

**Bindura University
of Science Education**



FACULTY OF SCIENCE AND ENGINEERING

DEPARTMENT OF SPORTS SCIENCE

**USING STANDARDISED DIETARY PLANS TO ENHANCE BONE HEALTH IN
UNDER-18 FOOTBALL PLAYERS IN BINDURA DISTRICT**

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**A RESEARCH PROJECT SUBMITTED IN PARTIAL FULFILLMENT OF THE
REQUIREMENTS FOR THE BACHELOR OF SCIENCE HONOURS DEGREE IN
SPORTS SCIENCE AND MANAGEMENT**

JUNE 2025

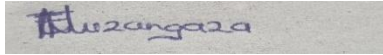
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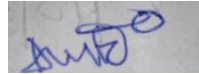


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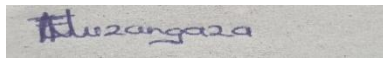
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ACKNOWLEDGEMENTS

I firstly acknowledge my supervisor for quality support, guidance and motivation throughout this research. Without her expert supervision, this research project would have failed. I express my gratitude to the entire Sports Science department for the continued support they gave me during the course of this project. I am also grateful for the help that I got from my fellow Sport Science students, they were my pillar of support and motivation.

Uttermost gratitude to the almighty Christ for granting me strength, power, courage and wisdom to carry out this research successfully. Much appreciation for making aligned paths during this project with my supervisor, the Sport Science department and classmates.

ABSTRACT

The researcher carried out this study in the Bindura district. The study investigated the use of nutrition to enhance bone health in under-18 football players in the Bindura district. It aimed at identifying how nutrition is being used to enhance bone health in under-18 football players. The main objective of the study was to establish proper nutritional strategies to address the current nutritional challenges being faced by under-18 football players in Bindura district. The other objectives included, promoting awareness of bone health and proper nutrition to enhance bone health in under-18 football players, implementing educational interventions to promote and enhance proper nutrition practices in under-18 football players in Bindura district, and enhancing the use of nutrition to improve bone health among under-18 football players in Bindura district.

The literature review reviewed the necessity of nutrition in the enhancement of bone growth and development. It also reviewed the importance of educating players on the importance of consuming a healthy diet as a way of enhancing bone health.

The current strategies that are being used to enhance bone health in under-18 football players include hydration, exposing athletes to sunlight, and using vitamin D and calcium supplements. The strategies that are currently being used to enhance bone health are being effective to a lesser extent due to resistance to change, and some of the coaches and players lack nutritional awareness and understanding and hence go for poor nutritional choices.

Data was collected using quantitative and qualitative research methods using questionnaires and interviews, respectively. 55 questionnaires were distributed to under-18 football players, and only 45 athletes responded. Physiotherapists, coaches, physical education teachers, and school heads were interviewed. The research had a target of conducting 20 interviews, but only 14 were conducted. The data collected was analyzed using SPSS and NVivo.

The findings also suggest the use of supplements rich in vitamin D, protein powders added with vitamin D and collagen supplements, which support bone health. Meal planning was also amongst the findings. Teams with under-18 football players are implementing nutrient-dense foods before and after training sessions to ensure that athletes get access to nutrient-rich foods and a balanced diet.

Findings suggest that athletes and coaches need continued and regular education so that they become knowledgeable on the vital role that nutrition plays in the promotion of strong and healthy bones. Schools also need to be engaged for them to increase and promote programs that aim at increasing and improving the nutrition of soccer players.

The researcher recommends that school heads, coaches, and players should be educated, as they play a key role in enhancing bone health. Doing regular follow-ups on to check if the taught strategies are being implemented is also a recommendation that the researcher suggests.

DEDICATION

This research is dedicated to my supportive parents, my siblings, my husband and our beloved daughter, Blue Cole. Thank you for the love, support and encouragement to sail through this course.

TABLE OF CONTENTS

Declaration.....	(i)
Approval sheet	(ii)
Statement of permission to use	(iii)
Acknowledgement	(iv)
Abstract	(v)
Dedication	(vi)
Table of Contents	(vi)
List of tables.....	(ix)
List of figures.....	(ix)
List of appendices.....	(x)

CHAPTER ONE: THE RESEARCH PROBLEM AND ITS SETTING

1.1 Introduction	1
1.2 Background of study.....	1
1.3 Statement of problem.....	3
1.4 Research Questions	4
1.5 Research Objectives	4
1.6 Significance of study	4
1.7 Delimitations of study	5
1.8 Study outline.....	5
1.9 Chapter summary.....	5

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction.....	7
2.2 Conceptual review	7
2.3 Theoretic view.....	7
2.4 Thematic view.....	11
2.5 Conclusion	12
2.6 Gaps in literature.....	12
2.7 Chapter summary.....	12

CHAPTER THREE: MATERIALS AND METHODS

3.1 Introduction.....	14
3.2 Methodological approach.....	14

3.3 Time horizons	14
3.4 Research designs	14
3.5 Population and Sampling.....	15
3.6 Data collection procedures.....	16
3.7 Data analysis and Presentation.....	17
3.8 Validity and Reliability.....	18
3.9 Ethical considerations.....	18
3.10Chapter summary.....	19

CHAPTER FOUR: DATA ANALYSIS AND PRESENTATION

4.1 Introduction.....	20
4.2 Response rate.....	20
4.3 Demographics.....	22
4.4 Analysis and presentation of data linked to research questions.....	24
4.5 Discussion.....	34
4.6 Summary.....	36

CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction.....	37
5.2 Summary of major findings from the research.....	37
5.3 Conclusions	38
5.4 Limitations.....	38
5.5 Implications.....	38
5.6 Chapter Summary	39
References.....	40

LIST OF TABLES

Table 4.1 Interview response rate	20
Table 4.2 Questionnaire response rate.....	21
Table 4.3 Comparison of interview and questionnaire response rates.....	21
Table 4.4 Respondents gender	22
Table 4.5 Respondents age	24
Table 4.6 current strategies that are being used in enhancing bone health in under-18 football players.....	26
Table 4.7Effectiveness of the current strategies that are being used in enhancing bone health in under-18 football players	29
Table 4.8 Measures that can be adopted to enhance bone health in under-18 football players in Bindura district.....	32

LIST OF FIGURES

Figure 2.1 Bone remodeling diagrams	9
Figure 4.1 The current strategies being used to enhance bone health in under-18 footballs players in Bindura district.....	27
Figure 4.2 Effectiveness of the current strategies being used to enhance bone health in under-18 football players.....	30
Figure 4.3 Measures that can be adopted to enhance bone health in under-18 football players in Bindura district	33

APPENDICIES

APPENDIX A: Consent letter from Bindura university	42
APPENDIX B: Questionnaires for Athletes	44
APPENDIX C: Interview Guide	46
APPENDIX D: Informed consent Form	48
APPENDIX E: Informed Consent Form for football players	49

CHAPTER 1

PROBLEM AND ITS SETTING

1.1 INTRODUCTION

Bone health is an essential aspect of physical wellbeing especially in young athletes who engage in sporting activities such as football. In Bindura, most school going children engage in football and nutrition plays a key role in bone health development and maintenance of strong bones as bone health significantly affect athlete performance. This research study seeks to use nutrition to enhance bone health in under-18 football players in Bindura district. In this chapter, the researcher will focus on the background of the study, statement the problem, significance of the study, research, questions, objects, delimitations of the stud, study outline and chapter summary.

1.2 BACKGROUND OF THE STUDY

Bone health and nutrition are important aspects of health for under-18 football players in Bindura district. Bone health can be defined as the strength and condition of bones in the human body (Mayo Clinic,2019). Good bone health plays a role in performance enhancement, injury prevention, supporting the body and facilitating movement. Nutrition plays a significant role in the maintenance and enhancement of good bone health as it encompasses essential nutrients such as `calcium, vitamin D, protein, phosphorus and magnesium which are essential for correct bone development during childhood and adolescence specially for under-18 football players in Bindura district (Butler,2020).

The researcher developed an interested in researching the use of standardized dietary plans to enhance bone health in under-18 football players in Bindura district because she observed nutritional gaps existing in school based football .The researcher observed a serious lack of nutrition awareness in under-18 football players in Bindura district remote areas probably due to primitive living conditions .Lack of nutritional awareness has increased the rates of bone related injuries in athletes .This problem gave the researcher the zeal and desire to address these gaps after exploring the relationship between nutrition and bone health in young athletes .

Adding on the researcher possess a strong personal connection to and an ardent affection for understanding the impact of nutrition on bone health of young football players as bone health affects participation. This strong connection drove the researcher to focus on the use of nutrition in enhancing bone health in under-18 football players in Bindura district.

Globally nutritional strategies implemented during youth football can have long term benefits for bone health (Marconi etal 2025). Coaches and dieticians need to provide athletes with the correct

diet by making a correct diet plan. This means that they have to make sure that athletes get the right diet with the right nutrients, in the right quantities at the right time. Young athletes require a calcium-rich foods such as dairy products and leafy greens for them to develop strong bones during their growth phase as this will affect their athletic life (Armento, 2023).

Nutrition education should be integrated into school-based football programs to promote healthy eating habits (Mountjoy, 2018). Coaches play a huge role in facilitating school-based health programs such as health awareness campaigns in order to advise their school-based football players on the benefits of a healthy diet in sport as they play a critical role in promoting healthy nutrition practices among their athletes.

School based football players require adequate nutrients to facilitate the growth of healthy strong bones during adolescence. (Weaver, 2016) argues that “Young football players require adequate phosphorous intake to support bone health and development,” dieticians should aid coaches and their athletes to normalize a healthy diet for them to support and promote the formation of strong bones during their growth stage.

Traditional African diets rich in whole grains, fruits and vegetables provide essential nutrients for bone health (Rondenelli, 2021). The scholar argues that whole grains such as corn, wheat and sorghum, fruits such as figs and vegetables such as okra, spinach and broccoli play a vital role in the formation of strong and healthy bones. Under-18 football players in Bindura district should be urged to maximize the intake of African calcium rich food to implement the growth of strong bones.

Physical education teachers are also important in promoting the growth of athletes with strong and healthy bones. Nutrition education should be integrated into physical education programs in African schools (El-Sayed,2020) coaches should urge physical education teachers to include physical education programs in their teaching schedules and advise their learners on the importance of a healthy diet in the formation of strong bones during their growth stage.

Communities also play a crucial role in the development of school-based football players. Food insecurities and limited access to nutritious food hinder optimal nutrition for bone health (Alabi, 2019). Community based programs can address nutritional deficiencies and promote the formation of healthy bones in athletes. Communities can address these deficiencies by offering food aid to the school-based football players and promote healthy athletes with strong and healthy bones.

Traditional foods are essential for promoting bone density in athletes. Traditional diet rich in calcium such as mazhanje, peanut butter and maheu and grains provide essential nutrients for bone health, (Moyo,2018). Under-18 football players in Bindura district coaches have a role to advise their players on the importance of taking available local food sources for them to incorporate the formation of healthy bones.

Teachers play a vital role in promoting health nutrition practices among young under-18 football players in Bindura district (Nkata,2019). Teachers have a special role in advising coaches to form

steering committees that advocate for the implementation of healthy and nutritious diet for athletes for them to form strong and healthy bones which are essential for optimal athletic performance.

Practical gaps in using standardized dietary plans to promote bone health under-18 football players in Bindura district include lack of knowledge in both coaches and athletes living in primitive conditions. They possess little or no knowledge of the role of nutrition in the formation of strong bones and they lack awareness about locally available highly nutritious foods. This lack of knowledge hinders participation as athletes develop weak bones which are prone to injuries when they are participating in sport.

Adding on, food availability and accessibility is another gap in using standardized dietary plans to enhance bone health in under football players in Bindura district. Most healthy and high nutrient food are costly and this affects under-18 football players in Bindura district as they fail to access highly nutritious food.

Nutrition monitoring and assessment is another key gap available when using standardized dietary plans to enhance bone health in under-18 football players in Bindura district. Most under-18 players in Bindura district need standardized, liable and advised nutrition monitoring protocol which aid them in nutritional monitoring and evaluation

These gaps can be addressed through educating the coaches on the effects and benefits of educating their athletes on the importance of consuming nutrient dense food in the formation of strong and healthy bones. Coaches can also advise to develop best nutrient guidelines full of content pertaining the use of nutrition to enhance bone health in under-18 football players in Bindura district.

The problem of food accessibility and availability can be addressed by implementing school food production projects such as gardening and livestock production to supplement diet of under-18 football players in Bindura district. These projects increase accessibility of highly nutritious diets in athletes.

The ministry of sport can work hand in hand with the ministry of education through including the importance of nutrition in bone health into the education curriculum in schools. Workshops can also be done to educate both the players and their coaches on the importance of nutrition in enhancing bone health in under-18 football players in Bindura district.

1.3 STATEMENT OF THE PROBLEM

There is a growing concern regarding bone health, and it remains a critical aspect in athletic performance, especially in under-18 football players in the Bindura district. This chapter focuses on the problem of poor nutrition in under-18 football players in Bindura district, especially in remote areas. This is an essential gap that needs to be addressed, as adequate and proper nutrition supports bone development. This research seeks to highlight specific problems that negatively affect bone health, such as limited access to nutrient-rich food diets, and to use nutritional strategies to enhance bone health in under-18 football players in Bindura district, current nutritional practices, and promote better nutrition practices to promote proper bone health and development.

1.4. RESEARCH QUESTIONS

Main research question

- ❖ How can nutrition be used to enhance bone health among under-18 football players in Bindura district?

Subsidiary questions

- ❖ What strategies are currently used to enhance bone health among under-18 football players in Bindura district?
- ❖ How effective are the strategies currently being used to enhance bone health among under-18 football players in Bindura district?

1.5. RESEARCH OBJECTIVES

Main research objective

- ❖ To explore nutritional practices that can enhance bone health among under-18 players in Bindura district.

Subsidiary objectives

- ❖ To identify the current strategies used to promote bone health among under-18 football players in Bindura district.
- ❖ To assess the effectiveness of the of the existing strategies for enhancing bone health among under-18 football players in Bindura district.

1.6 SIGNIFICANCE OF THE STUDY

The research aimed to use nutrition to enhance bone health in under-18 football players in the Bindura district. Its main focus was particularly on under-18 football players. By highlighting nutritional gaps in school-going athletes, the research can help the football players, coaches, and captains to improve the nutrition of the under-18 football players and enhance bone health. The study identified nutritional gaps faced by athletes and positively contributed to sport performance among under-18 football players, reducing the occurrence of bone-related injuries in sport. Nutrition in sport has the power and potential to positively affect the overall well-being of under-18 football players and promote the development of strong bones in the athletes.

The researchers' research provides groundwork for under-18 football players and coaches and even for further research. The research will benefit researchers and scholars in the field of physiotherapy, dietetics, education, and sport science. Injury prevention, nutrition, and bone health insights can be gained from the evidence provided by the research.

1.7 DELIMITATIONS OF THE STUDY

The study focused on school-going footballers, particularly on under-18 football players in the Bindura district. The researcher's research was specifically aimed at using standardized dietary plans to enhance bone health in under-18 football players in Bindura district. The research participants included footballers, physiotherapists, school heads, and physical education teachers. Mixed research methods, which include qualitative and quantitative research techniques, were employed to conduct the research.

1.8 STUDY OUTLINE

The research is divided into five chapters, chapter having distinct features and serving its own function.

Chapter1-Problem and its setting – The first chapter highlighted and summarized the statement of the problem, background, research objectives, research questions, significance of the study, and delimitations of the study.

Chapter 2- Literature review- This chapter presents a review of what is already known about the subject being investigated.

Chapter 3-Research methodology -This chapter examines the study processes and methodology.

Chapter 4- Data analysis and presentation -this chapter provides the findings of the study divided into qualitative and quantitative sections.

Chapter 5- Summary conclusion and Recommendations- This chapter forms the key findings, examines their implications, and recommends solutions for future.

1.9 CHAPTER SUMMARY

This chapter was centered on laying out the study background of the research, its objectives, a summarized problem, symptoms for the existence of the problem and justifications for carrying out the research. The problem summarized in this study is the problem of poor nutrition in under-18 football players in the Bindura district, football players which affects bone health and in turn leads to bone injuries and related injuries in sport. The second chapter, which is the next chapter, focuses on literature reviews from scholars relevant to the study.

CHAPTER TWO

LITERATURE REVIEW

2.1 INTRODUCTION

This research chapter focused on reviewing the literature on using standardized dietary plans to enhance bone health in Zimbabwean school-based football players. Nutrition plays a significant role in enhancing bone health in school-based football players (Boniquit, 2017). Nutrients such as calcium, vitamin D, magnesium, and omega-3 are essential for the enhancement of bone health, as they enhance bone mineralization and bone density and are necessary for bone growth and development. The nutritional strategies that can be employed in enhancing bone health in school-based football players include adequate calcium intake, vitamin D, supplementation and micronutrient diversity with the micronutrients being magnesium, phosphorous, and vitamin K.

2.2 CONCEPTUAL VIEW

Nutrition is the study of how the body uses nutrients and the relationship between diet, health, and diseases. (Butler, 2020) It plays a vital role in enhancing bone health as it aids in nourishment of the body. Nutrients supply the body with necessary nutrients such as calcium, vitamin K, and phosphorous that requires for enhancing bone health, which encompasses bone turnover, microarchitecture, bone mineralization, and bone density.

Bone health refers to the general and overall strength and well-being of an athlete's skeletal system (Mayo Clinic, 2019). An athlete has good bone health if they have a strong bone density, bone strength, and continued bone turnover. It can be promoted by consuming a strong calcium-rich diet, high in protein, vitamin D, and omega-3s, as they promote strong and healthy bones.

School-based athletes are school students who participate in competitive, well-organized sports implemented within educational institutions that focus on promoting the well-being of athletes and enhancing sports participation.

2.3 THEORATICAL VIEW

2.3.1 Bone remodeling theory by Simona B (2022)

The bone remodeling theory is a theoretical framework that supports bone remodeling through the use of nutrition, as it requires a constant supply of calcium, fluoride, phosphorous, and vitamin D (Cowin, 2022).

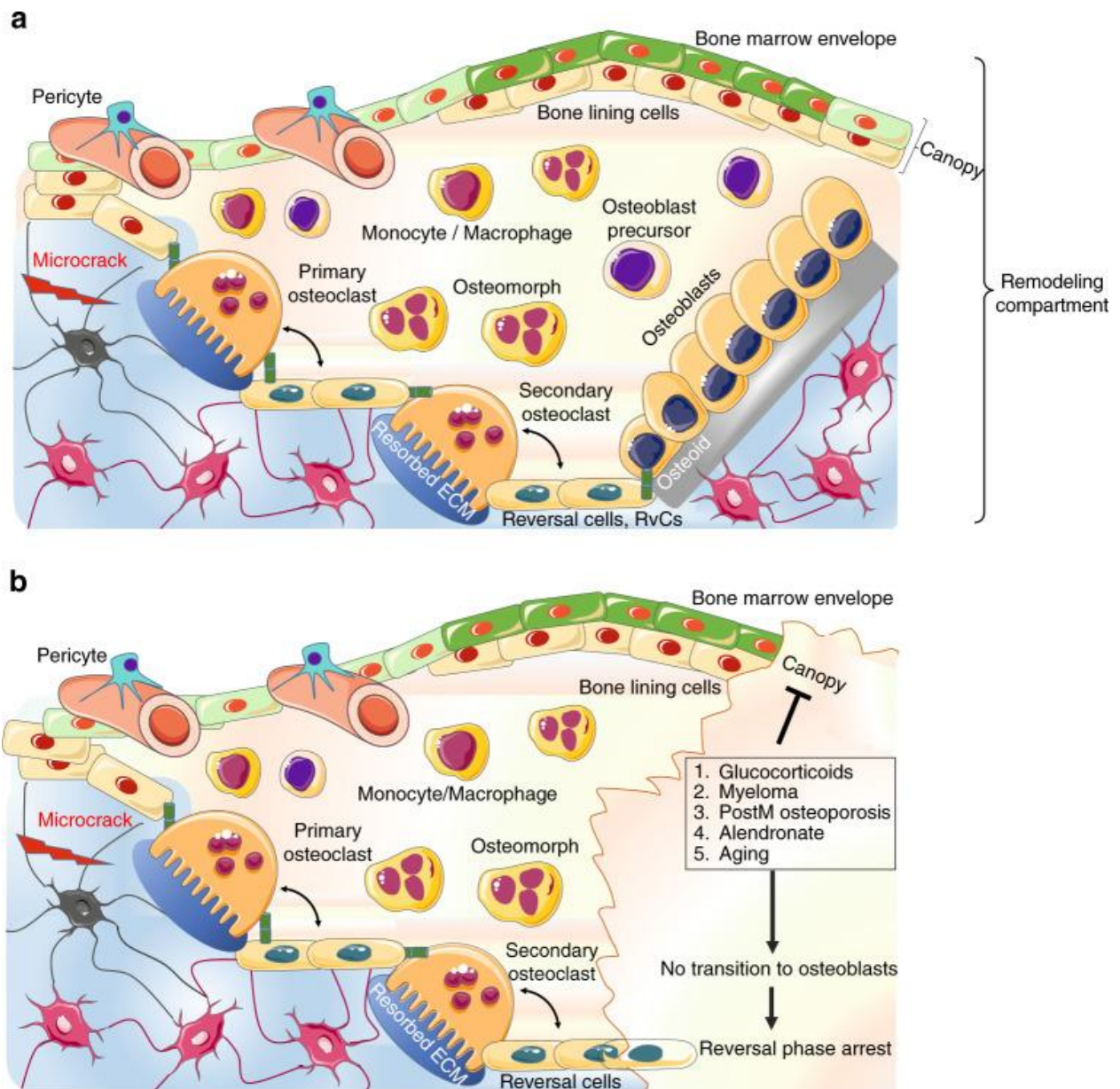
During bone health, old bone tissue is replaced with new tissue without changes in bone shape while maintaining calcium homeostasis and bone health continuously (Ruggatt, 2023). Osteoclasts and osteoblasts are responsible for remodeling as they interact and coordinate within time, maintaining the focal bone remodeling balance, which is the net amount of tissue resorbed and formed at each remodeling site, maintaining structural integrity of tissue.

Bone aliquots are then removed and synthesized at the maturity stage, which determines the focal balance, which can be negative or positive. During remodeling, coupling indicates that bones are being resorbed at some sites while being formed at other sites, increasing bone resorption and remodeling sites. Bone Marrow Envelope (BME) and Bone Lining Cells (BLCs) form a canopy that separates osteoblasts and osteoclasts from bone marrow (Simona, 2022). Bone lining cells disconnect from the underlying osteocytes through gap junction disruption, digesting fibrillary collagen, which is tightly packed to provide mechanical stability.

Figure 2.1 shows the bone remodeling processes (Simona, 2022).

Figure 2.1

Bone remodeling process



Bone Marrow Envelope and Bone Lining Cells. The canopy separates the remodeling site from bone marrow to allow osteoclasts and osteoblasts to enter the blood compartment (Simona, 2022). Secondary osteoclasts and reversal cells provide the basis for recruitment and expansion of osteoblastic pads except under counteracting conditions, allowing for the formation of a bone remodeling compartment.

2.3.2 Contribution of the bone remodeling theory

The bone remodeling theory contributes significantly when using standardized dietary plans to enhance bone health in under-18 football players as it aids in identifying and highlighting the nutrients that are essential for promoting bone health such as vitamin D, calcium, and phosphorous. It also aids in understanding the roles of nutrients as it further explains how nutrients such as calcium and phosphorous support bone health and remodeling. The theory also contributes greatly to using standardized dietary plans to enhance bone health in under-18 football players in the Bindura district as it considers the socio-economic and cultural factors affecting nutrition, for example, developing cost-effective nutritional strategies for enhancing bone health and incorporating traditional Zimbabwean foods such as calcium-rich vegetables, peanut stew, baobab fruit, Kapenta, and papayas.

2.3.3 Importance of the bone remodeling theory

Bone remodeling is important, as it maintains bone health and density, regulates calcium homeostasis, repairs micro fractures and adapts to changing mechanical loads.

2.3.4 Strengths of the bone remodeling theory

Its strengths are that it restores bone strength by replacing damaged bones and it regulates mineral metabolism (Cowin, 2022) and adapts to mechanical loads and local damage, while its weaknesses are that errors can occur during the remodeling stage and they can lead to bone diseases, and the life span of osteoblasts and osteoclasts can affect the remodeling cycle.

2.3.5 Paradigms of the Bone Remodeling Theory

The paradigms of the bone remodeling theory range from linear to dynamic (1960 to 1980) bone remodeling, where bone remodeling was recognized as a dynamic and continuous process (Ruggatt,

2023). This stage emphasized the role of osteoclasts and osteoblasts in bone remodeling.

The second paradigm (1990-2000) shifted focus from focusing on calcium to a multi-nutrient approach, which acknowledged the stage importance of other nutrients such as protein, vitamin D,

fatty acids, and omega-3 in bone remodeling and bone health, highlighting the interaction between nutrients and bone health.

The third paradigm (2000-present) shifted focus from bone density to bone quality and architecture and the importance of a nutrient-dense diet for optimal bone health.

2.3.6 Gaps in literature

The bone remodeling theory failed to recognize the role of dietary fat composition on bone health in football players (Dole, 2024); take note of the effects of composition and carbohydrate quality on bone remodeling in school-based football players. It also failed to take into consideration the role and effect of traditional Zimbabwean foods on the bone health of under-18 football players in the Bindura district and to note how zinc, copper, and manganese interact with the bone remodeling in school-based football players.

2.4 THEMATIC REVIEW

2.4.1 Nutritional factors affecting bone health in under-18 football players in Bindura district

Most school-based football players, for example, school-based football players in the Bindura district, have limited access to calcium-rich foods such as leafy greens and dairy products; hence, they are prone to poor bone health. This limit also affects their bone health, as their diet is mainly characterized by high intake of traditional foods high in carbohydrates; for example, high intake of maize, and the football players end up having nutrient deficiencies such as iron deficiency, which affects collagen, hence poor bone health. Another nutritional challenge affecting bone health in Zimbabwean school-based football is high intake of refined, processed, and fried food, which significantly decreases bone mineral health (Smith, 2023), causes cartilage buildup in growth plates, and impairs skeletal quality.

2.4.2. Interventions to promote improved bone health in under-18 football players in the Bindura district

One of the best interventions to promote bone health in under-18 football players in Bindura district when using standardized dietary plans is calcium and vitamin D supplementation. Providing nutrient supplements and maintaining a calcium and vitamin D-dense diet is vital for promoting bone density (Skulka, 2019) and improved bone turnover. The sources of vitamin D include fatty fish such as salmon and mackerel and eggs, and the sources of calcium include dairy products such as milk, dark leafy greens, such as collard greens, and canned fish with bones such as sardines.

Another intervention to promote bone health is education. Coaches and players for under-18 football players need to be educated on the importance of consuming a healthy diet as a way and

intervention to improve their bone health, as it affects their performance and prevents them from suffering from bone health related illnesses such as osteoporosis. Coaches also need to be educated on the type of diet that has to be provided for a school-based football player for the player to improve overall bone health.

Schools can provide healthy food options for their football players in order to maintain healthy football players with dense and strong bones. Schools can provide the soccer players with nutritious food that promotes bone health, such as milk, eggs, broccoli, spinach, nuts, oranges, and beans.

2.4.3 Barriers to improved bone health in under-18 football players in the Bindura district

Poverty has been a major barrier in the use of nutrition to promote bone health in under-18 football players in Bindura district. Most under-18 football players are financially unstable, and they find it very difficult to afford nutrient-rich foods. These athletes also face another problem of unavailability of healthy snack provisions during training and limited access to healthy, nutrient-dense food source options at school.

Another barrier to improved bone health in under-18 football players in the Bindura district is hyperinflation and economics constraints in food prices affecting school nutrition programs. The demand for nutrient-rich foods is elastic; hence, schools may forgo nutritious food due to economic constraints and supplement them with refined, cheaper, less nutritious foods, compromising the nutrition and bone health of their football players.

Culture is another barrier when using standardized dietary plans in enhancing bone health of under-18 football players in the Bindura district. Most cultures in Bindura influence bone health, as they believe in traditional diets that are carbohydrate dense, such as maize, which is consumed in large amounts as sadza, which is low in nutrients such as calcium, omega-3, phosphorous, zinc, and iron, and with favor and promote bone health. These people have limited awareness of healthy eating habits, which compromise their health, and they lack understanding of essential nutrients that affect bone health.

2.5 CONCLUSION

The literature research reviewed in this chapter highlights the significance of using standardized dietary plans in enhancing bone health in under-18 football players in the Bindura district. Schools can enhance the bone health of their football players by identifying the factors affecting the bone health of football players and implementing strategic interventions to promote healthy and strong football players.

2.6 GAPS IN LITERATURE

There is a limited amount of research based on using standardized dietary plans in enhancing bone health especially in under-18 football players in the Bindura district which makes it dreadful to develop evidence-based recommendations on using standardized dietary plans in enhancing bone health and assessing the usefulness and effectiveness of the different recommendations. More research is needed to understand the specific nutritional factors affecting bone health and the recommended interventions to promote bone health in this context. Much of the existing literature on bone health of athletes is based on fitness exercises and regular training, overlooking nutrition.

2.7 CHAPTER SUMMARY

This research, chapter on literature review gave an appreciation of work done by other authors about this research which focuses on using standardized dietary plans to enhance bone health in under-18 football players in the Bindura district. The literature review is important, as it can aid the researcher in choosing the right research method based on the literature reviewed. The next chapter focuses on the research methods and data collection techniques used in this study.

CHAPTER 3

MATERIALS AND METHODS

3.1 INTRODUCTION

This chapter, gives an appreciation of the research methodology used by the researcher in conducting this research giving a detailed account of data collection procedures and focusing more on data collection techniques and tools used in the collection of data. The research design is described in this chapter as well as population selection concerning the sampling methods and techniques to be used. In this chapter data analysis methods are also discussed, and data collection management is also described.

3.2 METHODOLOGICAL APPROACH

The study on enhancing bone health in under-18 football players in Bindura district can utilize mixed research methods based on a practical approach. Krustup (2023) supports the use of mixed research methods in using standardized dietary plans in enhancing bone health in school-based football players, as he also conducted similar research where he investigated the use of nutrition in improving musculoskeletal variables in 10–12-year-old Danish school football players using mixed research methods. Qualitative research methods were used in the form of interviews so as to understand the current nutritional practices and challenges, and quantitative research methods were used in the form of correlational design whereby the researcher analyzes the relationship between nutritional factors such as calcium intake and bone health indicators such as bone density.

3.3 TIME HORIZONS

Longitudinal research designs provide an effective approach when using standardized dietary plans to enhance bone health in under-18 football players in the Bindura district. The researcher used longitudinal research, as it allows researchers to identify instant effects of nutrition on bone health, assess the development and growth of bones during adolescence, and assess the effects of bone health on athletic performance. This information was used to generate hypotheses for further research. Several authors support the use of longitudinal time horizons in research on using standardized dietary plans to enhance bone health. For example, Caruana (2015) Et al urge that longitudinal research can be used, as they are generally observational when analyzing change over time for groups following change over time.

3.4 RESEARCH DESIGN

The research used mixed methods in the form of interviews and questionnaires to offer a powerful approach when using nutrition to enhance bone health in under-18 football players in the Bindura district. Mixed research methods allow the researcher to gather data through interviews and focus groups and analyze quantitative variables through surveys at the same time when using nutrition to enhance bone health in under-18 football players in Bindura district. Findings of different

variables were compared and contrasted to give strength to reliability and validity to this research. Several authors support the use of mixed research methods when using nutrition to enhance bone in under-18 football players in the Bindura district. For example, Krustup (2023) advocates for the use of mixed research design when conducting research on using nutrition to enhance bone health in football players, as he also conducted similar research on investigating the use of nutrition when enhancing the musculoskeletal variables in 10-year-old Danish soccer players.

3.5 POPULATION AND SAMPLING

3.5.1 Population

There are 55 football athletes on average in the Bindura district. The total population is 55, with the confidence level being 95% and a 5% margin of error, which the researcher got from using a sample size calculator. The population consisted of physiotherapists, school headmasters, physical education teachers, and coaches. A sample of the population was used during the research. Sample size was determined using a sample size calculator were:

n	=	required	sample	size
N	=	population	size	(60)
Z	=	Z-score (1.96	for 95% confidence level)	
p	=	estimated proportion (0.5	for maximum variability)	

e = margin of error (0.05 for ±5%)

Calculation Example:

Given

N	=	60
Z	=	1.96
p	=	0.5
e	=	0.05

Substitute into the formula:

$$n = (60 \times 1.96^2 \times 0.5 \times (1 - 0.5)) / ((0.05^2 \times (60 - 1)) + (1.96^2 \times 0.5 \times (1 - 0.5)))$$

$$n = (60 \times 3.8416 \times 0.25) / ((0.0025 \times 59) + (3.8416 \times 0.25))$$

$$n = 57.624 / (0.1475 + 0.9604)$$

$$n = 57.624 / 1.1079 \approx 55$$

3.5.2 Sampling

Research using mixed methods needs random selection of both qualitative and quantitative samples. A random selection of the population reduces bias, as every individual from the total

population has a chance of being represented helping the researcher to reduce bias. The researcher collected subsets of participants from a larger population from them to represent the whole population. The population has equal probability.

Quantitative sample:

A stratified random sample consisting of representatives of the population of high schools in Bindura with football was selected. A quantitative sample makes use of statistics to establish relationships between bone health and nutrition and it involves a large sample size which allows for generalization of findings. Contextually, the quantitative strand of the population of high schools with football in Bindura consisted of under-18 football players. With the use of a raw sample size, the researcher allowed for quantitative measurements such as bone health. and nutritional intake.

Qualitative sample:

A purpose sample of school heads, physical education teachers, coaches, and physiotherapists was selected based on their knowledge on experiences on using standardized dietary plans to enhance bone health in under-18 football players in the Bindura district. The expected sample size of the population is 20 based on the need to achieve data saturation. Qualitative sampling provides and allows for an in-depth use of contextual sources and knowledge taking environmental, cultural, and social dietary habits into consideration.

3.6 DATA COLLECTION PROCEDURES

3.6.1 Pilot study

A pilot study is essential for refining data collection with the use of questionnaires and interviews before the main study. During the pilot study, groups of physiotherapists, coaches, and physical education teachers were involved during data collection as a way of acquiring and compiling data from experts with knowledge and experience. Firstly, the researcher defined research objectives, chose a small sample of the population, designed a method of data collection, adapted to the data collection tools, which are interviews and questionnaires, and then conducted the study. The researcher analyzed the findings, evaluated the findings, and documented the findings. The pilot study allowed for the use of research instruments in gathering qualitative data.

3.6.2 Main study

The study made use of interviews and questionnaires as data collection tools. The researcher conducted interviews, and she interviewed physiotherapists, physical education teachers, coaches, and school heads. Questionnaires were distributed to athletes.

3.6.2.1 Interviews

Interviews were conducted by the researcher in Bindura using structured questions. The researcher was permitted to ask further questions that are not from the structured set of questions but linked to the area of study. School heads, physiotherapists, physical education teachers and coaches were interviewed in person. The interviews included a set of questions based on how nutrition can be used to enhance bone health among under-18 football players in Bindura district, strategies currently being used to enhance bone health among under-18 football players in Bindura district, how effective the strategies currently being used to enhance bone health among high school football players in the Bindura district are, and the measures that can be taken to improve bone health among under-18 football players in Bindura district.

3.6.2.2 Questionnaires

The researcher used questionnaires during this study with confidentiality and privacy of the responses given by the athletes. The questions were structured, and they were generated linked to the research questions. Questionnaires were used, as they can be offered on a large sample size, hence increasing reliability; they offer honest responses and ensure consistency in data collection.

3.7 DATA ANALYSIS AND PRESENTATION

Qualitative data

Qualitative data was analyzed by the researcher using NVivo. A thematic analysis was done categorizing and analyzing the data collected, allowing findings to be interpreted. This helps the researcher to create a coding system for analyzing data.

Quantitative data

Quantitative data collected during data collection was be analysed. SPSS is the software that was used when analyzing quantitative data. They make use of charts, graphs, and maps to visualize quantitative data helping communicate findings.

3.8 VALIDITY AND RELIABILITY

During the research, the researcher shared findings with the participants and kept detailed records of the research process. The researcher spent more time during the research to give room to more understanding, validate interpretations, and ensure accuracy.

3.9 ETHICAL CONSIDERATIONS

The researcher researching using standardized dietary plans to enhance bone health in Zimbabwean school-based football players took ethical considerations into practice as a way of ensuring respect and responsibilities. Different considerations were implemented,

Data security

- Collected data was secured and the data will only be accessed by authorized researchers in the future.

- Participants' personal, private, and confidential information was to be protected.

- Data collected as hard copies are secured safely, and data collected on soft copies were encrypted with passwords.

Cultural sensitivity.

- The researcher respected and adhered to different cultures of different ethnic groups during the research.
- The researcher respected different nuances, such as linguistics, which can affect data interpretation.
- Cultural sensitivity was taken into consideration during the research.

Confidentiality

- The researcher's collected data will only be accessible to authorized researchers.
- Collected data will be kept anonymous, private, and confidential.

Informed consent

- The researcher provided participants with a clear research purpose and made sure that they understood the researcher's study purpose, risks, and benefits.

3.10 CHAPTER SUMMARY

The research chapter on materials and methods explains the different research instruments to be used during data collection. It also explained the different data collection methods to be used during the research. The following chapter, which is chapter 4 mainly focuses on data presentation, interpretation, and analysis.

CHAPTER 4

DATA ANALYSIS AND PRESENTATION

4.1 INTRODUCTION

This chapter presents the findings from the research topic using standardized dietary plans to enhance bone health in under-18 football players in Bindura District. It also discusses the findings, putting more focus on the response rate, demographic data, and findings that are related to the studies' objectives.

4.2 RESPONSE RATE

4.2.1 Interview response rate

Table 4.1

Interview response rate

Target group	Planned	Done	Not done	Response rate (%)
Physiotherapists	5	5	0	100
Physical education teachers	5	4	1	80
Coaches	5	3	2	60
School heads	5	2	3	40

The research had a target of 20 participants, which consisted of physiotherapists, school heads, physical education teachers, and coaches. Physiotherapists had a high response rate of 100%, which shows success in engaging the target population and successful data collection. The findings suggest that there is increased validity of the study due to a high response rate. The high response from the physiotherapists was due to the relevance of the study in the field of physiotherapy as they understand the concept of nutrition in bone health more, as it is their field of study.

The interview response rate of school heads was 40 %, which was slightly low. This group had a slightly low response rate due to competing priorities, busy schedules, and time constraints.

Physical education teachers had a high response rate of 80%, which was due to the relevance of the study to their day-to-day interference with sports and the relevance of the research to their area of study. They also possess great experience related to the topic, using standardized dietary plans to enhance bone health in under-18 football players, and they find this research project highly applicable in their field.

Coaches had a response rate of 60%, which was slightly low, as some of the coaches did not possess knowledge related to the research. Some of them did not value the impact of the research on their practices; hence, they focused more on their duties.

The analysis of the interview response rate increased validity, leading to more reliability in the results; it also increased confidence in findings, lending credibility to the research

4.2.2 Questionnaire response rate

Table 4.2

Questionnaire response rate for athletes

Target group	Planned	Distributed	respondents	Spoiled/ not returned	Response rate (%)
Athletes	55	55	45	10	81%

The research targeted 55 participants who were to complete the questionnaires. These questionnaires were distributed to under-18 football players. The players had a high response rate, which was the highest response rate, making the data reliable. They had a high response rate due to possession of great knowledge related to the study. 10 spoiled questionnaires were distributed, but they were not returned.

4.2.3 Comparison of the questionnaire and interview response rates

Table 4.3

Questionnaire and interview response rate

Research instrument	Planned	Respondents	Spoiled	Response rate (%)
Interviews	20	14	6	70
Questionnaires	55	45	10	81

Table 4.3 shows a comparison of the research instruments. Questionnaires had a high response rate of 81% due to a high engagement level. The athletes showed great cooperation; they were

enthusiastic about the research, hence scoring higher. The 10 spoiled questionnaires were not returned by the participants. This made questionnaires more reliable.

From table 4.3, interviews had a slightly low percentage of 70% due to some of the participants prioritizing their duties more at the expense of the research. 14 out of 20 sessions were conducted, and the 6 interviews were not conducted due to data saturation. No new responses were emerging from the respondents.

4.3 DEMOGRAPHICS

This section focuses more on the age of the participants, the gender of the participants.

4.3.1 Gender of participants

Table 4.4 presents the total number of participants who completed the questionnaires for the research study. The research had a target of 55 respondents who were to complete the questionnaires.

Table 4.4

Total number of participants who were completed the questionnaires

Respondent's gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	31	56.4	68.9	68.9
	Female	14	25.4	31.1	100.0
	Total	45	81.8	100.0	
Missing	System	10	18.2		
Total		45	81.8s		

The total number of questionnaires completed was 45, 14 being female, with 26%, and 31 being male, with 25%. Analyzing the results from table 4.4, gender representation during the research

is unbalanced with males being more than females, as males have a higher proportion whilst females have a low proportion.

The researcher made an effort to interview both females and males to allow for gender balance in distribution. Gender balance is important in data collection as it aids in ensuring a comprehensive understanding of the research from different perspectives. This aids in identifying key issues amongst different demographics and achieving and obtaining better research outcomes towards the research topic using standardized dietary plans to enhance bone health in under-18 football players in Bindura District.

A higher percentage of male questionnaire respondents is due to more males participating in sports and stereotypes and societal expectations affecting demographics. Although the researcher targeted females, it is a way of ensuring that their voices are adequately presented in the study. The outcome produced was actually the opposite. The low percentage of female respondents was due to some females feeling that questionnaires related to sport are more relevant to men, making them lose interest. Additionally, females largely participate in board games such as handball and netball rather than in football, making them focus on those more than football.

More male respondents could indicate that the researcher targeted males, as males are more knowledgeable when it comes to issues related to soccer than females. To add, on sport is viewed as a male domain, and males are more passionate about sports than women. Ultimately, the gender distribution of both male and female questionnaire respondents seems to be aligned and going along with the objective of the study, improving the quality and reliability of the researcher's study.

4.3.2 Age of the respondents

Table 4.5

Age of questionnaire respondents

Respondent's age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	16	11	20.0	24.4	24.4
	17	13	23.6	28.9	53.3
	18	21	38.2	46.7	100.0
	Total	45	81.8	100.0	
Missing	System	10	18.2		
Total		55	100.0		

The questionnaire was distributed to under-18 football players who consisted of 16-year-old athletes, 17-year-old and 18-year-old players. 55 questionnaires were distributed, and only 45 were answered. 10 questionnaires were spoiled. Eleven 16- year-old players managed to complete the questionnaires, scoring up to 20%. 13 seventeen-year-old players managed to complete the questionnaires, scoring up to 25%. 21 eighteen-year-old players managed to complete the questionnaires, scoring up to 38%. 16-year-old players had the lowest percentage, as they were few in the category and they had little knowledge related to this research. 17-year-olds scored medium, as they understood the concept more due to maturity. 18-year-old players participated the most, as they were more knowledgeable of the subject and experienced.

4.4 ANALYSIS AND PRESENTATION OF DATA LINKED TO RESEARCH QUESTIONS

4.4.1 Research question 1

What are the current strategies being used to enhance bone health in under-18 football players in the Bindura district?

Table 4.6

current strategies that are being used in enhancing bone health in under-18 football players

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
The extent to which sunlight exposure is being used to enhance bone health	45	2.27	1.214	.181
The extent to which rest and recovery is used to enhance bone health	45	1.69	.821	.122
The extent to which health education is used to enhance bone health	45	2.38	1.451	.216
The extent to which balanced diet is used to enhance bone health	45	2.80	1.307	.195
The extent to which hydration is used to enhance bone health	45	4.22	.636	.095

Table 4.6 shows the current strategies that are being used in enhancing bone health in under-18 football players. It is a one-sample statistic generated by SPSS, which is showing the level of effectiveness of the different strategies that are currently being used. The data was collected through distributing questionnaires to athletes. It made use of a five-point Lickert scale, which was

1. Strongly disagree
2. Disagree
3. neutral
4. Agree
5. Strongly disagree

- Mean scores less than 4 indicated that the use of those strategies is to a lesser extent in enhancing bone health in under-18 football players in Bindura district.
- Mean scores greater than 4 indicated that the strategies are being used to a greater extent enhancing bone health in under-18 football players.

Hydration has a mean of 4.22, which shows that it is the most, used nutritional strategy as compared to the other ones. A mean greater than 4 shows the strategy that is being used the most and any value that has a mean that is below is being used to a lesser extent.

A balanced diet is being used secondly in enhancing bone health in under-18 football players in the Bindura district as it has a mean of 2.80. Health education is being used thirdly, as it has a mean of 2.38. Exposure to sunlight is being used to enhance bone health in under-18 football players in the Bindura district fourthly, as it has a mean score of 2.27. Rest and sleep are being used to a lesser extent, as they have the values and a mean score of 1.69, which shows that they are used to a lesser extent.

4.4.2.2 Qualitative data

The qualitative strand of the study was obtained through interviews. Key interview participants were asked by the researcher about the current nutritional strategies that are currently being used by under-18 football players in the Bindura district to enhance bone health. The findings from the interviews were presented using NVivo, which showed the most used nutritional strategy presented as figure 4.1.

Figure 4.1

The current strategies being used to enhance bone health in under-18 football players in Bindura district

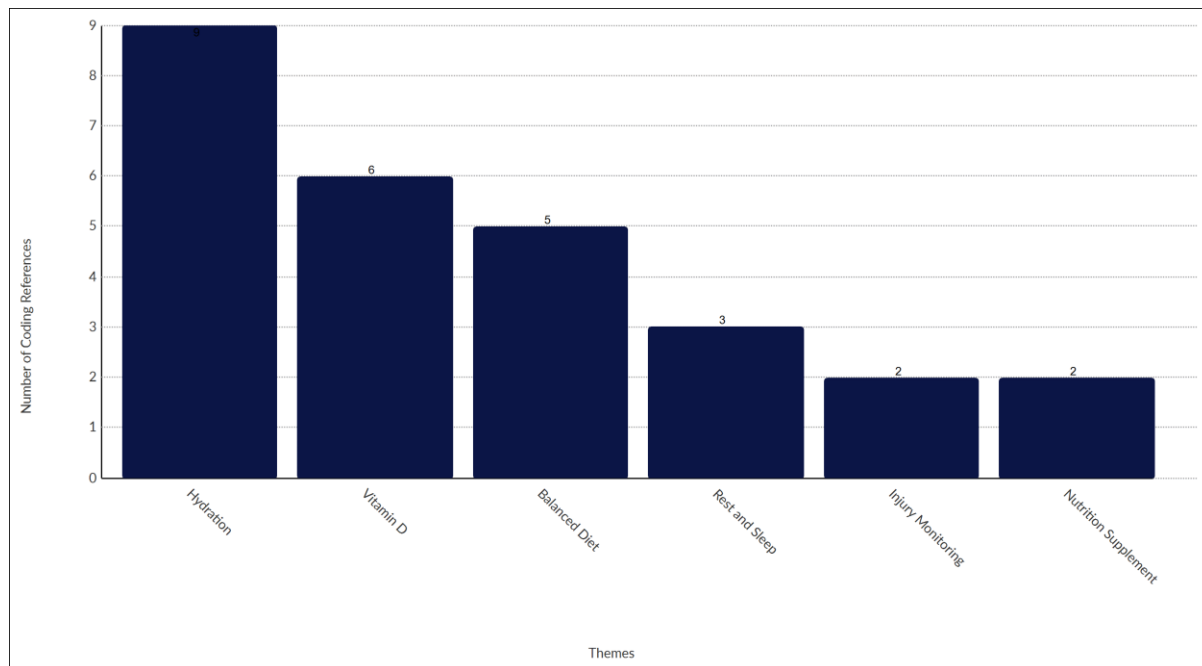


Figure 4.1 shows that hydration is being greatly used to enhance bone health in under-18 football players. This is because it has the highest coding reference of 9 which shows that it is the main strategy that is being used frequently in under-18 football players. Vitamin D sources are being used secondly by the under-18 football players in the Bindura district as it has a coding reference of 6. Thirdly, a balanced diet is being made use of by the under-18 football players in the Bindura district which has a coding reference of 5. Rest and Sleep are being used fourthly, as it has a coding reference of 3. Nutrition supplements and injury monitoring are being used equally to enhance bone health in under-18 football players in Bindura district as they both have coding references of 2.

Conclusively, slight differences are emerging from the quantitative and qualitative results. The quantitative strand presented health education and sun exposure as strategies that are currently being used to enhance bone health in under-18 football players, whereas the qualitative strand presented the use of vitamin D, nutrition supplements and injury monitoring. The results of the quantitative strand and qualitative strand are correlating, as they both presented hydration as the main nutritional strategy that is being used to enhance bone health in under-18 football players. They also both presented the use of a balanced diet and rest and sleep as strategies for enhancing bone health in under-18 football players.

4.4.3 Research question 2

How effective are the current strategies that are being used in using standardized dietary plans to enhance bone health in under-18 football players in the Bindura district?

4.4.3.1 Quantitative data

Table 4.7

The effectiveness of the current strategies being used to enhance bone health in under-18 football players in Bindura district

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
The strategies that are currently being used are not effective	45	2.36	1.300	.194

Table 4.7 is a one-sample statistics which is presenting the effectiveness of the current strategies being used to enhance bone health in under-18 football players in the Bindura district. The data was collected through distributing questionnaires to athletes. The findings were generated by SPSS. The table made use of a 5-point Likert scale which consisted of

1. Strongly disagree
2. Disagree
3. Neutral
4. Agree
5. Strongly agree

- Mean scores less than 4 indicated that the use of those strategies is to a lesser extent in enhancing bone health in under-18 football players in the Bindura district.
- Mean scores greater than 4 indicated that the strategies are being used to a greater extent, enhancing bone health in under-18 football players.

The results present a mean of 2.36, which shows that the strategies are being ineffective, as the mean is below 4. The Lickert scale presents that every value below 4 represents ineffectiveness of the strategies, and all values above 4 represent effectiveness.

4.4.3.2 Qualitative data

The qualitative strand of the study was obtained through interviews. Key interview participants were asked by the researcher about the effectiveness of the current nutritional strategies that are currently being used by under-18 football players in Bindura district to enhance bone health. The findings from the interviews were presented using NVivo, which showed the most used nutritional strategy presented as figure 4.2.

Figure 4.2

effectiveness of the current strategies being used to enhance bone health in under-18 football players?

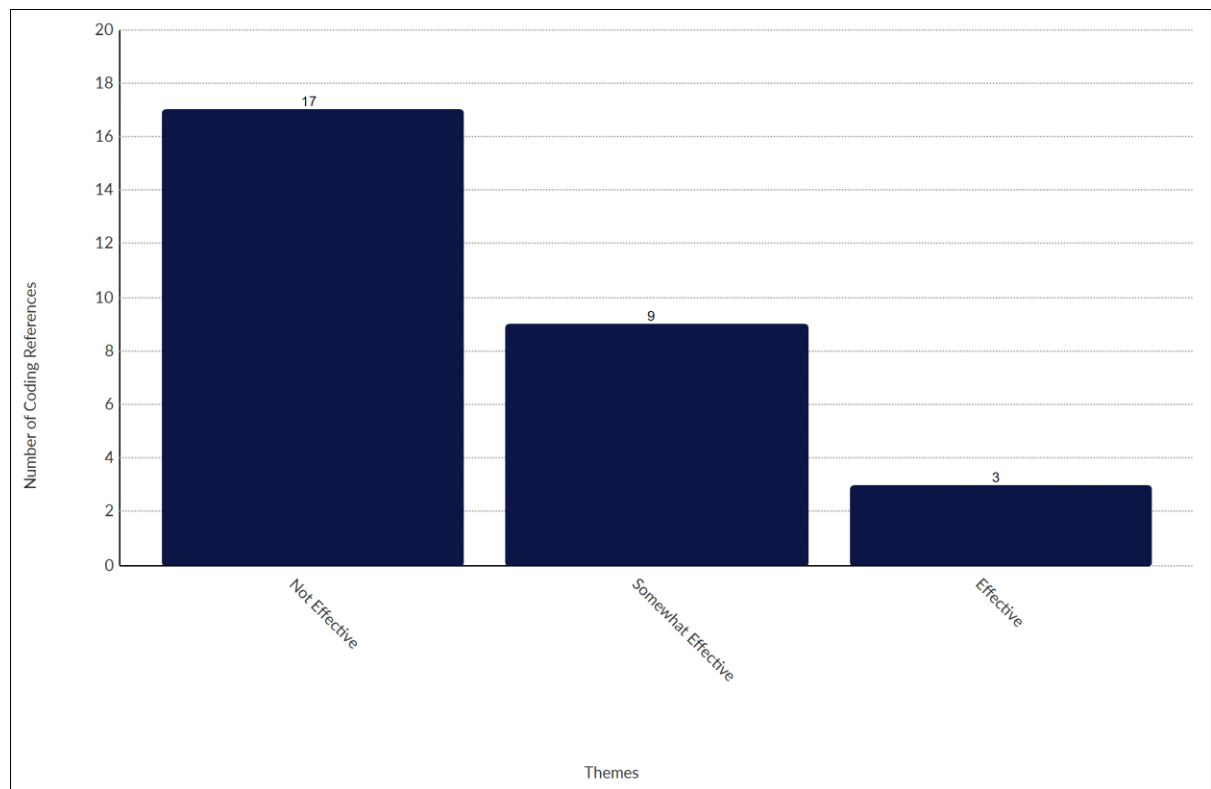


Figure 4.2 presents research data obtained from interviews done with physiotherapists, school heads, physical education teachers, and coaches. The results show that the strategies that are currently being used to enhance bone health in under-18 players are ineffective. This is because the results have a coding reference of 17. However, some of the interviewees argued that the current strategies being used to enhance bone health in under-18 football players are somewhat effective, and the coding reference of “somewhat” effective is 9. Some of the respondents also argued that the strategies that are currently being used to enhance bone health in under-18 football players in Bindura district are effective with a coding reference of 3.

To sum up, both quantitative and qualitative findings are correlating, as they both suggest that the strategies that are currently being used to enhance bone health in under-18 football players are ineffective. The quantitative strand responses presented a mean score of 2.36. Mean scores less than 4 indicated that the use of those strategies is to a lesser extent in enhancing bone health in under-18 football players in the Bindura district. At the same time the qualitative strand presented a highest coding reference of 17, which showed ineffectiveness of the strategies currently being used to enhance bone health in under-18 football players.

4.4.4 Research question

How can nutrition be used to enhance bone health in under-18 football players in the Bindura district?

4.4.4.1 Quantitative data

Table 4.8 presents the data obtained using SPSS concerning how nutrition can be used to enhance bone health in under-18 players in the Bindura district that were generated using SPSS. It makes the use of a 5-point Lickert scale which consists of

1. Strongly disagree
2. Disagree
3. Neutral
4. Agree
5. Strongly agree

Table 4.8

How can nutrition be used to enhance bone health in under-18 football players in Bindura district?

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Can nutrition education programs enhance bone health in under-18 football players	45	4.38	.684	.102
Can customized meal planning enhance bone health in under-18 football players	45	4.04	.520	.078
Can partnering with nutritionist enhance bone health in under-18 football players	45	4.2	.693	.103
Can promoting access to healthy foods enhance bone health in under-18 football players	45	4.11	.573	.085
Can the use of hydration enhance bone health in under-18 football players	45	4.4	.625	.093

- Mean scores less than 4 indicated that the measures can be used to a lesser extent in enhancing bone health in under-18 football players in the Bindura district.
- Mean scores greater than 4 indicated that the measures can be used to a greater extent, enhancing bone health in under-18 football players.

Table 4.8 presents that hydration is the best measure that can be used to enhance bone health in under-18 football players in the Bindura district as it has a mean score of 4.4. Secondly partnering with nutritionist is another measure that can be used to enhance bone health in under-18 football players in Bindura district. Thirdly, education programs can be done as a way of enhancing bone health in under-18 football players in Bindura district and it has a mean score of 4.38 promoting access to healthy foods is another measure to be used, as it has a mean score of 4.11. Lastly meal planning is the other measure that can be adopted to enhance bone health in under-18 football players, and it has a mean score of 4.04. All the measures can be adopted so as to enhance bone health can be adopted as they have mean values of 4 and above.

4.4.4.2 Qualitative data

The qualitative strand of the study was obtained through interviews. Key interview participants were asked by the researcher about the measures that can be adopted to enhance bone health in under-18 football players in the Bindura district to enhance bone health. The findings from the interviews were presented using NVivo, which showed the most used nutritional strategy presented as figure 4.3.

Figure 4.3

How can nutrition be used to enhance bone health in under-18 football players in Bindura district?

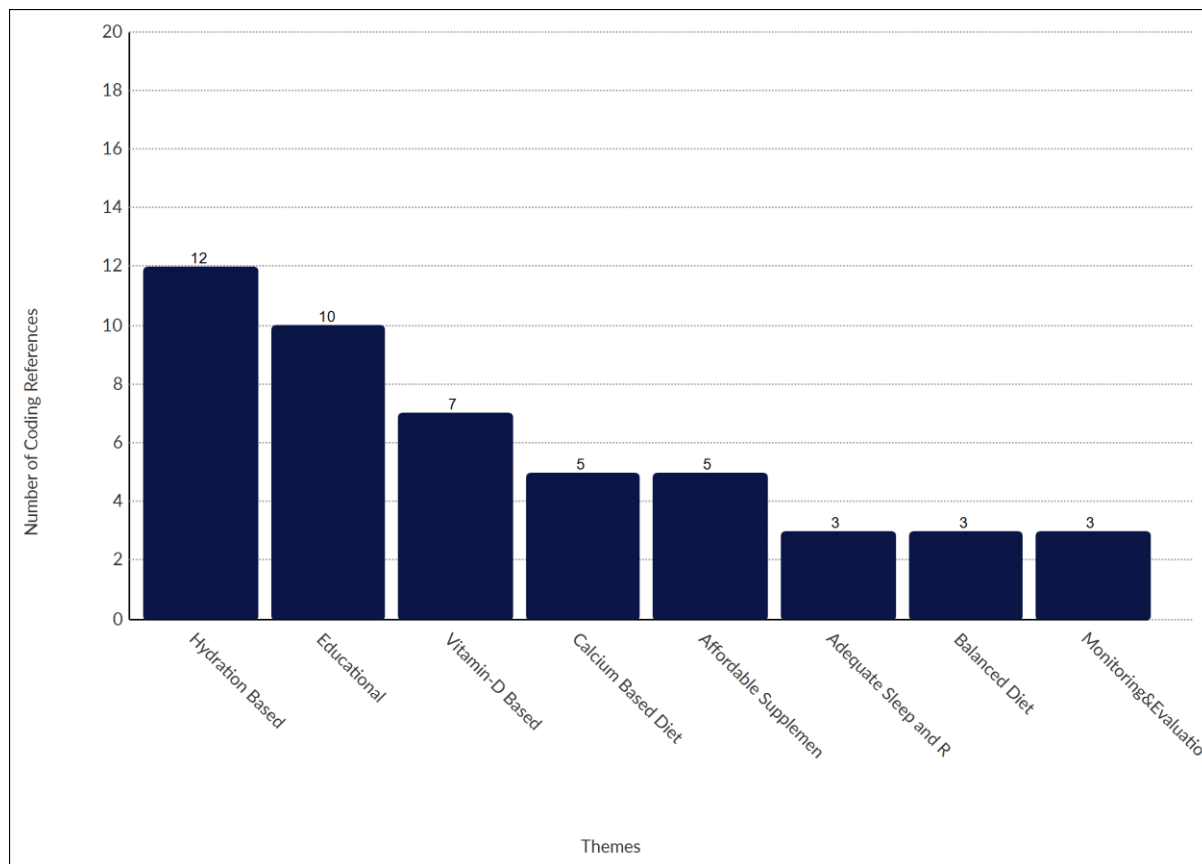


Figure 4.3 presents the measures that can be adopted to enhance bone health in under-18 football players. Hydration-based measures can be best adopted to enhance bone health, as it has the highest coding reference of 12. Education can also be adopted secondly, as it has a coding reference of 10. Vitamin-D based measures can also be adopted thirdly, and they have a coding reference of 7. The findings also suggest that calcium-based measures and the use of affordable supplements can be adopted to enhance bone health in under-18 football players, and they both have a coding reference of 5. Adding on, adequate sleep and rest, the consumption of a balanced diet, and monitoring and evaluation can be adopted last as they all have mean value of 3.

Conclusively, the findings from the quantitative strand are going hand in hand with the findings, from the qualitative strand, as they are all suggesting that hydration is the best strategy that can be adopted, as it has the highest mean score of 4.4 in quantitative findings and a coding reference of 12 in qualitative findings. Quantitative findings suggest that education, partnering with a nutritionist, meal planning and consuming a healthy balanced diet. Whereas the findings from the qualitative strand suggest that education, the use of vitamin D based-measures, the use of calcium-based measures, the use of affordable supplements, adequate sleep and rest, consuming a healthy diet, and monitoring and evaluation can be adopted to enhance bone health in under-18 football players in the Bindura district.

4.5 DISCUSSION

The findings of the researcher's study are contributing to the existing literature on using standardized dietary plans to enhance bone health in under-18 football players in Bindura district.

4.5.1 Findings from the Study

The findings from qualitative data suggest that nutrition can be used to enhance bone health in under-18 football players in the Bindura district through consuming a diet that is rich in vitamins, exposing themselves to the sun for vitamin D, the use of calcium and vitamin D supplements, and educating coaches on the importance of nutrition in bone health.

They also suggest that the current strategies that are being used to enhance bone health include calcium intake and consumption of vitamin D-dense diet. They suggest that hydration is being greatly used to enhance bone health in under-18 football players.

The study also presents that the current strategies that are currently being used to enhance bone health in under-18 football players in the Bindura district are being effective to a lesser extent as the athletes and some of the coaches put more effort on other factors to enhance bone health, such as exercising at the expense of nutrition.

The findings Qualitative data also suggest that measures that can be used to enhance bone health in under-18 football players in Bindura involve promoting the consumption of affordable sources of calcium such as leafy greens, educating players on the importance of nutrition in bone health, and properly hydrating athletes.

The quantitative data suggest that nutrition can be used to enhance bone health in under-18 football players in the Bindura district. The current methods that can be used include rest and recovery, education of coaches and athletes on the importance of nutrition in bone health, hydration, and consumption of calcium and vitamin D-dense diets.

Quantitative data also suggest that hydration is the most used nutritional strategy as it has a mean of 4.22 as compared to sunlight exposure, balanced diet, rest, and health education.

Quantitative data also suggest that nutrition education programs to enhance bone health in under-18 football players in Bindura district, customized meal planning, partnering with nutritionists, and promoting access to healthy foods are measures that can be adopted to enhance bone health in under-18 football players in Bindura district, as they have mean values of 4.38, 4.04, 4.44 and 4.11, respectively. All values that have mean values above 4 can be adopted.

4.5.2 Corroboration with existing literature

A correlation exists between the finding and the existing literature. The findings suggest the importance of hydrating under-18 football players in the Bindura district as a way of enhancing bone health. Hydration plays a key role in bone remodeling and preventing stress fractures. Hydration plays an important role in maintaining optimal bone mineral density by aiding the transportation and absorption of calcium (<https://www.boneandjointclinicbricom>). This aligns with the findings that stress the importance of hydration in the enhancement of bone health in under-18 football players.

To add on, findings suggest that vitamin D plays a crucial role when using standardized dietary plans to enhance bone health in under-18 football players in the Bindura district. It helps the body to absorb and utilize calcium for bone strength and improved bone density (LeBoff, 2020). Vitamin D supports mineralization of bones through improved calcium absorption.

Moreover, findings suggest that calcium plays a crucial role in enhancing bone health in under-18 football players. Existing literature suggests that calcium plays a key role in skeleton mineralization (Vannucci, 2018). It is essential for bone strength and bone remodeling, and this goes hand in hand with the findings, making the findings valid and relevant.

4.5.3 Bridging gaps in literature

The study highlights the importance of using standardized dietary plans to enhance bone health in under-18 football players in Bindura district. Existing literature concentrates on elite football, leaving behind grassroots football.

The existing literature focuses more on factors such as exercising, body weight, and proper training techniques. The literature brings out the importance of these aspects in enhancing bone health of football athletes, leaving behind nutrition, which is also an important factor in bone health.

4.5.4 New insights

The research is bringing new insights, highlighting the importance of nutrition in bone health, as most athletes and coaches focus on factors such as exercising, body weight, and proper training, ignoring the fact that nutrition plays a crucial role in bone health enhancement. The research is bringing out the need to focus more on grassroots football as it is looked down upon.

4.5.5 Alignment with best practices in the industries

The findings from the study are aligning well with established practices in the sports industry, specifically with the practices guiding the bone health of soccer players. Nutrition remains a key aspect of enhancing bone health in under-18 football players.

4.6 SIGNIFICANCE OF FINDINGS

Findings are significantly contributing to the existing literature on using standardized dietary plans to enhance bone health in under-18 football players focusing more on grassroots football, highlighting the measures that can be adopted so as to improve bone health in under-18 football players, thereby promoting a supportive environment for the athletes.

4.7SUMMARY

This chapter presented the findings and discussions of the data.

CHAPTER 5

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 INTRODUCTION

This chapter presents the summary of the research study, conclusions drawn from the study,¹ and recommendation of the study.

5.2 SUMMARY OF THE MAJOR FINDINGS FROM THE RESEARCH

The research findings from the study outline and suggest that proper nutrition plays a vital role in improving the bone health of under-18 players. Adequate nutrition is essential for the development of bones in the under-18 players.

The research findings suggest that nutrition can be used to enhance bone health among soccer players through the consumption of a balanced diet that focuses more on consuming calcium-dense foods, vitamin D, proteins K and vitamin k. Calcium-dense foods include dairy products such as cheese, milk, and yoghurt; leafy greens such as kale, broccoli, and spinach; and fortified foods such as cereal (Skulka, 2019). They improve bone density. Vitamin D-rich foods that improve bone health include salmon and sardines. whilst proteins play a vital role in maintaining bone health through the formation of bone matrix and collagen production. Protein-rich foods include almonds and Greek yogurt. This is going hand in hand with the literature view that suggested that providing nutrient supplements and maintaining a calcium and vitamin D-dense diet is vital for promoting bone density (Skulka, 2019) and improved bone turnover. The sources of vitamin D include fatty fish such as salmon and mackerel and eggs, and the sources of calcium include dairy products such as milk, dark leafy greens such as collard greens, and canned fish with bones such as sardines.

The findings also suggest the use of supplements rich in vitamin D, protein powders added with vitamin D and collagen supplements, which support bone health. Meal planning was also amongst the findings. Teams with under-18 football players are implementing nutrient-dense foods before and after training sessions to ensure that athletes get access to nutrient-rich foods and balanced diet.

The current strategies being implemented are being effective to a lesser extent, as some athletes and coaches are resistant to change, as they take their preferences, such as fitness training, into consideration more, and some of the players are struggling to maintain and follow proper nutritional strategies and interventions. Some of the athletes lack nutritional understanding; hence, they go for poor nutritional choices.

Findings suggest that athletes and coaches need continued and regular education so that they become knowledgeable on the vital role that nutrition plays in the promotion of strong and healthy bones. Schools also need to be engaged for them to increase and promote programs that aim at increasing and improving the nutrition of soccer players.

5.3 CONCLUSIONS

- ❖ What are the current nutritional strategies being used to enhance bone health in football players?

The study concludes that teams with under-18 football players are making an effort to provide the players with meals before and after training sessions as a way of promoting the consumption of a healthy diet. They are also making an effort to provide the athletes with enough hydration.

- ❖ How effective are the strategies being used to enhance bone health in under-18 football players in the Bindura district?

The study concludes that the strategies being used to enhance bone health are less effective, as teams are struggling to meet, maintain, and follow them due to a lack of financial resources needed to implement the strategies.

- ❖ What measures can be adopted to enhance the use of nutrition in enhancing bone health in under-18 football players?

The study concludes that educating school heads, coaches, and players plays a key role in enhancing bone health. Doing regular follow-ups on to check if the taught strategies are being implemented.

5.4 LIMITATIONS

The study was limited to under-18 football players only, leaving out all other age groups. This is a crucial factor, as it accounts for the different developmental phases with different age groups in school-going football athletes.

The geographical scope was only limited to under-18 football players in the Bindura district only. This target location may not present the nutritional problems in the other regions of the country. The findings from the study may not be transferred to other districts directly.

The study focused on nutrition only as a key factor of enhancing bone health, leaving out other factors such as adequate sun exposure, strength training, and regular weight-bearing exercises, which also enhance bone health in under-18 football players in the Bindura district.

5.5 IMPLICATIONS

5.5.1 Implications for practice

The research suggests the need for local teams and schools with under-18 football players in the Bindura district to come up with nutritional strategies aimed at improving the bone health of athletes and the implementation of those strategies.

The study highlights the importance of using standardized dietary plans to enhance bone health in under-18 football players which address the problem of nutritional deficiencies and poor bone health in under-18 football players.

The study highlights the measures that can be used to enhance the use of nutrition in enhancing bone health in under-18 football players such as regular education of coaches on the importance of nutrition in the promotion of strong, dense and healthy bones.

The research suggest that the use of nutritional supplements also play a key role in addressing nutritional deficiencies. Energy bars that is rich in nutrients such as calcium, vitamin D and magnesium can be made using local traditional supplements which ae affordable.

5.2 Implications for future research

Future studies related to this study should explore a wide geographical area not to mainly focus on Bindura district. This aids in obtaining more understanding of the research. Future researchers should focus more on other factors needed to enhance bone health rather than focusing on nutrition only.

5.6 CHAPTER SUMMARY

The chapter presented the summary, conclusions, and recommendations of the study.

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APPENDICES

APPENDIX A

CONSENT LETTER

BINDURA UNIVERSITY OF SCIENCE EDUCATION



FACULTY OF SCIENCE AND ENGINEERING

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BINDURA, Zimbabwe

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CHAIRPERSON DEPARTMENT OF SPORTS SCIENCE

7 April 2025

TO WHOM IT MAY CONCERN.

RE: UNDERGRADUATE DISSERTATION STUDY ACCESS REQUEST.

This is to certify that (Name and Student Number) is a bonafide Bachelor of Science in Sports Science and Management student in the Department of Sports Science at the Bindura University of Science Education. S/He is conducting an action research study entitled: ‘
’.

We are kindly requesting your organization to partner with her/him in the study by participating in the data collection and intervention strategy development process.

Participation in this research is completely voluntary, and you may choose to withdraw from the research at any time. The information from your organization will only be used for academic purposes and be kept private and confidential. Codes will be used to identify participant organizations. This is meant to ensure that information would not be linked to the providers. Password-protected computers will be used to store any identifiable information that may be obtained from your organization. Data will also be analyzed at the group level to ensure anonymity. You can also sign confidentiality agreements with the researcher.

A copy of the finished work will be provided to your organization after the study. The results of the study are expected to transform practice, and your support will be pivotal to its success.

If you have any queries regarding this project, please feel free to contact us.

We would like to thank you in advance for your support.

Yours Sincerely



Lysias Tapiwanashe Charumbira (Dr.)

APPENDIX B

QUESTIONNAIRE GUIDE

Demographic information

Please fill with the relevant answer

What is your gender?

Male	Female
------	--------

What is your age?

16	17	18
----	----	----

- Can nutrition be used to enhance bone health in under-18 football players?
 - No
 - Sometimes
 - yes
- Please indicate by ticking in the appropriate column which one among the following is a source of calcium?

Source	Strongly disagree	disagree	Neutral	Agree	Strongly agree
Maize					
Pears					
Kale					
Dairy products					
Wheat					

- Please indicate the extent to which the following strategies are being currently used to enhance bone health in under-18 football players

Strategy	Never used	Rarely used	Neutral	Occasionally used	Always used
Promoting sunlight exposure for vitamin d					
Rest and recovery					
Health education					

Ensuring a balanced diet					
Promoting hydration					

4. The strategies that are currently being used to enhance nutrition in under-18 football players are not effective? Please indicate the level of agreement.

Strongly disagree	Disagree	Neutral	Agree	Strongly agree
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5. Do you think these measures can enhance bone health in under-18 football players?
Please tick in the relevant box

Measures	Strongly disagree	disagree	Neutral	Agree	Strongly agree
Nutrition education programs					
Customized meal plans					
Partnering with nutritionists					
Promoting access to healthy foods					
Use of supplements					

APPENDIX C

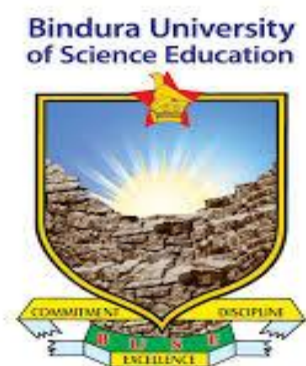
INTERVIEW GUIDE

1. Have you ever worked with under-18 football players? if yes, for how long?
2. Have you ever encountered a bone related injury?
3. For how long have you been involved in sport?
4. Are there any nutritional needs that you think are important for enhancing bone health in under-18 football players in Bindura district?

5. How can nutrition be used to enhance bone health in under-18 football players in Bindura district?
6. Are there any strategies being used to enhance bone health in under-18 football players in Bindura district?
7. How effective are the strategies?
8. What measures can be adopted to enhance the use of nutrition to improve bone health in football players?

APPENDIX D

INFORMED CONSENT FOR INTERVIEWS



INFORMED CONSENT FORM

Purpose of Study

You are kindly being asked to take part in research that seeks to using standardized dietary plans to enhance bone health in under-18 football players in Bindura District.

Conditions for Participation

1. I volunteer to participate in a research project conducted by the Sports Science student of Bindura University of Science Education
2. I understand that I will not be paid for my participation
3. I understand that even if I agree to participate now, I can withdraw at any time or refuse to answer any question without any consequences of any kind
4. I understand that all information I provide for this study will be treated confidentially
5. I understand that in any report on the results of this research my identity will remain anonymous
6. I understand that disguised extracts from my interview may be quoted in the research report and subsequent publications
7. I agree to my interview being audio- recorded
8. I understand that my identity will be protected
9. By signing this form, I am attesting that I have had the purpose and nature of the study explained to me and I have the opportunity to ask questions about the study and fully understand the nature and character of my involvement in this research and I freely give my consent to participate in the study
10. I have been given a copy of this consent form

Name of Research Participant..... Signature Date

Name of Investigator..... Signature Date.....

APPENDIX E

CONSENT FORM FOR ATHLETES

Bindura University
of Science Education



INFORMED CONSENT FORM

I am a final year student at Bindura University; I am conducting a research project focused on using standardized dietary plans to enhance bone health in under-18 football players in Bindura district. The main purpose of this research is to gather measures to enhance the use of nutrition in under-18 football players. Your child's participation in this study is very important in this research, and I give you assurance that all your responses remain confidential and only be used for academic purposes. By signing this consent form you thereby agree to allow your child to participate in this study.

Consent:

I, the undersigned, consent to my child's participation in this study

Parent/Guardian Signature.....

Date