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## Research Article

### Nutritional Knowledge and Dietary Habits of Student-Athletes in a State University: Towards a Contextualized Nutrition Education Plan

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#### ABSTRACT

Sustainable Development Goal 2 aims to end hunger, achieve food security, improve nutrition, and promote healthy and sustainable diets. Student-athletes deal with unique challenges due to the demands of physical and mental requirements of their sports, making proper nutrition and dietary habits crucial for their overall health and performance. Therefore, this study aimed to analyze the relationship between nutritional knowledge and dietary habits among State Colleges and Universities Athletic Association (SCUAA) Athletes at a state university in Pampanga, Philippines, as a basis for the development of a contextualized Nutrition Education Plan (NEP). The study was grounded on a postpositivist philosophical worldview that employed a quantitative non-experimental approach, specifically a correlational design. A total of 177 student-athletes were assessed for their nutritional knowledge and dietary habits using survey questionnaires. It was determined that student-athletes' level of nutritional knowledge was described as "knowledgeable" while their perceived dietary habits were described as "good", but still, there is an area for continued improvement. Meanwhile, it was found that there was no significant difference between nutritional knowledge and dietary habits of student-athletes when grouped according to their demographic profile. On the other hand, there was a significant but weak positive relationship between nutritional knowledge and dietary habits of student-athletes. The results of student-athletes' nutritional knowledge and dietary habits paved the way for a contextualized NEP anchored on the student-athlete. The study recommends generalizing the NEP and considering the other athletes who also need nutrition and dietary habits improvement.

**Keywords:** *Dietary habits, Nutrition, Nutrition education plan, Nutritional knowledge, Student-athletes*

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## **Introduction**

The Sustainable Development Goals (SDGs) of the United Nations comprise 17 goals, 169 constituent targets, and 230 indicators that seek to transform the entire world into a sustainable one (Pakkan et al., 2022). SDGs aim that by 2030, all kinds of starvation and malnutrition will end, focusing that everyone, especially children, will have enough nutritious food throughout the year (Sustainable Development Goals | United Nations Development Programme, n.d). Zero Hunger is widely known as Sustainable Development Goal 2 (SDG2), which aims to “end hunger, achieve food security, improve nutrition, and promote sustainable agriculture” (Galabada, 2022, p. 2).

According to the report of State of Food Security and Nutrition in the World 2022, despite the high hopes of every individual that the COVID-19 pandemic would be over soon and the food abundance would start to improve, the number of world hunger upsurge to 828 million in 2021. Hunger continues to rise in the Caribbean, Africa, Latin America, and Asia between the year 2019 to 2020 but at a slower pace. Two hundred seventy-eight million people in Africa, four hundred twenty-five million in Asia, and fifty-six million five hundred thousand in Latin America and the Caribbean suffered from Hunger in 2021. Across the globe, the totality of people who cannot afford a healthy diet increased by 112 million – to almost 3.1 billion, proving that many people cannot access safe, adequate, and healthy food. The report states that despite improvements in a few regions, world trends in child undernutrition, like wasting and stunting, obesity, overweight, and deficiencies in essential micronutrients in children, remain a significant concern. Obesity and maternal anemia, especially for adults, remain alarming (FAO, IFAD, UNICEF, WFP, and WHO, 2022).

Sustainable Development Report 2022 reveals that the Philippines has an SDG index rank of 95 out of 163 countries. The report also states that the country has an SDG index score of 66.6 and a spillover score of 97.2 (Sachs et al., 2022). Furthermore, in the report of the Global Hunger Index (GHI) 2022, out of the 121 countries, the Philippines ranks 69th with sufficient data to calculate 2022 GHI scores. With

a total score of 14.8, the Philippines is at a moderate level regarding Hunger (Global Hunger Index (GHI) - Peer-Reviewed Annual Publication Designed to Comprehensively Measure and Track Hunger at the Global, Regional, and Country Levels, 2022).

Due to the COVID-19 pandemic, food prices and a healthy diet have become increasingly expensive and unaffordable worldwide (FAO, IFAD, UNICEF, WFP, and WHO, 2022). In addition, diets are the variety of foods consumed throughout time, which achieve adequacy without exceeding all nutrients, including energy (Neufeld et al., 2023). Furthermore, unhealthy diets are a major risk factor driving world disease burdens (Mapes et al., 2022). On the other hand, a healthy diet promotes optimal growth and development. It helps protect against malnutrition and some non-communicable diseases (NCDs) related to diet, obesity, and other conditions (Kumanyika et al., 2020). Weinstock and Mazzeo (2022) state that the ketogenic diet and clean eating are popular dietary trends among young adults. In addition, in the study of Tahreem et al. (2022), the fad diet is a well-known dietary pattern for its fast-to-solve obesity. The study explores present evidence related to the health impacts of some trend diets: Atkins diet, detox diet, intermittent fasting, ketogenic diet, Mediterranean diet, paleolithic diet, and vegetarian diet.

Nutrition is a crucial part of health and development. Being well-nourished is related to having a long life, improved infants and children, robust immune systems, and maternal health. It lowers the risk of having non-infectious diseases such as cardiovascular disease and diabetes (World Health Organization [WHO], 2019). According to Cheikh Ismail et al. 2020, the coronavirus disease (COVID-19) pandemic leads to new difficulties and changes in people's lives worldwide. The Coronavirus disease pandemic remarkably impacts lifestyle, human life, and social life, affecting the local and global economy. During the lockdown, there was a short supply of fresh food, and the variety of food groups lessened. People may instead choose more processed, quick-to-eat foods that may be high in energy but low in nutrients. In addition, the boredom brought by the loss of employment and coronavirus media

reports adds to the stress of daily life. Stress or boredom can lead to emotional eating, overeating, and cravings for high-energy foods. These changes in lifestyle and eating habits were likely a result of the COVID-19 lockdown (Galali, 2021).

Nutritional knowledge (NK) refers to understanding the concept connected to health and nutrition, diseases, dietary guidelines, and suggestions (Huang et al., 2021). NK positively affects diet quality. It is associated with socioeconomic factors such as income and education affecting NK and dietary behaviors. Providing adequate information to the individual NK will cause improvement in choosing healthy food (Scalvedi et al., 2021). Furthermore, the study of Hakli et al. (2016) states that the level of knowledge in healthy nutrition and socio-demographics such as educational status, age, and marital status affect individuals eating behaviors and NK. In addition, lacking NK leads individuals to develop health problems and poor Dietary Habits (DH).

In sports, nutrition and performance are inseparable. Adequate nutrients and energy depend on an athlete's dietary intake supplies to meet the training requirements and achieve excellent performance (Tam et al., 2022). Nutrition is necessary to stay healthy, achieve well-being, and develop athletes' athletic performance. In addition, NK is one of the factors required to establish suitable DH for athletes (Vázquez-Espino et al., 2022). Furthermore, NK is vital in influencing food choices and dietary habits and is crucial to sports nutrition (Folasire et al., 2015).

Basic sports nutrition concepts are necessary for student-athletes to maintain their body and health while dealing with the training effects. In acquiring knowledge, student-athletes must balance competition schedules, practice, academic loads, and personal desire, and will change behavior, culture, and religious beliefs. However, to develop an educational program and counsel, the first step to consider is the basic NK, followed by behaviors (Andrews et al., 2016). In meeting the sports nutrition guidelines, NK is crucial (Klein et al., 2021). In the study of Heikkilä et al. (2017), one of the factors behind athletes' food choices is NK. The athlete's NK is related to the DH, and this

knowledge significantly impacts athletic performance.

Ali et al. (2015) assessed the NK, DH, nutrient intake, and nutritional status of student-athletes in one university. The respondents were involved in sports such as basketball, cross country, swimming, football, volleyball, weight-lifting, and other sports activities. The questionnaire consisted of different information such as demographic information, nutritional knowledge, and frequency of food consumption. The study revealed that 17% of the nutrition information of males is from friends, and 20% of the nutrition information of females relies on family members. The study shows that male student-athletes had a fair NK and better DH than female student-athletes with poor NK and DH.

On the other hand, Alaunyte et al. (2015) assessed the relationship between the level of NK and DH of rugby league players using the Eatwell plate food categories. The result showed that the NK of rugby players was adequate (72.82%). Furthermore, Werner et al. (2020) investigated the NK of Division I college athletes. One hundred twenty-eight student-athletes participated in the survey, male and female, from different sports: soccer, golf, basketball, field hockey, and rowing. Male sports include basketball, football, and ice hockey. The study revealed that athletes had a low nutrition knowledge that may affect their dietary choices and put their performance and health at risk. Furthermore, the study of Tugli et al. (2022) examines the relationship between socioeconomic standards, nutritional knowledge, and the dietary habits of athletes. The participants are Ghana-based athletes playing basketball, hockey, and football teams in the Greater Accra, Central, and Ashanti regions. The study revealed no significant relationship between athletes' levels of NK and their DH.

From the Philippine perspective, the study of Lee-Pineda et al. (2021) assessed the DH and NK of chosen Philippine national combat sports athletes. It also examined the correlation between athletes' demographic profiles and sources of nutrition using the DH and NK results. It assessed boxing and taekwondo athletes using the Dietary Habits and Nutrition Knowledge Questionnaire: Filipino Version. As

a result, taekwondo players possess good DH, while boxers show fair DH. Both players of the sports have a good NK. The study also revealed that most of the source of nutrition comes from the team coaches. To conclude, Filipino national athletes in boxing and taekwondo show fair DH and great NK. The study also suggests developing nutritional education programs to enhance good eating habits and knowledge vital for combat sports athletes to preserve optimal well-being while achieving outstanding performance and competitive goals.

In addition, a study at the two known universities in Manila, Philippines, assesses the athletes' NK and DH using the questionnaires developed by Paugh. Eighty-five student-athletes from two universities participated in the study. The athletes represent seventeen sports events: softball, football, athletics, baseball, *sepak takraw*, beach volleyball, volleyball, swimming, basketball, badminton, pep squad, *arnis*, chess, futsal, dance sport, karate-do, and taekwondo. The study revealed a significant relationship between NK and DH of the athlete-respondents. The study recommends consistently promoting the importance of proper nutrition for athletes. Sports administrators must develop a nutrition program or seminar workshop once every semester to value the importance of consuming adequate nutrients daily (Montecalbo & Cardenas, 2015).

Preedy and Watson (2010) defined DH as the repeated decisions of individuals or groups regarding what foods they consume. Appropriate dietary choices require the intake of carbohydrates, fats, minerals, proteins, and vitamins. In human health, DH and choices play a vital role. Furthermore, in the study of Olatona et al. (2018), unhealthy diets increased the risk factor for non-communicable diseases.

Randles (2018) stated that proper eating is one of the challenges athletes may experience. Consuming the right food at the right time is essential for student-athletes to compete, train, recover, heal, and, most importantly, think and learn. Hectic schedules may lead the student-athlete to wrong dietary habits such as skipping meals and consuming fast - foods. The study reveals that continuous nutritional tracking is necessary to understand the dietary habits of small-college athletes. Nutrition

interventions are much needed to enhance dietary intake. In addition, in the study of Hull et al. (2016), student-athletes from ten collegiate sports completed the study. Athletes took a survey consisting of questions on dietary habits and practices, such as pre, and post-workout nutrition, nutritional supplementation use, eating hydration, and breakfast habits. The study revealed a positive impact on DH when a sports dietitian was the primary nutrition information source. However, the study of Elias and Rizal (2021) compares the DH and Body Mass Index of student-athletes and non-student athletes at Universiti Teknologi MARA. The DH questionnaire consisted of eighteen questions: meal skipping, frequency of food consumption from every category of the food pyramid, breakfast, fast food, snack, beverage intake, mineral supplements, and vitamins. It revealed that the DH scores of student-athletes were significantly higher than non-student athletes. The result can indicate that student-athletes practice a good DH to improve their sports performance.

The daily food choice of athletes has an impact on their performance and health. The right foods and fluids should be integral to a well-planned nutrition strategy and training program (Birkenhead & Slater, 2015). In the study of Sánchez-Díaz et al. (2020), to enhance DH, body composition, and NK in team sports and training routines, nutrition education interventions are necessary to optimize the athlete's performance. In addition, one of the strategies for helping athletes consume a healthy diet is nutrition education.

Vázquez-Espino et al. (2022) stated that nutritional knowledge is necessary for every athlete. It can have a massive impact on establishing eating habits. It concluded that a Nutrition Education Plan is needed to improve the nutritional knowledge of athletes. Furthermore, college student-athletes are more likely to possess poor DH, including high consumption of processed foods and low micronutrient intake. Student-athletes have higher energy demands due to preparation, competition, and exercise; hence, athletes need to consume more nutrients. College students often adopt new dietary habits and maintain them throughout their lives. However, most of their eating habits are still unhealthy, including skipping meals, eating

processed foods, and eating irregularly (Lawson et al., 2020). In universities, student-athletes face the most challenging era of their lives as they experience hardship trying to juggle the demands of educational requirements and optimal performance. Student-athletes at the tertiary level must possess more energy than regular students. Choosing their own food choices is a challenge, especially for those first-timer athletes who do not have enough practical skills and nutrition knowledge. As a result, college student's diet is insufficient, leading to poor athletic and academic performance and more injuries (Brown & Tenison, 2018). Furthermore, Azizam et al. (2022) revealed that food awareness and sports nutrition must be improved. Due to the misconceptions and misinformation, athletes are more likely to choose unsuitable nutrition options which could harm their health and athletic performance.

While most studies are from foreign, NK and DH reviews are limited to the Philippines, specifically, in the context of Pampanga. Therefore, further studies are needed to explore the NK and DH from the perspective of State Colleges and Universities Athletic Association (SCUAA) Athletes. This study assessed the relationship between NK and DH among student-athletes which can be significant to the athletes, coaches, and the institution. By identifying the knowledge gaps, this study developed a Nutrition Education Plan (NEP) tailored to their NK and DH results to maintain or improve their knowledge and practices. Moreover, a well-designed NEP can provide the knowledge and tools to optimize their performance and promote long-term health and well-being. By prioritizing Nutrition Education Plans, student-athletes will be empowered to make decisions on their NK and DH that can significantly impact their athletic performance and overall well-being.

### **Statement of the Problem**

The researchers aimed to analyze the relationship between nutritional knowledge and dietary habits among State Colleges and Universities Athletic Association (SCUAA) Athletes at a state university in Pampanga, Philippines, as a basis for developing a contextualized Nutrition Education Plan (NEP).

Specifically, this study sought to answer the following:

1. How may the nutritional knowledge of the student-athletes be described?
2. How may the dietary habits of the student-athletes be described?
3. Is there a significant difference in the nutritional knowledge and dietary habits when grouped according to their demographic profile?
4. Is there a significant relationship between the respondents' nutritional knowledge and dietary habits?
5. What contextualized Nutrition Education Plan may be designed for the student-athletes?

### **Methods**

The study is grounded on the postpositivist philosophical worldview. Post-positivism focuses on keen observation and measurable objectives of reality that happen in the world. It involves developing numeric observation measures and studying specifically a correlational design. Correlational research is a non-experimental design that does not involve experiments in data collection. Creswell (2012) defined the correlational design as allowing for predicting scores and explaining the relationship between variables. It examines the degree or connection between two or more variables and a set of sources. The correlational design was suitable for examining the relationship between NK and DH of State Colleges and Universities Athletic Association (SCUAA) Athletes in one of the state universities in Pampanga, Philippines. The design sought to identify correlations between variables to better understand their relationship. The result of the study can serve as a benchmark to develop evidence-based plans to improve or maintain the NK and DH of the SCUAA Athletes.

### **Respondents**

The respondents were the State Colleges and Universities Athletic Association (SCUAA) Athletes in one of the Philippine-based state universities in Pampanga under the Academic Year 2022-2023. The study focused on SCUAA Athletes who competed in the annual State Universities and Colleges (SUC) III Olympics held

at Tarlac Agricultural University (TAU) on February 20, 2023. The respondents utilized a complete enumeration (census) of SCUAA Athletes with a total count of 203, but because of different reasons, other student-athletes did not participate. As written in the ethical considerations, their rights will be the top priority. Their decisions were respected and forcing them was strictly prohibited.

A total number of ( $N = 177$ ) student-athletes voluntarily participated in the study. Their characteristics include sex, age, religion, year in college, years of playing, college major, sport, height, and weight. The respondents were 56% males ( $n = 99$ ) and 44% females ( $n = 78$ ), with the age range of 18-26 years old. Furthermore, 84% ( $n = 148$ ) of them were Roman Catholic and 16% ( $n = 29$ ) answered other religions. Twenty percent ( $n = 36$ ) responded that their playing year was a year, their height ranged from 1.50 centimeters to 1.93 centimeters, and their weight ranged from 39 kilograms to 101 kilograms. The respondents represented 12 different sports such as basketball (14%), athletics (14%), volleyball (16%), badminton (6%), *arnis* (11%), *sepak takraw* (6%), football (9%), Futsal (6%), taekwondo (4%), swimming (2%), chess (5%), and Mobile Legends (e-sports) (8%).

A census involves collecting data through complete enumeration. It removes sampling errors and provides all the data on the population (Singh & Masuku, 2014). This requires collecting data using participants' demographic profiles including their personal information and history of involvement in sports that may affect the NK and DH (Lee- Pineda et al., 2021). Therefore, the SCUAA Athletes were well-qualified candidates for the study. The lifestyle and nutrition of the respondents were interesting discussions as they experienced a series of training and preparation before the competition. The study dug deeper into different levels of NK and DH of SCUAA Athletes. Therefore, the study developed a Nutrition Education Plan anchored on the results.

### **Instruments**

The Dietary Habits and Nutrition Knowledge Questionnaire: Filipino Version (DHNKQ-Fil) by Pineda et al. (2019) was

adapted to assess student-athletes' nutritional knowledge and dietary habits in one of the state universities in Pampanga, Philippines. The questionnaire was divided into three (3) sections: athletes' records (demographic profile), dietary habits, and nutritional knowledge. The 2nd and 3rd sections of the tool initially had 47 items. Eventually, it narrowed down to 38 items. The athlete's record included the sport, the chosen program in college, and playing years (Pineda et al., 2019). The demographic section required the participants to answer questions about sex, age, year in college, sport, height, and weight (Paugh, 2005).

Dietary habits comprise fourteen (14) items that determine the athlete's nutrition practices, for instance, how frequently a specific food is consumed, how regularly an athlete eats from each Food Guide Pyramid category, and how often the consumption of liquids, vitamins, and mineral supplements. Relatively, the nutritional knowledge portion consists of 24 questions that examine the level of proficiency regarding the nutrition of each student-athlete. Questions distinguished facts, information, and abilities that an athlete has theoretically or experimentally gained. The student-athlete indicated to what degree they agreed or disagreed with each item. Moreover, in the revision of the survey questionnaires, the instrument of Paugh (2005) was adapted since the majority of the items were the same.

Items were evaluated using a 4-point Likert scale corresponding to different point values. Some questions had answers that involved reverse scoring, in which 1 is the highest score. The dietary section choices ranged from Always (4), Often (3), Sometimes (2) and Never (1). The higher the score in this category, the better the dietary habits. On the other hand, the nutritional knowledge section's choices were Strongly Agree (4), Agree Somewhat (3), Disagree Somewhat (2), and Strongly Disagree (1). A higher score in this category means having better nutritional knowledge. The scoring key provided in the questionnaire was used for the evaluation and classification per section. These categories were used to interpret the participants' level of dietary habits and nutrition knowledge. Lee- Pineda et al. (2021) stated that "the instrument was shown to have good and

acceptable psychometric properties. Content and face validity resulted in a good overall score of 90% average congruency” (p. 82). For sections 2 and 3, internal consistency resulted in good alpha scores of 0.68 and 0.81. Good test-retest reliability scores were reflected in Pearson’s  $r$  values of 0.82 (ICC= 0.79) and 0.60 (ICC= 0.60).

**Content Validity of the DHNKQ-Fil.** To stabilize the validity of the DHNKQ-Fil, revalidation of the questionnaire was utilized to enhance the quality of each item. Pineda (2019) suggested, “Considering the different dialects being used in the Philippines, it would also be recommended to revalidate and translate to these dialects for future use among collegiate athletes outside the National Capital Region” (p. 15).

In this study, five pools of experts from different fields who are knowledgeable in the process facilitated the content revalidation: registered nurse ( $n = 1$ ), experts in physical education ( $n = 3$ ), and experts in the field of physical education and sports ( $n = 1$ ). The panel of experts was provided with a tool and evaluated every item using a 4-point rating scale. A rating of “4” implies that the item is relevant and succinct, “3” indicates that the item is relevant but needs minor alteration, “2” means that the validator is unable to assess relevance without item revision, and “1” indicates that the item is not relevant (Lynn, 1986). After the content validation process, each item’s ratings were tabulated, resulting in item content validity indices (I-CVI) ranging from 0.80 to 1.00. Based on the criteria of Lynn (1986), a minimum I-CVI of 0.83 for five experts is considered acceptable. Since five experts validated the items with 0.80 as the lowest computed I-CVI (11 items) and the remaining 43 items obtained an I-CVI of 1.00, all items in the survey questionnaire were valid.

**Administrative Feasibility.** To ensure administrative feasibility, the revalidated items went through a pilot survey of the instruments among 21 student-athletes who competed in different sports during the intramurals in one of the state universities in Pampanga, Philippines. During the administration, the content of the questionnaire was comprehensively ex-

plained. The time they started down to completing the questionnaire was strictly monitored. Clarifications of instructions and complications encountered were noted and addressed before administering them to the actual respondents of the study.

**Reliability.** The consistency of a measure is associated with reliability (Heale & Twycross, 2015). From the result of the pilot test, the internal consistency was determined. Each section of the survey questionnaire acquired a different alpha value. The second section of the instrument focused on the dietary habits of student-athletes having an alpha value of 0.718. Relatively, the third section of the instrument focuses more on the nutritional knowledge of the student-athletes, acquiring an alpha value of 0.853, which shows that the two sections are valid.

#### **Data Gathering Procedures**

A letter of permission was sent to the Dean of the College of Education to seek approval to conduct the study. The procedures and comprehensive description were discussed in the letter. The study primarily focused on the student-athlete’s nutritional knowledge and dietary habits toward a contextualized Nutrition Education Plan. Therefore, a total enumeration of the student-athletes who competed in the annual State Universities and Colleges (SUC) III Olympics is necessary. Another letter sought permission from the Office of Sports Development (OSD) to ask for the official list of student-athletes to gather their data immediately. With the help of social media, professors, and personal connections, contacting the respondents has been convenient.

A face-to-face survey questionnaire was used to gather the student-athletes’ data. An informed consent form was disseminated to the entire respondents and the importance of their participation was elaborated. A preliminary presentation of the purpose was further discussed to ensure that respondents could understand what nutritional knowledge and dietary habits were. A valid, reliable, and feasible self-administered survey was administered to the target respondents to assess their understanding of nutritional knowledge and dietary

habits toward a contextualized nutrition education plan. Answering the survey questionnaires consumed 10 to 14 minutes of their time. The face-to-face survey lasted eight days, together with all the follow-ups. Through spreadsheets and Microsoft Excel 365, manual encoding of the responses took place. With the help of an expert, data interpretation became easy and convenient.

### **Ethical Considerations**

In conducting the study, prioritizing the safety of participants, researchers, and other people involved is necessary by making sure that all the ethical research methods and procedures are transparent and being followed. In data collection procedures, the following research ethics were strictly applied and followed: Belmont Report (National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research, 1979), National Ethical Guidelines for Health and Health-Related Research (Philippine Health Research Ethics Board, 2017) and the Philippine Data Privacy Act of 2012 (R.A. 10173).

The Belmont Report summarizes the basic ethical principles and guidelines with the involvement of human participants, published by the National Commission for the Protection of Human Subjects in 1979. It focuses on three (3) areas: respect for persons, beneficence, and justice. Informed consent is the potential respondent's decision to participate in the research study after receiving and knowing the necessary information without coercion, forcing, and influence (Philippine Health Research Ethics Board, 2017). Informed consent was disseminated to student-athletes aged 18 years and above who can now make decisions. The informed consent form covered the purpose of the study, a list of the researchers, and whom to contact if there is a problem in the research process. It also covered the study's direct benefits, risks, if there is, and rights. Also,

protecting the confidentiality and privacy of the participants were maintained throughout the process. "The participants are free to withdraw from the research at any time without having to give any reason, and without penalty or loss of benefits to which he or she is entitled." (Philippine Health Research Ethics Board, 2017, p. 14). In collecting, retaining, and processing personal information, researchers followed the principles of transparency, legitimate purpose, and proportionality (Data Privacy Act of 2012). The researchers applied the principles and ensured that all participants' data would remain confidential and protected to the best of their ability.

### **Data Analysis**

A necessary preparation and organizing of data were made to have a systematic flow of information throughout the analysis. To ensure the efficiency of the organization of the data and their process, Microsoft Excel 365 was utilized. Statistical analysis was performed using the Statistical Package for the Social Sciences (SPSS) version 26. The study used descriptive and inferential statistics to analyze the responses of the student-athletes on their nutritional knowledge and dietary habits. Descriptive statistics refers to the summarization of data systematically by describing the relationship between variables in a population (Kaur et al., 2018). Statistics such as mean and standard deviation were used. Furthermore, inferential statistics is a statistical method that involves drawing conclusions and inferences about a population based on a sample of observations (Sutanapong & Louangrath, 2015). Both were used to analyze the student-athletes nutritional knowledge and dietary habits toward a contextualized Nutrition Education Plan. In assessing their nutritional knowledge and dietary habits the following scale and interpretation were used:

*Table 1. Statistical Ranges of Nutritional Knowledge and their Corresponding Verbal Interpretation*

Likert Scale	Interval	Verbal Description	*Reversed Interpretation
1	1.00 - 1.74	Not Knowledgeable	Highly Knowledgeable
2	1.75 - 2.49	Fairly Knowledgeable	Knowledgeable
3	2.50 - 3.24	Knowledgeable	Fairly Knowledgeable
4	3.25 - 4.00	Highly Knowledgeable	Not Knowledgeable



Table 2. Statistical Ranges of Dietary Habits and their Corresponding Verbal Interpretation

Likert Scale	Interval	Verbal Description	*Reversed Interpretation
1	1.00 - 1.74	Poor	Very Good
2	1.75 - 2.49	Fair	Good
3	2.50 - 3.24	Good	Fair
4	3.25 - 4.00	Very Good	Poor

An independent sample *t*-test was also performed to assess whether there was a difference between male and female student-athletes' nutritional knowledge and dietary habits. On the other hand, a Pearson correlation coefficient was employed to evaluate the relationship between nutritional knowledge and dietary habits of student-athletes.

## Result and Discussion

### Student-Athletes' Level of Nutritional Knowledge

Table 3 presents the summary of the assessment of student-athletes on the level of nutritional knowledge. It shows that student-athletes were "highly knowledgeable" in 10 items with a mean score that ranges from 2.73 ( $SD = .956$ ) to 3.68 ( $SD = .567$ ). The standard deviation values were interpreted as "moderately scattered" since they did not exceed to one (1) point. The item "Fats are essential in all diets. (*Ang taba ay kinakailangan sa pang-araw-araw na pagkain.*)" got the lowest mean of 2.73 ( $SD = .956$ ) while "Eating breakfast can improve concentration. (*Ang pagkain ng almusal ay nakapagpapabuti ng konsentrasyon.*)" obtained the highest mean of 3.68 ( $SD = .567$ ), resulting to student-athletes being "highly knowledgeable". Likewise, the student-athletes perceived nutritional knowledge in the item "Skipping breakfast can negatively affect athletic performance. (*Ang hindi pag-aalmusal ay maaaring*

*magkaroon ng negatibong epekto sa paglalaro ng isang atleta.*)" as "highly knowledgeable". Relatively, student-athletes were "highly knowledgeable" that nutrition can affect their athletic performance ( $\bar{x} = 3.58$ ;  $SD = .688$ ).

The grand mean in the nutritional knowledge section was 3.14 and they were interpreted as "moderately scattered" as they obtained a standard deviation value of 0.40. This signifies that student-athletes are "knowledgeable" regarding the nutritional knowledge, but still, there is an area for continued improvement. Lee-Pineda et al. (2021) showed that student-athletes have good nutritional knowledge. However, Vázquez-Espino et al. (2022) added that athletes should improve their nutritional knowledge using education plans that include acquiring accurate nutrition information and resources. It was found out that student-athletes who know how or what they consume are considered successful in their sports career (Montecalbo & Cardenas, 2015). In addition, nutritional knowledge is necessary for every athlete. It can have a massive impact on establishing eating habits. Folasire et al. (2015) advised that student-athletes should emphasize the importance of eating regularly, consuming healthy snacks, and not skipping meals to achieve optimal athletic performance. However, breakfast is said to be the most important meal, but many college students ignore it (Wells et al., 2016).

Table 3. Summary of the Assessment of Student-Athletes on the Level of Nutritional Knowledge

Items	$\bar{x}$	$SD$	Verbal Description
1. Skipping breakfast can negatively affect athletic performance. ( <i>Ang hindi pag-aalmusal ay maaaring magkaroon ng negatibong epekto sa paglalaro ng isang atleta.</i> )	3.54	.746	Highly Knowledgeable
2. Nutrition affects mental performance ( <i>Naaapektuhan ng nutrisyon ang kagalingang mental.</i> )	3.58	.688	Highly Knowledgeable

Items	$\bar{x}$	SD	Verbal Description
3. Calcium excretion from the body increases with alcohol consumption. ( <i>Tumataas ang inilalabas na calcium ng katawan kapag umiinom ng inuming alcohol halimbawa alak.</i> )	2.80	.977	Knowledgeable
4. According to the Filipino Food Guide Pyramid, one should consume 5-8 servings from the bread, cereal, rice and pasta group. ( <i>Ayon sa Filipino Food Guide Pyramid, dapat kumonsumo ang isang tao ng 5-8 na "serving" mula sa pangkat ng pagkaing tinapay, "cereal", kanin at "pasta" o "noodles" sa isang araw.</i> ) *	3.06	.747	Fairly Knowledgeable
5. According to the Filipino Food Guide Pyramid, one should consume 2-3 from the fruit group. ( <i>Ayon sa Filipino Food Guide Pyramid, dapat kumonsumo ang isang tao ng 2-3 na "serving" ng mga pagkaing prutas sa isang araw.</i> )	3.33	.696	Highly Knowledgeable
6. According to the Filipino Food Guide Pyramid, one should consume 1 serving from the dairy group. ( <i>Ayon sa Filipino Food Guide Pyramid, dapat kumonsumo ng 1 na "serving" mula sa pangkat ng produktong gawa sa gatas (halimbawa gatas) sa isang araw.</i> ) *	3.29	.726	Not Knowledgeable
7. According to the Filipino Food Guide Pyramid, one should consume 3 - 4 servings from the meat group. ( <i>Ayon sa Filipino Food Guide Pyramid, dapat kumonsumo ng 3-4 na "serving" mula sa pangkat ng pagkaing karne (halimbawa manok, baboy, baka, isda) sa isang araw.</i> )	3.20	.754	Knowledgeable
8. Eating breakfast can improve concentration. ( <i>Ang pagkain ng almusal ay nakapagpapabuti ng konsentrasyon.</i> )	3.68	.567	Highly Knowledgeable
9. Carbohydrates are less fattening than fatty foods. ( <i>Ang mga pagkaing mayaman sa "carbohydrates" ay hindi gaanong nakatataba kompara sa mga pagkaing mayaman sa taba.</i> )	3.10	.830	Knowledgeable
10. 60% of total calories should come from carbohydrates. ( <i>"Sixty percent of the total calories" o 60% ng kabuoang kinakain ay dapat manggaling sa mga pagkaing mayaman sa "carbohydrates".</i> )	3.12	.792	Knowledgeable
11. Carbohydrates are easier to digest than fats or proteins. ( <i>Ang mga pagkaing mayaman sa "carbohydrates" ay higit na madaling tunawin kompara sa mga pagkaing mayaman sa taba at protina.</i> )	3.16	.747	Knowledgeable
12. Excess vitamin consumption can be toxic. ( <i>Ang labis na pag-inom ng "vitamin supplements" ay nakakasama sa katawan.</i> )	2.96	.967	Knowledgeable
13. Cereal, bread, bagels, and pasta are good sources of carbohydrates. ( <i>Ang "cereal", tinapay, at "pasta" o "noodles" ay mainam na mapagkukunan ng "carbohydrates".</i> )	3.20	.833	Knowledgeable
14. Tofu, nuts and beans are good sources of proteins. ( <i>Ang tokwa, "nuts" (e.g. "peanuts", "cashew nuts") at "beans"</i> )	3.29	.762	Highly Knowledgeable

Items	$\bar{x}$	SD	Verbal Description
(e.g. monggo, "peas") ay mainam na mapagkukunan ng protina.)			
15. Athletes tend to consume twice as much protein as recommended. (Ang mga atleta ay nakakaubos nang dobleng dami ng pagkaing mayaman sa protina na higit sa inirerekomandang kailangan sa isang araw.)	3.44	.681	Highly Knowledgeable
16. Over consumption of protein is beneficial for athletes. (Ang labis na pagkonsumo ng mga pagkaing mayaman sa protina ay nakabubuti para sa mga atleta.) *	3.28	.761	Not Knowledgeable
17. Eating cereals or breads enriched with iron should be eaten with a source of vitamin C to enhance absorption of iron. (Ang pagkain ng cereal o tinapay na dinagdagan ng iron ay dapat sabayan ng iba pang pagkaing mayaman sa "vitamin C" para sa mas epektibong pagtanggap ng iron ng katawan.)	3.30	.687	Highly Knowledgeable
18. Proteins act to repair and build muscle tissue and make hormones to boost the immune system. (Ang mga protina ay tumutulong upang ayusin at palakasin ang mga tisyu ng kalamnan (muscle) at makagawa ng hormones upang mapalakas ang sistemang panlaban sa sakit.)	3.51	.649	Highly Knowledgeable
19. Fats are essential in all diets. (Ang taba ay kinakailangan sa pang-araw-araw na pagkain.)	2.73	.956	Knowledgeable
20. If a diet is lacking in carbohydrates, proteins are then used for energy. (Kung ang kinakain sa araw-araw ay kulang sa carbohydrates, ang protina ang ginagamit bilang enerhiya.)	3.12	.827	Knowledgeable
21. Oatmeal, legumes, and fruits are sources of soluble fiber. (Ang prutas, "beans" (e.g. monggo, "peas") at "oatmeal" ang pinagkukunan ng soluble fiber)	3.29	.708	Highly Knowledgeable
22. The recommended amount of fiber is 25 grams per day. (Ang inirerekomandang dami ng "fiber" sa pagkain ay 25 gramo kada araw.)	3.14	.686	Knowledgeable
23. Vitamin C is also known as ascorbic acid. (Ang "vitamin C" ay kilala rin bilang "ascorbic acid".)	3.49	.700	Highly Knowledgeable
24. If you are not thirsty, then you must not be dehydrated. (Kung hindi ka nauuhaw, maaaring hindi ka "dehydrated".) *	2.75	1.053	Fairly Knowledgeable
Grand Mean	3.14	0.40	Knowledgeable

### Student-Athletes' Level of Dietary Knowledge

Table 4 presents the student-athletes' perceived level of knowledge in terms of their dietary habits. It can be noted that the first item, based on three meals per day, how often do you skip at least one meal per day? (*Gaano kadalas kang hindi kumakain?*) got the lowest mean of 2.19 ( $SD = .913$ ) while the statement highest obtained the mean of 3.81 ( $SD = .537$ ) this came from the answers of the respondents based on

the statement "How often do you drink water? (*Gaano kadalas kang uminom ng tubig?*)". Relatively, the student-athletes noted as "good" in taking vitamins ( $\bar{x} = 2.36$ ;  $SD = 1.058$ ) and mineral supplements ( $\bar{x} = 2.42$ ;  $SD = 1.014$ ). Furthermore, how often they consume vegetables ( $\bar{x} = 3.02$ ;  $SD = .825$ ) and fruits ( $\bar{x} = 3.02$ ;  $SD = .772$ ) was assessed as "good".

Overall, the perceived dietary habits of student-athletes' acquired a grand mean of 2.75

( $SD = 0.29$ ) or interpreted as "good". Tugli et al. (2022) showed the same result in dietary habits that student-athletes possess good dietary habits. Student-athletes' dietary habits are influenced by the complex connection between their roles as students and athletes (Sutcliffe et al., 2019). Furthermore, Ali et al. (2015) stated that athletes should have a solid understanding

of the concepts of hydration and dehydration since they can impact athletic performance. The fluid intake should be monitored as they lose sweat during and after the exercise. In addition, as stated by Eck and Byrd-Bredbenner (2021) student-athletes frequently consume fruits and vegetables that are healthy and recommended in sports nutrition.

Table 4. Student-Athletes' Perceived Level of Knowledge in terms of their Dietary Habits

Items	$\bar{x}$	$SD$	Verbal Description
1. Based on three meals per day, how often do you skip at least one meal per day? ( <i>Gaano kadalang hindi kumakain?</i> ) *	2.19	.913	Good
2. How often do you take vitamin supplements? ( <i>Gaano kadalang uminom ng "vitamin supplements"?</i> ) *	2.36	1.058	Good
3. How often do you take mineral supplements? ( <i>Gaano kadalang uminom ng "mineral supplements"?</i> ) *	2.42	1.014	Good
4. How often do you drink water? ( <i>Gaano kadalang uminom ng tubig?</i> )	3.81	.537	Very Good
5. How often do you drink carbonated beverages? ( <i>Gaano kadalang uminom ng mga inuming "carbonated" (e.g. "soft drinks" o "sparkling water")?</i> ) *	2.29	.756	Good
6. How often do you eat breads, cereals, pasta, potatoes, or rice? ( <i>Gaano kadalang kumain ng mga pagkaing mayaman sa carbohydrates tulad ng tinapay, "cereal", "pasta o noodles", patatas, o kanin?</i> )	3.06	.813	Good
7. How often do you eat fruits, such as apples, bananas, or oranges? ( <i>Gaano kadalang kumain ng prutas?</i> )	3.02	.772	Good
8. How often do you eat vegetables, such as broccoli, tomatoes, carrots, or salad? ( <i>Gaano kadalang kumain ng gulay?</i> )	3.02	.825	Good
9. How often do you eat dairy products such as milk, yogurt, or cheese? ( <i>Gaano kadalang kumain ng "dairy products" o mga pagkaing gawa sa gatas (e.g. keso, yogurt)?</i> )	2.64	.764	Good
10. How often do you eat berry jams, cookies, candies, or other sweets? ( <i>Gaano kadalang kumain ng mga pagkaing mataas sa asukal?</i> ) *	2.53	.731	Fair
11. How often do you snack on foods like potato chips, cakes, candies, donuts, or soda? ( <i>Gaano kadalang magmeryenda ng mga pagkaing tulad ng chichirya, keyk, kendi, donut, o "soft drinks"?</i> ) *	2.37	.704	Good
12. How often do you snack on foods like bagels, yogurt, popcorn, pretzels, or fruits? ( <i>Gaano kadalang magmeryenda ng mga pagkaing tulad ng tinapay, "yogurt", "popcorn", crackers, o prutas?</i> )	2.47	.707	Fair
13. How often do you eat fast food? ( <i>Gaano kadalang kumain ng fast food (e.g. "pizza", "burger", o "fries")?</i> ) *	2.56	.774	Fair
14. How often do you seek out nutrition information? ( <i>Gaano kadalang maghanap ng impormasyong pangnutrisyon?</i> )	2.67	.829	Good
Grand Mean	2.75	0.29	Good

Note: Statistical Ranges: 3.25 - 4.00 (Very Good); 2.50 - 3.24 (Good); 1.75 - 2.49 (Fair); 1.00 - 1.74 (Poor) \*Reversed interpretation

### **Test of Differences in the Assessment of Student-Athletes between Nutritional Knowledge and Dietary Habits and Their Demographic Profile**

Table 5 presents the test of the difference between nutritional knowledge and dietary habits. An independent sample *t*-test was performed to evaluate whether there was a difference between the nutritional knowledge of male and female student-athletes. The results indicated that there was no significant difference between the male student-athletes ( $\bar{x} = 3.13$ ,  $SD = .44$ ) and female student-athletes ( $\bar{x} = 3.15$ ,  $SD = .33$ ),  $t(175) = .35$ ,  $p = .728$ .

In addition, a second independent sample *t*-test was also performed to evaluate whether there was a difference between the dietary habits of male and female student-athletes. The results indicated that there was no significant difference between the dietary habits of male student-athletes ( $\bar{x} = 2.75$ ,  $SD = .32$ ) and female

student-athletes ( $\bar{x} = 2.75$ ,  $SD = .25$ ),  $t(175) = 0.01$ ,  $p = .996$ .

The results imply that males and females had no significant differences as the *p*-value of nutritional knowledge ( $p = .728$ ) and dietary habits ( $p = .996$ ) were greater than 0.05. This means that the null hypothesis "There is no significant difference in the nutritional knowledge and dietary habits of the student-athletes when grouped according to their demographic profile" was accepted. Same with Bird and Rushton (2020) and Kumanyika et al. (2020), they have found no significant differences in nutritional knowledge when grouped according to their sexes. In addition, Jusoh et al. (2021) used an independent *t*-test to compare nutrition knowledge and dietary habits when it comes to their sexes. It resulted in no significant differences in their nutritional knowledge and dietary habits regarding their sexes.

Table 5. Summary of the Test of Differences in the Assessment of Student-Athletes on their Nutritional Knowledge and Dietary Habits

		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	t	df	Sig. (2-tailed)
Nutritional Knowledge	Equal variances assumed	7.810	.006	-.349	175	.728
Dietary Habits	Equal variances assumed	4.309	.039	-.005	175	.996

### **The Relationship Between Nutritional Knowledge and Dietary Habits of Student-Athletes**

Table 6 presents the correlation between nutritional knowledge and dietary habits of student-athletes through the Pearson correlation coefficient. It showed that there was a significant but weak positive relationship between the nutritional knowledge and dietary habits of student-athletes with an *r* (177) value of .22 and a *p*-value of .004. This implies that the null hypothesis "There is no significant

relationship between nutritional knowledge and dietary habits among student-athletes" was rejected as they obtained a *p*-value of less than 0.05.

The result parallels Sedek and Yih (2014) and Jusoh et al. (2021) that student-athletes have a weak significant positive relationship between nutrition knowledge and dietary habits. There was a correlation between the two variables indicating that the nutritional knowledge level can still affect the dietary habits of student-athletes (Jusoh et al., 2021).

Table 6. Correlations of Nutritional Knowledge and Dietary Habits

Variables	1	2
1. Nutritional Knowledge		.22**
2. Dietary Habits	.22**	

\*\*Correlation is significant at the 0.01 level (2 – tailed).

### Proposed Nutrition Education Plan

The Contextualized Nutrition Education Plan was anchored to the scores of the student-athletes with the lowest mean in nutritional knowledge and dietary habits. Table 7 shows the Proposed Nutrition Education Plan for Nutritional Knowledge and Dietary Habits. The contextualized Nutrition Education Plan (NEP) includes the Development of Instructional Materials (IMs), 2Bs: Effects of Skipping Meals to Human's Brain and Body, The Athletes' Plate: A Guide to Fat Consumption, the inclusion of Sports Nutrition in the PATHFit, Nutrition Counseling Program, and 7-Day Healthy Lifestyle Challenge that focus on improving the student-athletes nutritional knowledge and dietary habits.

In terms of nutritional knowledge, the item stating "Fats are essential in all diets. (*Ang taba ay kinakailangan sa pang-araw-araw na pagkain.*)" was resulted to having a low mean ( $\bar{x}$

= 2.73;  $SD = .956$ ) interpreted as "knowledgeable". On the other hand, the item "Based on three meals per day, how often do you skip at least one meal per day? (*Gaano kadalas kang hindi kumakain?*)" got the lowest mean of 2.19 ( $SD = .913$ ) or "good" in terms of dietary habits, but still, there is an area for continued improvement.

A well-educated student-athletes possess excellent athletic performance to sustain a healthy lifestyle. Additionally, well-knowledgeable athletes are considered healthy and competent as they achieve success without putting their health and life at risk (Montecalbo et al., 2015). To conclude, the main objective of the nutrition education plan is to improve their level of knowledge in terms of nutrition and dietary habits. Noronha et al. (2020) recommend creating nutrition education according to the student-athlete's lifestyle that provides healthy goals.

Table 7. A Proposed Nutrition Education Plan for Nutritional Knowledge and Dietary Habits of Student-Athletes

Nutrition Education Plan							
Objectives	Programs/ Projects/ Activities	Instructional Delivery Design	Targets	Persons Involved	Budget	Success indicators	Time frame
Develop an engaging, informative, and effective instructional materials such as infographics, posters, charts, and graphic organizers regarding nutritional knowledge and dietary habits	Instructional Materials (IMs) Development	Video Tutorials Demonstration Presentation of the developed Instructional Materials (IMs)	Health and Nutrition Teachers	Dean of the College of Education Area Chairperson	₱3,000.00	High rate of at least 80% of teachers have met the criteria in creating the IMs	1 week (subject to change depending on the complexity of the topics and IMs)
Identify the positive and negative	2Bs: Effects of Skipping	Classroom Discussions	Student-	Dean of the College of Edu-	₱11,000.00	Full attendance and participation	1 month

Nutrition Education Plan							
Objectives	Programs/ Projects/ Activities	Instructional Delivery Design	Targets	Persons Involved	Budget	Success indicators	Time frame
effects of skipping meals to human's brain and body	Meals to Human's Brain and Body		Athletes	cation Director of the Office of Sports and Development  Facilitators (Physical Education, Health, and Nutrition Teachers, Sports Professionals, Registered Nutritionists and Dietitians)		of student-athletes during the Classroom discussions	
Provide a guide towards an intelligent choice of fat-based foods	The Athletes' Plate: A Guide to Fat Consumption	Seminar	Student-Athletes	Dean of the College of Education  Director of the Office of Sports and Development  Facilitators (Physical Education, Health, and Nutrition Teachers, Sports Professionals, Registered Nutritionists and Dietitians)	₱11,000.00	Participation of at least 90% of the total student-athletes' population	2 weeks
Increase athletic performance through sports nutrition	Sports Nutrition: A Supplemental Concept in Physical Activities toward Health and Fitness	Intensive Deliberations  Classroom Discussions	Student-Athletes	Dean of the College of Education  Director of the Office of Sports and Development	₱7,000.00	Full attendance of student-athletes to all Physical Activities toward Health and Fitness	Whole academic year including off-seasons

Nutrition Education Plan							
Objectives	Programs/ Projects/ Activities	Instructional Delivery Design	Targets	Persons Involved	Budget	Success indicators	Time frame
	(PAthFit) Courses			Physical Activ- ities toward Health and Fit- ness (PAthFit) Instructors  Coaches		(PAthFit) courses	
Improve stu- dent-athletes' healthy food choices and practice healthy eating habits	Nutrition Counseling Program	One-on-one counseling be- tween the stu- dent-athlete and the nutri- tion counselor	Stu- dent- Ath- letes	Healthcare Professional Specializing in Nutrition (Registered Dietitian, Cer- tified Nutrition Specialist, Reg- istered Die- tetic Techni- cian, Certified Dietary Man- ager, etc.)	₱15,00 0.00	Participation of at least 90% of the total stu- dent-ath- letes' popu- lation	Twice a year
Practice a healthy lifestyle through the 7- day challenge	7-Day Healthy Life- style Chal- lenge	Vlog	Stu- dent- Ath- letes	Dean of the College of Edu- cation  Director of the Office of Sports and De- velopment  The Experts (Physical Edu- cation Teach- ers, Sports Professionals, Registered Nu- tritionists, and Dietitians)	₱8,000. 00	Full partici- pation of student-ath- letes to the 7-day chal- lenge	1 week

### Summary of Results

The researchers aimed to assess the relationship between nutritional knowledge and dietary habits among State Colleges and Universities Athletic Association (SCUAA) Athletes at a state university in Pampanga, Philippines,

as a basis for developing a contextualized Nutrition Education Plan.

1. The result showed that the student-athletes' level of Nutritional Knowledge has a mean score ranging from 2.73 (*SD* = .956) to 3.68 (*SD* =.567). "The item Fats are



essential in all diets. (*Ang taba ay kinakailangan sa pang-araw-araw na pagkain.*)” got the lowest mean of 2.73 ( $SD = .956$ ) while "Eating breakfast can improve concentration. (*Ang pagkain ng almusal ay nakapagpapabuti ng konsentrasyon.*)” Is the item that obtained the highest mean of 3.68 ( $SD = .567$ ), resulting in student-athletes being "highly knowledgeable." The grand mean in the nutritional knowledge section was 3.14 ( $SD = 0.40$ ). This could signify that student-athletes' nutritional knowledge can be described as "knowledgeable", but still, there is an area for continued improvement.

2. Based on the student-athletes perceived dietary habits, it showed that the item Based on three meals per day, how often do you skip at least one meal per day? (*Gaano kadalas kang hindi kumakain?*) got the lowest mean of 2.19 ( $SD = .913$ ). On the other hand, "How often do you drink water?" obtained the highest mean of 3.81 ( $SD = .537$ ). It was found that the perceived dietary habits of student-athletes acquired a grand mean of 2.75 ( $SD = 0.29$ ), which can be described as good but still, there is an area for continued improvement.
3. Through independent samples *t*-test, the difference between the nutritional knowledge of male and female student-athletes was evaluated. It showed in the result that there was no significant difference between male student-athletes ( $\bar{x} = 3.13$ ,  $SD = .44$ ) and female students - athletes ( $\bar{x} = 3.15$ ,  $SD = .33$ ),  $t(175) = .35$ ,  $p = .728$ . Furthermore, a second independent samples *t*-test was also performed to evaluate whether there was a difference between the dietary habits of male and female student-athletes. It was found that there was no significant difference between the dietary habits of male student-athletes ( $\bar{x} = 2.75$ ,  $SD = .32$ ) and female student-athletes ( $\bar{x} = 2.75$ ,  $SD = .25$ ),  $t(175) = 0.01$ ,  $p = .996$ . This concludes that males and females have no significant differences as the *p*-value of nutritional knowledge is  $p = .728$  and  $p = .996$  is greater than 0.05. That implies that the null hypothesis "There is no significant differ-

ence in the nutritional knowledge and dietary habits of the student-athletes when grouped according to their demographic profile" was accepted.

4. To test the relationship between nutritional knowledge and dietary habits of student-athletes. A person correlation coefficient was performed. It was found that there was a significant but weak positive relationship between the nutritional knowledge and dietary habits of student-athletes,  $r(177) = .22$ ,  $p = .004$ . This concludes that the null hypothesis "There is no significant relationship between nutritional knowledge and dietary habits among student-athletes in a state university in Pampanga, Philippines" was rejected as they obtained a *p*-value of .004. which is less than 0.05.
5. The Nutrition Education Plan was contextualized to the scores of the student-athletes nutritional knowledge and dietary habits. The nutrition education plan focused on nutritional knowledge and dietary habits that obtained the lowest mean. In terms of nutritional knowledge "Fats are essential in all diets. (*Ang taba ay kinakailangan sa pang-araw-araw na pagkain.*)" resulted having a low mean ( $\bar{x} = 2.73$ ;  $SD = .956$ ) indicating "knowledgeable." On the other hand, "Based on three meals per day, how often do you skip at least one meal per day?" got the lowest mean of 2.19 ( $SD = .913$ ) or "good" in terms of dietary habits. To conclude, the main objective of the nutrition education plan is to improve their level of knowledge in terms of nutrition and dietary habits.

## Conclusion

As retrieved from the results, the following conclusions were drawn:

1. The nutritional knowledge of the student-athletes was described as "knowledgeable", but still, there is an area for continued improvement.
2. The dietary habits of the student-athlete was described as "good", but still, there is an area for continued improvement.
3. There was no significant difference between nutritional knowledge and dietary

habits of student-athletes when grouped according to their demographic profile.

4. There was a significant but weak positive relationship between the nutritional knowledge and dietary habits of student-athletes.
5. The contextualized Nutrition Education Plan (NEP) was anchored to the scores of the student-athletes with the lowest mean in nutritional knowledge and dietary habits. NEP includes the Development of Instructional Materials (IMs), 2Bs: Effects of Skipping Meals to Human's Brain and Body, The Athletes' Plate: A Guide to Fat Consumption, the inclusion of Sports Nutrition in the PATHFit, Nutrition Counseling Program, and 7-Day Healthy Lifestyle Challenge that focus on improving the student-athletes nutritional knowledge and dietary habits.

### Limitations of the Study

1. Face-to-face survey questionnaires were used to collect the data, but some of the respondents chose not to participate in the study.
2. The respondents are delimited to the State Colleges and Universities Athletic Association (SCUAA) players in one of the state universities in Pampanga, Philippines.
3. The researchers designed the Nutrition Education Plan and did not undergo expert validation.
4. The scope of the Nutrition Education Plan is only focused on the lowest mean scores of nutritional knowledge and dietary habits.

### Recommendations

The following recommendations are proposed based on the study's limitations and conclusions.

1. Seek help from the coaches, athletes, and professors to quickly locate the student-athletes. Broaden the connection to enhance the participation rates and minimize the number of respondents who may not participate.
2. The university student-athletes are qualified to be respondents to assess their level of nutritional knowledge and dietary habits

to help maintain or enhance their overall athletic performance and healthy lifestyle.

3. To achieve the validity, effectiveness, and overall quality of the Nutrition Education Plan, consulting to experts is suggested to create a suitable one.
4. Generalize the Nutrition Education Plan and consider the other athletes that also need nutrition and dietary habits improvement.

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### References

- Aishwarya, R. (2021). Nutritional knowledge and attitudes of physical education students in Thiruvananthapuram district, Kerala. *Journal of Scientific Research*, 65(04), 83–87. <https://doi.org/10.37398/jsr.2021.650414>.
- Alaunyte, I., Perry, J. R. B., & Aubrey, T. (2015). Nutritional knowledge and eating habits of professional rugby league players: Does knowledge translate into practice?. *Journal of the International Society of Sports Nutrition*, 12(1), 18.

- <https://doi.org/10.1186/s12970-015-0082-y>.
- Ali, A., Al-Siyabi, M. S., Waly, M. I., & Kilani, H. (2015). Assessment of nutritional knowledge, dietary habits and nutrient intake of university student athletes. *Pakistan Journal of Nutrition*, 14(5), 293 – 299. <https://doi.org/10.3923/pjn.2015.293.299>.
- Andrews, A., Wojcik, J. R., Boyd, J. M., & Bowers, C. W. (2016). Sports nutrition knowledge among mid-major division I university student-athletes. *Journal of Nutrition and Metabolism*, 2016, 1 – 5. <https://doi.org/10.1155/2016/3172460>.
- Azizam, N. A., Yusof, S. R., Amon, J. J., Ahmad, A., Safii, N. S., & Jamil, N. R. (2022). Sports nutrition and food knowledge among Malaysian University athletes. *Nutrients*, 14(3), 572. <https://doi.org/10.3390/nu14030572>.
- Bird, S., & Rushton, B. D. (2020). Nutritional knowledge of youth academy athletes. *BioMed Central Nutrition*, 6(1). <https://doi.org/10.1186/s40795-020-00360-9>.
- Birkenhead, K., & Slater, G. W. (2015). A review of factors influencing athletes' food choices. *Sports Medicine*, 45(11), 1511–1522. <https://doi.org/10.1007/s40279-015-0372-1>.
- Black, M. M., Delichatsios, H. K., & Story, M. (2019). Nutrition education: Strategies for improving nutrition and healthy eating in individuals and communities. In *Nestlé Nutrition Institute Workshop series*, 92, 7 – 9. <https://doi.org/10.1159/isbn.978-3-318-06528-2>.
- Brown, M. M., & Tenison, E. (2018). Creation of a dual-purpose collegiate athlete nutrition advising program and educational curriculum. *Journal of Nutrition Education and Behavior*, 50(10), 1046 – 1052. <https://doi.org/10.1016/j.jneb.2018.07.004>.
- Cheikh Ismail, L., Osaili, T. M., Mohamad, M. N., Al Marzouqi, A., Jarrar, A. H., Abu Jamous, D. O., Magriplis, E., Ali, H. I., Al Sabbah, H., Hasan, H., AlMarzooqi, L. M. R., Stojanovska, L., Hashim, M., Shaker Obaid, R. R., Saleh, S. T., & Al Dhaheri, A. S. (2020). Eating habits and lifestyle during COVID-19 lockdown in the United Arab Emirates: A cross-sectional study. *Nutrients*, 12(11), 3314. <https://doi.org/10.3390/nu12113314>.
- Coombe, C., Anderson, N. J., & Stephenson, L. (2020). *Professionalizing Your English Language Teaching*. Springer Nature. [https://10.0.3.239/978-3-030-34762-8\\_27](https://10.0.3.239/978-3-030-34762-8_27).
- Cresswell, J. (2012). *Educational research: Planning, conducting, and evaluating quantitative and qualitative research*. Edwards Brothers, Inc.
- Cresswell, J. (2014). *Research design: Qualitative, qualitative, and mixed methods approaches*. SAGE Publications, Inc.
- Data Privacy Act of 2012, N. P. C. §§ 8-11 (2012). <https://www.privacy.gov.ph/data-privacy-act/#1>.
- Eck, K. M., & Byrd-Bredbenner, C. (2021). Food choice decisions of collegiate division I athletes: A qualitative exploratory study. *Nutrients*, 13(7), 2322. <https://doi.org/10.3390/nu13072322>.
- Elias, S. M., & Rizal, I. N. B. M. (2021). Dietary habits and body mass index between athletes and nonathletes of UiTM. *Malaysian Journal of Movement Health & Exercise*, 10(1), 12 – 17. <https://doi.org/10.15282/mohe.v10i1.492>.
- Erdoğan, R., Yilmaz, M., & Aydemir, I. (2021). Determination of physical education and sports teachers' nutrition habits and physical activity levels in the global epidemic (Covid-19) process. *Asian Journal of Education and Training*, 7(1), 51–59. <https://doi.org/10.20448/journal.522.2021.71.51.5>.
- FAO, IFAD, UNICEF, WFP and WHO. (2022). *In Brief to The State of Food Security and Nutrition in the World 2022. Repurposing food and agricultural policies to make healthy diets more affordable*. 36. <https://doi.org/10.4060/cc0640en>.
- Folasire, O. F., Akomolafe, A. A., & Sanusi, R. A. (2015). Does nutrition knowledge

- and practice of athletes translates to enhanced athletic performance? Cross-sectional study amongst Nigerian undergraduate athletes. *Global Journal of Health Science*, 7(5), 215 – 225. <https://doi.org/10.5539/gjhs.v7n5p215>
- Galabada, J. K. (2022). Towards the sustainable development goal of zero hunger: What role do institutions play?. *Sustainability*, 14(8), 4598. <https://doi.org/10.3390/su14084598>.
- Galali, Y. (2021). The impact of covid 19 confinement on the eating habits and lifestyle changes: A cross sectional study. *Food Science & Nutrition*, 9(4), 2105–2113. <https://doi.org/10.1002/fsn3.2179>.
- Global Hunger Index (GHI) - peer-reviewed annual publication designed to comprehensively measure and track hunger at the global, regional, and country levels. (2022). <https://www.globalhungerindex.org/philippines.html>.
- Hakli, G., Asil, E., Ucar, A., Ozdogan, Y., Yilmaz, M. V., Ozcelik, A. O., Surucuoglu, M. S., Cakiroglu, F. P., & Akan, L. S. (2016). Nutritional knowledge and behavior of adults: Their relations with sociodemographic factors. *Pakistan Journal of Nutrition*, 15(6), 532 – 539. <https://doi.org/10.3923/pjn.2016.532.39>.
- Heale, R., & Twycross, A. (2015). Validity and reliability in quantitative studies. *Evidence-Based Nursing*, 18(3), 66–67. <https://doi.org/10.1136/eb-2015102129>.
- Heikkilä, M., Lehtovirta, M., Autio, O., Fogelholm, M., & Valve, R. (2019). The impact of nutrition education intervention with and without a mobile phone application on nutrition knowledge among young endurance athletes. *Nutrients*, 11(9), 2249. <https://doi.org/10.3390/nu11092249>.
- Heikkilä, M., Valve, R., Lehtovirta, M., & Fogelholm, M. (2017). Nutrition knowledge among young Finnish endurance athletes and their coaches. *International Journal of Sport Nutrition and Exercise Metabolism*, 28(5), 522 – 527. <https://doi.org/10.1123/ijnsnem.2017-0264>.
- Hodes, J. S., James, T. C., Martin, G., & Milliner, K. (2015). Go for the win: A collaborative model for supporting student-athletes. *The Learning Assistance Review*, 20(1), 47–60. <http://files.eric.ed.gov/fulltext/EJ1058010.pdf>.
- Huang, Z., Huang, B., & Huang, J. (2021). The relationship between nutrition knowledge and nutrition facts table use in China: A structural equation model. *International Journal of Environmental Research and Public Health*, 18(12), 6307. <https://doi.org/10.3390/ijerph18126307>.
- Hull, M. G., Jagim, A. R., Oliver, J. M., Greenwood, M. J., Busteed, D. R., & Jones, M. T. (2016). Gender differences and access to a sports dietitian influence dietary habits of collegiate athletes. *Journal of the International Society of Sports Nutrition*, 13(1), 38. <https://doi.org/10.1186/s12970-016-0149-4>.
- Intiful, F. D., Oddam, E., Kretchy, I. A., & Quampah, J. (2019). Exploring the relationship between the big five personality characteristics and dietary habits among students in a Ghanaian university. *BioMed Central Psychology*, 7(1), 1 – 7. <https://doi.org/10.1186/s40359-019-0286-z>.
- Jusoh, N., Lee, J. L. F., Tengah, R. Y., Azmi, S. H., & Suherman, A. (2021). Association between nutrition knowledge and nutrition practice among Malaysian adolescent handball athletes. *Malaysian Journal of Nutrition*, 27(2). <https://doi.org/10.31246/mjn-2020-0113>.
- Kaur, P., Stoltzfus, J., & Yellapu, V. (2018). Descriptive statistics. *International Journal of Academic Medicine*, 4(1), 60. <https://doi.org/10.4103/ijam.ijam.7.18>.
- Klein, D. J., Eck, K. M., Walker, A., Pellegrino, J. G., & Freidenreich, D. J. (2021). Assessment of sport nutrition knowledge, dietary practices, and sources of nutrition information in NCAA division III collegiate

- athletes. *Nutrients*, 13(9), 2962. <https://doi.org/10.3390/nu13092962>.
- Kumanyika, S., Afshin, A., Arimond, M., Lawrence, M., McNaughton, S. A., & Nishida, C. (2020). Approaches to defining healthy diets: A background paper for the international expert consultation on sustainable healthy diets. *Food and Nutrition Bulletin*, 41(2), 7 – 30. <https://doi.org/10.1177/0379572120973111>.
- Labban, L. (2015). Nutritional knowledge assessment of Syrian University students. *Journal of the Scientific Society*, 42(2), 71. <https://doi.org/10.4103/0974-5009.157031>.
- Lawson, S. T., Gardner, J. C., Carnot, M. J., Lackey, S. S., Lopez, N. V., & Sutcliffe, J. T. (2020). Assessing the outcomes of a brief nutrition education intervention among division I football student-athletes at moderate altitude. *The Sport Journal*, 23(27). <https://thesportjournal.org/article/assessing-the-outcomes-of-a-brief-nutrition-education-intervention-among-division-i-football-student-athletes-at-moderate-altitude/>.
- Lee-Pineda, K., Pagarigan, S. C., Capucan, R. P., Cruz, F. G., Obispo, R. L., Romey, A. A., Sotelo, M. R. H. R., & Vasquez, N. M. (2021). Dietary habits and nutritional knowledge of selected Philippine national combat athletes: A cross-sectional study. *Philippine Journal of Allied Health Sciences*, 5(1), 80. <https://doi.org/10.36413/pjahs.0501.010>.
- Lynn, M. R. (1986). Determination and quantification of content validity. *Nursing Research*, 36(6), 382-85. <https://doi.org/10.1097/00006199198611000-00017>.
- Mapes, B. R., Prager, S. D., Béné, C., & Gonzalez, C. E. (2022). Healthy and sustainable diets from today to 2050—The role of international trade. *Public Library of Science One*, 17(5). <https://doi.org/10.1371/journal.pone.0264729>.
- Montecalbo, R. C., & Cardenas, R. C. (2015). Nutritional knowledge and dietary habits of Philippine collegiate athletes. *International Journal of Sports Science*, 5(2), 45–50. <https://doi:10.5923/j.sports.20150502.01>.
- National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research. (1979). *The Belmont report: Ethical principles and guidelines for the protection of human subjects of research*. U.S. Department of Health and Human Services. <https://www.hhs.gov/ohrp/sites/default/files/the-belmont-report-508c-FINAL.pdf>.
- Neufeld, L. M., Hendriks, S., & Hugas, M. (2023). Healthy diet: A definition for the United Nations food systems summit 2021. *Science and Innovations for Food Systems Transformation*, 21–30. [https://doi.org/10.1007/978-3-03115703-5\\_3](https://doi.org/10.1007/978-3-03115703-5_3).
- Noronha, D. J., Santos, M. B., Santos, A. A., Corrente, L. G. A., Fernandes, R. J. G., Barreto, A. L. S., De Jesus Santos, R. G., Santos, R., De Souza Gomes, L. P., & Nascimento, M. V. M. (2020). Nutrition knowledge is correlated with a better dietary intake in adolescent soccer players: A cross-sectional study. *Journal of Nutrition and Metabolism*, 2020, 1 – 7. <https://doi.org/10.1155/2020/3519781>.
- Olatona, F. A., Onabanjo, O., Ugbaja, R. N., Nnoaham, K. E., & Adelekan, D. A. (2018). Dietary habits and metabolic risk factors for non-communicable diseases in a university undergraduate population. *Journal of Health Population and Nutrition*, 37(1), 1 – 9. <https://doi.org/10.1186/s41043-0180152-2>.
- Pakkan, S., Sudhakar, C., Tripathi, S., & Rao, M. (2022). A correlation study of sustainable development goal (SDG) interactions. *Quality & Quantity*, 57, 1937–1956. <https://doi.org/10.1007/s11135-02201443-4>.

- Paugh, S. L. (2005). *Dietary habits and nutritional knowledge of college athletes*. California University of Pennsylvania. <http://libweb.calu.edu/thesis/umi-cup-1011.pdf>.
- Philippine Health Research Ethics Board. (2017). *National Ethical Guidelines for Health and Health-Related Research*. <https://ethics.healthresearch.ph/index.php/phoca-downloads/category/4-neg>.
- Pineda, K. L., Cardenas, A., Esteban, R. A., Pagarigan, S. C., Quilala, R. a. M., Se, J. P., & Servañez, N. (2019). The Filipino dietary habits and nutrition knowledge questionnaire (DHNKQ- FIL): A psychometric study. *Philippine Journal of Allied Health Sciences*, 3(1), 80 - 82. <https://doi.org/10.36413/pjahs.0301.006>.
- Preedy, V. R., and Watson, R. R. (2010). Dietary habits. *Handbook of Disease Burdens and Quality of Life Measures*, 4189. [https://doi.org/10.1007/978-0-387-78665-0\\_5487](https://doi.org/10.1007/978-0-387-78665-0_5487).
- Randles, A. (2018). Dietary behaviors & perceived nutrition availability of small college student-athletes: A pilot project. *The Sport Journal*, 21, 1 - 18. <https://thesportjournal.org/article/dietary-behaviors-perceived-nutrition-availability-of-small-college-student-athletes-a-pilot-project/>.
- Sachs, J. D., Kröll, C., Lafortune, G., Fuller, G., & Woelm, F. (2022). *Sustainable Development Report 2022*. <https://doi.org/10.1017/9781009210058>.
- Sánchez-Díaz, S., Yanci, J., Del Castillo, D., Scanlan, A. T., & Raya-González, J. (2020). Effects of nutrition education interventions in team sport players. A systematic review. *Nutrients*, 12(12), 3664. <https://doi.org/10.3390/nu12123664>.
- Scalvedi, M. L., Gennaro, L., Saba, A., & Rossi, L. (2021). Relationship between nutrition knowledge and dietary intake: An assessment among a sample of Italian adults. *Frontiers in Nutrition*, 8, 714493. <https://doi.org/10.3389/fnut.2021.714493>.
- Sedek, R., & Yih, T. Y. (2014). Dietary habits and nutrition knowledge among athletes and non-Athletes in national university of Malaysia (UKM). *Pakistan Journal of Nutrition*, 13(12), 752. <https://doi.org/10.3923/pjn.2014.752.759>.
- Singh, A. S., & Masuku, M. B. (2014). Sampling techniques & determination of sample size in applied statistics research: An overview. *International Journal of Economics, Commerce and Management*, 2(11), 1 - 22. <https://ijecm.co.uk/wp-content/uploads/2014/11/21131.pdf>.
- Sustainable Development Goals | United Nations Development Programme*. (n.d.). UNDP [https://www.undp.org/sustainable-development-goals?utm\\_source=EN](https://www.undp.org/sustainable-development-goals?utm_source=EN).
- Sutanapong, C., & Louangrath, P. I. (2015). Descriptive and inferential statistics. *International Journal of Research & Methodology in Social Science*, 1(1), 22-35. <https://doi.org/10.5281/zenodo.1319900>.
- Sutcliffe, J. T., Gardner, J. C., Gormley, J. M., Carnot, M. J., & Adams, A. (2019). Assessing the dietary quality and health status among Division 1 College Athletes at moderate altitude. *The Sport Journal*, 22, 1543-9518. <https://thesportjournal.org/article/assessing-the-dietary-quality-and-health-status-among-division-1-college-athletes-at-moderate-altitude/>.
- Tahreem, A., Rakha, A., Rabail, R., Nazir, A., So-col, C. T., Maerescu, C. M., & Aadil, R. M. (2022). Fad diets: Facts and fiction. *Frontiers in Nutrition*, 9, 1. <https://doi.org/10.3389/fnut.2022.960922>.
- Tam, R., Gifford, J. A., & Beck, K. L. (2022). Recent developments in the assessment of nutrition knowledge in athletes. *Current Nutrition Reports*, 11(2), 241-252. <https://doi.org/10.1007/s13668-022-00397-1>.
- Tugli, L. S., Adoju, A. O. F., Abonie, U. S., Tugli, F. M., & Tobin-West, H. S. (2022). Socioeconomic standards, nutritional knowledge and dietary habits of Ghanaian athletes: A study of three major sporting regions in Ghana. *Journal of Advances in Sports and*

- Physical Education*, 5(5), 77-95. <https://doi.org/10.36348/jaspe.2022.v05i05.001>.
- Vázquez-Espino, K., Rodas, G., & Farran-Codina, A. (2022). Sport nutrition knowledge, attitudes, sources of information, and dietary habits of sport-team athletes. *Nutrients*, 14(7), 1345. <https://doi.org/10.3390/nu14071345>.
- Weinstock, M., & Mazzeo, S. E. (2022). College students' perceptions of individuals following popular diets and individuals with orthorexia nervosa. *Eating Behaviors*, 47, 101671. <https://doi.org/10.1016/j.eat-beh.2022.101671>.
- Wells, E. A., Avery, M. L., Catanzarito, B., Wilson, B., & Bunn, J. A. (2016). Assessment of breakfast and physical activity habits in college students at a rural private institution. *Journal of Physical Education and Sport*, 16(3), 770–775. <https://doi.org/10.7752/jpes.2016.03123>.
- Werner, E. N., Guadagni, A. J., & Pivarnik, J. M. (2020). Assessment of nutrition knowledge in division I college athletes. *Journal of American College Health*, 70(1), 248 – 255. <https://doi.org/10.1080/07448481.2020.1740234>.
- World Health Organization: WHO. (2019). *Nutrition*. [https://www.who.int/health-topics/nutrition#tab=tab\\_1](https://www.who.int/health-topics/nutrition#tab=tab_1).