport nutrients to muscles for repair and growth (Burke et al., 2007). On average 189 out of 214 (88%) football players hydrated daily in the Uganda Premier League. Three team managers revealed that they get sponsorship from water companies who provide water during match days and training sessions. Also, water is cheap and readily available to all football players in the Uganda Premier League. Uganda having a tropical climate could also contribute to the high rate of water consumption.

**Table 4.6: Players' Food Frequency Intake per week**

Food groups	Food Frequency per week				
	Daily n (%)	5-6/week n (%)	2-4/week n (%)	Once/week n (%)	Rarely/never n (%)
<b>Starchy grains &amp; roots</b>					
Sweet potatoes	72 (35)	12 (5.8)	12 (5.8)	45 (21.8)	65 (31.6)
Irish potatoes	85(42.3)	15(7.3)	10(4.9)	39(18.9)	57(27.7)
Maize & products	120(58.3)	12(5.8)	18(8.7)	24(11.7)	32(15.5)
Millet/Sorghum	22(10.7)	4(1.9)	12(5.8)	13(6.3)	155(75.2)
Wheat & products	103(50)	13(6.3)	9(4.4)	10(4.9)	71(34.5)
Yams	40(19.4)	7(3.4)	12(5.8)	32(15.5)	115(55.8)
Cassava	70(34)	14(6.8)	16(7.8)	34(16.5)	72(35)
Sugarcane	83(40.3)	10(4.9)	17(8.3)	28(13.6)	68(33)
<b>Protein (Plant and Animal) foods</b>					
Beans/peas	146(70.9)	16(7.8)	18(8.7)	13(6.3)	13(6.3)
Ground nuts	92(44.7)	8(33.9)	17(8.3)	30(14.6)	59(28.6)
Beef/goat/mutton	93(45.1)	14(6.8)	28(13.6)	35(17)	36(17.5)
Pork	9(4.4)	-	8(3.9)	23(11.2)	166(80.6)
Chicken	67(32.5)	10(4.9)	22(10.7)	60(29.1)	47(22.8)
Eggs	122(59.2)	20(9.7)	22(10.7)	26(12.6)	16(7.8)
Fish	48(23.3)	6(2.9)	29(14.1)	54(26.2)	69(33.5)
Milk	135(65.5)	12(5.8)	13(6.3)	16(7.8)	30(14.6)
Yoghurt	74(35.9)	10(4.9)	22(10.7)	26(12.6)	74(35.9)
<b>Fruits and fruit juices</b>					
Fruit juice	140(68)	16(7.8)	18(8.7)	9(4.4)	23(11.2)
Passion juice	123(59.7)	13(6.3)	10(4.9)	17(8.3)	43(20.9)
Watermelon	101(49)	8(3.9)	19(9.2)	33(16)	45(21.8)
Pineapple	58(28.2)	7(3.4)	21(10.2)	26(12.6)	94(45.6)
Bananas	136(66)	11(5.3)	15(7.3)	19(9.2)	25(12.1)
Mangoes	74(35.9)	11(5.3)	26(12.6)	25(12.1)	70(34)
<b>Vegetables</b>					
Green vegetables	110(53.4)	10(4.9)	16(7.8)	23(11.2)	47(22.8)
Carrots	90(43.7)	17(8.3)	8(3.9)	28(13.6)	63(30.6)
Salads	80(38.8)	10(4.9)	15(7.3)	26(12.6)	75(36.4)
Pumpkin	45(21.8)	7(3.4)	16(7.8)	27(13.1)	111(53.9)
<b>Fats (Butter/cheese)</b>	34(16.5)	1(0.5)	9(4.4)	19(9.2)	143(69.4)
<b>Water</b>	184(89.3)	6(2.9)	3(1.5)	1(0.5)	12(5.8)

*Source: Primary data N=214*

These findings emphasize the need for comprehensive nutritional counselling and appropriate dietary planning to optimize match-day performance. According to FAO guidelines (2021), football players should progressively increase carbohydrate intake as match day approaches, following initial depletion in the preceding days of the week. However, the study indicates a deviation from this strategic dietary approach among Uganda Premier League football players as all team managers reported they do not practice carbo loading.

#### **4.5.3 Timing of football players' meals**

The research assessed the timing and dietary intake of football players, focusing on meals before, during, and after matches. The dietary intake of football players includes carbohydrates, proteins, fats, vitamins, water, and minerals. Additionally, they use supplements like energy drinks, carbohydrate-based snacks, and protein sources to enhance their nutrition during matches. The study findings are shown in Table 4.7.

Before the match, the study found out that only 42 (20%) of football players ate a balanced diet. A balanced diet is important for football players as it provides the necessary carbohydrates, fats, and proteins for energy during training and matches (Burke et al., 2011), supports muscle repair and growth (Philips et al., 2011), and aids in mental focus (Kennedy 2016). Some football players, accounting for 69 (36%) consumed carbohydrates, proteins, and water. About 61 (30%) of players had only carbohydrates and proteins. Naughton et al., (2016) recommended a pre-match meal with proteins as the amino acids are essential for muscle up keep and repair.

Contrary to the belief that a carbohydrate-rich meal the day before a match is sufficient, research by Malcom (2014) suggests that footballers actually benefit from a high-carbohydrate meal 3-4 hours before the match (Bettonviel et al., 2019). A few 10 (5%) of football players preferred to have a snack before the match. Couto et al., (2018) a pre match snack 30 minutes to one hour before the match bolsters energy levels and enhances performance. Only three (1 %) football players consumed energy drinks, while 21 (10%) football players opted for fresh fruits before the match. However, many Uganda Premier League football players miss out on these benefits due to financial

constraints, personal food tastes and preferences, and the lack of sports nutrition guidance from sport nutrition experts. This lack of proper nutrition significantly affects their energy levels and overall performance when they are playing football.

**Table 4.7: Players’ Dietary Intake before, during and after the match**

	Before	During	After
<b>Meal/snack</b>	<b>n (%)</b>	<b>n (%)</b>	<b>n (%)</b>
Balanced diet	42 (20.4)	-	17 (8.3)
Carbohydrates protein & water	69 (33.5)	-	-
Carbohydrates & protein	61 (29.6)	-	-
Snack	10 (4.9)	-	-
Energy drink&/juice	3 (1.5)	1 (0.5)	14 (6.8)
Fresh fruits	21 (10.2)	33 (16)	16 (7.8)
Fruits & water	-	64 (31.1)	51 (24.8)
Water	-	80 (38.8)	67 (32.5)
Water & glucose	-	12 (5.8)	13 (6.3)
Snack and water	-	5 (2.4)	28 (13.6)

*Source: primary data N=214*

From the Table 4.7, the football players intake of water was limited. This was in contrast with Maughan et al., (2017) who found out that football players should consume 500ml of water two to three hours before the match. This could be attributed to fear of getting stitches during the match.

During the match, majority 80 (39%) of the football players drunk plain water while 64 (31%) combined water with fruits. This aligned with Tavares et al., (2018) recommendation of replenishing with electrolytes including sodium and potassium which are vital in proper muscle function and forestalling cramping. Kasper et al., (2019) football players need carbohydrate rich snacks or sports drinks during half time.

A minority 5 (2%) snacks and water, one football player took energy drinks. This trend could be due to the limited nutrition guidance football players and club managers. The appropriate nutrition for football players is a challenge to most clubs especially community and individual owned clubs due to socio economic factors as they find it expensive to provide appropriate sports drinks and snacks during the match.

After the match, Table 4.6 reveals that majority 67 (33%) of the football players opted for plain water, 57 (27%) of the football players consumed water with a fruit, 28 (14%) of the football players had a snack with water. Krstrup et al., (2016) football players should consume carbohydrate rich foods or beverages 30 minutes after the match to help in the recovery process. A minority 17 (8%) of the football players had a balanced diet after the match. This is common with institutionalized clubs which are funded from the government or mega companies. One out of the eight team managers reported providing an appropriate meal for the football players after the match. Beelen et al., (2017) inclusion of protein with a post-match meal serves as a catalyst for muscle recovery and repair. Majority of the football clubs could not enforce this due to the absence of sports nutrition experts and limited funds available in privately owned and community owned clubs.

#### **4.5.4 Football players' dietary strategy on match days**

This involves examining the dietary choices and preparations made by football players concerning their performance during matches.

The research provided insight into the nutritional provisions and protocols operational on match days. Team managers stated that they distributed fluids and energy biscuits to football players during the halftime break. Additionally, glucose and water bottles were strategically stationed around the field, ensuring easy access by football players. The dietary intake was further enriched with the inclusion of fruits such as bananas, watermelons, and apples, concurring with the football player's dietary intake during matches. However, an undertone surfaced, indicating football players' personal responsibility for monitoring their dietary behaviours throughout game play.

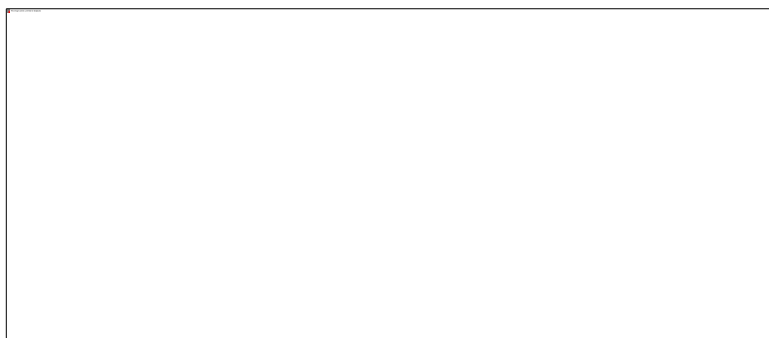
During the interviews, all team managers reported that they provided guidance to football players about their nutrition. They claimed to advocate for consumption of a comprehensive meal approximately 30 minutes post-match. This directive resonates with the recommendations of ingesting a carbohydrate-rich meal following match culmination, aligning with the precepts

advanced by Williams and Serratosa (2006) concerning optimal meal timing contingent upon match schedules.

The research findings revealed an oversight within Uganda Premier League clubs. All Team managers admitted that they were not conversant with the concept of carbohydrate loading hence it was largely disregarded in the build-up to consequential matches. Malcom (2014) recommended that football players need to deplete their energy reserves during the initial two days of the week followed by a gradual augmentation of Carbohydrate intake as match day approaches. Carbohydrate loading involves deliberate consumption of substantial carbohydrate quantities (approximately 8-10 g per kg of body weight per day) to augment muscular glycogen reserves, as advocated by Nutrition for Football (2010). Regrettably, this strategic nutritional modality was not used within Uganda Premier League clubs, with training sessions remaining uniform irrespective of forthcoming match importance based on responses from the interviews with team managers. This could be due to limited workshops and access to nutritional guidance material that football players and team managers could use.

#### **4.5.5 Nutritional supplements intake by the football players on match days**

The research investigated the use of nutritional supplements among football players. The key findings are as follows:



***Fig 4.1: Football Player's Nutritional Supplement Intake***

***Source: Primary data***

Some football players (28%) admitted to using nutritional supplements to improve their performance. This might suggest that they are vulnerable to experiencing reduced energy levels and are seeking additional support as a result.

Most football players 155 (72%) did not use nutritional supplements; while a smaller group 60 (28%) mentioned using them only on match days. This aligns with research done by Muwonge et al., (2017) which found low usage of nutritional supplements among Ugandan athletes. This consistent trend is caused by expensive nutritional supplements and low salary earned by football players.

Before the match, most 13 (22%) of football players consumed Sting Gold Rush followed by Riham Rock Boom with 11 (18%) football players. Surprisingly one football player reported using weed before the match. Grgic & Mukulic (2018) noted that caffeine in energy drinks improves endurance performance helping football players maintain their energy levels throughout the match. The few football players who consumed energy drinks could have this perspective in order to perform well. The intake of Sting Gold Rush and Riham Rock Boom is due to the excessive advertisement and availability on the market. They are also cheap hence football players can afford them. The limited use of energy drinks before the match however is caused by team managers. All eight reported discouraging football players from using energy drinks before the match.

**Table 4.8: Energy drink intake of football players**

<b>Energy drinks</b>	<b>Before N (%)</b>	<b>During N (%)</b>	<b>After N (%)</b>
Sting Gold Rush	13(21.7)	1(1.7)	6(10)
Riham Rock Boom	11(18.3)		16(26.7)
Red Bull	8(13.3)		7(11.7)
Lucozade	7(11.7)	2(3.3)	6(10)
RihamX Play	3(5)		1(1.7)
Power play	9(15)		7(11.7)
Kirungi Kazi	2(3.3)		
<b>Weed</b>	<b>1(1.7)</b>		<b>2(3.3)</b>

*Source: Primary data N=60*

During the match, few football used energy drinks as 3 (5%) consumed lucozade. Alford et al., (2001) found out some energy drinks contain simple sugars that can provide a rapid source of energy during short breaks or half-time. The consumption of lucozade fits the argument because it's made out of natural fruits. Lucozade is used by few players because it is very expensive compared to other energy drinks. The low usage of energy drinks during the match can be based on socioeconomic factors affecting football players and privately owned clubs and community clubs faced with financial constraints.

After the match, the outstanding energy drink used by 16 (27%) of football players was Riham Rock Boom. Energy drinks with added electrolytes and carbohydrates can aid in post-match recovery by replenishing lost fluids and glycogen stores (Desbrow et al., 2018). Football players highly consumed Riham Rock Boom because it is marketed as a drink that restores lost energy. This explains why football players who take energy drinks opted for it. It is also cheap.

The results revealed that football players used energy drinks sparingly during matches, underscoring the significance of thorough hydration plans before, during, and after games. This underscores the requirement for improved nutritional advice to enhance performance and lessen fatigue. Offering football players personalized diet plans and educational materials about wise nutritional decisions could have the potential to greatly enhance their performance on the field and their overall well-being.

#### **4.6 Fatigue symptoms experienced by football players**

The study explored the fatigue symptoms experienced by football players during and after matches. These symptoms were assessed as signs of mild and severe fatigue, including issues like headaches, fever, thirst, muscle weakness, muscle strains, reduced running speed, and decreased flexibility. The discussion about fatigue symptoms was organized based on when they occurred, either during or after the match. Some fatigue symptoms occurred in periods, during the match and in the post-match phase. It becomes clear that fatigue has a negative impact on both physical and psychological

performance, primarily by depleting the glycogen stores needed for energy, which are closely linked to the players' diets.

The research reveals a variety of fatigue symptoms that affect football players during matches and afterward. These symptoms are significant as they can greatly impact overall performance and the football players' well-being. It is important to emphasize that careful dietary choice and effective nutritional strategies can play a crucial role in reducing the impact of fatigue. This, in turn, can enhance both physical and psychological performance during matches and aid in the players' recovery after these engagements.

#### 4.6.1 Periods when football players experience fatigue symptoms on match days

The study focused on understanding how dietary intake, fatigue symptoms, and player performance are interconnected, particularly in relation to different match situations and recovery after matches. The main findings are presented in Table 4.9.

**Table 4.9: Periods when Players experienced Fatigue Symptoms on match day**

Fatigue symptom	During the match	After the match	During & After the match
	n (%)	n (%)	n (%)
Dizziness	5(2.7)	35(18.8)	4(2.2)
Muscle pulls	18(9.7)	47(25.3)	8(4.3)
Stitches	13(7)	18(9.8)	-
Body weakness	16(8.6)	98(52.7)	9(4.8)
<b>Thirst</b>	<b>42(22.6)</b>	<b>67(36)</b>	<b>33(17.7)</b>
<b>Reduced Running speed</b>	<b>53(28.5)</b>	<b>32(17.2)</b>	<b>16(8.6)</b>
Heavy body	36(19.4)	54(29)	18(9.8)
Reduced flexibility	26(14)	44(23.7)	14(7.5)
Muscle soreness	6(3.2)	58(31.2)	10(5.4)

*Source: primary data N= 186*

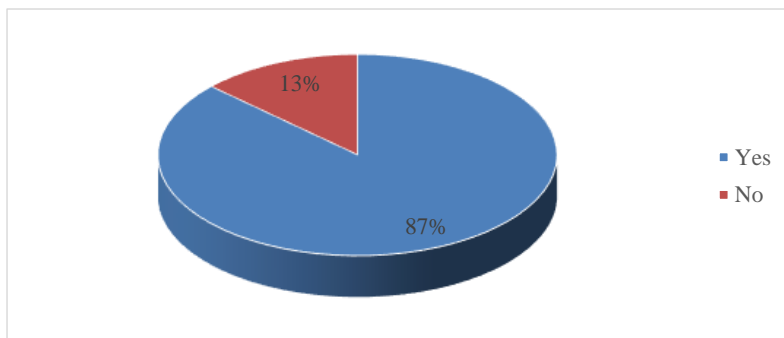
During the match, the study revealed that during the match football players 53 (29%) were highly affected by reduced running speed. This was followed by thirst with 42 (23%) of the football players. Ric et al., (2017) found that football players face a challenge of preserving tactical acumen

and rendering strategic choices due to cognitive fatigue. Fatigue impairs and affects effective communication and coordination among football players (Harder et al., 2021). In contrast, only five (3%) football players reported being affected by dizziness a fatigue symptom related to cognitive fatigue. The occurrence of these fatigue symptoms during the match can be attributed to the fact that only 20% of the football players reported having a balanced diet before the match.

After the match, body weakness affected majority 98 (80%) of the football players. Thirst was in second position affecting 67 (47%) of football players. Muscle soreness 58 (78%) and heavy body 54 (50%) also affected a significant number of football players after the match. This related with the findings of Malone et al., (2018) fatigued muscles contribute to faulty movements and heightened vulnerability of football players to injuries. This could be to the dietary intake of football players in the Uganda Premier League has inadequate food nutrients to counter fatigue symptoms. It was found out that only 8% of football players had a balanced diet after the match. This could be due to socio economic factors affecting the privately owned and community owned clubs and some few institutional clubs.

Some fatigue symptoms affected football players during and after. Girard et al., (2016) found out that football players show sensations of heaviness, soreness and general discomfort during and after the matches. This was observed in the study findings with 18 (17%) of the football players being affected by heavy body. Muscle soreness affected 10 (14%) of the football players. However, the dominant fatigue symptom that affected football players during and after the match was thirst. Thirst affected 33 (23%) football players during and after the match. This trend can be attributed to tropical climate and most matches being played in the afternoon. The research findings highlighted a significant occurrence of fatigue symptoms among football players. Specifically, a substantial majority (87%) of football players experienced fatigue symptoms. In contrast, a minority of 27 (13%) of football players were exceptions, as they did not encounter such fatigue-related challenges. Football players encounter fatigue symptoms which influence their performance due to football's physiological and psychological demands (Polito et al., 2017). Uganda Premier League football

players are faced with fatigue due to their unplanned dietary intake, playing environment and socio-economic factors affecting individual football players and clubs.



**Fig 4.2: Percentage of Football Players who experience Fatigue Symptoms**

**Source: Primary data**

The research results not only highlight the widespread occurrence of fatigue symptoms among football players but also underscore the crucial role of diet in either causing or alleviating the undesirable effects of fatigue. It is a complex situation where dietary balance emerges as a challenging yet essential tool, capable of influencing the balance between strong performance and the risk of falling into fatigue's grip.

#### **4.7 Relationship between Dietary Intake and Fatigue Symptoms reported by Football Players**

This research focused on exploring the relationship between dietary choices and fatigue symptoms in football players within the Uganda Premier League. By examining the impact of balanced pre-match diets and snacks, the study investigated a range of fatigue symptoms experienced by players, including dizziness, muscle strains, body weakness, stitches, thirst, reduced running speed, feeling physically heavy, decreased flexibility, and muscle soreness. The main hypothesis centred around the crucial question of whether there is a significant relationship between dietary intake and the occurrence of fatigue symptoms.

Football players who followed a balanced diet before the match were less likely to experience fatigue symptoms during and after the game compared to those who relied on snacking. However, this statistically significant correlation was only evident in the context of muscle strains ( $p = 0.031$ ), as explained in Table 4.10. While a comprehensive statistical link between dietary intake and the

full range of fatigue symptoms was not established, a noticeable trend did emerge. Specifically, players who adopted a balanced pre-match diet tended to have a reduced likelihood of encountering fatigue symptoms during and after the match, as supported by the insights provided in Tables 4.10 and 4.11.

**Table 4.10: Dietary Intake before the match and Fatigue Symptoms during and after the match**

<b>Fatigue symptoms</b>	<b>During the match n (%)</b>	<b>After the match n (%)</b>	<b><i>P-Value</i></b>
<b>Dizziness</b>			
Balanced diet	1 (0.5)	4 (2.3)	0.979
Snack	8(4.3)	31(16.7)	
<b>Muscle-pull</b>			
Balanced diet	0 (0.0)	18 (9.7)	0.031*
Snack	18(9.7)	43(23.1)	
<b>Body weakness</b>			
Balanced diet	1 (0.5)	22 (11.8)	0.171
Snack	15(8.1)	85 (45.7)	
<b>Stitches</b>			
Balanced diet	1(0.5)	4(2.2)	0.368
Snack	12 (6.5)	14(7.5)	
<b>Thirst</b>			
Balance diet	8(4.3)	20(10.8)	0.896
Snack	34(18.3)	80(43)	
<b>Reduced Running Speed</b>			
Balance diet	6(3.2)	10(5.4)	0.276
Snack	47(25.3)	38(20.4)	
<b>Heavy body</b>			
Balance diet	2(1.1)	12(6.5)	0.135
Snack	34(18.3)	60(32.3)	
<b>Reduced Flexibility</b>			
Balance diet	3(1.6)	11(5.9)	0.533
Snack	23(12.4)	47(25.3)	
<b>Muscle Soreness</b>			
Balance diet	0(0.0)	13(6.9)	0.583
Snack	6(3.2)	55(29.6)	

*Values are N (%) unless otherwise specified n(186)*

*\* P < 0.05*

*Source: primary data*

**Table 4.11: Dietary Intake during the match and Fatigue Symptoms reported during and after the match**

<b>Fatigue symptoms</b>	<b>During the match n (%)</b>	<b>After the match n (%)</b>	<b><i>P-Value</i></b>
<b>Dizziness</b>			
Balanced diet	1(0.5)	14(7.5)	0.480
Snack	4(2.1)	25(13.4)	
<b>Muscle-pull</b>			
Balanced diet	5(2.7)	17(9.1)	0.802
Snack	13(6.9)	38(20.4)	
<b>Body weakness</b>			
Balanced diet	3(1.6)	36(19.4)	0.232
Snack	13(6.9)	71(38.2)	
<b>Stitches</b>			
Balanced diet	1(0.5)	5(2.7)	0.162
Snack	12(6.5)	13(6.9)	
<b>Thirst</b>			
Balance diet	13(6.9)	34(18.3)	0.725
Snack	29(15.6)	66(35.5)	
<b>Reduced Running Speed</b>			
Balance diet	14(7.5)	8(4.3)	0.236
Snack	39(20.9)	40(21.5)	
<b>Heavy body</b>			
Balance diet	5(2.7)	16(8.6)	0.302
Snack	31(16.7)	56(30.1)	
<b>Reduced Flexibility</b>			
Balance diet	3(1.6)	19(10.2)	0.041*
Snack	23(12.4)	39(20.9)	
<b>Muscle Soreness</b>			
Balance diet	1(0.5)	19(10.2)	0.551
Snack	5(2.7)	49(26.3)	

*Values are N (%) unless otherwise specified n(186)*

*\* P < 0.05*

*Source: primary data*

In a prior study conducted by Dijk, Francina, Hartog, et al., in 2018, they made an important discovery. They found that reduced intake of specific vitamins and minerals led to a decline in oxidative capacity, which had a noticeable impact on muscle function and the ability to generate force. The low consumption of fruits before matches, reported by only 10% of players, could potentially explain the link between dietary choices and the occurrence of muscle strains. This aligns with the findings of Andersson et al., in 2016 who also suggested that the depletion of muscle glycogen toward the end of a match could contribute to fatigue, potentially explaining the high prevalence of reduced running speed (experienced by 29% of players) during the game.

Crucially, a notable correlation became evident regarding dietary choices and these factors.

Football players who maintained a balanced diet were notably less likely to experience fatigue symptoms, both during the match and afterward, compared to those who relied on snacks. It's worth mentioning, though, that this correlation was particularly significant in the context of reduced flexibility ( $p = 0.041$ ), as detailed in Table 4.11.

This observation underscores the fundamental importance of proper dietary intake, which provides the necessary nutrients essential for achieving optimal performance in the game, as emphasized by Res (2014). Proper nutrition not only supports physical performance but also contributes to overall health and recovery, enabling athletes to maintain peak condition throughout their training and competition schedules.

## CHAPTER FIVE

### SUMMARY, CONCLUSION AND RECOMMENDATIONS

#### 5.0 Introduction

This chapter presents the summary, conclusions and recommendations of the study.

#### 5.1 Summary of the findings

The general objective of the study was to determine the relationship between dietary intake and fatigue symptoms experienced during and after the match among football players in the Uganda Premier League [UPL] in Kampala district. To determine the nutritional status of football players in the Uganda Premier League clubs; to examine the dietary intake of football players in the Uganda Premier League; to determine fatigue symptoms commonly experienced by football players during and after matches in the Uganda Premier League and to establish the relationship between dietary intake and fatigue symptoms of football players in the Uganda Premier League. The following research questions were formulated; what is the nutritional status of football players in the Uganda Premier League? What are the dietary practices before, during and after the matches of football players in the Uganda Premier League? What are the fatigue symptoms reported during and after the matches by football players in the Uganda Premier League?

The hypothesis of the study was there would be no significant relationship between dietary intake and fatigue symptoms among football players in the Uganda Premier League. The hypothesis was made to establish whether there was a relationship between dietary intake and fatigue symptoms among football players in the Uganda Premier League.

The instruments used to collect data included questionnaires, interview guide, and TANITA Bio impedance machine. The findings were analysed using SPSS version 20 software through organizing them based on study objectives. Qualitative data was analysed through thematic analysis. Frequency and percentages were used to analyse data related to demographic characteristics of football players, types of foods eaten and correlation of variables.

The following were the major findings on nutritional status, dietary intake, body composition and fatigue symptoms of football players.

### **5.1.2 Findings on the nutritional status of football players in UPL clubs**

Football players exhibited a shorter stature with an average height (SD) of 173.3( $\pm$ 50) compared to average height of European football players. Furthermore, a noticeable disparity in weight was observed, particularly in comparison to their counterparts participating in European leagues. Despite these distinctions, the body mass index (BMI) of the majority (87%) of UPL football players aligned with established norms and standards, mirroring the patterns seen in other elite leagues. Additionally, the fat percentage 9.2( $\pm$ 3.7) of football players fell within the range of recommended range.

The study also highlighted that football players' dietary choices are largely based on personal preferences, with limited guidance from team managers regarding strategic dietary intake, including carbohydrate loading strategies for match days. As a result, Uganda Premier League clubs have yet to prioritize comprehensive carbohydrate loading strategies that ensure adequate glycogen stores to enhance effective match performance.

The study revealed that only a minority, 20% of football players, ate a balanced diet before a match. A notable group (34%) of football players relied on a diet of carbohydrates, proteins, and water, while about 30% consumed only carbohydrates and protein.

### **5.1.3 Findings on the common food types eaten by football players**

In terms of dietary intake, football players within the UPL exhibited a preference for maize and its products, wheat flour, and Irish potatoes as their primary carbohydrate sources on a daily basis. Conversely, Millet and Sorghum ranked as the least preferred carbohydrate options among UPL football players. For protein sources, beans/peas emerged as the preferred choice, with eggs and milk also being popular. However, consumption of fish and pork remained infrequent due to religious influences and socio-economic constraints. Remarkably, fat intake among football players

was notably low, with a majority indicating minimal consumption of butter/cheese. This trend might be attributed to football players' shared concerns about weight management and social economic status.

Within the context of vitamin sources, football players in the UPL displayed a preference for fruit juices, bananas, and watermelons, which were widely acknowledged as the most commonly ingested options. This inclination was driven by their availability and familiarity to the football players. Conversely, pineapple found itself as the least preferred fruit in daily consumption. Notably, green vegetables were extensively consumed on a daily basis, whereas pumpkin received the least preference among the football players.

Regarding hydration, the majority of football players exhibited commendable hydration habits, consistently consuming water on a daily basis. However, it was ascertained that clubs in the UPL did not implement carbo loading strategies to optimize players' performance. Additionally, there was a lack of structured dietary plans, with chefs preparing meals based on individual tastes and preferences. This unstructured approach potentially contributed to a notable incidence of fatigue symptoms among the players.

Regrettably, dietary intakes among football players were deemed inappropriate, with merely 20% adhering to a balanced diet intake before matches. The utilization of nutritional supplements remained limited; with only 28% of football players resorting to their usage. These findings show that Ugandan football players rely on their regular diets to fulfil their energy and nutrient requirements. Alarmingly, one football player was found to use substances such as weed before and during matches. An overarching deficiency was identified in the provision of adequate nutritional guidance across all clubs. Nutritionist consultation and dietary counselling were notably absent both for football players and team managers.

#### **5.1.4 Findings on timing of football players meals in the UPL**

The timing of meals, as revealed by all team managers, was based upon individual football player preferences. Typically, football players consumed their meals an hour before the match, primarily

consisting of carbohydrates, proteins and water. Majority of football players adhered to a daily routine of consuming breakfast, lunch, and dinner. Institutional clubs predominantly offered all three meals daily, while community-based and privately owned clubs primarily provided lunch. Supper consumption was less frequent due to varying factors such as marital status and familial responsibilities. Notably, carbohydrate loading practices before matches were not commonplace in UPL clubs.

A significant proportion of football players resorted to consuming energy drinks after match. Conversely, during the match, a minority opted for water consumption, while a smaller percentage preferred energy drinks. This hydration pattern corresponded with a prevalent issue of dehydration among football players, leading to the manifestation of fatigue symptoms. A limited number of football players managed to consume a balanced diet before matches, implying restricted glycogen availability for energy requirements and an insufficiency of essential nutrients. Team managers played a pivotal role in hydration management by providing football players with water during matches, including plain water and glucose-infused variants strategically positioned around the field for easy access. Watermelon consumption was also encouraged during halftime. Additionally, team managers advocated for football players to have their meals approximately 30 minutes before matches, aligning with their pre-match nutrition strategies.

Nutritional supplement utilization among UPL football players remained low, as players predominantly relied on their regular diets to fulfil energy and nutrient requirements. Among football players experiencing fatigue symptoms, only a minor segment resorted to supplements. Energy drinks emerged as the most prevalent supplement choice in the UPL, with specific brands like Sting Gold Rush, Lucozade, and Riham Rock Boom being preferred at distinct stages of the match. However, the utilization of supplements necessitates thorough consideration of both benefits and potential risks, thereby necessitating informed decision-making by football players.

### **5.1.5 Findings on fatigue Symptoms experienced by UPL football players**

The aggregation of findings highlight that a substantial majority of football players acknowledged experiencing symptoms of fatigue. Among the reported fatigue symptoms, thirst emerged as a prevalent concern, significantly impacting players across various stages of the match with 23% players affected during the match, 36% players affected after the match and 18% players were affected during and after.

During the match football players were commonly affected by fatigue symptoms such as reduced running speed, thirst, heavy body, reduced flexibility, muscle pulls, body weakness, stitches, muscle soreness and dizziness. Comparatively, dizziness and muscle soreness had the least pronounced effect on football players during the match. Reduced running speed and thirst had a greatly affected the football players during the match.

After the match football players were commonly affected by body weakness, thirst, muscle soreness, heavy body, muscle pulls, dizziness, reduced flexibility, reduced running speed and stitches. Body weakness affected more football players after the match when compared to other fatigue symptoms experienced. Thirst also affected football players greatly after the match.

In both intervals, football players were significantly affected by thirst, heavy body, reduced running speed, reduced flexibility, muscle soreness, body weakness, muscle pulls, dizziness and stitches. Thirst as a recurring fatigue symptom, exerted a considerable influence on football players throughout distinct match intervals.

The findings underscore the prevalence of fatigue symptoms among football players, with thirst being a particularly pervasive concern across various match phases. The array of physical challenges, including reduced running speed and muscle-related discomfort, further contributes to players' experience of fatigue. Acknowledging these insights, recommendations can be formulated to address the identified issues and enhance players' physical preparedness and performance.

### **5.1.6 Relationship between dietary intake and fatigue symptoms**

There was significant relationship between dietary intake and fatigue symptoms among football players in UPL with respect to muscle pulls (0.03) and reduced flexibility (0.041).

## **5.2 Conclusion**

The nutritional status of football players was mean height  $173\pm 6.0$  and weight  $70.1\pm 6.9$ . Furthermore 87% football players had a normal BMI with a suitable fat percentage of  $9.2\pm 3.7$ . The football players' dietary intake was insufficient, with only 20% of football players consuming a balanced diet before matches. Football players' dietary intake was also unmonitored. Majority (87%) football players reported experiencing fatigue symptoms during and after the matches. Thirst, muscle pulls and reduced flexibility were fatigue symptoms that greatly compromised performance. There was a significant relationship between dietary intake and fatigue symptoms with respect to muscle pulls ( $p = 0.031$ ) and reduced flexibility ( $p = 0.041$ ).

## **5.3 Recommendations**

Basing on findings of the study, the following are recommendations that have implications for policy change, practice and further research.

### **5.3.1 Recommendations for practice and policy change**

Based on these findings, it is recommended that Uganda Premier League team managers should consider implementing a more comprehensive approach to monitoring football players' body composition and nutritional well-being throughout the course of the season. This could potentially enhance football players' competitiveness on both domestic and international stages.

Uganda Premier League clubs should employ sports nutritionists to offer essential guidance regarding optimal dietary strategies that enhance players' performance, mitigate fatigue symptoms during matches, and facilitate effective recovery after the matches.

The Federation of Uganda Football Association (FUFA) should provide all clubs with the FIFA Nutrition guide which is a comprehensive reference tool to help football players' dietary intake.

Lastly, the Ministry of Education and Sports should formulate a comprehensive policy that delineates and provide guidance to clubs regarding Uganda football players' welfare.

### **5.3.2 Recommendations for further research**

Several recommendations emerge from this study, paving the way for potential avenues of future research:

A comprehensive nationwide investigation is warranted to elucidate the relationship between dietary intake and fatigue symptoms among football players from different regions of Uganda playing in the Uganda Premier League. This broader perspective would yield insights into regional variations and potential disparities.

A comparative study should be undertaken to analyse the connection between dietary intake and fatigue symptoms of other players on various sports within Uganda. This approach could offer in depth insights into localized factors impacting players' performance and fatigue experiences.

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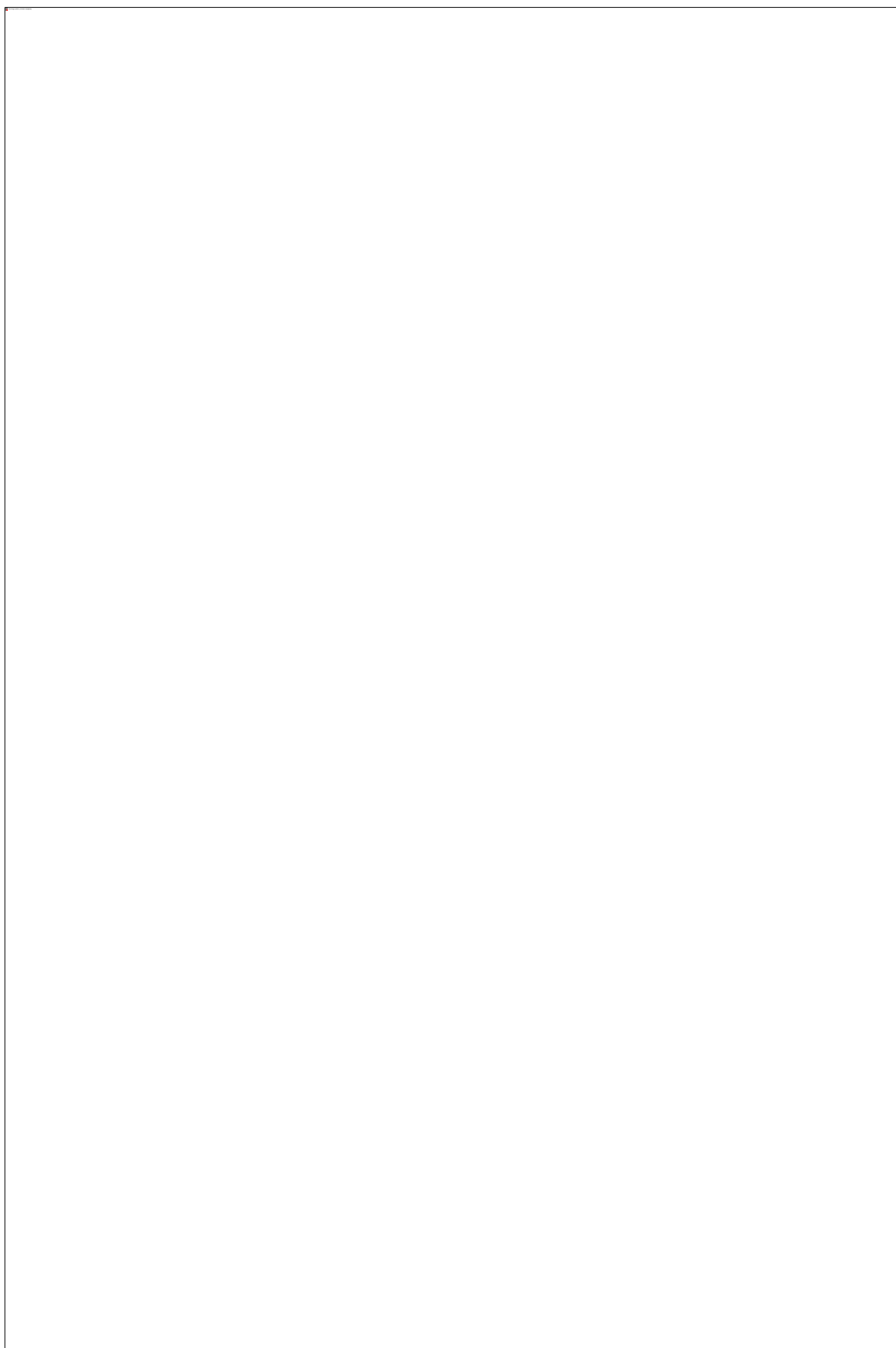
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## **Appendix I**

### **Introduction Letter**



## Appendix II

### Approval from TASO Review Board



## Appendix III

### Consent forms

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***DEPARTMENT OF SPORTS SCIENCE***

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#### **CONSENT/ASSENT FORM – FOOTBALL PLAYERS**

Dear Dr/Mr.....

Title of the project: **Dietary intake and fatigue symptoms among football players in the Uganda Premier League Clubs in Kampala District**

**Purpose of the study:** You are cordially invited to participate in study above whose overall purpose is to determine the association between dietary intake and fatigue symptoms among the clubs in the Uganda premier league in Kampala district. The specific objectives include: (i) To determine the nutritional status using anthropometric measurements indicated by BMI, body fat percentage, weight, height and body composition of the football players of the UPL clubs. (ii) To identify the food types eaten before, during and after the matches by football players of Kampala clubs. (iii) To establish the time football players of UPL clubs, have their meals before, during and after matches. (iv) To determine fatigue symptoms commonly experienced by football players in UPL during and after matches. (v) To establish the relationship between quality of meals and fatigue symptoms of UPL football players

**Investigators:** The investigators in this study are a team of researchers from Kyambogo University Uganda. The team is well versed with research implementation especially cross-sectional design by training, experience and qualifications.

**Procedures:** During the study, we will ask each player a set of questions that will solicit information on sociodemographic characteristics of the players, eating behaviors and patterns and the fatigue symptoms. A 24-hour recall and a food frequency questionnaire will be used to collect information about the players' usual dietary intake.

Body composition and nutritional status will be determined by the TANITA bio-electric impedance analyser (BIA). The whole process will take about 30 minutes.

You are therefore, requested to participate in this study.

**Voluntary participation:** You have the right to decline to participate and if you decide to participate, you have the right to withdraw from the study at any time without any repercussions or denial of your rights.

**Confidentiality:** The information collected will be strictly confidential, will only be available to the principal investigator and will be used for this research.

**Risks and benefits:** The study is a less than minimal risk. Should there be any risks to participants, you will be informed and supervised on how to take appropriate action. If you agree to participate, you will be collaborating with the students, lecturers and professors from Kyambogo University in efforts to improve nutrition and performance of football players and other athletes in Kampala and Uganda at large.

**Dissemination of findings:** Meetings will be organized at various levels CAF or FUFA to interface with the various leaders and the athletes to disseminate our findings and especially the results of nutritional status performance and fatigue symptoms. The study results will also be published through academic papers in peer reviewed journals.

**Contact information:** If you have any questions, comments, or complaints about the study, you can contact the following: Dr. Grace Muhoozi (+256772487890,); Prof. Constance Nsibambi (+256772370848).

Should you have any questions as regards your rights and welfare during participation in the study, please do not hesitate to contact the chairperson, TASO IRB/REC, Dr. Bogere Daniel: +256 772139126.

**Statement of consent/assent:**

**I agree to participate in this study yes ( ) no ( )**

Name ..... Signature and/or Thumb Print .....

Date .....

Witness..... Signature and/or Thumb..... Date

.....

Signed: .....

**Linika Lumbuye (Principal investigator)** Email: [lynkhr2@gmail.com](mailto:lynkhr2@gmail.com), Tel: 0700194760,

**MSC. Sports Science Student, Department of Sports Science, Kyambogo University**

## Appendix IV

### GENERAL QUESTIONNAIRE

Dietary intake and fatigue symptoms among football players in the Uganda Premier League Clubs in Kampala District

Introduction: I have with me a number of questionnaires that have been designed to enlist responses on various issues such as your social demographic characteristics, food frequency and food intake and fatigue symptoms you normally feel during and after a football match

I will also take measurements of height, and by use of the TANITA (bio-electric impedance analyzer (BIA), your BMI and body composition will be determined. I will be glad if you can give some of your time to me to answer the questions that I have. Feel free to stop me at any point to attend to your daily activities.

#### A. Demographic characteristics

Please tick the age bracket you belong to

16-20

21-25

26-30

30+

1. Write the number of your religious affiliation in the box given

Catholic = 1

Anglican = 2

Muslim = 3

Born again = 4

Traditionalist = 5

Others, (specify) .....

2. Write the number of your Marital status in the box given

Married = 1

Single = 2

Divorced = 3

Separated = 4

Cohabiting = 6

Widow = 7

Others, (specify).....

3. How many people do you take care of?

1-3

4-6

7+

0

4. Please tick the number of years you spent in school

3-5

6-9

10-13

15+

#### B. Dietary Intake

5. Are you a vegetarian?

1= Yes

2= No

6. If yes, which type of vegetarian are you?

1= Strict vegetarian (Vegan)

2= Lacto-vegetarian

7. If Lacto vegetarian in (6) above, do you take any dairy products?

1= Yes                      2=No

8. If yes, which of the following foods do you take?

Eggs

milk

yoghurt

cheese

9. Tick three (3) common foods you commonly eat as a vegan.

Beans

Soya products

Cowpeas

Cabbages

Sweet potatoes

Irish potatoes

Salads

Others, specify-----

**C. Food frequency**

A. **Food frequency**- Tick the number of times you feed on the following foods?

	Food intake frequency per day or per week or per month								
Food	6+/day	4-5/day	2-3/ day	Once/ day	5-6/week	2-4/ week	Once/ week	1-3/ month	Never or < once/month
Sweet potatoes (Fried or boiled)									
Irish potatoes (Fried or boiled)									
Maize and its products									
Millet/sorghum									
Wheat and wheat products									
Yams									
Ground nuts									
Cassava									
Beans/peas									
Beef/goat/ mutton									
Pork									
Chicken									
Eggs									

Fish									
Green vegetables									
Carrots									
Salads									
Pumpkin									
Fruit juice									
Water									
Passion fruit									
Sugar cane									
Watermelon									
Pineapple									
Bananas									
Mangos									
Milk									
Butter/ cheese									
Yoghurt									

B. Tick the number of days you have the following

Breakfast	once	<input type="checkbox"/>	3	<input type="checkbox"/>	4	<input type="checkbox"/>	7	<input type="checkbox"/>	never	<input type="checkbox"/>
Lunch	once	<input type="checkbox"/>	3	<input type="checkbox"/>	4	<input type="checkbox"/>	7	<input type="checkbox"/>	never	<input type="checkbox"/>
Supper	once	<input type="checkbox"/>	3	<input type="checkbox"/>	4	<input type="checkbox"/>	7	<input type="checkbox"/>	never	<input type="checkbox"/>
Snacks	once	<input type="checkbox"/>	3	<input type="checkbox"/>	4	<input type="checkbox"/>	7	<input type="checkbox"/>	never	<input type="checkbox"/>

**D. Dietary diversity**

**QUESTIONS AND FILTERS CODING CATEGORIES**

Now I would like to find out the types of foods that you ate yesterday during the day and at night.

READ THE LIST OF FOODS. PLACE A *ONE* IN THE BOX IF YOU ATE THE FOOD IN QUESTION; PLACE A *ZERO* IN THE BOX IF YOU DID NOT EAT THE FOOD.

**A.** Any posho, kalo, mugoyo, katogo, bread, rice noodles, biscuits, cookies, or any other foods made from millet, sorghum, maize, rice, wheat?

A ..... |\_\_|

**B.** Any Roots and tubers; Any white potatoes, or yellow potatoes, white yams, manioc, cassava or any other foods made from roots or tubers?

B ..... |\_\_|

**C.** Vegetables Any dark, green, leafy vegetables such as cassava leaves, bean leaves, kale, spinach, pepper leaves, taro leaves, and amaranth leaves? Any pumpkin, carrots, squash, or sweet potatoes that are yellow or orange inside?

C ..... |\_\_|

**D.** Any fruits? Including ripe mangoes, ripe papayas or pineapples, passion fruits, jack fruit, vitamin a-rich fruit?

D ..... |\_\_|

**E.** Meat and Poultry: Any beef, pork, lamb, goat, rabbit wild game, chicken, duck, or other birds, liver, kidney, heart, or other organ meats?

E ..... |\_\_|

**F.** Any eggs?

F..... |\_\_|

**G.** Fish and seafood (fresh or dried fish)

G..... |\_\_|

**H.** Pulses/legumes/nuts. (Any foods made from beans, peas, or lentils, Soy beans, ground nuts simsim?)

H..... |\_\_|

**I. Milk and milk products; Any cheese, yogurt, milk or other milk products?**

I ..... |\_\_|

**J. Oils/ fats; Any foods made with oil, fat, or butter?**

J..... |\_\_|

**K. Sugar/honey**

K..... |\_\_|

**L. Soft/non-alcoholic drinks**

L..... |\_\_|

**E. Timing of meals (Diet before, during and after the match)**

Please write down what you normally eat and or drink:

i) 3-2 hours before any match -----, -----, -----  
-----,-----

ii) At half time or during the match -----, -----, -----  
-----,-----

iii) Within 30mins after the match -----, -----, -----  
-----,-----

**F. Supplement use**

i) Do you take nutritional supplements before a match?

1= Yes                      2=No

ii) If yes, tick when you take the supplements and the time you take them

Energy drinks	Before the match	During the match	After the match
Sting gold rush			
Riham Rock boom			
Red bull			
Lucozade			
Riham X energy			
Power play			
Kirungi Kazi Booster			
Ergogenic aids			

**C. Fatigue**

Have you ever felt any fatigue symptoms during / after playing a match?

1= Yes

2=No

If yes, can you tick the fatigue symptoms you have felt and the time you felt them?

Fatigue symptoms felt	During the match	After the match
Dizziness		
Muscle pulls		
Stitches		
Body weakness		
Thirst		
Reduced running speed		
Heavy body (hard to jump)		
Reduced flexibility		
Muscle soreness		

## **Appendix V**

### **Interview guide for Team Managers**

What foods do your players eat before, during and after the match?

Do you think diet has an effect on football players' performance?

What are the causes of fatigue symptoms among players?

Explain some of the fatigue symptoms you have witnessed players experiencing?

How can players overcome fatigue symptoms?

Do you think there is any relationship between diet and fatigue symptoms?

## Appendix VI

### Approval email sent to clubs

Lumbuye Linika

P.O Box 1 Kyambogo

Email: lynkhr2@gmail.com

Tel: 07001947

22nd/Jan/2021

CEO

\_\_\_\_\_Football Club

Kampala, Uganda

RE: Permission to Conduct Research Study

Dear CEO;

I am writing to request permission to conduct a research study at your football club. I am currently enrolled in the Master's degree in Sports Science at Kyambogo University and am in the process of collecting my Master's Thesis data. The study is entitled, "Dietary Intake and fatigue symptoms among football clubs in Kampala district."

I hope that the club administration will allow me to recruit 28 players i.e., 18 first team players and 10 reserve team players from the club to anonymously complete a 4-page questionnaire (copy enclosed) and measure their body composition using a bio impedance machine. Due to the nature of the study, I hope to recruit (coaches) of these players to anonymously participate in interviews (copy enclosed). Interested players, who volunteer to participate, will be given a consent form to be signed by them (copy enclosed) and returned to the primary researcher at the beginning of the survey process. Coaches who volunteer to participate will also be given consent forms to be signed and returned to the primary researcher (copy enclosed).

If approval is granted, club participants will complete the survey in an enclosed room or other quiet setting on the club site. (Indicate when and where i.e., before training, during training,

lunch, after club training and ask permission for use of this time as well). The survey process should take no longer than (1 hour). Coach participants would complete the interviews thereafter. The survey results will be pooled for the thesis project and individual results of this study will remain absolutely confidential and anonymous. Should this study be published, only pooled results will be documented. No costs will be incurred by either your club or the individual participants.

Your approval to conduct this study within **25<sup>th</sup> January to 10<sup>th</sup> February 2021** will be greatly appreciated. I will follow up with a telephone call next week and would be happy to answer any questions or concerns that you may have at that time. You may contact me at my email address: [Lynkhr2@gmail.com](mailto:Lynkhr2@gmail.com) and my phone contact is (0700194760).

If you agree, kindly sign below and kindly submit a signed letter of permission on your institution's letterhead acknowledging your consent and permission for me to conduct this survey/study at your Club.

Sincerely,

Lumbuye Linika

Principal Researcher, Sports Science Department

Kyambogo University

Enclosures

CC: Ass. Prof Constance Nsibambi and Dr. Muhoozi Grace, Research Supervisors, Kyambogo University

Approved by:

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