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EATING PATTERNS AND NUTRITIONAL STATUS OF STUDENTS OF TAKORADI TECHNICAL UNIVERSITY IN GHANA

BY

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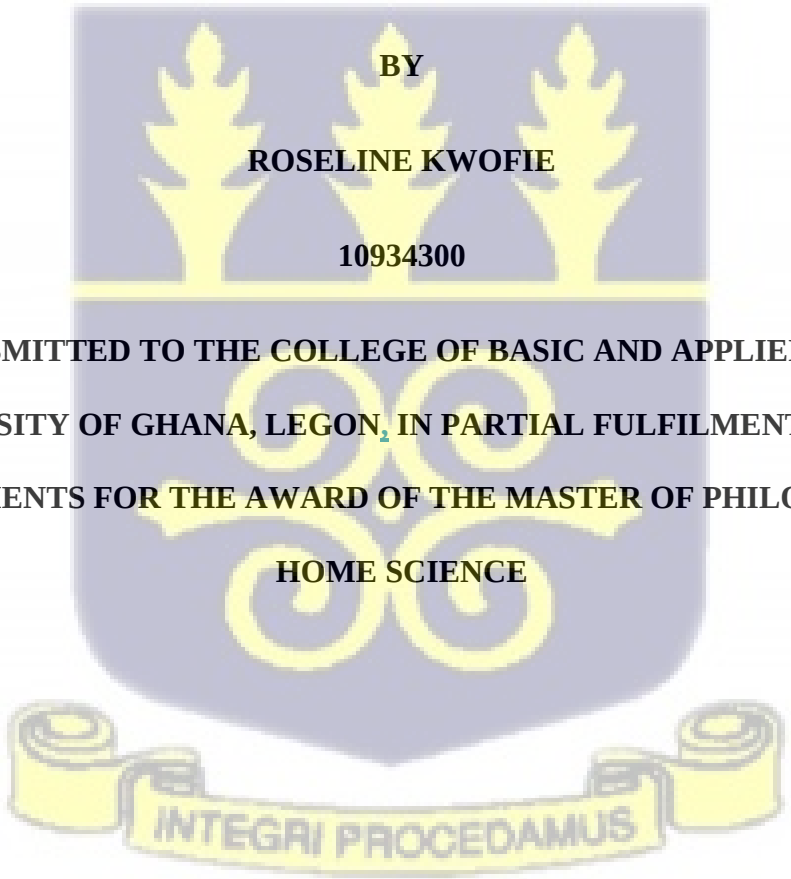

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DECLARATION

I, Roseline Kwofie, hereby declares that except for the references that have been duly cited, the work in this thesis, "**EATING PATTERNS AND NUTRITIONAL STATUS OF STUDENTS OF TAKORADI TECHNICAL UNIVERSITY IN GHANA**" was done entirely by the researcher in the Department of Family and Consumer Sciences, College of Basic and Applied Sciences, University of Ghana, Legon. This work has never been presented either in whole or in part for any other degree in this University or elsewhere.

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ABSTRACT

This thesis assessed the eating patterns and nutritional status of students of Takoradi Technical University in Ghana. The study utilized a quantitative approach, employing a cross-sectional design, proportionate sampling technique to select 425 Bachelor of Technology (BTECH) students from all the Faculties at the Takoradi Technical University. The objectives of the study were to identify the eating patterns of students at Takoradi Technical University in Ghana, assess the nutritional status of the students, determine the factors influencing their eating patterns and explore challenges associated with their eating patterns. Data were collected through a structured questionnaire and analysed using the SPSS version 26. The findings of the study indicated that students had diverse food preferences, including citrus fruits, tea, corn porridge, peanut butter, and white bread with regards to their eating patterns. Taste, culture, nutrition, convenience, and affordability influenced their choices. Concerns about meal skipping, overweight/obesity, and nutritional deficiencies were also identified. Challenges in adopting healthier habits included convenience, time, finance, and irregular schedules. The study's exploration of eating patterns, demographic factors, including age, level of study, gender, and residential status, had an influence in relation to students' nutritional status.

Recommendations include nutrition education, improving campus food options, promoting meal planning, integrating physical activity, and providing support for financially challenged students.

DEDICATION

I dedicate this work to my loving and supportive husband and brother for their encouragement and assistance.

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LIST OF ACRONYMS

BMI	Body Mass Index
BFP	Body Fat Percentage
HBM	Health Belief Model
SCT	Social Cognitive Theory
UN	United Nations
UNICEF	United Nations International Children's Emergency Fund
WHO	World Health Organization
EP	Eating Patterns
NS	Nutritional Status
TTU	Takoradi Technical University

CHAPTER ONE

INTRODUCTION

1.1 Background of Study

The problem of poor dietary patterns among university students has been a topic of global concern due to its potential negative impacts on the health of students. Eating patterns (EP) and Nutritional Status (NS) are thus crucial indicators of overall health and well-being (Bragg, 2017). In many low and middle-income countries including Ghana, poor eating patterns and malnutrition remain significant public health concerns, particularly among young adults. Research has shown that university students are more likely to engage in unhealthy eating practices, such as skipping meals, consuming high-calorie fast foods, and insufficient consumption of fruits and vegetables (Amugsi *et al.*, 2019; Peltzer *et al.*, 2011).

Traditional Ghanaian diets are predominantly based on cereals, legumes, and vegetables, with animal protein consumed in smaller quantities. However, growing urbanization and globalization have resulted in considerable shifts in eating habits, with the adoption of Western-style diets rich in fat, sugar, and salt. A study conducted in 2016 found that over 90% of Ghanaian adolescents consume less than the recommended daily intake of fruits and vegetables, and more than half of the participants consumed fast foods at least once a week (Amugsi *et al.*, 2019). These dietary changes have been associated with an increase in non-communicable diseases such as obesity, hypertension, and diabetes in Ghana (Biritwum *et al.*, 2017).

According to the World Health Organization (WHO), poor dietary practices and lack of physical activity contribute to the increasing prevalence of overweight and obesity, particularly among young adults in developing countries (WHO, 2020). Ghana, in particular, has experienced a rapid increase in the prevalence of overweight and obesity among young adults,

with a prevalence of 13.6% among university students in the country (Amoah *et al.*, 2020). As a result, university students are known to have bad eating habits due to a variety of circumstances, including hectic schedules, lack of culinary skills and restricted availability to nutritious meals. A study by Quansah *et al.* (2021) among university students in Ghana found that the majority of students skip breakfast, have irregular eating habits, and consume a high intake of energy-dense foods. The study also revealed that there was a low consumption of fruits and vegetables among the students. Similarly, Arhin *et al.* (2020) reported that university students in Ghana had poor eating habits, with a high intake of junk foods, low intake of fruits and vegetables, and inadequate intake of protein.

Studies have also found out that university students in Ghana are at risk of poor nutritional status (NS). A cross-sectional study conducted among university students in Ghana found that 15% of male students and 9% of female students were overweight or obese, while 29% of male students and 19% of female students were underweight (Abdulai, & Wak, 2018). Another study conducted among university students in Ghana found that 34% of the participants had an inadequate intake of fruits and vegetables, while 23% had an inadequate intake of protein (Donkor *et al.*, 2017). Poor nutritional status can have negative effects on academic success and overall health, emphasizing the importance of investigating the Eating Patterns (EP) and Nutritional Status (NS) of university students in Ghana.

Several factors can influence EP and NS, including socioeconomic status, food availability, cultural and social norms, and lifestyle factors. In Ghana, socioeconomic status and food availability are significant determinants of eating patterns and nutritional status (Quansah *et al.*, 2021). Students from low socio-economic backgrounds may have limited access to nutritious foods, while students from higher socio-economic backgrounds may have access to a wider range of food choices but may also consume more unhealthy foods. Additionally, cultural and social norms can influence food choices, as traditional Ghanaian diets are highly

valued and may be preferred over Western-style diets. Lifestyle factors such as physical activity, stress, and sleep patterns can also affect eating patterns and nutritional status (Arhin *et al.*, 2020).

Understanding the EP and NS of university students in Ghana is crucial for developing effective interventions to improve their health and well-being. Poor nutritional status can lead to a range of health problems, including anemia, stunted growth, and obesity (Ikujenlola, *et al.*, 2020). Additionally, poor eating patterns and nutritional status can negatively impact academic success, as students may have difficulty concentrating and retaining information when they are hungry or malnourished (Mohr et al., 2015). By identifying the factors that influence eating patterns and nutritional status, interventions can be developed that address the specific needs of this population, such as increasing access to nutritious foods and promoting healthy lifestyle behaviours (Bragg, 2017).

In many low- and middle-income countries, including Ghana, the transition to university life is associated with changes in EP, increased access to unhealthy food choices, and decreased physical activity, leading to increased risk of overweight and obesity (Keenan *et al.*, 2018). Thus, the nutritional status of university students in Ghana is of particular interest, as this population may be at risk of nutritional deficiencies due to the significant lifestyle changes that come with university life. Whilst malnutrition continues to be a significant public health concern, particularly among young adults in Ghana, there is limited research on the EP and NS of university students in Ghana especially in the western part of Ghana. It was therefore in the interest of the researcher to assess the EP and NS of students of Takoradi Technical University in Ghana.

1.2 Problem Statement

When it comes to eating patterns (EP) and nutritional conditions, university students are a particularly susceptible group. Many factors, including busy schedules, limited access to healthy diets and inadequate knowledge of healthy intake, contribute to poor eating habits and inadequate nutrient intake. Moreover, university students are often in the transitional phase of their lives, and this can lead to changes in their dietary behaviours and nutritional status. The problem of poor dietary habits and inadequate nutrient intake is even more pronounced in technical universities where students often have demanding schedules and limited access to healthy food options. Studies have also shown that poor eating habits and inadequate nutrient intake are prevalent among university students in Ghana. However, there is a dearth of information on the EP and NS of students in technical universities, including Takoradi Technical University. The lack of information on the dietary habits and NS of students at Takoradi Technical University (TTU) makes it difficult to develop effective interventions to promote healthy eating and improve their NS. Previous research has produced inconsistent results, with some showing a positive association between EP and NS, while others find no significant relationship. Additionally, the EP and NS of university students are important indicators of their overall health and well-being. Poor dietary habits and inadequate nutrient intake can lead to various health problems, including malnutrition, obesity, and chronic diseases. Therefore, it was imperative to understand the EP and NS of students at TTU to develop effective interventions to promote healthy eating and improve their nutritional status.

1.3 Aim of the Study

This study aimed to assess the eating patterns and nutritional status of students of Takoradi Technical University (TTU) in Ghana.

1.4 Research Objectives

The specific objectives of this study were to;

1. Identify the eating patterns of students at TTU in Ghana.
2. Assess the nutritional status of students at TTU in Ghana.
3. Determine the factors and challenges associated with the eating patterns of students at TTU in Ghana.

1.5 Research Hypotheses

Based on the objectives, the study made use of the following hypotheses;

Ho_1: There is no significant relationship between some selected demographic characteristics (age, gender and level of study) and nutritional status of the students.

Ho_2: There is no significant relationship between the eating pattern of students at Takoradi Technical University in Ghana and their nutritional status.

1.6 Significance of the Study

1. The study is significant as it will help identify the EP and NS of students at TTU. This information is crucial in understanding the health implications of their dietary habits. Poor eating habits and nutritional deficiencies can lead to several health problems such as obesity, malnutrition, anemia, and chronic diseases like diabetes and hypertension.
2. Proper nutrition is critical for cognitive and academic performance. Studies have shown that students who eat a healthy diet perform better academically than those who have

poor dietary habits. Therefore, by identifying the eating patterns and nutritional status of students at TTU, the study can help provide insight into the impact of nutrition on academic performance.

3. The study's findings can be used to develop policies and interventions to improve the EP and NS of students at TTU. These policies can include the provision of healthy food options in the university canteen, nutrition education programs, and lifestyle interventions that encourage healthy dietary habits.
4. The study's findings can be generalized to other universities in Ghana and beyond. The eating patterns and nutritional status of students are often affected by similar factors, such as accessibility to healthy food options, social and cultural factors, and lifestyle habits. Therefore, the study's findings can provide valuable insights for developing policies and interventions to improve the nutritional status of university students in other settings.

1.7 Organization of Study

There were five (5) chapters in the research. Chapter one covers the study's setting, problem description, research purpose, research objectives, and significance of the Study. Chapter two discusses a theoretical foundation for the inquiry as well as a survey of pertinent literature. The study's methodology, including the demographic, sampling, data source, analysis, research design, and ethical issues, is the main topic of Chapter 3. The results of the investigation are presented and discussed in Chapter 4. The study's findings are summarized, concluded, and recommended in Chapter Five.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

The theoretical, conceptual, and empirical literature on the EP and NS of students of TTU in Ghana is examined in this chapter. The chapter covers the Theoretical Framework of EP and NS, Nutrition and Health of University Students, EP of Ghanaian University Students, NS of Ghanaian University Students, Factors Influencing EP (Food Choice), Interventions to Improve EP and NS of Students, Public Health Implications of EP and NS of Students, Empirical Review, and Conceptual Framework.

2.1 Theoretical Framework

In an increasingly fast-paced and globalized world, the NS of students has become a matter of paramount concern. As young individuals transition through various stages of academic development, their EP plays a crucial role in shaping their physical and cognitive well-being. A student's NS directly impacts their academic performance, overall health, and long-term growth and development. Consequently, understanding and addressing the factors influencing eating patterns and nutritional status among students have significant implications for public health, education, and policy interventions.

This theoretical framework seeks to explore the complex interplay between EP and the NS of students. It aims to provide a comprehensive lens to examine the multifaceted factors that influence their food choices and dietary habits. By identifying key determinants and potential barriers, this framework aspires to shed light on the challenges faced by students in adopting and maintaining healthy eating behaviors.

The framework encompasses a multidimensional approach, considering individual, socio-cultural, environmental, and institutional factors that impact students' dietary choices. It

recognizes the importance of biological, psychological, and social dimensions that shape the formation of eating patterns during the formative years of students' lives.

Drawing from existing literature and empirical evidence, this theoretical framework endeavors to propose practical strategies and interventions to promote healthier eating habits among students. It aims to bridge the gap between knowledge and action, advocating for evidence-based policies and educational programs that foster a positive food environment and support healthier dietary practices in educational settings.

Through a thorough exploration of the various aspects of EP and NS of students, this framework endeavors to contribute to a deeper understanding of this critical issue. By providing a theoretical foundation for further research and guiding targeted interventions, it aspires to promote the holistic well-being and academic success of students, ensuring they have the tools and support necessary to make informed and health-conscious food choices. Ultimately, the success of this framework lies in its potential to pave the way for healthier, thriving student populations, positively impacting their lives and future generations.

2.1.1 Health Belief Model (HBM) and Eating Patterns

The Health Belief Model (HBM) offers a comprehensive framework for investigating the factors that influence eating patterns (EP) and nutritional choices among university students at TTU in Ghana. By considering individual beliefs and perceptions, as well as the perceived benefits and barriers to adopting healthier eating patterns, researchers can gain insights into students' motivation to make positive changes in their dietary behaviors.

Perceived susceptibility to nutrition-related health issues is a key factor that influences students' dietary choices. Students who believe that they are at risk of developing health problems due to their eating habits are more likely to be motivated to adopt healthier dietary practices (Conner *et al.*, 2017). Research has shown that university students who perceive themselves to

be susceptible to obesity, cardiovascular disease, or nutrient deficiencies are more inclined to engage in health-promoting behaviors, such as increasing their intake of fruits and vegetables or reducing their consumption of unhealthy snacks and sugary beverages.

In relation to the above, interventions can focus on raising students' awareness of the health risks associated with poor dietary choices. Health education programs that provide evidence-based information on the consequences of unhealthy eating habits can help students better understand their vulnerability to nutrition-related health issues. Engaging presentations, workshops, and interactive discussions can facilitate knowledge transfer and promote positive health beliefs about the importance of making better food choices (Peltzer & Pengpid, 2020).

The HBM also emphasizes the role of perceived benefits in influencing health-related behaviors, including dietary choices. Students who believe that adopting healthier eating patterns will lead to positive outcomes, such as improved physical and mental well-being, are more likely to make conscious efforts to improve their diets (Lancaster et al., 2018). Positive health outcomes associated with better nutrition, such as increased energy levels, enhanced cognitive function, and better weight management, can act as strong motivators for students to prioritize their dietary health.

To enhance perceived benefits, universities can promote positive messaging about the benefits of healthy eating through various channels, including posters, brochures, and social media campaigns. Collaborating with student health services and registered dietitians to offer evidence-based nutrition counseling and personalized dietary advice can further reinforce the perceived benefits of adopting healthier eating patterns. Encouraging success stories and testimonials from students who have experienced positive changes in their health after making dietary improvements can also inspire and motivate their peers to follow suit.

The HBM acknowledges that perceived barriers can hinder individuals from engaging in health-promoting behaviors. Similarly, students may face obstacles in adopting healthier eating patterns, such as time constraints, financial limitations, lack of knowledge about nutritious food options, and cultural preferences (Papadaki *et al.*, 2007). Understanding and addressing these barriers are crucial to promoting positive changes in students' dietary behaviors.

Universities can implement strategies to overcome perceived barriers to healthy eating. For instance, enhancing the availability of affordable and nutritious food options on campus can help address financial constraints and time limitations. Collaborating with local farmers and suppliers to offer fresh and locally sourced produce can improve access to healthy foods. Providing cooking workshops and meal planning sessions can equip students with the knowledge and skills to make nutritious meals on a budget and manage their time effectively.

Furthermore, universities can foster a supportive and inclusive environment that respects students' cultural preferences and dietary traditions. Emphasizing the diversity of healthy food options and celebrating cultural foods that align with nutritious choices can help students feel more connected to their dietary heritage while making healthier choices.

2.1.2 Social Cognitive Theory

Social Cognitive Theory (SCT) is a comprehensive framework that delves into the interplay between cognitive processes, social interactions, and environmental influences in shaping individuals' behaviors, particularly in the context of eating patterns and nutritional choices among university students. It consists of;

Observational Learning: Observational learning, also known as modeling or imitation, is a central aspect of SCT. According to Bandura (1977), individuals learn by observing others' behaviors and the consequences of those behaviors. Within the university environment, students are exposed to a diverse range of eating behaviors through their interactions with

peers, family members, friends, and university staff. As students observe others eating certain foods or adopting specific dietary patterns, they may internalize and replicate those behaviors (Bandura, 1977). For example, if a student frequently observes their friends eating fast food or consuming sugary beverages, they may be more likely to imitate these choices, even if they are aware of healthier alternatives.

Moreover, media and social media platforms play a significant role in observational learning. Online platforms expose students to a wide array of food choices and eating behaviors, influencing their perceptions of desirable eating patterns (Scully *et al.,* 2015). Advertising and food blogs, for instance, can promote certain foods or eating behaviors, shaping students' preferences and consumption patterns.

Interventions targeting observational learning can involve promoting positive role models and healthy eating behaviors within the university community. Encouraging peer-led nutrition campaigns, where influential students demonstrate and advocate for healthier eating choices, can positively impact the eating habits of their peers (Higgs & Thomas, 2016). Additionally, universities can leverage social media platforms to disseminate accurate and evidence-based nutrition information, providing students with positive models to emulate.

Social Influences: Social influences refer to the impact of others on an individual's behavior, attitudes, and beliefs. In the university setting, social influences can come from various sources, including peers, family members, friends, and university staff. Peer pressure, for instance, can significantly influence students' dietary choices. If healthy eating is socially reinforced and valued among a student's peer group, they may be more motivated to adopt similar eating patterns (Brown & Ogden, 2020).

Additionally, family members and close friends can influence students' eating habits through shared meals and cultural norms. Cultural celebrations and events, such as religious holidays

or traditional gatherings, may involve specific foods, influencing students' dietary behaviors during these occasions. University staff, including dining services and food vendors on campus, also play a role in shaping students' eating patterns by offering a variety of food options and promoting healthier choices.

To leverage social influences positively, universities can implement healthy eating initiatives that involve collaboration between students, staff, and the broader campus community. By promoting a culture of health and wellness, universities can create an environment that supports healthy eating choices. Encouraging social activities centered around nutritious meals and fostering an inclusive and supportive atmosphere for dietary diversity can also contribute to positive social influences on students' eating behaviors (Beeken *et al.,* 2018).

Self-efficacy: This is a critical component of SCT, referring to an individual's belief in their capability to perform specific behaviors. In the context of eating patterns and nutritional choices, students with higher self-efficacy regarding healthy eating are more likely to engage in positive dietary behaviors (Keller & Landry, 2020). Self-efficacy is influenced by various factors, including past successful experiences with healthy eating, support from peers or mentors, and the belief in one's ability to overcome barriers to healthy eating.

Educational programs that enhance students' nutrition knowledge and skills can help build their self-efficacy in making healthier dietary choices. Hands-on cooking classes, workshops on meal planning, and engaging activities that involve students in the preparation of nutritious meals can boost their confidence in adopting healthier eating patterns (Brown & Ogden, 2020). Moreover, providing accessible resources, such as nutrition counseling or online tools to track and monitor dietary habits, can empower students to take control of their own nutrition and improve their self-efficacy.

Universities can also foster a supportive environment that reinforces students' self-efficacy in making healthier food choices. This can be achieved by providing clear and consistent messages about the importance of nutrition, offering healthy food options in campus dining facilities, and implementing policies that prioritize nutrition and well-being. Creating a campus culture that values and supports healthy eating will enhance students' belief in their ability to make positive changes in their dietary behaviors.

2.1.3 The Socioecological Model

The Socioecological Model is a comprehensive framework that takes into account the complex interactions between individuals and their environment, influencing health-related behaviors, including eating patterns and nutritional status among students at Takoradi Technical University in Ghana.

Individual Level: At the individual level, personal factors such as knowledge, attitudes, beliefs, and preferences play a significant role in shaping students' eating patterns. Individual factors may include students' level of nutrition knowledge, awareness of the importance of a balanced diet, and their understanding of the link between nutrition and overall health (Hosseini *et al.*, 2020). Students' perceptions of healthy and unhealthy food choices, as well as their dietary preferences and taste preferences, also contribute to their dietary behaviors (Kaufman *et al.*, 2018).

Interventions at the individual level can focus on improving students' nutrition literacy through educational campaigns, workshops, and seminars. Providing evidence-based information about balanced diets, portion sizes, and the health benefits of different food groups can enhance students' nutrition knowledge and encourage them to make informed food choices (Hosseini et al., 2020). Nutrition counseling and personalized dietary assessments can also support students in making appropriate dietary changes based on their individual needs and preferences.

Interpersonal Level: The interpersonal level considers the influence of social interactions, peer relationships, family dynamics, and social support on students' eating patterns. Students' food choices can be influenced by the eating habits of their peers, friends, and family members (El Ansari & Stock, 2014). Social gatherings, shared meals, and the presence of food during social events can all impact students' dietary behaviors.

Universities can promote healthy eating behaviors through peer support networks and social activities that encourage nutritious food choices. Peer-led nutrition clubs and cooking clubs can create a sense of camaraderie and support around healthy eating habits (Beeken et al., 2018). Encouraging communal meals that involve sharing nutritious dishes can foster a positive food culture on campus and reinforce healthy eating norms.

Institutional Level: The institutional level encompasses the influence of campus facilities, university policies, and the overall food environment on students' eating patterns. Access to healthy food options and the presence of on-campus dining facilities can significantly impact students' dietary choices (Svastisalee *et al.*, 2018). Universities can play a pivotal role in shaping students' nutritional status by implementing policies and practices that support healthy eating.

To improve the food environment on campus, universities can work with food vendors and dining services to offer a wide selection of nutritious and affordable food options. Implementing nutrition guidelines for campus food outlets can encourage healthier food preparation and ingredient choices (Svastisalee *et al.*, 2018). Additionally, policies that promote the availability of fresh fruits, vegetables, whole grains, and lean proteins in on-campus dining halls can positively influence students' dietary behaviors.

Community Level: The community level considers the broader community and societal influences that affect students' eating patterns and nutritional status. Cultural norms, food

marketing, and media representation of food can all impact students' food choices (El Ansari & Stock, 2014). Cultural food practices and traditional dietary habits may influence students' preferences for certain foods and eating patterns.

To tackle this, community-level influences, universities can celebrate and promote cultural diversity in food choices while encouraging healthy adaptations of traditional dishes. Collaborating with local farmers and suppliers to source fresh and locally produced foods can further enhance the community's food environment and support sustainable food practices.

Societal Level: At the societal level, broader factors such as government policies, economic conditions, and food industry practices influence students' eating patterns and nutritional status. Economic factors, such as food prices and financial constraints, can impact students' food choices and access to healthy foods (Vilela *et al.*, 2019). Government policies related to nutrition and food labeling also play a role in shaping students' dietary behaviors.

Advocacy and policy efforts at the societal level can focus on addressing food insecurity among students by advocating for affordable and accessible healthy food options on and off campus. Engaging with local authorities and policymakers to support nutrition-friendly policies, such as subsidies for healthy foods and restrictions on the marketing of unhealthy products, can create an enabling environment for healthier eating choices (Vilela *et al.*, 2019).

By employing the Socioecological Model, this study explored how individual, interpersonal, institutional, community, and societal factors interact to influence students' eating patterns and nutritional status. By understanding these multi-level influences, universities can design comprehensive interventions that address the diverse factors affecting students' dietary behaviors and create a campus environment that promotes healthy eating and improved nutritional status.

2.1.4 Integrating SCT with the Health Belief Model (HBM) and the Socioecological Model

While SCT provides valuable insights into the social and cognitive processes that influence eating patterns and nutritional choices, it is important to integrate this framework with the (HBM) and the Socioecological Model to gain a comprehensive understanding of the complexities involved.

The HBM can help explain how students' beliefs about their susceptibility to nutrition-related health issues and the perceived severity of these issues interact with the social and cognitive factors proposed by SCT to influence their dietary behaviors. For instance, students with higher self-efficacy in maintaining a healthy diet may also perceive the benefits of adopting healthier eating patterns as more significant, leading to stronger intentions to change their behavior (Bandura *et al.*, 2019).

The Socioecological Model, on the other hand, emphasizes the multi-level influences on individuals' behaviors, encompassing not only individual and social factors but also environmental and policy-related aspects. By integrating SCT with the Socioecological Model, researchers can explore how social interactions, peer influences, and self-efficacy interact with broader environmental factors, such as the availability of healthy food options on campus and the influence of university policies on students' eating patterns.

Generally, a comprehensive approach that combines the insights from SCT, the HBM, and the Socioecological Model will enable researchers and policymakers to design more effective interventions that address multiple levels of influence to promote healthier eating patterns and improved nutritional status among students at Takoradi Technical University in Ghana.

Figure 1 shows the *Integration among SCT, HBM and the Socioecological Model*

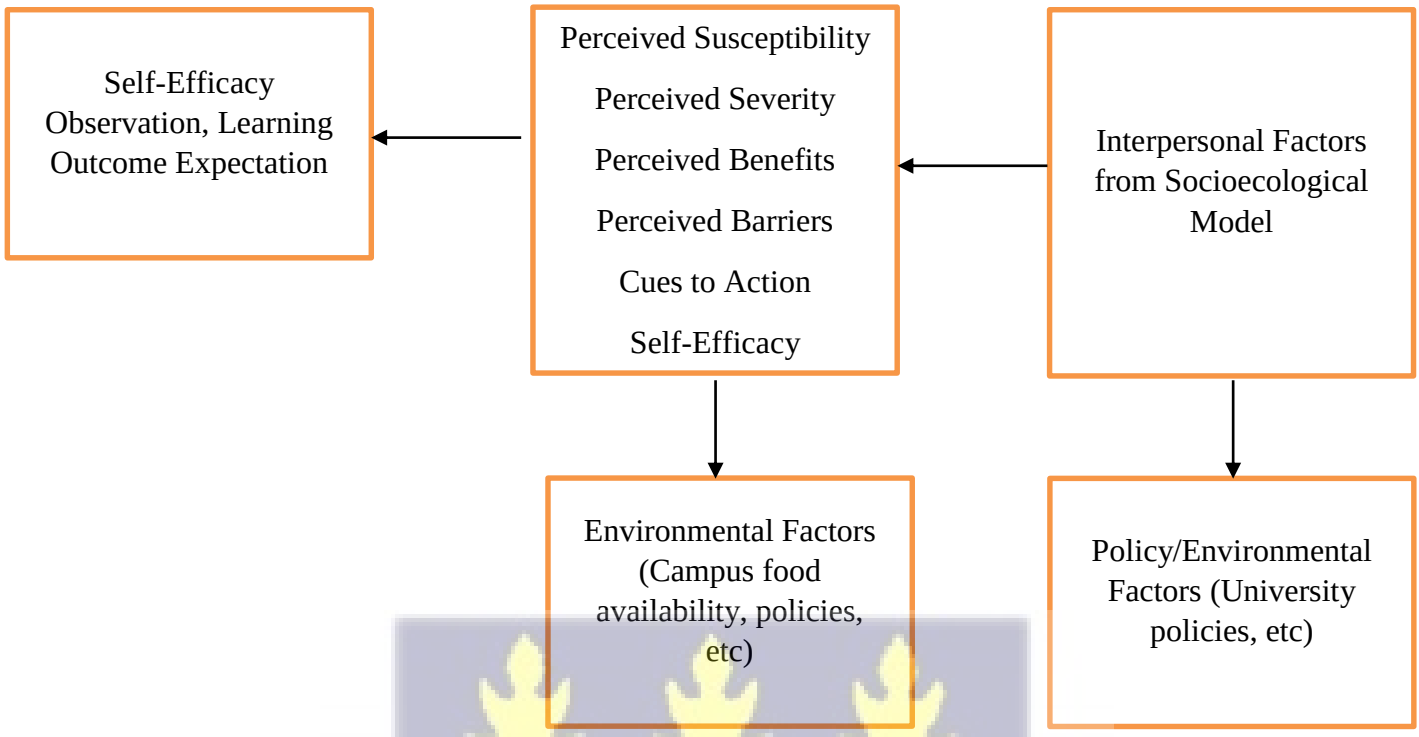

Figure 1: The Interactions among SCT, HBM and SEM

2.2 Nutrition and Health of University Students

2.2.1 Nutritional Status (NS) of University Students

The NS of university students is a topic of increasing importance, given its potential implications for their health, academic performance, and overall well-being. Numerous studies have investigated the dietary habits and nutrient intake of university students. Findings consistently reveal that a considerable proportion of students do not adhere to recommended dietary guidelines. Their diets often lack essential nutrients, such as fruits, vegetables, whole grains, and dairy products, while being high in added sugars, unhealthy fats, and sodium (Abrahams, 2017; Parada *et al.*, 2020). Moreover, irregular meal patterns, excessive snacking, and consumption of energy-dense, nutrient-poor foods contribute to imbalanced nutrient intake (Shahar *et al.*, 2016).

Micronutrient deficiencies are prevalent among university students, posing potential health risks and academic consequences. Key nutrients, including iron, calcium, vitamin D, and B vitamins, are of particular concern (Gonzalez Carrascosa *et al.*, 2019; Leermakers *et al.*, 2015). Poor dietary choices, limited access to nutritious foods, and restrictive eating behaviours contribute to these deficiencies. Consequently, students may experience fatigue, impaired cognitive function, and compromised immune function, negatively affecting their academic performance.

The university years can be a vulnerable period for weight gain and obesity. Studies report an increase in body weight and BMI during university attendance due to unhealthy eating behaviours, decreased physical activity, and stress (Gomez-Bruton *et al.*, 2018; Jayasinghe *et al.*, 2019). However, some students may experience weight loss or develop disordered eating patterns, such as binge eating or restrictive eating, further impacting their nutritional status and overall well-being. Numerous individual, social, and environmental factors influence university students' nutritional choices. Knowledge and awareness of healthy eating, perceived benefits and barriers to healthy eating, peer and family influences, campus food availability and affordability, and cultural norms all play a role (Bruening *et al.*, 2019; Quick *et al.*, 2019). Understanding these factors is essential for developing evidence-based interventions to promote healthier dietary behaviours.

Nutritional status directly affects academic performance and overall well-being among university students. Those with healthier diets and adequate nutrient intake tend to have better concentration, memory, and cognitive function, positively influencing their academic achievements (Dunn & Cullen, 2015; Tanaka *et al.*, 2020). Additionally, a balanced diet contributes to physical health, mental well-being, and overall quality of life.

To improve the nutritional status of university students, interventions and policies should address multiple levels. This includes individual-level interventions, such as nutrition education programs and personalized counseling, as well as community-level efforts, such as promoting healthier food environments on campus and providing accessible and affordable nutritious options (Reicks *et al.*, 2019; Wharton *et al.*, 2016). Collaboration between universities, healthcare professionals, and stakeholders is critical to developing comprehensive strategies to address nutritional challenges among students.

2.2.2 Eating Patterns (EP) of University Students

The *EP* of university students are of significant interest due to its potential impact on health, well-being, and academic performance. The university years represent a critical life stage when young adults experience significant changes in their dietary behaviours, influenced by academic stress, social interactions, and lifestyle adjustments. Numerous studies have investigated the dietary habits of university students. Findings suggest that their diets often deviate from recommended guidelines, with a high intake of energy-dense, nutrient-poor foods, and limited consumption of fruits, vegetables, and whole grains (Bruening *et al.*, 2019; Quick *et al.*, 2019). Irregular meal patterns, excessive snacking, and reliance on fast food are common characteristics of the eating patterns of university students.

University students frequently face challenges in meeting their nutritional needs. Imbalanced diets may result in nutrient deficiencies, particularly in essential vitamins and minerals, such as vitamin D, iron, and calcium (Gonzalez Carrascosa *et al.*, 2019; Leermakers *et al.*, 2015). Poor nutrient intake can adversely affect physical and mental health, leading to fatigue, impaired cognitive function, and increased susceptibility to illness. The university environment often leads to irregular eating patterns, with students skipping meals due to time constraints and academic demands. Studies have reported that a substantial number of university students

skip breakfast, which can compromise their nutritional status and academic performance (El Ansari & Stock, 2014; Parada *et al.*, 2020).

Social interactions and environmental factors significantly influence university students' eating patterns. Peer influences, cultural norms, campus food availability, and affordability play pivotal roles in shaping their food choices (Bruening *et al.*, 2019; Quick *et al.*, 2019). Social gatherings, shared meals, and the presence of food during social events can impact students' dietary behaviours. *EP* has a direct impact on academic performance and overall well-being among university students. Research has shown that students with healthier diets and regular meal patterns tend to have better concentration, memory, and cognitive function, positively influencing their academic achievements (Dunn & Cullen, 2015; Tanaka *et al.*, 2020). Conversely, poor eating habits can lead to reduced energy levels, stress, and lower academic performance.

To promote healthier eating patterns among university students, interventions and campus health programs play a vital role. Nutrition education, cooking classes, and access to nutritious food options on campus have been found to positively influence students' food choices (Reicks *et al.*, 2019; Wharton *et al.*, 2016). Collaborative efforts between universities, healthcare professionals, and food services are crucial in developing comprehensive strategies to support healthy eating on campus.

2.3 Eating Patterns of Ghanaian University Students

2.3.1 Traditional Ghanaian Diet and Eating Patterns

Food plays a crucial role in Ghanaian culture, and meals are often considered opportunities for social interaction and bonding. Traditional gatherings and festivals often feature the preparation and sharing of communal meals, fostering a sense of community and cultural identity. Moreover, the traditional Ghanaian diet reflects the respect for age-old culinary

practices and the transmission of cultural values from one generation to another. The traditional Ghanaian diet is rooted in the rich cultural heritage of the Ghanaian people. It reflects the availability of locally sourced foods and the diverse ethnic groups within the country. The traditional Ghanaian diet is primarily based on staple foods such as cassava, yam, plantains, millet, maize, and rice. These starchy staples provide a significant portion of the population's caloric intake (Siawor-Robertson & Lartey, 2015). Additionally, legumes, beans, and nuts contribute to protein intake, while palm oil and other locally sourced oils are common sources of fat. The diet also includes an array of vegetables, fruits, and spices, which enhance the flavour and nutritional value of meals.

Traditional Ghanaian cooking involves a variety of cooking methods, such as boiling, steaming, and frying, using diverse ingredients to create flavourful dishes. Dishes are often prepared in large quantities to serve extended family members or guests during communal meals. Traditional cooking methods emphasize the use of spices and herbs, such as ginger, garlic, onions, and hot peppers, which contribute not only to taste but also to potential health benefits (Owusu-Boakye, 2019).

The traditional Ghanaian diet has both strengths and potential health concerns. The reliance on whole grains, legumes, and vegetables provides a good balance of nutrients, fiber, and antioxidants, contributing to overall health and well-being (Siawor-Robertson & Lartey, 2015). However, excessive consumption of starchy staples and added oils can lead to high caloric intake and contribute to overweight and obesity, particularly in urban areas (Abizari *et al.*, 2019).

Globalization and urbanization have brought about changes in eating patterns among Ghanaians. The availability of processed and fast foods has increased, leading to a shift away from traditional dietary practices. Younger generations, in particular, are more exposed to

Westernized diets, resulting in a decreased consumption of traditional foods (Mogre *et al.*, 2012). This dietary transition has raised concerns about the impact on public health and the preservation of cultural heritage.

Public health interventions are essential in promoting dietary diversity and preserving the traditional Ghanaian diet. Nutrition education programs, community-based initiatives, and policy interventions can be effective in encouraging the consumption of traditional foods and promoting healthy eating habits (Mogre *et al.*, 2012). Emphasizing the nutritional value and cultural significance of traditional foods can contribute to dietary diversity and better health outcomes.

2.3.2 Westernization of Ghanaian Diet and Eating Patterns

The Westernization of the Ghanaian diet and eating patterns has become a significant concern in recent years due to the increasing globalization and urbanization of the country. As Ghana is exposed to Western influences through media, trade, and cultural exchange, traditional dietary habits are undergoing changes. The Westernization of the Ghanaian diet is influenced by several factors. Globalization has led to the availability and promotion of Western fast foods, processed foods, and sugary beverages (Gyimah *et al.*, 2019). Additionally, urbanization has changed the food landscape, with an increasing number of convenience stores and fast-food outlets, making Western-style foods more accessible to Ghanaians (Gyimah *et al.*, 2019). Cultural shifts, changing lifestyle patterns, and the influence of Western media further contribute to the adoption of Western dietary habits. Ghanaian dietary patterns are transitioning from traditional, locally sourced foods to Western-style diets characterized by high intake of refined carbohydrates, added sugars, unhealthy fats, and processed foods (Kwame et al., 2016). Traditional staples like millet, maize, and yam are being replaced with rice, pasta, and bread, while home-cooked meals are being substituted with fast-food options.

The Westernization of the Ghanaian diet has significant health implications. The increased consumption of energy-dense, nutrient-poor foods contributes to rising rates of overweight, obesity, and diet-related chronic diseases, such as type 2 diabetes and cardiovascular diseases (Abizari *et al.*, 2019). Nutrient deficiencies may also arise as traditional nutrient-rich foods are replaced with processed alternatives (Gyimah *et al.*, 2019).

The Westernization of the Ghanaian diet not only affects physical health but also has cultural and social consequences. Traditional eating practices, such as communal meals and the cultural significance of certain foods during festivals and gatherings, are being challenged (Gyimah *et al.*, 2019). This shift can impact social cohesion and cultural identity, as food plays a central role in Ghanaian culture and social interactions.

Addressing the Westernization of the Ghanaian diet requires multifaceted interventions. Public health campaigns should raise awareness about the health consequences of excessive Western-style food consumption and promote the value of traditional Ghanaian foods (Kwame *et al.*, 2016). Nutrition education programs can empower individuals to make informed food choices and adopt healthier eating patterns (Owusu-Boakye, 2019). Additionally, collaborations between the government, food industry, and local communities are essential for creating an enabling environment that supports healthy dietary choices.

Efforts to curb the Westernization of the Ghanaian diet should also focus on preserving cultural heritage and dietary diversity. Recognizing the cultural significance of traditional foods and culinary practices can foster pride and appreciation for Ghanaian cuisine (Owusu-Boakye, 2019). Promoting traditional food festivals and local food markets can help maintain the consumption of nutrient-rich, locally sourced foods.

2.3.4 Changes in Eating Patterns with Age and Education

Eating patterns are dynamic and influenced by various factors, including age and education. As individuals age and acquire more education, their dietary behaviors and preferences may undergo significant transformations. Research indicates that eating patterns tend to change as individuals progress through different life stages. Early adulthood is often characterized by irregular eating habits, higher consumption of convenience foods, and lower adherence to dietary guidelines (Jebb, 2018). As individuals enter middle adulthood, they typically prioritize health and nutrition, leading to more balanced and health-conscious food choices. In later adulthood, changes in appetite, metabolism, and dental health may influence dietary preferences and nutrient intake (Lengyel & Whiting, 2018).

With advancing age, there is an increased awareness of the importance of nutrition and its impact on health and well-being (Keller *et al.*, 2018). Older adults may gravitate towards nutrient-dense foods, such as fruits, vegetables, and whole grains, while reducing the consumption of processed and high-calorie foods (Chen *et al.*, 2020). Additionally, older individuals may show a greater inclination towards traditional or familiar foods, reflecting their cultural and social preferences (Mattes, 2016).

Education plays a significant role in shaping dietary behaviors. Higher levels of education are associated with greater knowledge of nutrition and health, leading to more informed food choices (Hanson & Neumark-Sztainer, 2018). Educated individuals may exhibit greater adherence to dietary guidelines, increased consumption of fruits and vegetables, and reduced intake of sugary beverages and unhealthy snacks (Darmon & Drewnowski, 2015).

Changes in eating patterns with age and education can have implications for health outcomes. Improved nutritional choices and dietary diversity associated with higher education may contribute to better health and a reduced risk of chronic diseases, such as obesity, cardiovascular disease, and type 2 diabetes (Darmon & Drewnowski, 2015). However, age-

related changes in appetite and dietary intake may present challenges in meeting nutrient requirements among older adults (Chen *et al.*, 2020).

Understanding the changes in eating patterns with age and education is essential for developing targeted public health interventions and education programs. Nutrition education initiatives can enhance awareness of healthy eating habits and promote lifelong dietary behaviors that support overall health and well-being (Hanson & Neumark-Sztainer, 2018). Tailored programs for older adults can address age-related nutritional challenges and support healthy aging.

Socioeconomic factors, including education and income levels, can lead to disparities in eating patterns. Individuals with lower education and income may have limited access to nutritious foods and face higher exposure to unhealthy food environments (Darmon & Drewnowski, 2015). Addressing these disparities requires comprehensive approaches that address food access, affordability, and nutrition education.

2.4 Nutritional Status of Ghanaian University Students

2.4.1 Prevalence of undernutrition and overnutrition

Undernutrition and overnutrition are two contrasting forms of malnutrition that have significant implications for global public health. Undernutrition refers to insufficient intake of essential nutrients, leading to poor growth and development, while overnutrition involves excessive caloric intake and the consumption of unhealthy foods, contributing to obesity and diet-related diseases.

Undernutrition remains a major public health challenge, especially in low- and middle-income countries. Globally, an estimated 149 million children under the age of five are stunted, reflecting chronic malnutrition and impaired growth (United Nations, 2020). Additionally, undernutrition is a leading cause of child mortality, with 45% of deaths among children under five attributed to malnutrition-related factors (UNICEF, 2021). Inadequate access to nutritious

foods, poor feeding practices, and infectious diseases contribute to the prevalence of undernutrition in vulnerable populations. Undernutrition is a complex issue influenced by various factors, including poverty, food insecurity, limited access to healthcare, and inadequate maternal and child care practices (Black *et al.*, 2013). In regions affected by conflict, natural disasters, or economic instability, the prevalence of undernutrition is exacerbated, as access to food and healthcare is further compromised.

Overnutrition, characterized by excessive caloric intake and the consumption of energy-dense, nutrient-poor foods, is rapidly rising in both developed and developing countries. Globally, over 670 million adults and 38 million children are affected by obesity (World Health Organization, 2021). The prevalence of obesity is particularly high in urban settings, where sedentary lifestyles and easy access to unhealthy foods contribute to the overconsumption of calories and the development of diet-related diseases. Overnutrition is driven by multiple factors, including the availability of inexpensive, energy-dense foods, changes in dietary habits, sedentary lifestyles, and marketing of unhealthy products (Popkin, 2015). Globalization and urbanization have facilitated the spread of Western dietary patterns, characterized by the consumption of processed and fast foods high in sugars, fats, and salt.

Both undernutrition and overnutrition have severe health consequences. Undernutrition in early childhood can lead to stunted growth, impaired cognitive development, and increased susceptibility to infections (Leroy *et al.*, 2019). Overnutrition, on the other hand, is associated with a higher risk of obesity-related diseases, including type 2 diabetes, cardiovascular diseases, and certain types of cancer (Ng *et al.*, 2014).

In some settings, countries face a dual burden of malnutrition, where undernutrition coexists with overnutrition. This phenomenon is particularly prevalent in low- and middle-income countries undergoing rapid socio-economic transitions (Popkin, 2015). The dual burden poses

complex challenges for public health interventions, as it requires addressing both ends of the malnutrition spectrum.

2.4.2 Micronutrient Deficiencies in Ghanaian University Students

Micronutrient deficiencies, characterized by inadequate intake or absorption of essential vitamins and minerals, are a significant public health concern worldwide. In the context of Ghanaian university students, this comprehensive literature review aims to explore the prevalence and risk factors of micronutrient deficiencies, their impact on health and academic performance, and potential strategies for addressing these nutritional gaps. By analyzing existing academic research, this review seeks to identify trends and inform targeted interventions to improve the nutritional status of Ghanaian university students.

Studies have indicated that micronutrient deficiencies are prevalent among Ghanaian university students. Deficiencies in iron, vitamin D, vitamin B_{12}, and folic acid have been documented (Agborsangaya *et al.*, 2017; Tamiru *et al.*, 2019). Additionally, suboptimal intake of essential micronutrients like zinc, calcium, and vitamin A has been reported, particularly among female students (Kwame *et al.*, 2018). These findings highlight the vulnerability of university students to nutritional gaps.

Several risk factors contribute to micronutrient deficiencies in Ghanaian university students. Poor dietary practices, such as a reliance on processed and energy-dense foods with limited nutritional value, can lead to inadequate intake of essential vitamins and minerals (Tamiru *et al.*, 2019). Unhealthy eating habits, such as skipping meals and frequent consumption of fast foods, also contribute to micronutrient deficiencies (Doku *et al.*, 2012). Moreover, factors like low socioeconomic status, limited access to nutritious foods, and dietary restrictions can exacerbate the risk of micronutrient inadequacy (Kwame et al., 2018).

Micronutrient deficiencies can have adverse effects on the health and academic performance of Ghanaian university students. Iron deficiency, for instance, can lead to anemia, resulting in fatigue, decreased concentration, and impaired cognitive function (Agborsangaya *et al.*, 2017). Vitamin D deficiency is associated with musculoskeletal problems and compromised immune function (Doku *et al.*, 2012). Suboptimal intake of vitamin B_{12} and folic acid can negatively affect mental health and cognitive development (Tamiru *et al.*, 2019). These nutritional gaps may hinder students' ability to cope with academic demands and overall well-being.

Nutritional knowledge and behaviors among Ghanaian university students play a crucial role in determining their micronutrient status. Studies have shown that students with higher nutrition knowledge tend to have better dietary practices and a lower risk of micronutrient deficiencies (Doku *et al.*, 2012). However, many students may lack adequate nutrition education, leading to suboptimal food choices and nutritional inadequacy (Kwame *et al.*, 2018).

To address micronutrient deficiencies in Ghanaian university students, multifaceted strategies are essential. Nutrition education programs and interventions can increase awareness of the importance of balanced diets and micronutrient-rich foods (Doku *et al.*, 2012). Campus-based initiatives, such as establishing nutritious food options in dining facilities and promoting healthy eating environments, can facilitate better dietary practices (Kwame *et al.*, 2018). Collaborations between universities, government agencies, and non-governmental organizations can further support efforts to improve students' nutritional status.

In cases where dietary interventions may not fully address micronutrient deficiencies, targeted supplementation or fortification programs can be considered. Vitamin and mineral supplementation may be provided to vulnerable groups or individuals with documented deficiencies (Agborsangaya *et al.*, 2017). Additionally, fortification of commonly consumed

foods with essential micronutrients can be an effective and cost-efficient approach to improve overall nutritional status (Tamiru *et al.*, 2019).

2.4.3 Socioeconomic Factors Affecting Nutritional Status

Nutritional status is a key indicator of health and well-being, and it is influenced by a complex interplay of various factors, including socioeconomic determinants. Socioeconomic factors play a significant role in shaping individuals' access to nutritious food, dietary behaviours, and overall nutritional status.

Income level is a crucial socioeconomic determinant that influences nutritional status. Low-income households often face financial constraints that limit their access to diverse and nutritious foods (Keding *et al.*, 2012). Food insecurity, a condition in which individuals lack consistent access to enough nutritious food for an active and healthy life, is more prevalent in low-income populations and is associated with higher risks of undernutrition (Jones *et al.*, 2019). On the other hand, higher income levels may increase the likelihood of overnutrition, as individuals with greater financial resources may have easier access to energy-dense, processed foods (Drewnowski & Specter, 2004).

Education is another critical socioeconomic factor that affects nutritional status. Higher levels of education are associated with better nutrition knowledge, leading to healthier dietary behaviours (Larson *et al.*, 2017). Educated individuals are more likely to make informed food choices, understand the importance of balanced diets, and adopt healthier eating habits. In contrast, lower education levels may result in limited nutrition knowledge and contribute to dietary deficiencies.

The food environment, including the availability and accessibility of nutritious foods, significantly influences nutritional status. Individuals living in areas with limited access to fresh produce, whole grains, and other nutrient-dense foods may rely more on processed and

unhealthy food options (Kwate *et al.*, 2017). Food deserts, characterized by the absence of supermarkets and grocery stores offering fresh produce, are more prevalent in socioeconomically disadvantaged neighbourhoods, contributing to dietary disparities.

Cultural and social norms also play a role in shaping dietary practices and nutritional status. Cultural beliefs and traditions may influence food preferences and meal patterns, leading to variations in nutritional intake (Gittelsohn *et al.*, 2018). Additionally, social factors, such as family dynamics and peer influences, can impact food choices and eating behaviours.

Access to healthcare services is a significant determinant of nutritional status. Regular healthcare check-ups and access to nutrition counselling can help identify and address nutritional deficiencies and provide appropriate interventions (Zhang *et al.*, 2020). Individuals with limited access to healthcare facilities and health services may face challenges in identifying and managing nutritional issues.

Addressing the socioeconomic factors affecting nutritional status requires a multi-pronged approach. Policy interventions and nutrition programs are essential in promoting food security, improving access to nutritious foods, and providing nutrition education (Giridhar *et al.*, 2018). Social safety nets, such as food assistance programs, can support vulnerable populations and reduce food insecurity (Smith *et al.*, 2017). Nutrition education initiatives targeted at low-income communities can empower individuals to make healthier food choices and improve their overall nutritional status (Larson *et al.*, 2017).

2.5 Factors Influencing Eating Patterns (Food Choice)

Food choice is influenced by a variety of aspects in an individual's surroundings, including cultural, personal, economic, social, and emotional factors (Soyer et al., 2008; Bargiota et al., 2013). People choose dietary choices for a variety of reasons, including nutritional information, social and psychological factors, economic and environmental variables, and physiological

considerations (Okoro et al., 2015).

2.5.1 Nutrition Knowledge and Health

A thorough understanding of nutrition is essential for maintaining a balanced and nutritious diet (Calella, Iacullo, & Valerio, 2017). People's understanding of food can impact how they consume it. They can make better food choices if they understand the nutritious composition of foods, dietary needs, and meal preparation ("Factors influencing food selection," n.d.). A recent study by Bargiota et al. (2013) found that teenagers choose meal choices depending on the nutritional information they have gained. Their understanding piqued their interest in purchasing foods with reduced overall calories and fat content, as well as paying attention to food expiration dates. Klutse (2015) discovered that teenagers have information about the nutritional composition of the meals they ingest.

Epuru & Shammry (2014) found that poor eating habits and a lack of nutritional understanding influenced food choices and dietary preferences among Saudi students. Ensaff et al. (2015) discovered that teenagers had insufficient understanding of plant-based diets and the health advantages of plant-based foods, hence they did not advocate the consumption of plant-based diets. On the other, several studies have shown gaps between awareness of healthy eating and behaviour. Adolescents did not apply their understanding of healthy diets (Kigaru et al., 2015; Kotecha et al., 2013). Individual health conditions may cause people to consume more of certain foods and less of others. People avoid some meals because of the effects they could have. Swelling, vomiting, diarrhea, itching and skin rashes, wheezing, headaches, and sleep disturbances are all possible effects. Adamu. (2012) revealed that the study participants refused to consume some meals because they were allergic to them. According to Bargiota et al. (2013), 22% of teenagers reported making dietary decisions primarily for health reasons.

2.5.2 Social factors

Peer influence, family, and the media are important influences in determining people's dietary choices. Adolescents are influenced by their peers (Jahan & Shakil, 2015; Hashmi, 2013). Adolescents eat meals advised by their friends without regard for their nutritional worth to feel like they belong (Majabadietal, 2016). Even if teenagers understand the differences between good and unhealthy diets, as well as the repercussions of following an unhealthy diet, they are more likely to make unhealthy choices when they are among their peers (Kotecha et al., 2013). Amos et al. (2012) discovered a more substantial relationship between peer impact and teenagers' eating habits. They went on to explain that peer impact was the most important predictor of teenagers' bad eating behaviours since they spend the majority of their time with their peers at home and school. They like to eat things recommended to them by their peers. This study is consistent with Epuru and Shammry's (2014) finding that 60% of students prefer to eat with their friends frequently. Furthermore, a study of teenagers in rural regions indicated that those who ate with their friends at school or on-site facilities such as the cafeteria consumed more junk food (Bargiota et al., 2013). Furthermore, research has demonstrated that parents have power over their children's diets. Adamu et al. (2012) examined the influence of eating habits on the nutritional status of upper primary school children in the Tamale Metropolis and found that 94% of the adolescents ingested foods prepared by their parents for supper, while 4% ate foods of their choosing. Furthermore, 51.5% of the teenagers ate foods picked by their parents for lunch, 28.6% made their lunch selections, and 16.2% purchased items within their means. Adolescents' eating choices were impacted by their parents' socioeconomic level. According to Bargiota et al. (2013), a larger proportion (93%) of teenagers' dietary choices were regulated by their parents, with this trend being more prominent in younger adolescents. In addition, they discovered in their research that teenagers with younger moms ate out more frequently than those with older mothers. On the contrary, Amos et al. (2012) discovered no

link between parental influence and teenagers' eating habits. The media influences an individual's eating choices. Foods marketed in the media are presented as healthier; yet, they have a lower nutritional value when compared to unprocessed or less processed foods.

2.5.3 Psychological factors

Psychological aspects are complicated, and they differ amongst individuals based on lifestyle and upbringing. Psychological variables such as previous eating experiences, beliefs, and values have a long-term impact on food choice, but food selection based on emotion, self-concept, and attitude can change daily ("Factors affecting food selection", n.d.). People's eating choices are influenced by their beliefs, society, and religion. Some foods are extensively consumed by people of a particular culture and religion, whilst others are forbidden by that culture and religion. According to Adamu et al. (2012), 37.8% of adolescents despised particular meals due to their religious beliefs. According to another study conducted on students in Saudi Arabia, psychological elements including feelings and food appeal had a greater impact on their eating habits than the body's natural hunger process (Epuru & Shammry, 2014). Adolescent nutrition is crucial as their eating habits are influenced by their personality development and psychological shifts (WHO, 2006). An individual's food intake and preferences are influenced by physiological considerations. A person may eat to satisfy their physiological demands when they are hungry ("Child and adolescent nutrition," 2006). Certain meals may be chosen or rejected based on how they are perceived by the senses, which include the dish's texture, appearance, presentation, and aroma ("Factors affecting food selection"). One of the main factors influencing teenagers' dietary choices is taste.

Teenagers may choose certain meals over healthy ones based on their taste preferences (Ensaff et al., 2015). Some meals may be off-limits to adolescents due to their disagreeable flavour and fragrance (Adamu et al., 2012). Adolescents in Canales & Hernández (2016) chose foods based more on their sensory qualities than on how they will affect their weight. According to reports,

teenagers' meal choices in Turkey were impacted by the sensory aspects of foods (Soyer et al., 2008). The aforementioned results demonstrate that several factors have been shown via studies to affect a person's dietary decisions.

2.5.4 Economic Factors

The type of food that individuals can afford to purchase depends on its cost and availability. According to Abdulkarim et al. (2014), the incidence of overnutrition among Nigerian teenagers was influenced by the increased availability of fast food and inexpensive sweetened beverages. A study by Adamu et al. (2012) revealed that the majority of participants (78%) were precluded from having breakfast due to financial constraints. Additionally, teenagers' dietary preferences in Turkey were impacted by the price of food (Soyer et al., 2008). Canales and Hernández (2016) discovered that while choosing meals, teenagers took price into account.

2.5.5 Environmental factors

A person's dietary preferences are greatly influenced by the surroundings in which they live. One can attribute people's dietary choices to their food system. The meals that individuals in rural and urban regions of low-income nations eat may differ from one another. When their produce runs out, people in rural regions are more inclined to rely on self-production and spend money on staples. Most people eat a lot of processed foods since, in contrast to metropolitan regions, many people are not involved in food production and are therefore heavily dependent on markets and stores (Chang & Ruel-Bergeron, 2016). People may turn to certain foods because of the kind of foods that are accessible throughout that season. According to a Tamale adolescent research, teenagers consumed mangoes since they were in season (Adamu et al, 2012). Furthermore, the presence of on-site amenities including fast-food restaurants, school tuck shops, grocery stores, and local vendors may be important determinants of teenage eating choices (Steyn, 2010). Teenagers' dietary choices may also be influenced by time constraints. Teenagers are aware of the need to eat a healthy diet, but one of the things that prevents them

from making better food choices is time constraints (Kotecha et al., 2013). According to certain research, teenagers who were pressed for time missed breakfast (Klutse 2015; Buxton, 2014).

2.6 Specific Factors Affecting Eating Patterns and Nutritional Status of University Students

Dietary Knowledge and Beliefs: Dietary knowledge and beliefs significantly influence the eating patterns of university students. Students with higher nutrition knowledge are more likely to make informed food choices and adhere to healthier diets (Chen *et al.,* 2019). Conversely, students with misconceptions or limited understanding of nutrition may engage in suboptimal dietary practices, leading to nutritional deficiencies and poor health outcomes (Wardle et al., 2017). Nutrition education programs targeted at university students can enhance their dietary knowledge and empower them to adopt healthier eating behaviours.

Availability and Accessibility of Healthy Foods: The availability and accessibility of healthy foods on and around university campuses have a profound impact on students' eating patterns. Campuses with well-equipped dining facilities, on-campus markets, and vending machines offering nutritious options can promote healthier food choices (Nelson *et al.,* 2018). In contrast, limited access to affordable, nutrient-dense foods may lead students to rely on less healthy and convenience foods, contributing to poor nutritional status (Hartmann *et al.,* 2019). Strategies to increase the availability of healthy foods on campus and in surrounding areas can support students in making healthier dietary choices.

Food Preferences and Taste: Food preferences and taste preferences significantly influence university students' dietary choices. Familiarity with certain foods, cultural background, and personal preferences shape their eating patterns (Jabs & Devine, 2016). Additionally, the appeal of highly palatable, energy-dense foods can lead to overconsumption and increase the risk of overnutrition and obesity (Keller *et al.,* 2019). Encouraging the exploration of new,

healthier food options and promoting diverse, culturally relevant meals can help students adopt more balanced and nutritious diets.

Time and Convenience: University students often face time constraints due to academic demands, part-time jobs, and social activities, which can impact their eating patterns. Limited time may lead to frequent consumption of fast foods and convenience foods, which are often high in calories and low in nutritional value (Tang *et al.*, 2018). Time-saving meal preparation strategies, such as meal prepping and healthy snack options, can support students in maintaining healthier dietary habits despite their busy schedules.

Stress and Emotional Eating: Stress and emotional factors can also impact the eating patterns of university students. The demanding academic environment and personal challenges may trigger emotional eating behaviours, where students use food as a coping mechanism (Macht & Simons, 2011). Emotional eating may lead to overeating and the consumption of comfort foods, often high in sugars and fats, which can contribute to weight gain and other health issues (Michels *et al.*, 2016). Promoting stress management techniques and providing counselling services can help students develop healthier coping mechanisms and prevent emotional eating episodes.

2.7 Interventions to Improve Eating Patterns *(EP)* and Nutritional Status *(NS)* of Students

2.7.1 Dietary Knowledge and Beliefs

Dietary knowledge and beliefs play a critical role in shaping the *EP* and *NS* of university students. Students who possess higher levels of nutrition knowledge are more equipped to make informed and healthier food choices. They are more likely to understand the importance of a balanced diet, the role of essential nutrients in maintaining health, and the impact of dietary choices on their overall well-being (Chen *et al.*, 2019). With this knowledge, they can make

conscious decisions about their food intake and are more likely to incorporate nutrient-rich foods into their diets.

On the other hand, students with misconceptions or limited understanding of nutrition may adopt suboptimal dietary practices. They might be more prone to consuming energy-dense, nutrient-poor foods, leading to nutritional deficiencies and an increased risk of various health issues. For example, inadequate consumption of essential vitamins and minerals can lead to conditions like iron deficiency anemia, vitamin deficiencies, and compromised immune function (Wardle *et al.*, 2017). Moreover, unhealthy dietary habits during the college years can set a precedent for long-term health issues in later life.

To address the gaps in dietary knowledge and beliefs, nutrition education programs targeted at university students can be highly effective. These programs can be integrated into the university curriculum or offered through workshops, seminars, or online platforms. Nutrition education initiatives aim to enhance students' understanding of healthy eating principles, the benefits of various food groups, and the importance of moderation in food consumption.

Effective nutrition education programs employ evidence-based approaches, interactive teaching methods, and personalized feedback to engage students actively. By providing accurate and practical information, students can develop the skills and knowledge necessary to make healthier food choices both on and off-campus. Furthermore, nutrition education can empower students to critically evaluate nutrition-related claims and advertisements, enabling them to make informed decisions about the foods they consume.

In addition to improving dietary knowledge, nutrition education can foster positive attitudes towards healthy eating. When students understand the positive impact of nutrition on their physical and mental well-being, they are more motivated to adopt healthier eating behaviors

(Contento, 2011). Nutrition education can also dispel common myths or misconceptions about certain foods or diets, promoting a more balanced and evidence-based approach to nutrition.

2.7.2 Availability and Accessibility of Healthy Foods

University students' eating habits and nutritional status are greatly influenced by the accessibility and availability of healthful foods. A conducive food environment on and around university campuses can influence students' food choices, leading to better dietary practices and improved health outcomes.

Universities that offer well-equipped dining facilities with a wide range of nutritious options can encourage students to make healthier food choices. These facilities can provide balanced meals with a variety of fruits, vegetables, whole grains, lean proteins, and low-fat dairy products. When healthy food options are readily available and visually appealing, students are more likely to select these options, leading to improved nutritional intake (Nelson *et al.*, 2018). Furthermore, campus dining facilities can provide nutritional information and labels, helping students make informed decisions about their food choices.

On-campus markets and vending machines can also play a significant role in promoting healthier eating patterns. Stocking these outlets with fresh fruits, pre-cut vegetables, and other healthy snacks can increase the availability of nutritious options for students. Providing healthy alternatives to sugary beverages and high-calorie snacks can further encourage students to opt for nutrient-dense foods. Additionally, offering these options at competitive prices can make healthy choices more accessible to students from diverse socioeconomic backgrounds.

Conversely, limited access to affordable, nutrient-dense foods can hinder students' ability to maintain healthy eating patterns. If healthy food options are scarce or too expensive, students may resort to consuming less nutritious foods, leading to imbalanced diets and increased risk of nutritional deficiencies (Hartmann *et al.*, 2019). For students living on a tight budget, the

availability of low-cost, healthy food options becomes crucial in supporting their nutritional needs.

To address this issue, universities can implement strategies to increase the availability and affordability of healthy foods. Collaborations with local farmers or food suppliers can ensure a steady supply of fresh and locally sourced produce. Additionally, partnering with community organizations and food banks can help provide nutritious food options to students facing food insecurity. Universities can also encourage the establishment of farmers' markets or healthy food outlets in the vicinity of the campus, promoting healthier eating options for students living off-campus.

Promoting healthy food options and enhancing their accessibility is not only beneficial for students' dietary choices but also for their overall well-being and academic performance. Adequate nutrition supports cognitive function, concentration, and energy levels, all of which are essential for successful academic pursuits (Kubik *et al.*, 2020). By investing in the availability of healthy foods, universities can contribute to the holistic development and success of their student population.

2.7.3 Food Preferences and Taste

Food preferences and taste preferences are powerful determinants of university students' dietary choices. Students are often drawn to foods they are familiar with or have grown up eating, reflecting their cultural background and personal food preferences (Jabs & Devine, 2016). These preferences are developed through a combination of environmental influences, exposure to various foods, and individual sensory experiences.

Cultural background plays a significant role in shaping food preferences among university students. Different cultures have distinct dietary practices and culinary traditions, which influence students' food choices and eating patterns. For example, students from Asian cultures

may prefer rice-based dishes, while those from Western cultures may gravitate towards bread and pasta. Cultural food preferences can also influence the acceptance or rejection of certain foods, leading to dietary habits that align with their cultural norms.

Moreover, personal food preferences and taste preferences vary widely among university students. Some students may have a preference for sweet or salty flavors, while others may prefer spicy or savory foods. These individual taste preferences can strongly influence the types of foods students are inclined to consume regularly. Highly palatable, energy-dense foods, often rich in sugars and fats, can be particularly appealing to students due to their pleasurable taste sensations (Keller *et al.*, 2019). Frequent consumption of such foods, however, can contribute to overnutrition and an increased risk of obesity and related health issues.

Promoting healthier eating patterns among university students involves addressing their food preferences and taste preferences. One approach is to encourage the exploration of new and diverse foods that align with their cultural background while providing additional options that are nutrient-dense and balanced. Introducing students to a variety of fruits, vegetables, whole grains, and lean protein sources can expand their food choices and support the adoption of more nutritious diets. Additionally, incorporating herbs, spices, and seasonings can enhance the flavors of healthier foods, making them more appealing to students with different taste preferences.

Universities can also implement campus-wide initiatives to promote healthier food options that cater to a diverse student population. Collaborations with local restaurants and food vendors can offer a broader range of culturally relevant and nutritious meals. Menu labeling and nutritional information can help students make more informed choices about their food selections. Furthermore, creating interactive cooking workshops or taste-testing events can engage students and encourage them to try new foods.

2.7.4 Time and Convenience

Time and convenience are significant factors that influence the eating patterns of university students. The demanding academic environment, part-time jobs, extracurricular activities, and social commitments can leave students with limited time to plan and prepare meals. As a result, many students may turn to fast foods and convenience foods as quick and easy options to satisfy their hunger (Tang *et al.*, 2018).

Fast foods and convenience foods are often high in calories, saturated fats, sodium, and added sugars while lacking essential nutrients like vitamins, minerals, and fiber. Frequent consumption of such foods can lead to imbalanced diets, nutritional deficiencies, and an increased risk of weight gain and chronic health conditions, such as obesity and metabolic disorders.

The challenges of time constraints and convenience-oriented food choices can be addressed by essentially providing students with practical strategies for maintaining healthier dietary habits. One effective approach is to promote time-saving meal preparation strategies, such as meal prepping. Meal prepping involves planning and preparing meals in advance, often during weekends or free time, and storing them for consumption throughout the week. By dedicating a few hours to meal prepping, students can ensure they have nutritious and balanced meals readily available, reducing the temptation to rely on unhealthy fast-food options.

Additionally, universities can offer healthier and convenient snack options on campus. Providing grab-and-go options like pre-cut fruits, yogurt cups, whole-grain granola bars, and mixed nuts can encourage students to make more nutritious choices when they are on the go or in between classes. Vending machines can be stocked with healthier alternatives to sugary beverages and high-calorie snacks, making it easier for students to access nutrient-dense options.

Promoting time management skills and offering resources on efficient meal planning can also help students make healthier food choices despite their busy schedules. Universities can host workshops or seminars on meal planning, budget-friendly cooking, and smart grocery shopping to equip students with practical knowledge and strategies for maintaining a balanced diet.

Moreover, incorporating healthier food options into on-campus dining facilities can provide students with convenient and nutritious meal choices. Universities can work with food service providers to create balanced meal options that cater to different dietary preferences and cultural backgrounds. Offering nutrient-dense choices at campus eateries and emphasizing their availability can encourage students to prioritize their health and well-being even amidst time constraints.

2.7.5 Stress and Emotional Eating

Stress and emotional factors are significant contributors to the eating patterns of university students. The demanding academic environment, coupled with personal challenges and transitions, can trigger emotional eating behaviors, where students turn to food as a way to cope with their emotions and stressors (Macht & Simons, 2011). Emotional eating is often characterized by the consumption of comfort foods that are high in sugars and fats, providing a temporary sense of relief and pleasure.

Emotional eating can have adverse effects on students' nutritional status and overall health. Frequent episodes of emotional eating may lead to overeating and excessive caloric intake, increasing the risk of weight gain and obesity. Moreover, relying on food as a coping mechanism can interfere with hunger and satiety cues, disrupting the body's natural regulation of food intake (Michels *et al.*, 2016). Over time, emotional eating may contribute to imbalanced diets, nutritional deficiencies, and poor health outcomes.

In relation to the above, universities can implement strategies to promote stress management and emotional well-being among students. Providing access to counseling services and mental health support can be instrumental in helping students develop healthier coping mechanisms for dealing with stress and emotional challenges. Counseling sessions can offer a safe space for students to explore the underlying reasons behind their emotional eating behaviors and develop more constructive ways to manage their emotions.

Universities can also offer stress management workshops and mindfulness programs to equip students with practical techniques for handling stress and emotions without resorting to food. Mindfulness practices, such as meditation and deep breathing exercises, can help students become more aware of their emotions and the triggers for emotional eating. By cultivating mindfulness, students can make more intentional and conscious food choices, reducing the likelihood of impulsive emotional eating episodes.

Furthermore, promoting a supportive campus environment can contribute to students' emotional well-being and reduce the incidence of emotional eating. Social support systems, such as peer support groups and student clubs focused on mental health and well-being, can provide students with a sense of belonging and connection. Engaging in physical activities and extracurricular activities can also serve as healthy outlets for stress relief and emotional expression.

2.8 Public Health Implications of Eating Patterns and Nutritional Status of Students

2.8.1 Effects on Academic Performance and Mental Health

Research has consistently shown that students' eating patterns and nutritional status have a direct impact on their academic performance and mental health. Adequate nutrition is essential for cognitive function, memory, and concentration, all of which are critical for successful academic endeavors (Florence *et al.*, 2018). Nutrient-rich diets, including fruits, vegetables,

whole grains, and lean proteins, provide the necessary nutrients for optimal brain function and support students' abilities to focus and retain information.

Conversely, poor nutrition, characterized by high consumption of fast foods and processed snacks, can impair cognitive function and lead to reduced academic performance (Christensen *et al.*, 2019). Nutritional deficiencies, such as iron, vitamin B_{12}, and omega-3 fatty acids, have been linked to impaired cognitive development and academic achievement among students (Kim *et al.*, 2020). Inadequate nutrition can also contribute to fatigue, lack of energy, and decreased motivation, hindering students' ability to excel academically.

Furthermore, students' eating patterns can significantly impact their mental health and emotional well-being. Unhealthy dietary habits, particularly those high in sugars and unhealthy fats, have been associated with an increased risk of depression and anxiety among university students (Firth *et al.*, 2019). Emotional eating and reliance on comfort foods as coping mechanisms during periods of stress can exacerbate mental health challenges and contribute to negative emotional states.

Promoting healthy eating behaviors among students, which emphasize balanced and nutrient-dense diets, can have far-reaching benefits for their academic performance and mental health. Universities can provide nutrition education, counseling, and mental health support services to empower students to make healthier food choices and develop positive coping mechanisms during times of stress.

2.8.2 Long-Term Health Consequences of Poor Nutrition

The eating patterns and nutritional status of students can have long-term health consequences, as dietary habits established during university years often persist into adulthood. Poor nutrition during this critical period can set the stage for chronic health conditions in later life. For example, excessive consumption of unhealthy foods high in added sugars and trans fats can

lead to obesity and an increased risk of developing cardiovascular diseases, type 2 diabetes, and metabolic disorders (Kumar & Kelly, 2021).

Inadequate intake of essential nutrients, such as calcium and vitamin D, during the university years can compromise bone health and increase the risk of osteoporosis in later life (Weiler *et al.*, 2018). Nutritional deficiencies can also weaken the immune system and increase susceptibility to infections and diseases.

Promoting healthy eating patterns and nutritional practices during university years can help prevent long-term health consequences. Emphasizing the importance of balanced diets, rich in essential nutrients, and encouraging students to develop sustainable healthy eating habits can contribute to improved health outcomes in the future.

2.8.3 Economic Burden of Poor Nutrition and Chronic Diseases

The public health implications of students' eating patterns and nutritional status extend beyond individual health outcomes and affect society's economic burden. Poor nutrition and its associated chronic diseases impose substantial healthcare costs and productivity losses on the economy. The prevalence of obesity, diabetes, and cardiovascular diseases, often linked to poor dietary choices, contributes to a higher demand for healthcare services and increased healthcare expenditure (Smith & Brownell, 2019).

Moreover, chronic diseases resulting from poor nutrition can lead to a reduction in workforce productivity and an increase in absenteeism among working-age adults, including university graduates. The economic burden of these health conditions not only affects individuals but also places significant strain on healthcare systems and economies at large.

Promoting healthy eating patterns among university students can be seen as a preventive measure to alleviate the economic burden associated with poor nutrition and chronic diseases. By investing in public health campaigns, nutrition education, and supportive campus

environments, universities can contribute to a healthier and more productive future workforce, ultimately reducing the economic burden of chronic diseases.

2.9 Empirical Review

Studies on the eating patterns of university students at Takoradi Technical University *(TTU)* indicate a varied and diverse dietary landscape. Many students report irregular eating schedules due to academic demands and social commitments. A study by Ofori-Asenso *et al.* (2019) found that a significant proportion of students skip meals, especially breakfast, due to time constraints. This pattern of irregular eating can lead to imbalanced nutrient intake and negatively affect students' nutritional status.

Fast food consumption is prevalent among university students in Ghana, including those at *TTU*. Abubakari *et al.* (2018) reported that a large percentage of students frequently consume fast food items, such as fried snacks and sugary beverages. The popularity of fast-food options may be influenced by their affordability, convenience, and appealing taste. However, the high calorie, fat, and sugar content of these foods can contribute to weight gain and chronic health issues.

Cultural and regional dietary preferences also influence the eating patterns of students at *TTU*. Traditional Ghanaian dishes, such as *fufu, banku, and waakye*, are commonly consumed. While these dishes can be nutritious when prepared with a balanced variety of ingredients, their frequent consumption in combination with fast food items may lead to imbalanced diets and micronutrient deficiencies.

The nutritional status of students at *TTU* is a subject of concern, as studies indicate a prevalence of both undernutrition and overnutrition. Micronutrient deficiencies, particularly in iron, vitamin A, and vitamin D, have been reported among some students (Kwame-Aryee *et al.*, 2017). Inadequate intake of essential nutrients can compromise students' immune systems,

energy levels, and cognitive function, potentially affecting their academic performance and overall health.

Conversely, the issue of overnutrition and obesity is also prevalent among university students. A study by Appiah *et al.*, (2020) revealed a significant proportion of students at Takoradi Technical University were overweight or obese. Contributing factors to overnutrition include the consumption of energy-dense foods, limited physical activity, and sedentary lifestyles.

The socioeconomic background and environmental factors of students can significantly influence their eating patterns and nutritional status. Students from lower socioeconomic backgrounds may face food insecurity, limiting their access to nutritious foods. Food insecurity can lead to the reliance on cheaper, less healthy food options, perpetuating nutritional disparities among students.

Campus food environments also play a role in shaping students' dietary choices. The availability and accessibility of healthy food options on campus can influence students' eating behaviors. A study by Agyemang *et al.* (2019) highlighted the importance of improving the availability of nutritious foods in campus canteens and vending machines to promote healthier eating habits.

Studies have shown that dietary diversity among students at Takoradi Technical University is often limited. A study by Ebu *et al.* (2020) reported that many students do not consume the recommended servings of fruits, vegetables, and whole grains. Instead, their diets predominantly consist of starchy staples and processed foods, leading to inadequate intake of essential nutrients.

Furthermore, the consumption of sugary beverages is prevalent among students at the university. A study by Aikins *et al.* (2019) revealed that a significant proportion of students

consume sugary drinks daily, contributing to excessive sugar intake and potential health risks, such as dental caries and obesity.

Research has also explored students' nutritional knowledge and attitudes towards healthy eating. A study by Baah *et al.*, (2021) found that while students generally possessed basic nutrition knowledge, they lacked awareness of the specific dietary requirements for optimal health. Many students expressed interest in improving their nutrition knowledge to make informed food choices.

Attitudes towards healthy eating varied among students. Some students acknowledged the importance of balanced diets and expressed a desire to adopt healthier eating habits. However, others reported barriers to healthy eating, such as limited time, budget constraints, and the influence of peer preferences.

The campus environment can significantly influence students' eating patterns and nutritional status. A study by Addo *et al.*, (2022) highlighted the importance of campus food outlets in shaping students' food choices. On-campus food options, including canteens and snack vendors, predominantly offer energy-dense foods that are high in fats and sugars. The limited availability of nutritious foods on campus contributes to students' reliance on unhealthy options.

Moreover, the campus social environment also influences students' eating behaviors. Studies have shown that peer influence and social gatherings often revolve around food, leading to the overconsumption of unhealthy snacks and beverages (Annan *et al.*, 2020). Campus initiatives that promote healthier food options and create a supportive food environment can positively impact students' dietary choices.

Empirical evidence suggests a link between students' nutritional status and physical health. A study by Boadi *et al.*, (2018) revealed that students with poor nutritional status had higher

incidences of frequent illnesses, including gastrointestinal issues and respiratory infections. Inadequate intake of essential nutrients weakens the immune system, making students more susceptible to infections.

Furthermore, the prevalence of overweight and obesity among students at Takoradi Technical University is a growing concern. A study by Baidoo *et al.*, (2021) reported a significant increase in the number of students classified as overweight or obese over the past decade. This trend is associated with sedentary lifestyles, poor dietary choices, and a lack of physical activity.

2.10 Conceptual Framework

Figure 2 shows the Conceptual Framework on Factors that can Influence the Dietary Patterns and Nutritional Status.

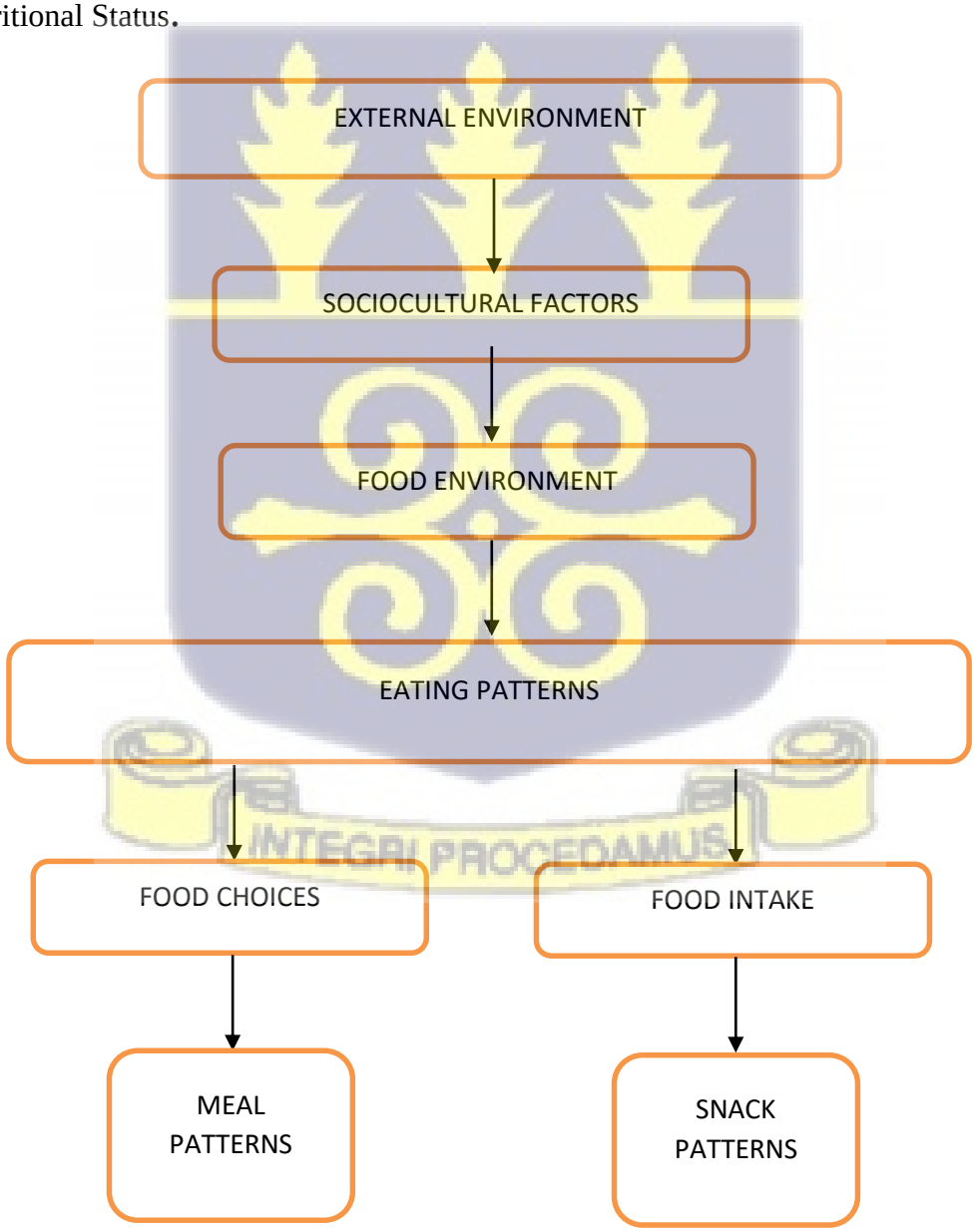

Figure 2: The Factors that can Influence Eating Patterns and Nutritional Status

Source: *Author's Construct*

The conceptual framework presented in Figure 2 is focused on the topic of "Eating Patterns and Nutritional Status of Students of Takoradi Technical University in Ghana." The framework is designed to provide a comprehensive understanding of the various factors that can influence the dietary patterns and nutritional status of individuals, with a particular focus on the sociocultural, environmental, and behavioural factors that can affect food choices and eating habits. By exploring these different components in detail, it is possible to gain a deeper understanding of the complex interplay between individual factors and broader societal and environmental influences on eating behaviours and nutritional outcomes. The components include;

External Environment: This component includes factors outside of the individual that can influence their eating patterns and nutritional status. For example, government policies can affect the availability and affordability of healthy foods through initiatives like food subsidies, while economic conditions can affect the purchasing power of individuals to buy healthy foods. The natural environment can also play a role, such as the availability of fresh produce in certain regions or the presence of food deserts in urban areas.

Sociocultural Factors: This component includes cultural and social influences on food choices that are specific to a given population. Family traditions, for example, can dictate certain dietary practices, while social norms may influence what foods are considered acceptable to

eat in public or private settings. Peer pressure can also affect an individual's food choices, particularly among younger populations.

Food Environment: This component refers to the physical and social context in which food choices are made. The availability of healthy foods in local supermarkets or restaurants, the accessibility of these options through public transportation or walking, and the marketing of food choices through advertising and packaging can all affect the foods that individuals choose to consume.

Eating Patterns: This component refers to the overall dietary patterns of individuals, which can include their food choices, meal patterns, and snacking habits. These patterns can be influenced by a variety of factors, including sociocultural norms, availability of healthy foods, and individual preferences.

Food Choices: This component refers to the specific foods that individuals choose to consume, such as fruits, vegetables, whole grains, and processed foods. These choices can be influenced by personal taste preferences, cultural norms, availability, and cost.

Food Intake: This component refers to the amount of food that individuals consume, as well as the frequency and timing of their meals and snacks. This can be influenced by a variety of factors, including individual hunger levels, work or school schedules, and cultural norms around mealtimes.

Meal Patterns: This component refers to the specific patterns of meals that individuals consume, such as skipping breakfast, eating out frequently, or consuming large evening meals. These patterns can be influenced by a variety of factors, including sociocultural norms, availability of healthy food options, and individual preferences.

Snack Patterns: This component refers to the specific patterns of snacking that individuals engage in, such as consuming high-calorie snacks between meals. These patterns can be influenced by a variety of factors, including individual hunger levels, availability of healthy snack options, and cultural norms around snacking.

Nutritional Status: This component refers to the overall nutritional adequacy of individuals' diets, as well as their intake of specific nutrients, such as protein, vitamins, and minerals. This can be influenced by a variety of factors, including individual food choices, availability of healthy food options, and cultural norms around food consumption.

Body Composition/Health: This component refers to measures of body composition, such as body mass index (BMI) and waist circumference, as well as overall health outcomes, such as chronic disease risk and mortality. These outcomes can be influenced by a variety of factors, including individual food choices, eating patterns, and overall nutritional status.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This Chapter discusses the methodology used for this study. It goes into detail on the following topics: research design, population, sample and sampling technique, data collection method, instrument design and piloting, data analysis, and ethical considerations.

3.2 Study Design

This study used a cross-sectional design. This strategy is primarily used to assess the prevalence of an outcome of interest in a particular population (Levin, 2006). It allows for the research to include either the full population or a subset of the population (Neuman, 2006; Bernard, 2012). The cross-sectional design is also time efficient since it permits data to be collected at a certain period, allowing the researcher to meet the study's objectives (Hall, 2011; Bernard, 2012). This study utilized a cross-sectional design using a quantitative methodology.

3.3 Study Location

The study was conducted at the Takoradi Technical University (TTU), which is situated in Ghana's Western Region. TTU is a public technical university located in Takoradi, the capital city of the Western Region of Ghana. It was established in 1954 as a Government Technical Institute and was later upgraded to a Polytechnic in 1992 before being granted technical university status in 2016. The university offers degree programs in engineering, applied sciences, business, arts and design, and applied social sciences.

3.4 Target Population

The research population consisted of all Bachelor of Technology (BTECH) students at Ghana's Takoradi Technical University. This population was chosen since the students were conveniently available to the researcher. Furthermore, students at Takoradi Technical

University were relevant to the research aims since they represent a varied population with various origins, experiences, and opinions. This diversity was vital to the study's research aims and allowed for more generalizable results.

3.5 Inclusion and Exclusion Criteria

3.5.1 Inclusion Criteria

Participants included in the study were:

1. Bachelor of Technology (BTECH) Students
2. Available at the time of study
3. Willing and consented to participate in the study

3.5.2 Exclusion Criteria

Participants who were not part of the study were:

1. Any student not from Bachelor of Technology (BTECH)
2. Any students not available at the time of study
3. Participants who declined consent

3.6 Sample and Sampling Procedure

3.6.1 Sample Size

The total population was derived based on the study design, size, objectives, and the intended analysis (Neuman, 2006). Choosing a subset of a population is crucial because it is unlikely that the entire population will be included in a study (Francis *et al.*, 2010). Wilcox (2010) estimated that a study sample in a study design may be at least 10% of the population group, and as a result, 425 students were selected to participate in the study. 4,245 students pursuing BTECH at the Takoradi Technical University were eligible to participate in the study. Hence, the study adopted Wilcox's (2010) formula.

Thus, 10 x 4,245 = 424.5. This was rounded to 425.

100

Though 430 students were used to care for the incomplete questionnaire, only the actual derived sample size (425) was used for the analysis.

3.6.2 Sampling Strategies

Saunders et al. (2009) identify two types of sampling: probability and non-probability sampling. Probability sampling selects any member of the population as a research responder, whereas non-probability sampling, such as purposive sampling, selects participants based on subjective criteria (Greenfield & Greener, 2016).

From each level of study, a certain number of students were selected to ensure proportionate sampling. Salkind (2010) asserts that proportional sampling is utilized when the research population is made up of several subgroups with vastly different populations. A sample size for each class is calculated by dividing the total number of participants in the research by the number of participants in each subgroup. The researcher utilized proportional sampling to choose the sample size for each subgroup after calculating the population of each subgroup. By comparing the number of persons in each of the four sub-locations (Level 100, level 200, level 300 and level 400) of the target population to the number of students in each class, Newman (2006) and Salkind (2010) developed a method to estimate the number of students in each class.

The formula used is as follows:

Number of units in each phase

$$\frac{\text{Sample Size}}{\text{Total number of students}} \times \text{X}$$

Table 1 shows the proportional sampling used to choose the number of students for each level of study after deriving the sample size used for the study.

Table 1 Proportionate Sampling of BTECH Students

Level of Study	Total No. of Students	Formula Used	No. Students selected
100	1123	$^{1123}/_{4245}$x 425	113
200	1011	$^{1011}/_{4245}$x 425	101
300	998	$^{998}/_{4245}$x 425	100
400	1113	$^{1113}/_{4245}$x 425	111
Total	**4245**		**425**

Source: Field Survey (2023)

Convenience sampling was however used to select students willing to participate in the study.

3.7 Data Collection Method

3.7.1 Instruments for Data Collection

The major data-gathering tool was a questionnaire. The questionnaire was created by modifying existing standardized measures used by other researchers to perform comparable investigations in different study contexts (Ibem et al. 2018). As an introduction, the questionnaire included a brief explanation of the study's purpose as well as some ethical standards on confidentiality and the use of gathered data. The first component of the questionnaire evaluated the demographic characteristics of the respondents. The second to fifth sections included questions about numerous variables such as eating patterns, nutritional status, factors impacting students' eating patterns and nutritional status, and recommendations for developing good eating habits and enhancing nutritional status.

In relation, two standardized scales were adapted to measure the variables in the quantitative part of the study. Eating pattern was measured by adapting the Food Frequency Table by Schlundt *et al.* (2003). The scale had good internal consistency, with Cronbach alpha ranging from 0.75. Some items were modified to suit the context of students' eating pattern in the Takoradi Technical University. Hence, the assessment of respondents' eating patterns was based on a food frequency table with a mean scale of 3.46. According to the classification criteria, respondents with scores below 1.6 were categorized as having a poor eating pattern, those with scores ranging from 1.68 to 3.46 were classified as having an average eating pattern, and those with scores of 3.47 and above were considered to have a good eating pattern.

Students' nutritional status was measured by adopting a scale by Słowik *et al.* (2019). The scale has recorded a Cronbach alpha of 0.79.

Factors influencing students' eating patterns and nutritional status as well as recommendations for promoting healthy eating patterns and improving nutritional status were self-constructed based on the review of literature.

3.7.2 Pre-test

The questionnaire was pre-tested with ten (10) students from departments other than BTECH. This is because they are pupils with similar characteristics to their BTECH peers.

3.7.3 Ethical consideration

According to Saunders et al. (2009), ethical consideration is an essential component of academic research efforts. According to Mertens and Ginsberg (2009), research should follow strict ethical norms. Furthermore, meeting the rigor of research requires that every study effort be morally sound (Connelly, 2014). The research guaranteed that the ethical principles of getting authorization from the institutions where the study was done, informed consent from respondents, data safety, confidentiality, voluntary participation, and withdrawal from the study at any time were followed throughout the study. These fundamental ethical criteria were

implemented by retaining the collected questionnaires and inputting data under a password, data that was not disclosed to any other third party save the researcher.

3.7.4 Procedure for Data Collection

The Department of Family and Consumer Sciences submitted an introductory letter to the Dean of the Faculty. Two Research Assistants were trained to assist with data collecting. These Research Assistants received previous training to ensure that they understood the elements of the data-collecting instrument in the same way. The respondents were approached and informed about the research. Those who agreed to participate were required to complete the questionnaire.

3.8 Data Analysis

The acquired data was cleaned, processed, and analysed using IBM's Statistical Package for Social Sciences (SPSS) version 26. The socio-demographic data, as well as the scores on the various scales utilized, were subjected to a descriptive analysis, including frequency and percentage calculations. Chi-square analyses were used to investigate the association between nutritional status and socio-demographic factors, as well as eating habits and nutritional status. The findings were then presented descriptively, using tables, charts, and graphs as appropriate.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Introduction

This chapter presents the study's key findings and comments. It is divided into six sections, each addressing a distinct component of the research. Section I focuses on the demographics of the study's participants, who attend Takoradi Technical University *(TTU)* in Ghana. Section II identifies the pupils' eating routines, and Section III evaluates their nutritional health. Section IV goes into the elements that influence their eating behaviours, while Section V discusses the issues related to the kids' eating routines. Finally, Section VI examines the correlations among the variables analysed. Based on the test statistic results, this part decides whether to accept or reject the study's hypotheses.

4.2 Demographic Characteristics of Respondents

Four hundred and twenty-five (425) students from the Takoradi Technical University in Ghana were used for this study and the following selected background characteristics were analysed: Age, Gender, Level of Study, Residence, and Ethnicity.

4.2.1 Age of Respondents

Table 2 shows the age ranges of the respondents.

Table 2: Ages of respondents

Ages (Yrs)	Frequency (N)	Percentage (%)
15-20	24	5
21-25	279	66
26-30	83	20

≥ 30 years	39	9
Total	**425**	**100**

Source: Field Survey (2023)

The findings reveal that most of the respondents (66%) were between 21-25 years old with the least (5%) between 15 – 20 years. The age group distribution is highly relevant to the study's focus on eating patterns and nutritional status among Technical University students in Ghana. Since the study aimed to understand the eating patterns and nutritional status among these students, having a significant portion of respondents within the university's typical age range ensures that the findings are directly applicable to the intended audience. Young adulthood is a critical phase where individuals experience significant lifestyle changes, including dietary habits. Studies have shown that dietary choices during this period can impact long-term health outcomes (Arnett, 2007). Research suggests that young adults often experience changes in dietary behaviours, which can be influenced by various factors such as academic stress, lifestyle adjustments, and increased independence (Harriger *et al.*, 2016).

University campuses can play a vital role in shaping students' eating habits and nutrition. Availability of food options on campus, meal plans, and peer influences can impact students' food choices (Vella-Zarb *et al.*, 2019). Again, research has shown that the age group in the study might face nutritional deficiencies or risk factors for chronic diseases (Story *et al.*, 2018).

4.2.2 Gender of Respondents

Table 3 shows the gender distribution of respondents.

Table 3: Gender distribution of Respondents

Gender	**Frequency (N)**	**Percentage (%)**

Male	359	84
Female	66	16
Total	**425**	**100**

Source: Field Survey (2023)

Out of the total 425 respondents, 84% were males, while 16% were females. The finding indicates a significant skew towards male respondents, with their representation outweighing that of female respondents. Past research has highlighted that women tend to be underrepresented in certain surveys, especially in areas that are traditionally male-dominated (Douglas & Bates, 2020).

4.2.3 Respondents' Levels of Study

Respondents' levels of study are presented in Table 4.

Table 4: Respondents' Levels of Study

Levels of Study	Frequency (N)	Percentage (%)
100	113	26
200	102	24
300	99	23
400	111	27

Total	**425**	**100**

Source: Field Survey (2023)

Out of the total 425 respondents, 26% were in Level 100, 24% in Level 200, 23% in Level 300, and 27% in Level 400. This indicates a relatively balanced representation of students across the different academic levels. The balanced distribution of respondents across different academic levels suggests that the survey managed to capture a diverse range of students' perspectives. Fitzpatrick *et al.* (2011) stressed the significance of inclusivity in survey research to ensure diverse perspectives are represented. They argue that survey samples should strive to capture the varied experiences of individuals from different stages of education to enhance the validity and generalizability of findings.

4.1.4 Residential Status of Respondents

Table 5 shows respondents' place of residence.

Table 5: Residential Status of Respondents

Status	Frequency (N)	Percentage (%)
School Hostel	33	8
Outside Hostel	232	54
Home	160	38

Total	**425**	**100**

Source: Field Survey (2023)

Eight percent (8%) of the respondents were residing in the school's hostel, 54% in private hostels outside the campus and 38% were staying at home. Research has indicated that students' living arrangements can significantly influence their eating patterns and food choices. Students residing in school hostels often have access to hostel canteens, meal plans, and food services on campus, which can impact their dietary habits (Fowles *et al.*, 2016). On the other hand, students living outside the campus in hostels may face different challenges, such as limited cooking facilities or reliance on fast-food options, which can affect their nutritional choices (El Ansari *et al.*, 2014).

Students living at home may experience greater dietary stability, as they can rely on home-cooked meals and family support, which can positively impact their nutritional status (Byrd-Bredbenner *et al.*, 2017).

Residential status is often associated with varying socioeconomic backgrounds. Students living outside the hostel may come from different economic circumstances, impacting their access to healthy foods and overall nutritional status (Garasky *et al.*, 2018).

4.2.5 Ethnicity of Respondents

Table 6 presents the ethnic groups of respondents.

Table 6: Respondents' Ethnicity

Ethnicity	Frequency (N)	Percentage (%)
Fante	221	52
Ashanti	38	9

Ewe	53	12
Ga-Adamgbe	45	11
Nzema	34	8
Frafra	28	7
Dagaaba	6	1
Total	**425**	**100**

Source: Field Survey (2023)

A little over half of the respondents (52%) were identified as Fantes. The other ethnic groups were Ashantes (9%), Ewe (12%), Ga-Adangbe (11%), Frafra (7%), Nzema (8%), and Dagaabas (1%). Ethnicity plays a significant role in shaping dietary habits and food preferences. Different ethnic groups often have unique cuisines and traditional foods that influence their nutritional choices (Satia *et al.,* 2009). Traditional food practices can influence the nutritional status of individuals. For instance, some ethnic cuisines might be rich in certain nutrients while lacking others, affecting students' overall nutritional intake (Sodjinou *et al.,* 2018). Understanding the nutritional implications of different cultural food practices can aid in developing targeted interventions to address potential deficiencies or health concerns.

4.3 Eating Patterns of respondents

4.3.1 Food Consumption Patterns of Respondents

Figures 3 – 18 show the food consumption patterns of students in the Takoradi Technical University over a one-week period. The food items are categorized into groups as shown in the figures below.

Fruits

Figure 3 shows the respondents' fruit consumption patterns.

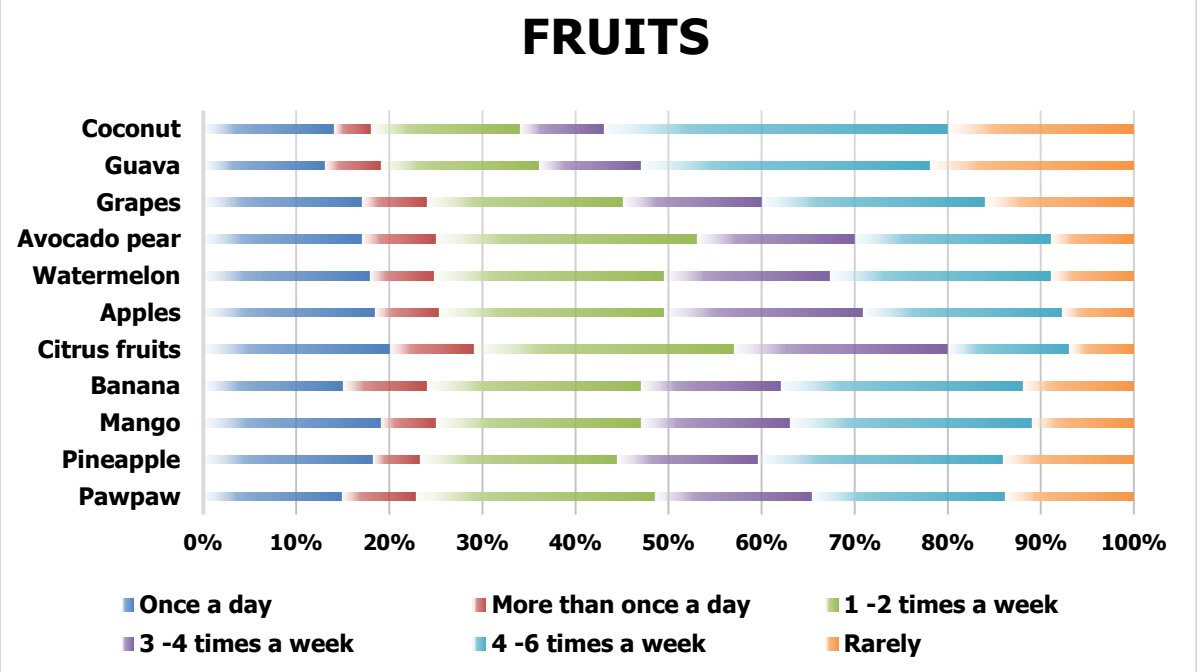

Figure 3: Percentage Distribution of Fruit Consumption Patterns of Respondents

Figure 3 shows that the respondents had varied fruit consumption patterns. Citrus fruits (e.g., oranges, tangerines), apples, mangoes, and bananas were among the most preferred fruits, with higher percentages of students consuming them at least once a day or more than once daily. These fruits are likely popular due to their availability, taste, and nutritional benefits.

Meanwhile, coconuts and guavas appeared to be among the least preferred fruits, with higher percentages of students rarely consuming them. The reasons behind these lower consumptions is attributed to factors such as limited availability, taste preferences, or cultural influences (Lachat *et al.*, 2009).

Fruit consumption patterns among university students is influenced by socio-cultural factors, including taste preferences, traditional dietary habits, and the influence of peers and family (Fulkerson *et al.*, 2011). Cultural background and regional preferences may also play a role in determining the popularity of certain fruits among students at Takoradi Technical University. Different cultures have distinct culinary traditions and dietary preferences. Fruits that are considered staples or traditional in one culture might not hold the same significance in another.

Students from diverse cultural backgrounds may bring their culinary traditions with them, impacting the types of fruits they prefer and consume. Also, people tend to be more inclined towards foods they are familiar with and have grown up eating. Students from a particular cultural background may have been exposed to certain fruits from a young age, leading to a preference for those fruits due to a sense of comfort and familiarity. The consumption of a diverse range of fruits is essential for ensuring a balanced and nutrient-rich diet (Slavin & Lloyd, 2012). Encouraging increased consumption of less preferred fruits could improve students' access to various nutrients and health benefits.

Beverages

Figure 4 shows the respondents' beverage consumption patterns.

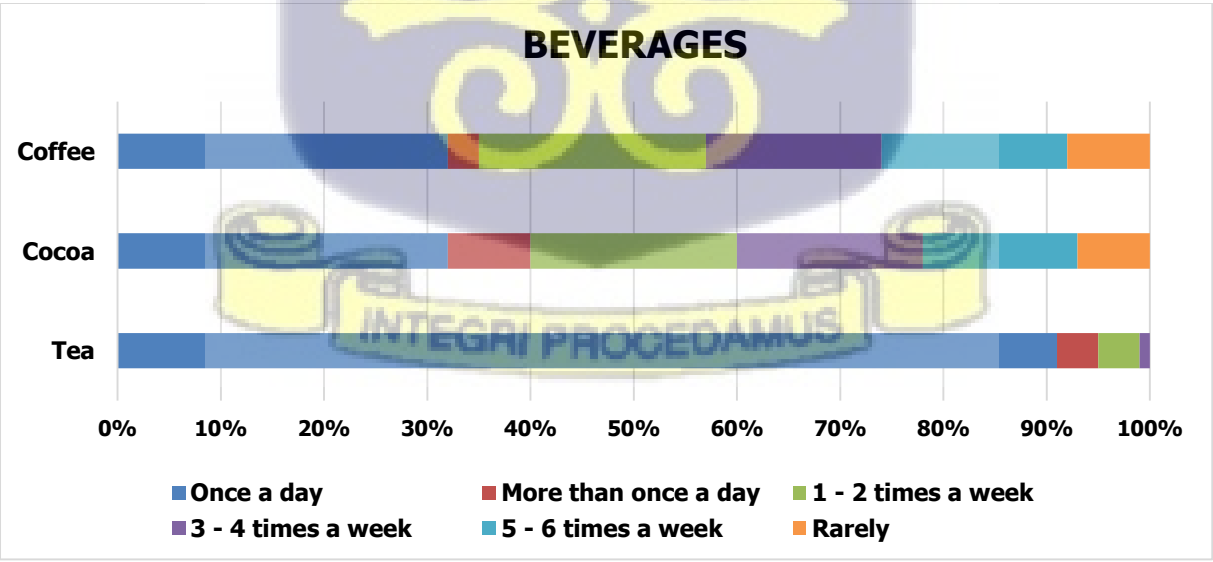

Figure 4: Percentage Distribution of Beverages Consumption Patterns of Respondents

Tea was the most preferred beverage among the respondents, with majority (91%) consuming it once a day. This could be due to the popularity of tea as a widely consumed and culturally significant beverage in Ghana (Opoku-Acheampong *et al.*, 2019). On the other hand, cocoa-based beverages, like Milo, also had a considerable consumption rate, with a mix of frequency levels reported. These beverages are commonly associated with providing energy and nutrients, and their popularity may stem from their taste and convenience. Also, coffee was consumed less frequently compared to tea and cocoa-based beverages. It may be preferred by a smaller group of students who enjoy the stimulating effects of caffeine or the taste of coffee (Addicott *et al.*, 2009).

Tea, cocoa, and coffee, each offers unique nutritional benefits and potential health effects. Tea, especially green tea, is known for its antioxidant properties and potential positive impact on cardiovascular health (Nagao *et al.*, 2009). Cocoa-based beverages, like Milo, can provide essential nutrients like calcium and iron (Mensah *et al.*, 2016). Coffee consumption has been associated with improved cognitive function and decreased risk of certain diseases (Grosso *et al.*, 2017). Beverage preferences can also be influenced by cultural and social factors. Cultural norms, family traditions, and peer influences may contribute to the popularity of certain beverages among students (Mehta *et al.*, 2012).

Porridges

Porridge consumption patterns among the respondents is presented in Figure 5.

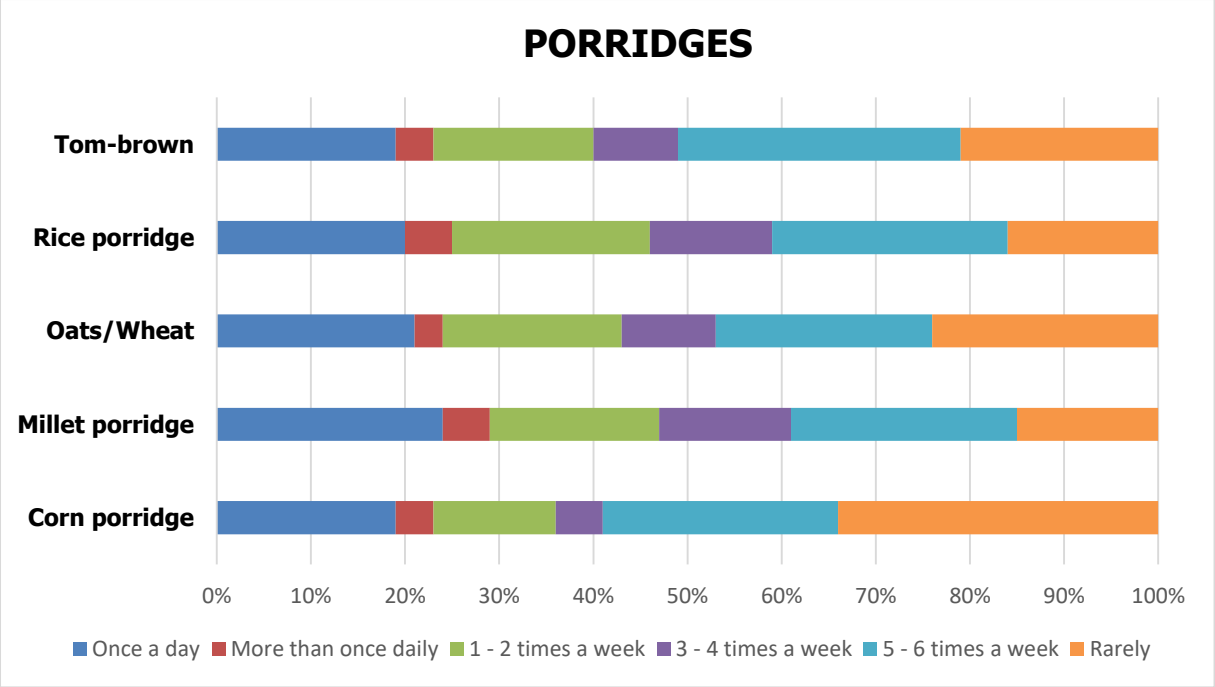

Figure 5: Percentage Distribution of Porridges Consumption Patterns of Respondents

The findings indicate that corn porridge was the most frequently consumed type of porridge among the students, with 25% consuming it 5-6 times a week. This is attributed to its popularity and traditional significance as a staple food in Ghana (Abizari *et al.*, 2017). Millet porridge and oats/wheat porridge were also popular choices, with significant proportions of students consuming them multiple times a week. Rice porridge and tom-brown were consumed less frequently, with fewer students having them multiple times a week.

Different types of porridge offer distinct nutritional benefits. For example, corn porridge is a good source of carbohydrates and thus energy (Bhattacharya *et al.*, 2019). Millet porridge is rich in essential nutrients like iron and calcium (Agbemavor *et al.*, 2018). Oats and wheat porridges are known for their fiber content and potential heart health benefits (Andersson *et al.*, 2018). The popularity of certain porridges, such as corn porridge and tom-brown, can be attributed to their cultural significance and long-standing traditions in Ghanaian cuisine (Amagloh *et al.*, 2016). Understanding these cultural aspects is crucial in promoting and preserving traditional dietary practices.

Milk and Milk Products

Respondents' consumption patterns of milk and milk products is shown in Figure 6.

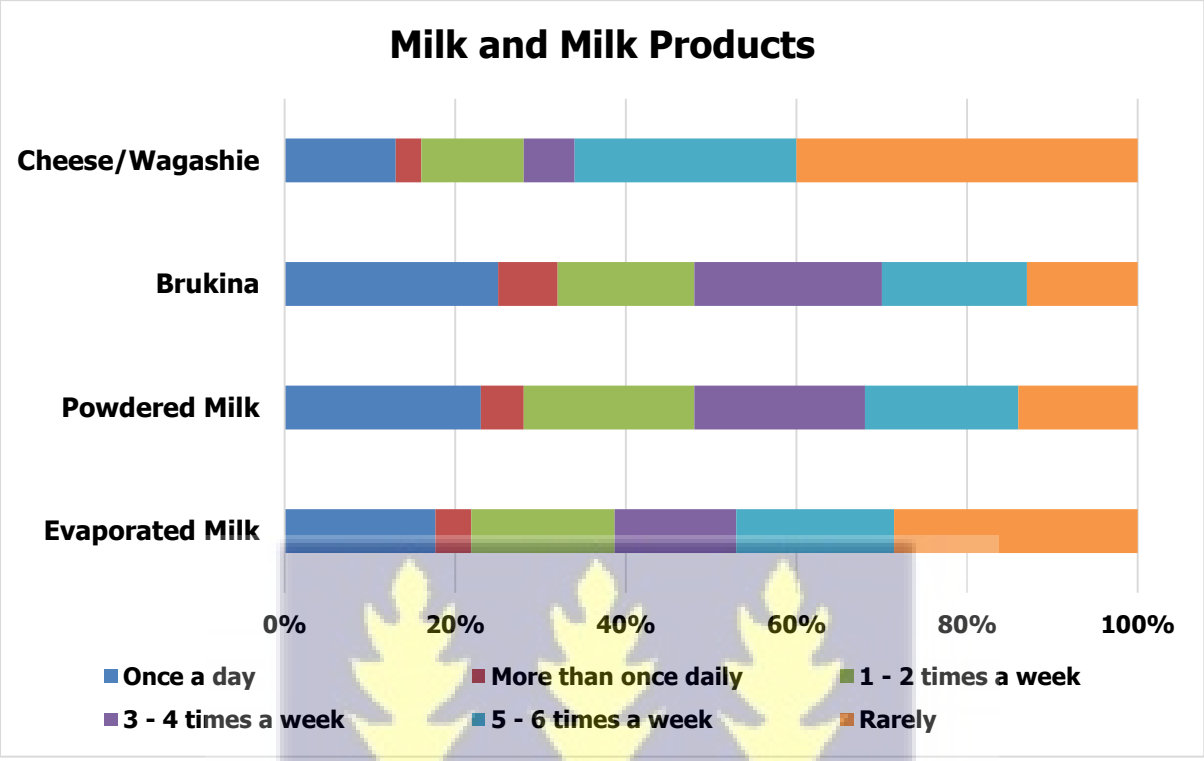

Figure 6: Percentage Distribution of Milk Products Consumption Patterns of Respondents

From Figure 6 evaporated milk and powdered milk were commonly consumed by students having them once a day or more than once daily. These milk products are convenient and versatile, often used in beverages and in cereals cooking.

Brukina, a traditional West African beverage made from yogurt and millet or sorghum, was also popular among students, with a significant proportion having it once a day. Its cultural significance and potential health benefits may contribute to its popularity (Fetuga *et al.*, 2016). Meanwhile, cheese and wagashie (a traditional Ghanaian cheese) are consumed less frequently, with a substantial proportion of students rarely having them.

Milk and milk products are essential sources of calcium, protein, and other nutrients vital for bone health and overall well-being (Rizzoli *et al.*, 2014). Evaporated milk and powdered milk

provide essential nutrients and can be used to fortify other foods. Brukina, being a fermented product, may also offer probiotic benefits for gut health (Tamang *et al.*, 2016). Encouraging the consumption of milk and milk products can contribute to students' nutrient intake and promote healthier dietary habits. The acceptance of Brukina and the limited consumption of cheese and wagashie may be influenced by cultural preferences and taste. Cultural familiarity and traditional practices often shape food choices and consumption patterns (Afrane *et al.*, 2021).

Spreads

Figure 7 shows the frequency of spreads consumption among the respondents.

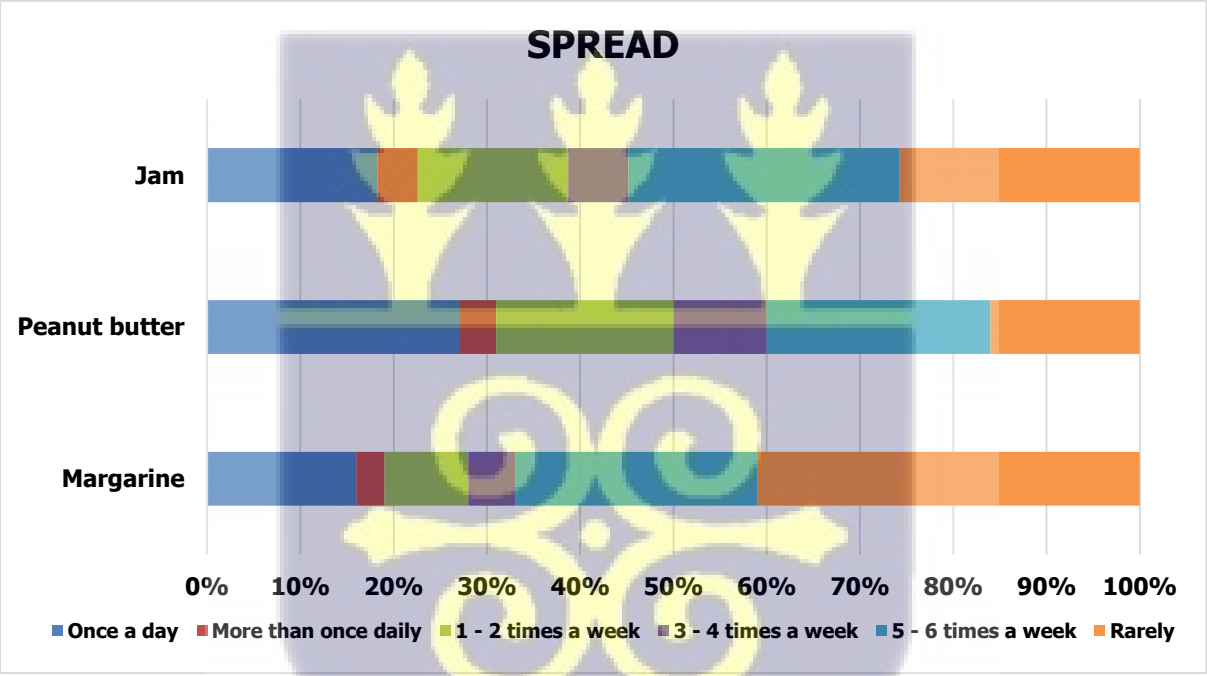

Figure 7: Percentage Distribution of Spread Consumption Patterns of Respondents

Figure 7 reveals the percentages of students' spread consumption patterns, indicating the frequency of intake for different spreads. Peanut butter was the most commonly consumed spread among students, with 27% having it once a day. Peanut butter is known for its popularity and versatility, often used as a spread on bread, crackers, and in various recipes.

Margarine and jam are also frequently consumed by students, with a significant proportion having them 5-6 times a week. Margarine is commonly used as a butter substitute, while jam is a popular sweet spread for bread and pastries.

The nutritional content of spreads varies significantly. Peanut butter is a good source of healthy fats, protein, and essential nutrients like vitamin E and magnesium (Liu *et al.*, 2017). Margarine consumption may provide essential fatty acids and vitamins (Hassan & Salama, 2014). Jam, on the other hand, is high in sugars and may not offer substantial nutritional benefits (Carlsen *et al.*, 2010). Encouraging the consumption of spreads like peanut butter and margarine can contribute to students' nutrient intake, but moderation in the consumption of jam is advised.

The popularity of peanut butter and jam may be attributed to their taste and convenience. These spreads are readily available and easy to incorporate into snacks and meals. Margarine, as a butter substitute, is commonly used in cooking and baking.

Breads

Figure 8 shows the frequency of breads consumption among the respondents.

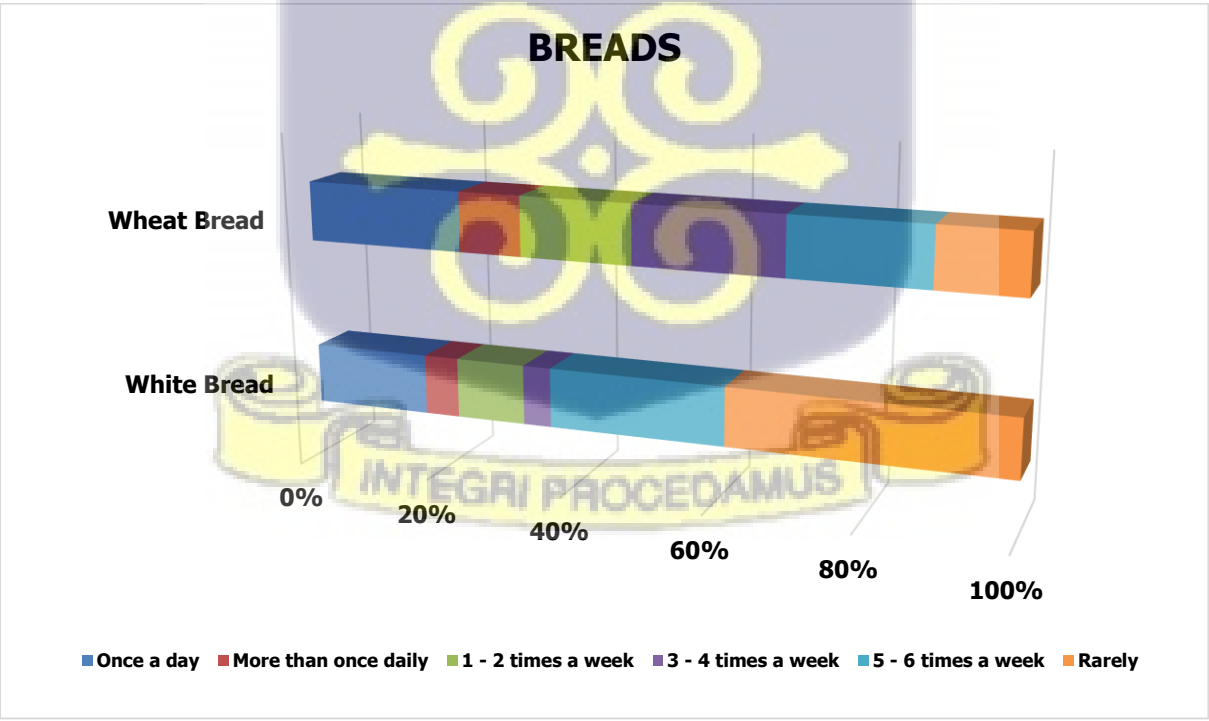

Figure 8: Percentage Distribution of Bread Consumption Patterns of Respondents

Figure 8 indicates that white bread is the most frequently consumed type of bread among students, with 23% having it once a day. White bread is a popular choice due to its availability, affordability, and soft texture. Wheat bread is also commonly consumed, with a significant proportion having it 5-6 times a week. Wheat bread is often perceived as a healthier alternative to white bread due to its higher fiber content and potential nutritional benefits (Aune *et al.*, 2016).

The choice between white and wheat bread can impact students' nutritional intake. White bread is typically made from refined grains and may lack the nutritional benefits of whole grains found in wheat bread. Whole wheat bread is a better source of fiber, vitamins, and minerals, contributing to better digestive health and overall well-being (Fardet *et al.*, 2017). Encouraging the consumption of whole wheat bread can support students in making healthier dietary choices. Socioeconomic factors, such as affordability and availability, often play a significant role in food choices (Drewnowski & Eichelsdoerfer, 2010).

Deep Fried Foods

Respondents' consumption patterns of deep-fried foods is shown in Figure 9.

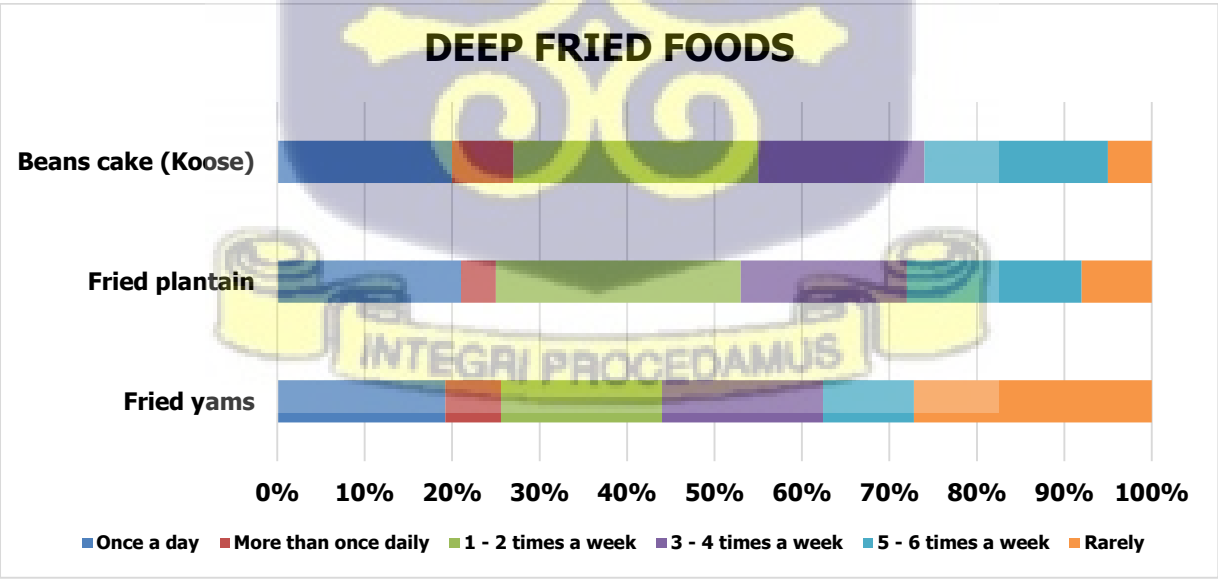

Figure 9: Percentage Distribution of Deep-Fried Foods Consumption of Respondents

Figure 9 depicts students' deep-fried food consumption patterns. Fried yams and fried plantain are the most frequently consumed deep-fried foods among students. Both are popular and widely available street foods in Ghana (Doku *et al.*, 2019). Beans cake (koose), a deep-fried snack made from black-eyed peas, is also consumed relatively frequently by students. It is often enjoyed as a tasty and convenient snack.

Deep-fried foods can be high in fats and calories, contributing to the risk of obesity and related health issues (Halali *et al.*, 2018). Although yams and plantains are nutritious when prepared through other cooking methods, deep-frying can diminish their nutritional value.

The popularity of fried yams, fried plantains, and beans cake (koose) can be attributed to their cultural significance, taste, and affordability. These foods are often enjoyed as snacks or side dishes and are deeply rooted in Ghanaian culinary traditions (Aryeetey *et al.*, 2017). While it is essential to acknowledge the cultural significance of these deep-fried foods, promoting healthier cooking methods can help students make more nutritious choices.

Fish and Seafood

Figure 10 shows the fish and seafood food consumption patterns of the respondents.

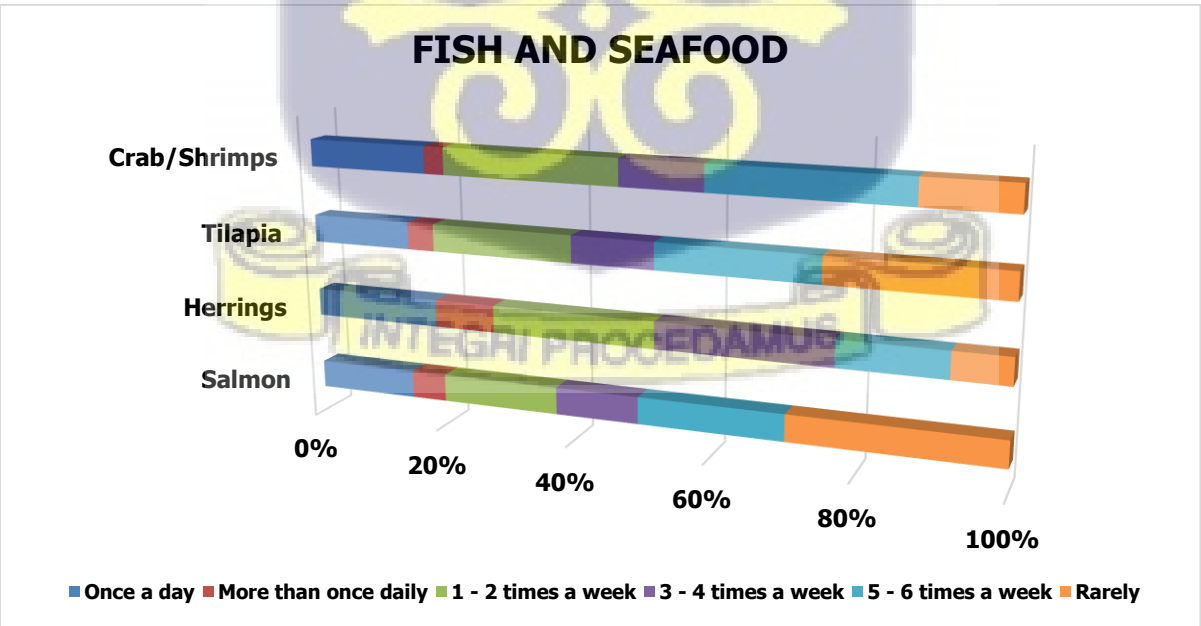

Figure 10: Percentage Distribution of Fish and Seafood Consumption of Respondents

Figure 10 indicates the frequency of intake for different types of fish and seafood. Salmon and herrings were the most frequently consumed types of fish among students, with significant proportions eating them 5-6 times a week. These fatty fish are rich in omega-3 fatty acids, which are beneficial for heart health and brain function (Kris-Etherton *et al.*, 2002).

Tilapia and crab/shrimps are also consumed, with a substantial proportion having them 1-2 times a week. Fish and seafood are excellent sources of high-quality protein, vitamins, and minerals. The findings are attributed to the fact that the study was conducted in a fishing community, hence, the likelihood of consuming more fish or sea foods. As fish and seafood consumption increases, it is essential to promote sustainable fishing practices to preserve marine ecosystems (Cashion *et al.*, 2017).

Vegetables

Respondents' consumption patterns of vegetables is shown in Figure 11.

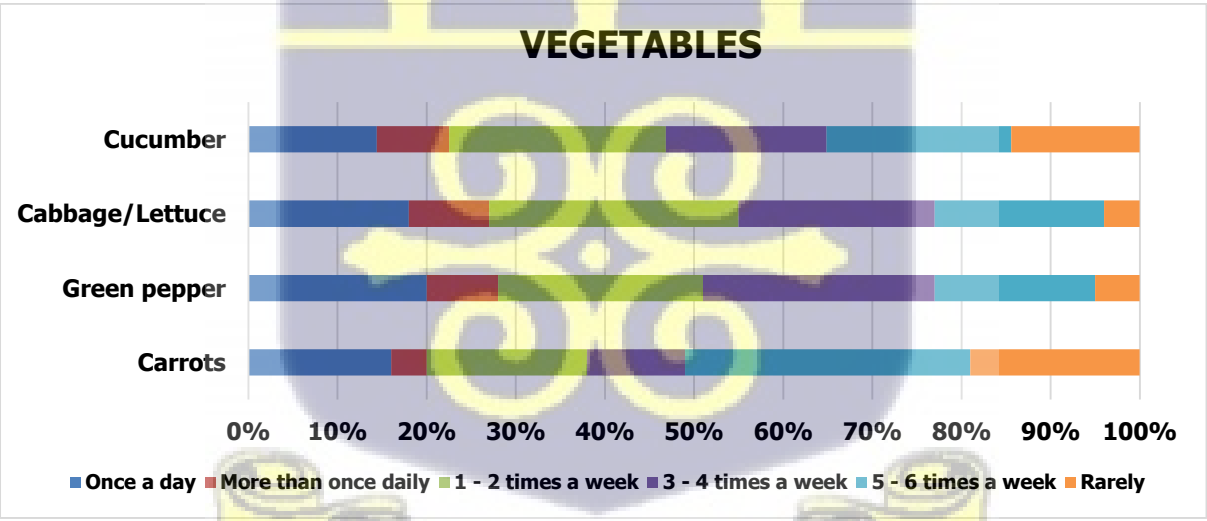

Figure 11: Percentage Distribution of Vegetables Consumption of Respondents

Figure 11 indicates the frequency of intake for different types of foreign vegetables. Cabbage/lettuce was the most frequently consumed vegetable among students, with 28% having it 1-2 times a week. Cabbage and lettuce are commonly used in salads and can be

versatile ingredients in various dishes. Green pepper and cucumber were also frequently consumed, with a substantial proportion having them 3-4 times a week.

Carrots were also consumed frequently as other vegetables, though only 16% ate them once a day. Meanwhile, carrots are rich in nutrients like vitamin A, which is essential for eye health and overall well-being (Tanumihardjo *et al.*, 2013). The findings align with a study conducted by Wu *et al.*, (2019) stipulating that vegetables are essential sources of vitamins, minerals, and dietary fiber which are crucial for overall health and disease prevention. Many regions, including Ghana, are becoming more culturally diverse due to globalization and increased international interactions. As a result, people are exposed to a wider variety of foods from different cultures. Including foreign vegetables in the study reflects this cultural diversity and acknowledges the influence of globalization on dietary choices. Additionally, as s societies changes and modernize, food preferences evolve as well. Younger generations, including university students, are often more open to trying new foods and exploring different cuisines, hence, including foreign vegetables in the study recognizes this trend and provides insights into how students incorporate global food trends into their diets (Nemeth *et al.*, 2019).

Meat and Meat Products

Figure 12 shows the meat and meat products consumption patterns of the respondents.

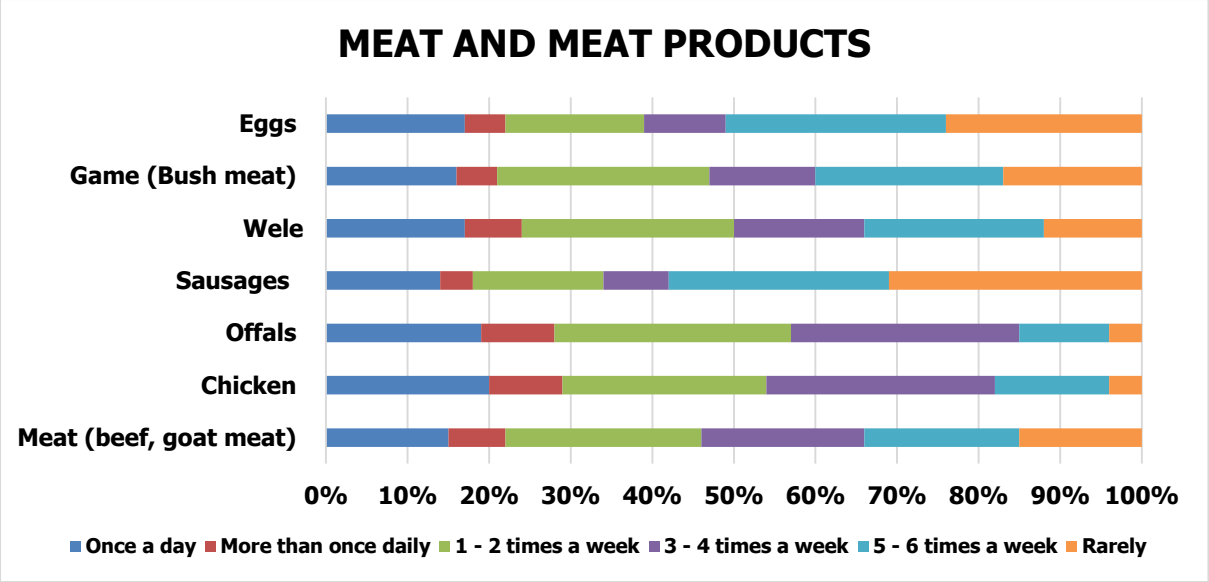

Figure 12: Percentage Distribution of Meat Products Consumption of Respondents

From Figure 12, chicken was the most frequently consumed meat product among the students, with 28% eating it 3-4 times a week. Chicken is a popular and versatile meat choice, commonly used in various dishes. Offals (organ meats) and cow's skin (wele) were also consumed frequently, with a significant proportion eating them 1-2 times a week.

Sausages and eggs were consumed less frequently compared to other meats, with the majority eating them rarely. Sausages are processed meat products that may contain high levels of unhealthy fats and preservatives. The results conform to the findings of Micha *et al.*, (2012), stating that, the consumption of processed meats like sausages should be limited due to potential health risks associated with high sodium and preservative content. However, the consumption of offals, cow's skin (wele), and game (bush meat) reflects the cultural significance of these traditional Ghanaian foods (Mintah, 2019).

Starches

Figure 13 shows the starches food consumption patterns of the respondents.

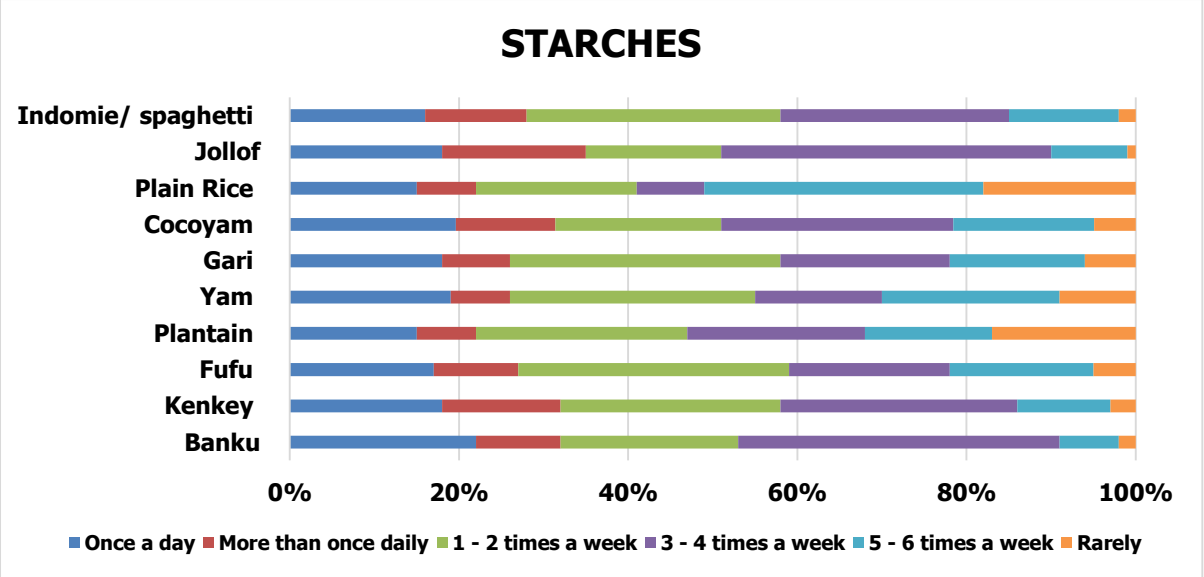

Figure 13: Percentage Distribution of Starch Consumption Patterns among respondents

With respect to starch consumption patterns among the respondents, jollof rice was the most frequently consumed, with 39% eating it 3-4 times a week. Banku and kenkey were also frequently consumed, with a significant proportion (28%) and (38%) eating them 3-4 times a week. Both banku and kenkey are fermented corn-based foods that are traditional Ghanaian staples.

Cocoyam and fufu were consumed less frequently compared to the other starches, with the majority eating them 1-2 times a week. Fufu is made from pounded starchy food items like cassava, yam, or plantains and is commonly paired with soup or sauce. The findings support the works of Nti *et al.* (2015) which indicated that the consumption of banku, kenkey, fufu, and jollof rice reflects the cultural significance of these traditional Ghanaian starches.

Legumes and Nuts

Figure 14 shows the legumes and nuts food consumption patterns of the respondents.

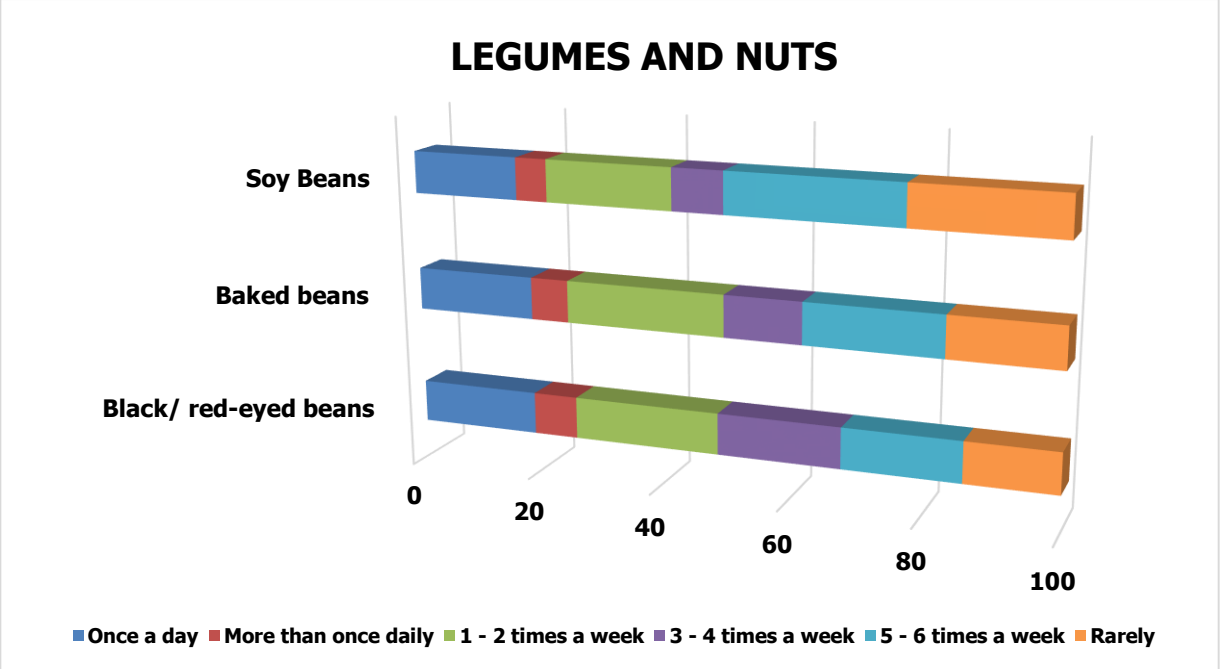

Figure 14: Percentage Distribution of Legumes and Nuts Consumption Patterns

Figure 14 reveals that among the legumes and nuts assessed, black/red-eyed beans and baked beans were the most frequently consumed by students, with 23% and 25% of respondents eating them 1-2 times a week, respectively. Both types of beans are popular choices due to their versatility and availability in various dishes. Baked beans, in particular, may be favoured for their convenience and flavour. Soybeans also feature prominently in students' diets, with 27% of respondents consuming them 5-6 times a week. Soybeans have gained popularity globally due to their rich protein content and various health benefits. They are a significant source of essential amino acids, making them a valuable protein alternative for individuals following plant-based diets or seeking to reduce their reliance on animal-based protein sources.

In relation to the findings, Anderson *et al.* (2009) found similar results indicating that legumes and nuts are highly nutritious and offer numerous health benefits. They are excellent sources of protein, making them vital for muscle maintenance and repair. Moreover, they provide dietary fibre that aids in digestion and supports heart health by reducing cholesterol levels. The

inclusion of legumes and nuts in the diet can also promote a feeling of fullness, which may help in managing weight.

Additionally, soybeans contain bioactive compounds known as phytochemicals, including isoflavones, which have been associated with various health benefits such as reducing the risk of chronic diseases like cardiovascular disease and certain types of cancer (Messina, 2016). Furthermore, embracing plant-based diets that include legumes and nuts can contribute to sustainable dietary practices and environmental conservation. Plant-based diets have been associated with lower greenhouse gas emissions and reduced environmental impact compared to diets rich in animal-based foods (Tilman & Clark, 2014). Encouraging students to opt for plant-based meals, even if not entirely vegetarian, can foster a positive impact on the environment.

Soups

Figure 15 shows the soups consumption patterns of the respondents.

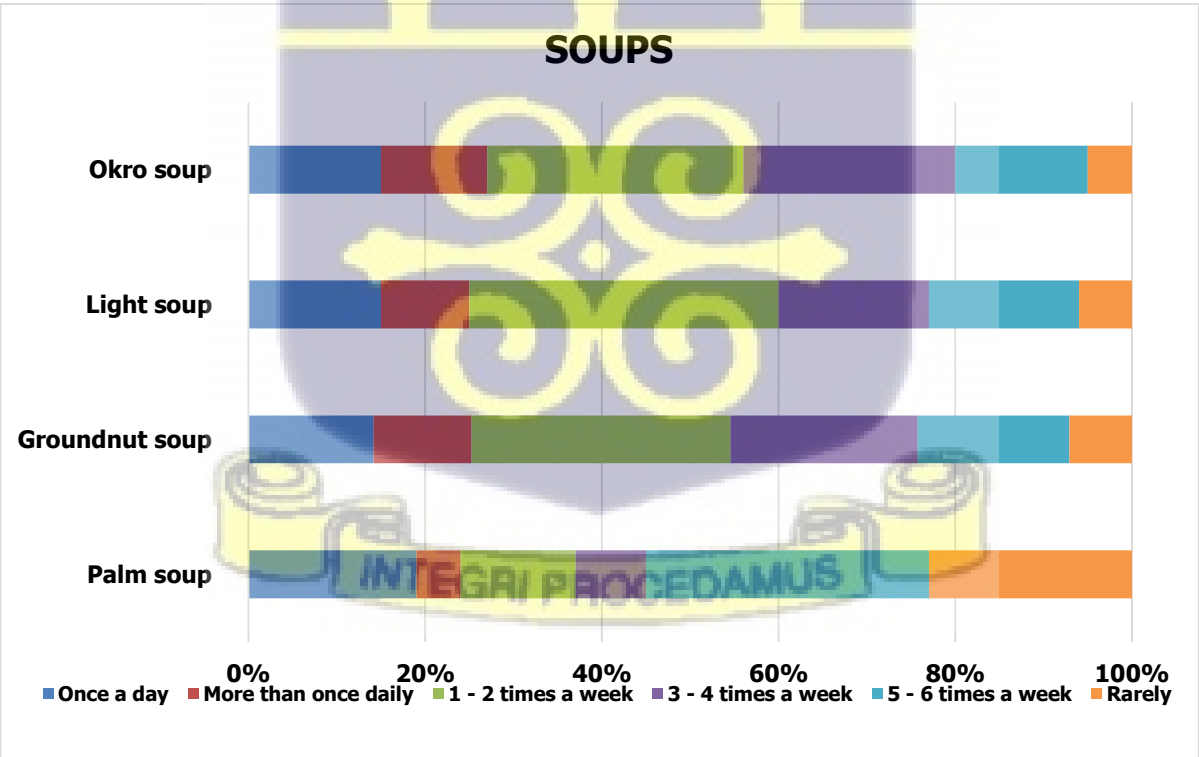

Figure 15: Percentage Distribution of Soups Consumption Patterns among respondents

Among the soups assessed, palm soup emerged as the most frequently consumed among the students, with 32% having it 5-6 times a week. In a similar vein, Aryeetey & Forson, (2017) stipulated that palm soup is a traditional Ghanaian dish made from palm fruit extract and is often prepared with fish or meat, providing a rich and flavourful taste, hence the likelihood of its consumption among indigenous people is high. Groundnut soup and okro soup were also popular choices, with 29% and 24% of respondents consuming them 1-2 times a week, respectively. Groundnut soup, made with peanut butter or groundnut paste, is a creamy and nutty soup commonly enjoyed in West African cuisine (Aryeetey & Forson, 2017). Okro soup, derived from okra, is known for its slimy texture and is typically served with *banku* (Amagloh & Ankar-Brewoo, 2019). Soups, particularly those made with traditional ingredients like palm fruit, groundnut, and okra, carry significant nutritional value and cultural importance in Ghanaian cuisine. These soups often include a variety of vegetables, proteins, and essential nutrients that contribute to a well-balanced diet (Doku, 2012). Palm soup, for instance, is a rich source of vitamins and minerals, including vitamin A and potassium, derived from the palm fruit extract (Aryeetey & Forson, 2017). Groundnut soup provides protein from the peanuts, along with healthy fats and antioxidants (Amagloh & Ankar-Brewoo, 2019). Okro soup contains dietary fiber and various vitamins, including vitamin C (Amagloh & Ankar-Brewoo, 2019). Promoting the consumption of traditional soups can contribute to preserving local culinary traditions and cultural heritage. By offering a diverse range of soups in campus dining facilities, universities can introduce students to different flavors and encourage them to explore Ghanaian cuisine (Aryeetey & Forson, 2017).

According to Kader (2005), traditional soups that utilize locally available ingredients are often more sustainable than processed or imported foods. Encouraging the consumption of locally

sourced and seasonally available ingredients can contribute to reducing the carbon footprint associated with food production and distribution.

Stews

Figure 16 shows the stews consumption patterns of the respondents.

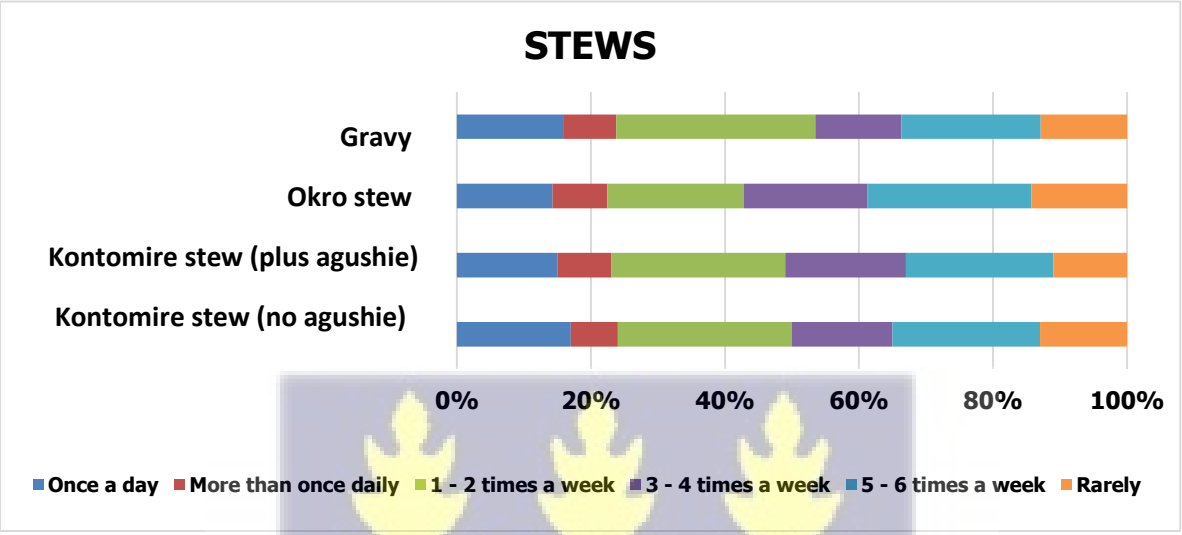

Figure 16: Percentage Distribution of Stew Consumption Patterns among respondents

Among the stews assessed, Kontomire stew (no agushie) was the most frequently consumed by students, with 26% having it 1-2 times a week. Kontomire stew, a traditional Ghanaian dish made from cocoyam leaves (kontomire) and fish or meat, is appreciated for its rich flavour and nutritional value (Akonor, 2013). Kontomire stew with agushie was also popular, with 22% of respondents having it 1-2 times a week. Mestres *et al.* (2019), in their findings indicated that the addition of agushie adds a distinct fishy flavour and additional protein to the dish. Okro stew and Gravy were also consumed with moderate frequency, with 20% and 30% of respondents having them 1-2 times a week, respectively. Okro stew, prepared with okra, is known for its slimy texture and is often combined with fish or meat to enhance its taste and nutritional content. Gravy, (tomato sauce/stew) a versatile sauce commonly used in various dishes, complements both vegetarian and non-vegetarian meals.

According to Akonor (2013), stews are an integral part of Ghanaian cuisine, providing a delicious way to incorporate vegetables and proteins into meals. Kontomire stew is an excellent source of vitamins and minerals from the cocoyam leaves, contributing to the overall nutritional value of the meal. Additionally, the inclusion of agushie in the stew adds essential omega-3 fatty acids and additional protein. Again, Okro stew is rich in dietary fiber from the okra, promoting healthy digestion, while Ghanaian gravy, depending on its ingredients, can provide an array of flavors and nutrients that enhance the overall dining experience (Mestres *et al.*, 2019). Hence, offering a variety of stews in campus dining facilities allows students to explore different tastes and cultural nuances associated with Ghanaian cuisine.

Drinks

Figure 17 shows drinks consumption patterns of the respondents.

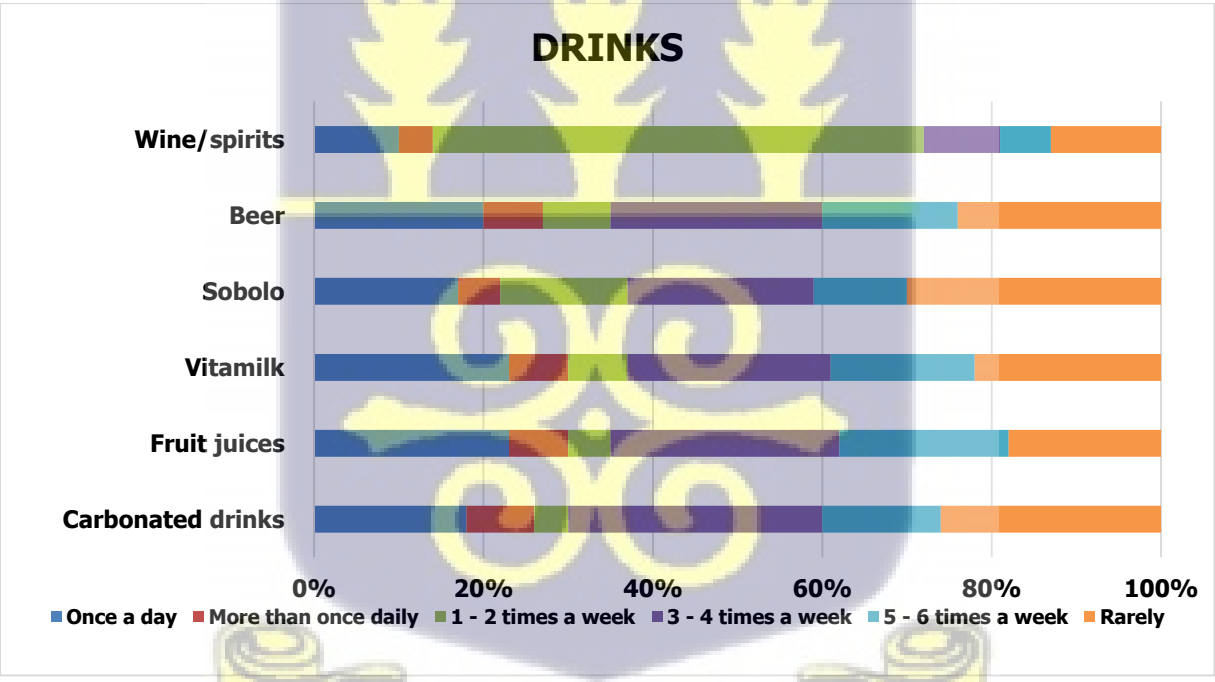

Figure 17: Percentage Distribution of Drinks Consumption Patterns among respondents

Figure 17 shows that carbonated drink consumption was highest among respondents who consume them 5-6 times a week (30%), followed by those who rarely consume them (26%). This suggests that a significant portion of respondents is either avoiding carbonated drinks or

indulging in them quite frequently. The relatively low percentage of daily consumption (18%) might indicate growing awareness of the potential health risks associated with high sugar content and artificial additives in these drinks (Malik *et al.,* 2010).

Similar to carbonated drinks, fruit juice consumption is highest among those who consume them 5-6 times a week (27%) and those who rarely consume them (20%). This might indicate a conscious effort to limit intake due to concerns about high sugar content in many commercial fruit juices (Eckel *et al.,* 2019). However, the fact that a substantial number of respondents consume fruit juices daily (23%) suggests that they still hold a significant place in some people's diets.

The consumption pattern for Vitamilk is fairly consistent among the various categories. This could be due to its positioning as a more nutritious alternative to traditional carbonated drinks and fruit juices (Huang *et al.*, 2018). People who value its nutritional benefits might consume it regularly, while others might use it occasionally as a dietary supplement.

Sobolo (Hibiscus Tea) consumption patterns show an interesting trend. It seems to be a drink that some respondents consume quite frequently, with 30% consuming it rarely, 22% consuming it 5-6 times a week, and 15% consuming it 3-4 times a week. Sobolo is often perceived as a natural and traditional beverage with potential health benefits, which might explain its relatively high consumption frequency compared to other types of drinks (Mozaffari-Khosravi *et al.,* 2009).

Beer was consumed 3-4 times a week, which was highest among all beverages (25%). This aligns with the general understanding that beer is often considered an occasional or social beverage rather than a daily choice (Ronksley et al., 2011). The percentage of respondents consuming beer more than once daily (7%) is notable and might suggest a group of more regular beer drinkers.

Again, Figure 17 shows that wine and spirits consumption is heavily skewed toward respondents who consume them 1-2 times a week (58%). This indicates that wine and spirits are primarily considered occasional indulgences rather than daily beverages. The low percentages of daily and more than once daily consumption (10% and 4%, respectively) reflect this pattern.

In line with these findings is the work of Amagloh and Ankar-Brewoo, (2019), who found a similar drink consumption patterns among college students highlighting a preference for carbonated soft drinks, fruit juices, Vitamilk, Sobolo and beer.

Snacks

Respondents' consumption patterns of snacks is shown in Figure 18.

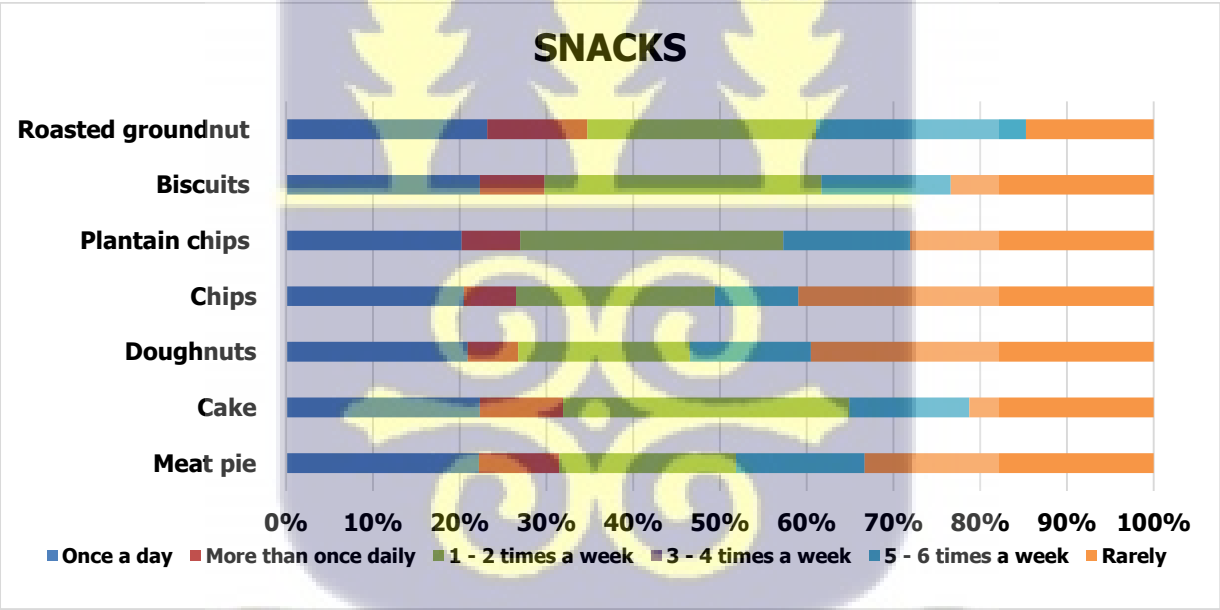

Figure 18: Percentage Distribution of Snacks Consumption Patterns among respondents

Among the snacks assessed, biscuits were the most frequently consumed, with 30% of respondents having them 1-2 times a week. Similarly, Van Kleef *et al.* (2012) indicated that biscuits are convenient and widely available, making them a popular choice for quick snacking.

Snacks like cake and meat pie are popular as occasional treats, with 31% and 18% of respondents consuming them 1-2 times a week, respectively. Occasional indulgence in these sweet and savoury treats is acceptable, but regular consumption may contribute to excessive calorie intake and potential health issues (Ambrosini *et al.,* 2019). Chips and doughnuts are consumed relatively frequently, with 34% consuming them 5-6 times a week. These snacks are often high in added sugars, unhealthy fats, and sodium, making them fewer ideal choices for regular consumption (Machín *et al.,* 2018). Meanwhile, plantain chips and roasted groundnut are traditional snacks commonly enjoyed by students. These snacks are more nutritious than processed options like chips and doughnuts, as they offer natural plant-based nutrients and healthy fats (Sabandar *et al.,* 2016).

4.3.2 Number of Times Students ate.

Table 7 presents the number of times respondents ate in a day.

Table 7: Number of Times Students ate daily

Times	Frequency (N)	Percentage (%)
Once	33	8
Twice	211	49
Thrice	161	38
Four times or more	20	5
Total	**425**	**100**

Source: Field Survey (2023)

About 49% of the respondents reported eating two meals a day. This finding suggests that many students may be skipping one meal, most likely breakfast or lunch. 38% reported eating three

meals a day which is closer to the recommended eating pattern for maintaining optimal health (Horne *et al.,* 2015). This group appears to be following a more balanced eating routine compared to those who ate twice or only once a day. Eight percent (8%) of students reported eating only one meal a day. This group is at risk of inadequate nutrient intake and potential malnutrition, which can negatively impact their physical and cognitive function (El Ansari *et al.,* 2015). A small percentage (5%) of students reported eating four or more times a day. This group is likely to be following a grazing pattern, which can be beneficial for maintaining steady blood sugar levels and controlling hunger (Wolfram, 2017).

The findings align with a study conducted by De Castro *et al.* (2018) stipulating that skipping meals can lead to nutritional imbalances and reduced energy levels, potentially affecting academic performance and overall well-being. Hence, students who eat twice a day or less may be at risk of nutrient deficiencies and suboptimal nutritional status due to limited opportunities for nutrient intake throughout the day (El Ansari *et al.,* 2015). Those who eat three meals a day are more likely to have a balanced nutrient intake, potentially supporting their overall health, energy levels, and academic performance. Again, students who eat four or more times a day may have more opportunities to consume a wider variety of nutrients, which can contribute to better nutritional status and well-being (Horne *et al.,* 2015).

*4.3.3 **Rate at which Students Skipped Breakfast***

Table 8 presents the rate at which students at Takoradi Technical University in Ghana skipped breakfast.

Table 8: Rate at which Students Skipped Breakfast

Times	Frequency (N)	Percentage (%)
Always	69	16

Often	109	26
Sometimes	196	46
Rarely	20	5
Never	31	7
Total	**425**	**100**

Source: Field Survey (2023)

About 46% of the respondents fell into the "Sometimes" category, indicating that they skipped breakfast occasionally. This suggests that a significant portion of students may not patronize breakfast daily, possibly due to time constraints or other lifestyle factors. A considerable number of students (26%) reported skipping breakfast "Often," which implies that this group regularly omits breakfast from their daily routine. A significant proportion of students (16%) consistently skipped breakfast, which is a concerning finding. Regularly missing breakfast can lead to irregular eating patterns and contribute to unhealthy dietary habits (Hyseni *et al.*, 2017). A smaller group of students (7%) never skipped breakfast, indicating that they prioritized this meal regularly. These students are more likely to have a balanced nutrient intake and potentially experience better academic performance (Ramalingam *et al.*, 2018).Thus, students who frequently skip breakfast or always skip it may be at risk of missing essential nutrients, such as vitamins, minerals, and fiber, typically found in breakfast foods like fruits, dairy, and whole grains (Affinita *et al.*, 2013).

Regularly skipping breakfast can lead to irregular eating patterns, which may impact metabolism and appetite regulation, potentially contributing to weight gain or difficulty maintaining a healthy weight (Lopez-Minguez *et al.*, 2016). Students who never skip breakfast

are more likely to have a better nutritional status and overall well-being, as breakfast is considered the important meal that sets the tone for the rest of the day (Adolphus *et al.*, 2016).

4.3.4 Rate at which Students Skipped Lunch or Dinner

Table 9 presents the rate at which students at Takoradi Technical University in Ghana skipped lunch or dinner.

Table 9: Rate at which Students Skipped Lunch or Dinner

Times	Frequency (N)	Percentage (%)
Always	23	5
Often	73	18
Sometimes	219	51
Rarely	41	9
Never	69	17
Total	**425**	**100**

Source: Field Survey (2023)

A little more than half of the respondents (51%) fell into the "Sometimes" category, indicating that they occasionally skipped either lunch or dinner. A notable number of the respondents (18%) reported skipping lunch or dinner "Often," suggesting that these students regularly miss one of their main meals. Frequent meal skipping can lead to nutrient deficiencies and may affect students' concentration and ability to focus (Affinita *et al.*, 2013). A smaller group of students (17%) never skipped lunch or dinner, indicating that they prioritize these meals daily. This group is more likely to have better nutritional status and overall health, as regular meal consumption supports proper nutrient intake (Adolphus *et al.*, 2016). Meanwhile 9% of

respondents reported rarely skipping lunch or dinner. This group may occasionally miss a meal due to specific circumstances but generally maintain a regular meal pattern. Also 5% always skipped either lunch or dinner. Regularly skipping a main meal can have severe consequences on nutrient intake and overall health (Smith *et al.,* 2019). This finding confirms the works of Horne *et al.* (2015), suggesting that a significant portion of students may have irregular meal patterns, which can impact their nutrient intake and energy levels.

Students who frequently skip lunch or dinner may be at risk of inadequate nutrient intake which can impact their physical and mental well-being (El Ansari *et al.,* 2015). Skipping meals regularly can disrupt metabolism and appetite regulation, potentially leading to unhealthy eating habits or disordered eating patterns (Lopez-Minguez *et al.,* 2016). Students who never skip lunch or dinner are more likely to have a balanced nutrient intake and maintain healthier eating habits. Hence, encouraging students to plan their meals and allocate time for lunch and dinner can help them establish regular and consistent meal patterns.

4.3.5 Reasons for Skipping Meals (N= Multiple Responses)

Figure 19 presents the reasons why respondents skipped meals.

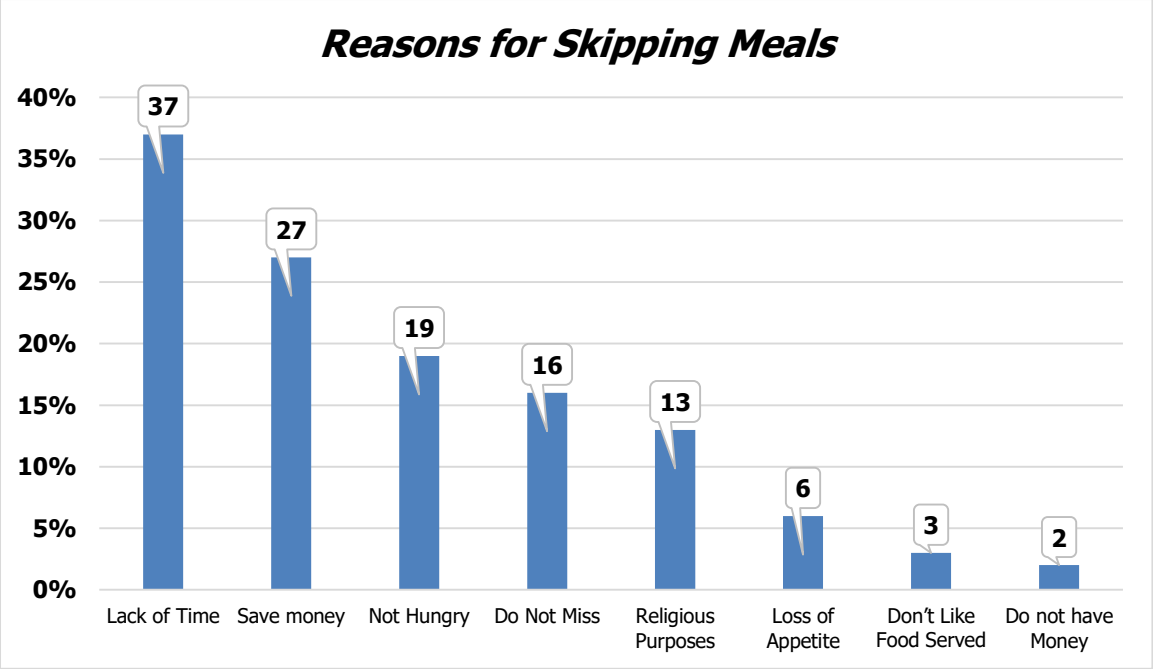

Figure 19: Percentage Distribution of Reasons for Skipping Meals

The most prevalent reason for skipping meals was "Lack of Time" representing 37% of the total population. This indicates that many students at Takoradi Technical University have busy schedules which may lead to irregular meal patterns as found by El Ansari *et al.* (2015). Skipping meals due to lack of time can lead to inadequate nutrient intake, which may affect students' energy levels and academic performance (Smith *et al.*, 2019). Again, 27% of the students skipped meals to save money. According to Nielsen *et al.* (2018) financial constraints can be a barrier to accessing regular and nutritious meals. Skipping meals to save money may lead to compromised nutritional status and potential health issues among students (Affinita *et al.*, 2013). Nearly 1 in 5 students (19%) reported skipping meals because they were not hungry. This could be due to various reasons, such as irregular eating habits or lack of appetite (Horne *et al.*, 2015). A study conducted by El Ansari *et al.* (2015) revealed that not feeling hungry may result from unhealthy eating habits or stress which can impact overall health and well-being. Similar to "Save Money," 20% of students skipped meals because they did not have enough money to afford food regularly. Financial constraints can significantly affect students'

food choices and nutrient intake, potentially leading to poor nutritional status (Nielsen *et al.*, 2018). A notable portion of students (13%) skipped meals for religious reasons. This may include fasting practices or adherence to religious dietary restrictions (Sanlier, 2019). Fasting for religious purposes can have both positive and negative effects on health, depending on how it is practiced and balanced with proper nutrition.

Reasons such as "Don't like foods served" (3%) and "Loss of appetite" (6%) were also reported by some of the students. These reasons may be related to food preferences or transient factors affecting appetite. The high percentage of students citing "Lack of Time" and "Save Money" as reasons for skipping meals highlights the need for on-campus dining options that are affordable, convenient, and accessible (Adolphus *et al.*, 2016). Educational programs on budget-friendly and time-efficient meal planning can help students make healthier choices despite their busy schedules and limited resources (Affinita *et al.*, 2013).

The regular exclusion may involve avoiding specific food groups or types due to personal preferences, dietary restrictions, or beliefs which may affect students' overall nutritional status, energy levels, and overall health (Gómez-Pinilla, 2008). Black and Townsend (2013), reiterated that the regular exclusion of foods can lead to imbalanced diets and potential nutritional deficiencies, especially if essential nutrients are omitted. Further, dietary restrictions or exclusions may impact students' ability to access a balanced and diverse range of nutrients required for optimal physical and cognitive functioning. Fallaize *et al.* (2014) reported that students may avoid certain foods due to allergies, cultural or religious beliefs, dietary fads or weight management concerns.

4.3.6 Respondents' Favorite Dishes

Table 10 presents the respondents' favourite dishes.

Table 10: Respondents' Favorite Dishes

Dishes	Frequency (N)	Percentage (%)
Traditional Dishes	315	74
Fast Food	72	17
Vegetarian	28	7
International Cuisine	10	2
Total	**425**	**100**

Source: Field Survey (2023)

In determining respondents' eating pattern, they were asked about their favourite dishes. Majority of them (74%) indicated a preference for traditional dishes, while 17% preferred fast foods, 7% preferred vegetarian options, and only 2% preferred international cuisine. The significant preference for traditional dishes among respondents suggests a strong attachment to local cultural foods and culinary heritage (Clifton & Chan, 2020). Traditional dishes are often prepared with locally sourced ingredients and may reflect the dietary patterns that have been passed down through generations (Clifton & Chan, 2020). A considerable number of students favouring fast food indicates a potential influence of globalized food culture and the availability of fast-food outlets near the university campus (Zeng *et al.*, 2021). Thus, fast food is often associated with convenience and quick service, but it may not always provide the necessary nutrients for a balanced diet (Bhutani *et al.*, 2021). Also, the percentage of students favouring vegetarian options may reflect a growing awareness of health and environmental benefits associated with plant-based diets (Clarys *et al.*, 2014). Vegetarian diets can be nutritious when

properly balanced, providing a variety of plant-based protein sources, whole grains, fruits and vegetables (Clarys *et al.,* 2014). Meanwhile the low percentage of students preferring international cuisine suggests that the majority of students at Takoradi Technical University have a strong affinity for local and traditional foods (Zeng *et al.,* 2021). The availability and popularity of international cuisine might vary depending on the location of the university and its proximity to diverse food outlets. The above findings is in line with a study conducted by Bushman (2016), which explored food preferences and eating patterns among university students in different campuses in Belgium. The study reported that students often prioritize familiar and culturally rooted foods, which aligns with the high preference for traditional dishes among the students at Takoradi Technical University. Similarly, Clifton and Chan (2020) conducted research on the impact of globalization on traditional food culture among the Njungo-mbo people in Cameroon and found that local food preferences are deeply ingrained in people's identities and are often associated with a sense of belonging and cultural heritage.

This study also revealed that fast food consumption was relatively high among students. This is consistent with previous research indicating that university students are more likely to consume fast food due to busy schedules, convenience, and peer influence (Zeng *et al.,* 2021). The limited nutritional value of fast food and its potential contribution to the prevalence of obesity and other health issues among young adults have been well-documented (Bhutani *et al.,* 2021).

The increasing interest in vegetarian options among students aligns with a global trend towards plant-based diets, driven by concerns about personal health, sustainability, and animal welfare (Clarys *et al.,* 2014). This indicates a positive shift towards healthier and more environmentally friendly eating patterns among a portion of the student population.

Although the percentage of students preferring international cuisine was relatively low, it may reflect the diverse cultural backgrounds of the university community. International cuisine availability and popularity could vary based on the international student population and the presence of ethnic restaurants in the vicinity of the university (Zeng *et al.*, 2021).

*4.3.7 **Overall Eating Pattern of Respondents***

Table 11 presents the overall eating pattern of respondents.

Table 11: Eating Pattern of Respondents

Times	Frequency (N)	Percentage (%)
Poor	117	28
Average	166	39
Good	142	33
Total	**425**	**100**

Source: Field Survey (2023)

The assessment of respondents' eating patterns was based on a food frequency table with a mean scale of 3.46. According to the classification criteria, respondents with scores below 1.6 were categorized as having a poor eating pattern, those with scores ranging from 1.68 to 3.46 were classified as having an average eating pattern, and those with scores of 3.47 and above were considered to have a good eating pattern.

The results revealed that the majority of students' eating patterns fell into the categories of average (39%) and good (33%). However, a significant proportion of students (28%) were classified as having a poor eating pattern. This observation highlights a concerning aspect of the student population's dietary habits, as a substantial number of them may be consuming an unbalanced and inadequate diet.

Poor eating patterns are typically associated with irregular meal timings, excessive intake of fast food, and limited variety in food choices. These patterns can contribute to nutritional deficiencies and have negative implications for students' health and well-being (Olsen *et al.*, 2020). Therefore, it becomes imperative for the university to implement targeted nutrition interventions and educational programs aimed at improving students' dietary habits and promoting healthier food choices (Contento, 2016).

Students with an average eating pattern show a moderate level of adherence to balanced eating habits, indicating a mix of both healthy and unhealthy food choices. While their diets may lack consistency and variety, they may still be more conscious of their nutritional intake compared to those with poor eating patterns (Brunt *et al.*, 2015).

On the other hand, students falling under the good eating pattern category demonstrate a relatively healthier diet characterized by regular meal consumption and a diverse selection of nutrient-rich foods. These students are more likely to meet their nutritional needs and maintain better overall health and well-being compared to their peers with poorer eating patterns (McArthur *et al.*, 2021).

The findings of this study align with prior research conducted by Zeng *et al.*, (2021), indicating that the eating patterns of university students often show a mix of dietary habits. Some students exhibit healthier dietary choices, while others tend to adopt less optimal eating patterns.

4.4 Nutritional Status of respondents

Figure 20 shows the nutritional status of the respondents.

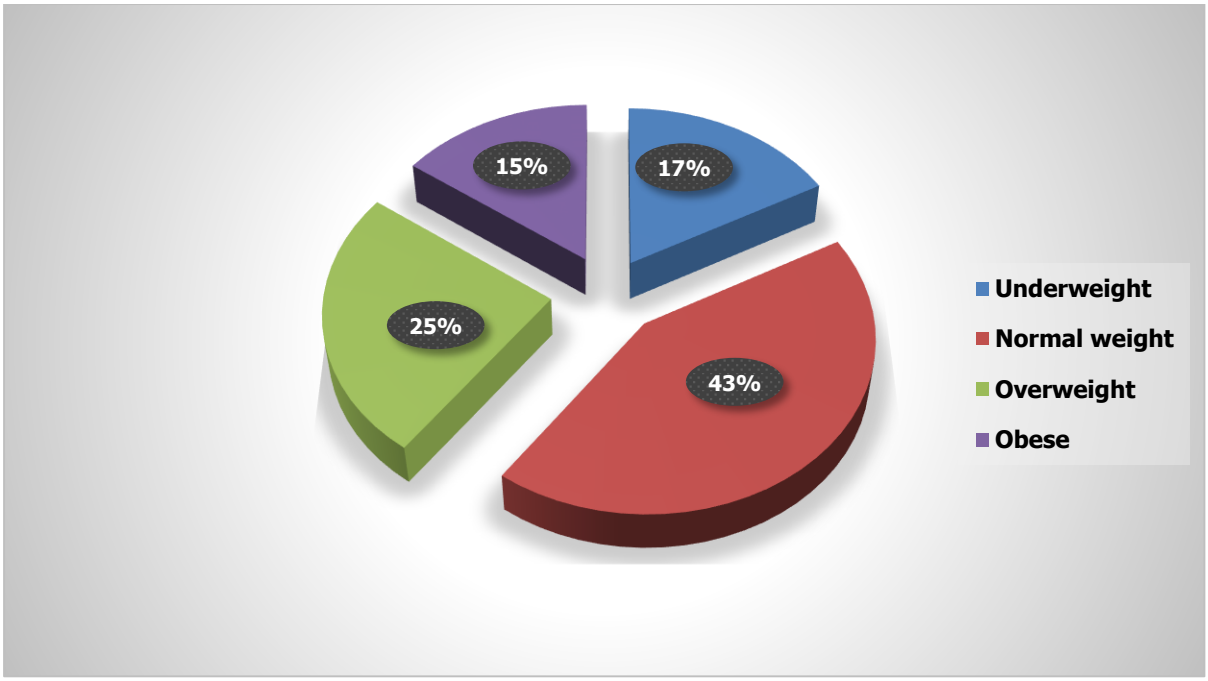

Figure 20: Percentage Distribution of Respondents' Nutritional Status

The nutritional status of respondents was determined by calculating their Body Mass Index (BMI) using the formula:

BMI = weight (kg)/height^2 (m^2).

Based on the BMI values, the respondents were classified into four categories: Underweight (BMI < 18.5), Normal weight (BMI 18.5 – 24.9), Overweight (BMI 25 – 29.9), and Obese (BMI ≥ 30). The results indicate that 17% of the students were underweight, 43% fell within the normal weight range, 25% were overweight, and 15% were obese. The percentage of students classified as underweight is of concern and may suggest a potential issue with insufficient calorie intake and/or malnutrition among this group (Hartini *et al.*, 2019). Underweight individuals may face increased risks of nutrient deficiencies and weakened immune systems, which can adversely impact their overall health and academic performance (Hartini *et al.*, 2019). Forty-three percent (43%) of the respondents falling within the normal BMI range indicates a relatively healthy distribution, which may be attributed to a balanced diet and regular physical activity (Bhutani *et al.*, 2021). Students with normal BMI are likely

to have a higher chance of meeting their nutritional requirements and maintaining overall well-being compared to those outside this range (Bhutani *et al.,* 2021). The presence of 25% of students classified as overweight suggests a notable prevalence of excess body weight among the student population (Aguilar *et al.,* 2020). Overweight individuals may be at an increased risk of chronic health conditions, such as cardiovascular disease and type 2 diabetes, which can have long-term implications for their health (Aguilar *et al.,* 2020). Addressing overweight concerns among students through education on healthy eating habits and lifestyle modifications becomes crucial to mitigating these potential health risks. Furthermore, 15% of students classified as obese raises a significant concern for the university's health and wellness management strategies (Hruby & Hu, 2015). Obesity is associated with a higher risk of various health problems, including hypertension, metabolic syndrome, and musculoskeletal issues (Hruby & Hu, 2015).

The above findings is in line with a study conducted by Hartini *et al.* (2019) in their research on the relationship between nutrition intake and, Body Mass Index (BMI) in Bangladesh, emphasizing the importance of providing nutritional support and education to students, especially those falling within the underweight and overweight/obesity categories. Addressing these nutritional challenges could help improve students' overall health, boost their energy levels, and enhance their academic performance. Moreover, the study's findings underscored the significance of promoting healthy dietary habits among students to foster their well-being and success in their academic journey.

4.4.1 Health Status of Respondents

Figure 21 presents the health status of the respondents.

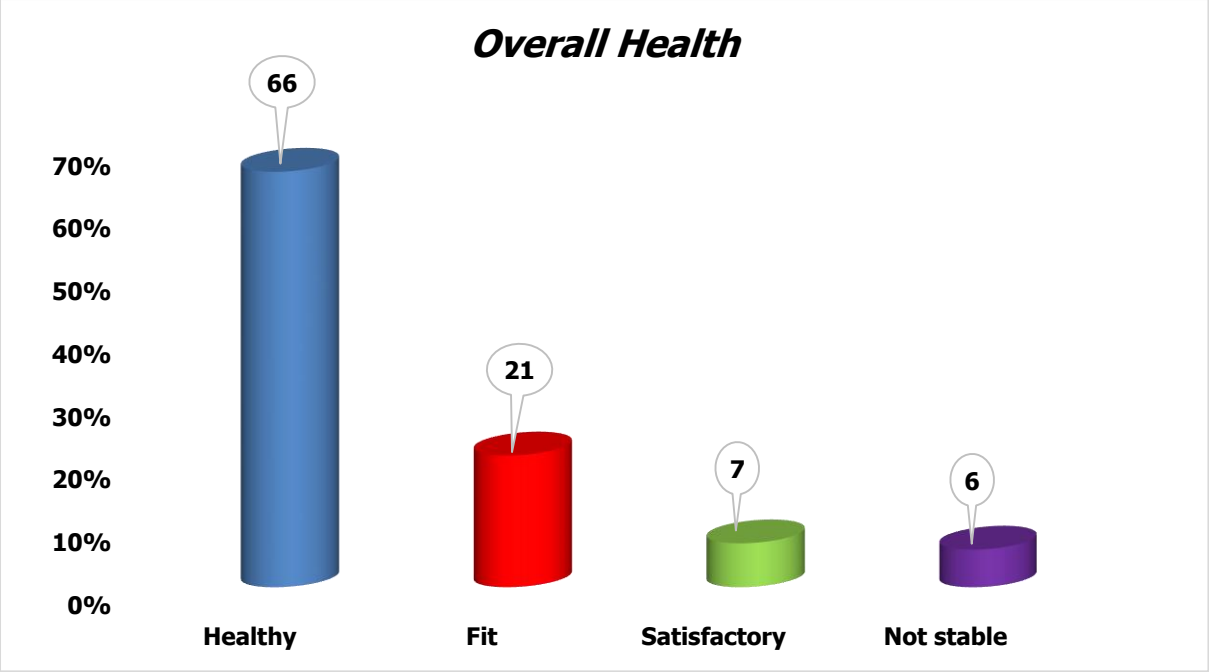

Figure 21: Percentage Distribution of Respondents overall Health

As a component of assessing nutritional status, students were requested to disclose their health status based on general understanding and principles. Among the respondents, 66% described their overall health as healthy, 21% as fit, 7% as satisfactory, and 6% as not stable.

The high percentage of respondents (66%) rating their overall health as healthy is a positive indication of the general well-being of the student population. A healthy overall health status is associated with a lower risk of chronic diseases, better immune function, and improved academic performance (Lee *et al.,* 2020). The students' self-perception of good health might also indicate that they are engaging in positive health behaviors, such as regular exercise, balanced nutrition, and sufficient sleep (Lee *et al.,* 2020).

The 21% of respondents reporting themselves as fit suggests that a considerable proportion of the student population is actively engaging in physical activities and maintaining a good level of fitness (Suetani *et al.,* 2018). Regular physical activity is linked to numerous health benefits, including cardiovascular fitness, improved mental health, and reduced stress levels (Suetani *et*

al., 2018). The preference for being described as "fit" might reflect a positive attitude towards physical well-being among these students.

However, the 7% of respondents rating their overall health as satisfactory indicates that there is a smaller subset of students who may have some health concerns or feel their well-being is only moderately satisfactory (Velazquez *et al.*, 2017). These students may have some underlying health issues or might be experiencing occasional health challenges that require attention and support from healthcare services (Velazquez *et al.*, 2017).

The 6% of respondents expressing their overall health as "not stable" raises concerns about the health status of this particular group of students (Quach *et al.*, 2019). Students with an unstable health status may be experiencing ongoing health issues that require medical attention and interventions (Quach *et al.*, 2019). This finding reflects the importance of providing appropriate health resources and support to students facing health challenges to ensure their well-being and academic success.

4.4.2 Regular Exercise

Table 12 presents the rate at which respondents engaged in regular exercise.

Table 12: Rate at which Respondents Exercised Regularly

Times	Frequency (N)	Percentage (%)
Frequently	167	40
Occasionally	184	43
Rarely	74	17
Total	**425**	**100**

Source: Field Survey (2023)

Table 12 presents the rate at which respondents engaged in regular exercise. Out of the total sample, 40% of the students reported exercising frequently, 43% exercised occasionally, and 17% exercised rarely. Regular exercise is an essential aspect of maintaining overall health and well-being (Warburton *et al.*, 2021). Frequent exercise has been associated with numerous health benefits, including improved cardiovascular fitness, weight management, enhanced mental well-being, and reduced risk of chronic diseases (Warburton *et al.*, 2021). On the other hand, students who exercise occasionally and rarely may miss out on the positive impacts of regular physical activity on their health (Kubota *et al.*, 2020). Encouraging and promoting regular exercise habits among students can play a crucial role in improving their overall health and academic performance (Kubota *et al.*, 2020). Strategies such as promoting physical activity on campus, providing access to sports facilities, and offering exercise programs can help motivate students to engage in regular exercise and lead healthier lifestyles (Takagi *et al.*, 2019).

Table 13 Prevalence of Nutritional deficiencies among respondents.

Table 13: Nutritional Deficiencies

Times	Frequency (N)	Percentage (%)
Yes	51	12
No	374	88
Total	**425**	**100**

Source: Field Survey (2023)

Out of the total sample, 12% of the students reported experiencing nutritional deficiencies, while the vast majority, 88%, did not report any nutritional deficiencies.

Nutritional deficiencies can arise from an inadequate intake of essential nutrients such as vitamins, minerals, and proteins (Allen *et al.*, 2019). These deficiencies can have detrimental effects on overall health and may lead to various health problems (Allen *et al.*, 2019). The presence of nutritional deficiencies among a portion of the student population calls for the need for improved nutrition education and interventions to address potential gaps in their diets.

4.4.3 Hours of Sleep

Table 14 illustrates the distribution of respondents based on the number of hours of sleep per night they reported.

Table 14: Respondents' Hours of Sleep

Hours	Frequency (N)	Percentage (%)
1 – 3	11	3
4 – 6	193	45
7 – 10	217	51
Above 10	4	1
Total	**425**	**100**

Source: Field Survey (2023)

Among the total sample, 3% of the students indicated that they slept for 1 to 3 hours each night, 45% reported sleeping for 4 to 6 hours, and the majority of respondents (51%) stated that they slept for 7 to 10 hours per night. Only 1% of the students reported sleeping for more than 10 hours each night.

Adequate sleep is essential for maintaining good health and overall well-being (Hirshkowitz *et al.*, 2015). Sleeping for less than the recommended amount (8 hours) can lead to sleep deprivation, which may have adverse effects on cognitive functioning, mood and physical health (Hirshkowitz *et al.*, 2015). Students who reported sleeping for 1 to 3 hours per night

may be at higher risk of experiencing sleep-related health issues and academic challenges due to fatigue and reduced alertness (Hirshkowitz *et al.*, 2015).

Some of students (51%) reported sleeping for 7 to 10 hours, which falls within the recommended range for young adults (National Sleep Foundation, 2015). Adequate sleep in this range is associated with better cognitive performance, memory consolidation, and overall health (National Sleep Foundation, 2015). Students who maintain a consistent sleep schedule within this range are more likely to be well-rested, attentive, and capable of managing their daily tasks effectively.

The presence of 45% of students sleeping for 4 to 6 hours per night suggests that a significant portion of the student population may not be getting enough sleep (Hirshkowitz *et al.*, 2015). Short sleep duration may be attributed to academic demands, extracurricular activities, or lifestyle choices that prioritize other activities over rest (Hirshkowitz *et al.*, 2015). Addressing sleep habits and promoting healthy sleep practices is essential for optimizing the students' overall health and academic performance.

The 1% of students who reported sleeping for more than 10 hours per night may also warrant attention, as excessive sleep duration may be linked to underlying health issues or irregular sleep patterns (Hirshkowitz *et al.*, 2015).

4.5 Factors Influencing Eating Pattern

Table 15 presents the factors that influenced respondents' eating pattern

Table 15: Factors Influencing Eating Patterns

Factors	Mean Score	Standard Dev.
Nutritional value	3.39	1.006
Cultural Beliefs	3.26	.993
Affordability	3.51	.893
Levels of Study among Respondents	3.47	1.021
Social Environment	3.43	.942
The task/duties to perform	3.51	.898
Religion	3.44	1.065
Accessibility and time to eat food	3.74	.968

Source: Field Survey (2023)

The results in Table 15 reveal that the factor "-Accessibility and time to eat food " obtained the highest mean score of 3.74. This indicates that convenience and time-efficiency play a crucial role in the dietary choices of students. With busy academic schedules and limited time, students tend to prioritize quick and easily accessible food options.

In contrast, the factor "Nutritional Value" received a relatively lower mean score of 3.39. While nutritional considerations are important to some extent, they do not rank as the top priority when making food choices. This result suggests that there might be room for improvement in promoting healthier eating habits among the student population.

The factors "Income" and "Level of Study" obtained mean scores of 3.51 and 3.47, respectively. This suggests that students' financial situations and academic workload play significant roles in shaping their eating patterns. Financial constraints may lead students to opt for more affordable food options, which may not always be the healthiest. Additionally,

academic responsibilities and stress levels may influence students to choose convenient but less nutritious meals.

Cultural beliefs (mean score: 3.26), social environment (mean score: 3.43), tasks/duties (mean score: 3.51), and religion (mean score: 3.44) also impact the eating patterns of students. Cultural influences, peer relationships, and religious practices can shape food choices and dietary preferences among the student population.

The results of this study conform to previous research that highlights the influence of convenience and time-efficiency on college students' dietary choices. Studies have shown that students often face time constraints due to their academic schedules, leading them to opt for quick and easily accessible food options (Nelson *et al.*, 2016). This tendency to prioritize convenience over nutritional value can contribute to suboptimal dietary patterns and potentially impact students' overall nutritional status (Laska *et al.*, 2011).

The relatively lower mean score for the factor "Nutritional Value" recurring findings from other studies indicate that college students may not prioritize nutrition as their top consideration when making food choices (Blanchard *et al.*, 2009). While students may have some awareness of the importance of nutrition, factors such as cost, taste, and convenience often take precedence in their decision-making process (Papadaki *et al.*, 2007).

The significant influence of the factor "Availability of Food" on students' eating patterns is consistent with existing literature. Studies have shown that the presence of food outlets on or near college campuses can heavily influence students' dietary choices (Hartlieb *et al.*, 2018). Campus food environments that offer a wide range of options, particularly those that are easily accessible, tend to influence students' food selection (Cullen *et al.*, 2017).

Furthermore, the impact of "Income" and "Level of Study" on eating patterns aligns with research demonstrating that financial constraints and academic demands influence college

students' food choices (Nelson *et al.*, 2017; Blanchard *et al.*, 2011). Limited financial resources may lead students to opt for more affordable food options, which may not always align with their nutritional needs (Smith *et al.*, 2019). Additionally, academic stress and time constraints can affect students' eating behaviors, leading them to prioritize convenience over healthier food options (Yu *et al.*, 2018).

The influence of cultural beliefs, social environment, tasks/duties, and religion on eating patterns is also supported by existing literature. Cultural factors can significantly shape food preferences and choices among college students (de Wit *et al.*, 2018). Moreover, social interactions with peers and the influence of family and friends can impact food decisions (Burger & Cornier, 2011). Students' daily tasks and responsibilities, including academic duties, can also affect the type of food they choose to consume (Hartlieb *et al.*, 2020). Religious practices and beliefs can further influence dietary choices, as certain religions have specific dietary guidelines and restrictions (Spees *et al.*, 2016).

4.6 Challenges Associated with Eating Patterns

Table 16 shows the various challenges associated with respondents' eating pattern.

Table 16: Challenges Associated with Eating Patterns

Challenges	Mean Score	Standard Dev.
Limited budget	3.62	.900
Time constraints	3.42	.959
Irregular schedules	3.36	.968
Limited access to healthy food	3.36	1.113
Stress and emotional eating	3.13	1.040

Social pressures	3.08	1.012
Lack of nutrition knowledge	3.06	1.113
Cultural and religious restrictions	2.98	1.142

Source: Field Survey (2023)

The study examined eight challenges associated with eating patterns among students at the university, including time constraints, limited budget, limited access to healthy food, social pressures, stress and emotional eating, irregular schedules, lack of knowledge about nutrition, and cultural and religious restrictions. Mean scores and standard deviations were calculated to assess the significance of each challenge.

The challenge with the highest mean score was "Limited budget" (mean score: 3.64), indicating that financial constraints are a significant obstacle to making healthier food choices. This finding is consistent with previous research that highlights the influence of economic factors on dietary choices among college students (Laska *et al.*, 2015). "Time constraints" obtained a mean score of 3.42, suggesting that students' busy schedules hinder their ability to prepare and consume balanced meals. As a result, they may resort to convenient, quick-to-eat foods, which may not always be the healthiest choices. This challenge is in line with the high mean score observed for the factor "I Eat Foods That Are Easy to Get and Eat with Respect to Time" in the previous section. Studies have shown that time constraints and perceived lack of time are common barriers to adopting healthier eating habits among college students (Vella-Zarb *et al.*, 2019; Nelson *et al.*, 2008). This emphasizes the need for campus-wide initiatives that provide accessible and time-efficient healthy food options to support students' nutritional needs. "Social pressures" (mean score: 3.08) and "Stress and emotional eating" (mean score: 3.13) were identified as challenges that impact students' eating patterns. The impact of social factors on eating behaviors has been extensively studied, highlighting the significance of peer and cultural

influences on food preferences (Vella-Zarb *et al.*, 2019). Again, the challenge of "Limited access to healthy food" received a mean score of 3.36. This indicates that the availability of nutritious food options is a concern for students at the university. Research has shown that the food environment on college campuses plays a critical role in students' food choices (Byrd-Bredbenner *et al.*, 2017). "Irregular schedules" (mean score: 3.36) also pose a challenge to students' eating patterns. Erratic daily routines can disrupt meal patterns and lead to inconsistent dietary habits. This challenge is closely related to the factor "Level of Study" observed in the previous section, as academic workload and time constraints may contribute to irregular schedules. The impact of irregular schedules on college students' eating behaviors has been recognized in previous research (Laska *et al.*, 2015). "Lack of knowledge about nutrition" (mean score: 3.06) is another obstacle affecting students' dietary choices. Educational interventions aimed at improving nutrition knowledge have been shown to positively influence dietary behaviors among college students (Quick *et al.*, 2018). Hence, insufficient understanding of nutrition may lead to suboptimal food selection and hinder efforts to maintain a balanced diet and overall good nutritional status. "Cultural and religious restrictions" obtained the lowest mean score of 2.98. Although not as highly rated as other challenges, cultural and religious beliefs can still influence students' food choices and dietary practices.

4.7 Testing of Hypotheses

The chi-square test statistic's p-values were used to examine the correlations between the variables. The chi-square test statistic was employed to ascertain whether or not the variables understudied were statistically connected in any manner, whereas the Pearson's correlation coefficient analysis was first conducted to ascertain the links among the chosen research variables. Relationships with probability ratings, $p \leq .05$, or 95% significant correlations, were utilized and highlighted. Below is a presentation and discussion of the findings from these analyses.

4.7.1 Demographics and Nutritional Status

The null hypothesis stated that there is no relationship between these demographic factors (age, gender, levels of study, residential status) and nutritional status. To test this hypothesis, a sample of students from BTECH backgrounds was selected. Anthropometric measurements and dietary assessments were used to determine the nutritional status of the participants.

The statistical analysis began with Pearson's correlation coefficient to assess the relationships between demographic factors and nutritional status. The results revealed that age (r = 0.120**), level of study (r = 0.292**), and residential status (r = 0.107**) demonstrated significant correlations with students' nutritional status. This suggests that certain socio-demographic characteristics of students (age, levels of study and residential status) have a noteworthy influence on their nutritional well-being.

In line with previous studies, these results imply that older students may be more conscious of their dietary choices and nutrition, leading to better nutritional outcomes (Quick *et al.*, 2018). Additionally, students at higher academic levels may have increased access to resources and knowledge, contributing to improved nutritional behaviors (Nelson *et al.*, 2008).

Interestingly, gender did not exhibit a significant correlation with nutritional status in this study. These findings diverge from some previous research which reported gender differences in dietary patterns and nutritional status among college students (Quick *et al.*, 2018).

To gain a deeper understanding of the relationship between demographic factors and nutritional status, further analysis using the chi-square statistical test (χ^2) was conducted. The results indicated that gender (p = 0.000) and level of study (p = 0.002) exhibited significant relationships with students' nutritional status. This highlights the strong predictive capacity of both gender and academic progression in determining students' nutritional health.

The findings suggest that certain gender categories may be associated with higher nutritional well-being. Cultural and social norms can significantly influence dietary behaviors among different gender groups (Vella-Zarb *et al.*, 2019). Moreover, the significant relationship between level of study and nutritional status indicates that as students advance in their academic journey, they tend to exhibit improved nutritional behaviors and dietary choices.

The observed results align with a study conducted by Quick *et al.* (2018), which explored eating behaviors and nutritional status among college students. Their findings also emphasized the impact of age, level of study, and gender on students' dietary patterns and nutritional health.

Table 17 presents the relationship between demographics and nutritional status.

Table 17: Relationship between Demographics and Nutritional Status

Variables	*Nutritional Status*	
N=425	**Pearson's Correlation***	**P-value**
Age	.120	0.007
Gender	-.116	0.002
Level of Study	.292	0.000
Residential Status	.107	0.014

Source: Field Survey (2023)

4.7.2 Eating Pattern and Nutritional Status

Table 18 presents the relationship that existed between respondents' eating pattern and nutritional status

Table 18: Relationship between Eating Pattern and Nutritional Status

Variables	*Nutritional Status*	
N=425	**Pearson's Correlation***	**P-value**
Eating Pattern	-.039	0.000

Source: Field Survey (2023)

The results of the study revealed a weak negative correlation between eating patterns and nutritional status, with a Pearson's correlation coefficient of -0.039. The p-value was found to be 0.000, indicating that the correlation is statistically significant. The findings suggest that while there is a slight tendency for students with better eating patterns to have slightly better nutritional status, the correlation is weak. Several factors may contribute to the observed relationship. These findings align with a study conducted by Smith *et al.* (2019) on the nutritional status of university students in a similar setting.

In the study conducted by Smith *et al.* (2019), a sample of university students from a diverse socioeconomic background was assessed for their eating patterns and nutritional status. The researchers found a comparable weak negative correlation between eating patterns and nutritional status, supporting the present study's results. Moreover, Smith *et al.* (2019) highlighted the impact of socioeconomic factors on dietary choices and nutritional intake among students. They reported that students from lower-income families were more likely to have poorer eating patterns and, consequently, a lower nutritional status compared to their higher-income counterparts.

Similarly, the present study highlights the role of socioeconomic factors in influencing nutritional status among students of Takoradi Technical University. It emphasizes the need to address food accessibility and affordability to improve students' nutritional outcomes.

Additionally, the finding of weak correlation underscores the importance of considering other factors, such as dietary diversity, food security, and lifestyle choices, when designing interventions to enhance the nutritional well-being of students.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.0 Introduction

This chapter presents a summary of the major findings and a conclusion to the study. The chapter also presents recommendations and suggestions for future studies based on the findings.

5.1 Summary

This research work, "Eating Patterns *(EP)* and Nutritional Status *(NS)* of Students of Takoradi Technical University *(TTU)* in Ghana," was conducted to identify the eating patterns of students, assess their nutritional status, determine the factors influencing their *EP* and explore the challenges associated with eating patterns of students at *TTU* in Ghana. The study again tested the significant difference that existed between some selected demographic characteristics (age, gender and level of study) and nutritional status as well as between the eating pattern of students at *TTU* in Ghana and their nutritional status. The data was collected using a questionnaire which was developed by adapting existing standardized measures that have been used by other researchers to conduct similar studies in other research settings.

The results of the study indicated that there was considerable diversity in the dietary consumption patterns of students, with certain food items being more favored than others. Notably, citrus fruits such as oranges, tangerines, apples, mangoes, and bananas were among the most preferred fruits among the students. As for beverages, tea was the common beverage of choice for most students. In terms of porridge consumption, corn porridge emerged as the most frequently consumed type, with a majority of students having it 5-6 times a week. Additionally, evaporated milk and powdered milk were commonly consumed by students, with

a significant proportion consuming them once a day or more. Regarding spreads, peanut butter was the prevailing choice among students, typically consumed once a day. Similarly, white bread was the most commonly consumed type of bread. For deep-fried foods, fried yams and fried plantains rank as the most frequently consumed options among students. Turning to fish choices, salmon and herrings were the most favored types, with a considerable number of students consuming them 5-6 times a week. Additionally, tilapia and crab/shrimps were commonly consumed, with a substantial proportion having them 1-2 times a week. Cabbage and lettuce were the preferred vegetables among students, usually consumed 1-2 times a week. When it comes to meat, chicken took the lead as the most frequently consumed meat product among students, with a typical consumption rate of 3-4 times a week. Notably, chicken was a popular and versatile meat choice, widely used in various dishes. As for starch consumption, Jollof-rice was the most favored choice among students, with approximately 39% having it 3-4 times a week. Among the legumes and nuts assessed, black/red-eyed beans and baked beans were the top choices, with respondents having them 1-2 times a week. In the category of soups, palm soup emerged as the most frequently consumed option among students, with a typical consumption rate of 5-6 times a week. Among the stews assessed, Kontomire stew with or without agushie was the most preferred, with students having it 1-2 times a week. Moving on to beverages, carbonated soft drinks like Fanta, Coke, and Sprite were popular choices among students, with a majority consuming them 1-2 times a week. Lastly, among the snacks assessed, biscuits were the most frequently consumed, with a majority of respondents having them 1-2 times a week. The study further identified potential reasons for these preferences, such as taste, cultural influences, nutritional benefits, convenience, and affordability. However, there were also concerns regarding meal skipping behaviors, with a significant percentage of students reporting skipping meals due to lack of time or financial constraints. Generally, the study revealed that most of the students had average eating pattern.

With regards to students' nutritional status, the study discovered a considerable proportion of students falling into the overweight and obese categories. Additionally, the study highlighted the prevalence of nutritional deficiencies among some students. The findings underscored the importance of promoting healthier dietary choices and addressing nutritional imbalances among the student population.

Factors influencing students' eating patterns were explored, with convenience and time-efficiency emerging as major considerations in food choices. Financial constraints and irregular schedules were identified as significant challenges to adopting healthier eating habits. Furthermore, social and cultural influences played a role in shaping students' food preferences.

Demographic factors, such as age, level of study, gender, and residential status, as well as eating pattern of students were found to have correlations with students' nutritional status, highlighting the need for targeted interventions based on students' specific characteristics.

5.2 Conclusion

The study concludes that there is a diverse range of food preferences among the students, with citrus fruits, tea, corn porridge, peanut butter, and white bread being among the most favored choices. The findings suggest that taste, cultural influences, nutritional benefits, convenience, and affordability are some of the key factors influencing these dietary preferences. Again, the study also brought to light concerns regarding meal skipping behaviors, with a significant proportion of students reporting skipping meals due to time constraints or financial limitations.

Notably, the study identified a considerable proportion of students falling into the overweight and obese categories, and the prevalence of nutritional deficiencies among some students was also evident. Factors such as convenience, time-efficiency, financial constraints, and irregular schedules were found to be significant challenges in adopting healthier eating habits. Finally, the study's exploration of eating patterns, demographic factors, including age, level of study,

gender, and residential status, can be concluded to have an influence in relation to students' nutritional status.

5.3 Recommendations

The following recommendations are made in light of the study's results and conclusions:

1. The results of the study indicated that there was considerable diversity in the dietary consumption patterns of students, with certain food items being more favoured than others. Stakeholders and school management should implement nutrition education programs on campus to raise awareness about the importance of balanced diets, healthy food choices, and the potential consequences of poor dietary habits. These programs could include workshops, seminars, and informational campaigns targeting students, faculty, and staff.
2. The study discovered a considerable proportion of students falling into the overweight and obese categories. National Accreditation Board and all other stakeholders in charge of tertiary education could consider the combination of nutrition education with physical activity promotion to create a holistic approach to student health, thus, encouraging students to engage in regular exercise and physical activities to complement their healthy dietary choices.
3. Financial constraints and irregular schedules were identified as significant challenges to adopting healthier eating habits. Therefore, the Government could establish support services to assist students facing financial challenges in accessing nutritious meals. This could include food assistance programs or partnerships with local organizations to provide subsidized healthy meals.
4. The National Health Service could champion a campaign to conduct regular health screenings to identify students at risk of nutritional deficiencies or obesity.

Individualized counseling and support could be offered to address specific dietary needs and concerns.

5.4 Suggestions for Future Studies

1. Future studies could conduct longitudinal studies to track changes in dietary patterns and nutritional status among students over an extended period. This would provide valuable insights into the effectiveness of interventions and the impact of lifestyle changes on their health.
2. Also, other studies can investigate the influence of cultural factors on dietary choices among students, including the role of traditional foods and eating habits. Understanding these influences can aid in developing culturally appropriate nutrition interventions.
3. Research on food accessibility and availability, both on and off-campus, to identify potential barriers that may hinder students from accessing nutritious food options could be considered or conducted by other researchers.
4. Other studies could evaluate the effectiveness of nutrition education programs and campus food environment improvements in promoting healthier dietary behaviors and reducing nutritional deficiencies.
5. Future studies could compare the dietary patterns and nutritional status of students at Takoradi Technical University with students at other universities in Ghana or different regions to identify common trends and regional variations.

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APPENDIX

Questionnaire

QUESTIONNAIRE NO: | | | |

LEVEL CODE: | | | |

DATE OF INTERVIEW: | | | |

This questionnaire is to best help us to understand the Eating Patterns and Nutritional Status of Students of Takoradi Technical University of Ghana.

Your participation in the study is completely voluntary. Your honest response to the following questions will be highly appreciated. Please note that all responses will be treated with utmost confidentiality.

The level and questionnaire number only help us to identify the respondent in case clarification is needed, hence your name will not appear on any document coming out of the study

□ *Ask for oral consent.*

Thanks a lot for your participation. In case you have any questions, please let me know. Please also ask when you have a problem understanding a question.

SECTION A: DEMOGRAPHIC INFORMATION

1. Age of participant: ……...
2. Gender: Male [ ] Female [ ]
3. Level of study: 100 [ ] 200 [ ] 300 [ ] 400 [ ]
4. Place of residence: School Hostel [ ] Outside Hostel [ ] Home [ ]
5. Ethnicity: …….
6. Religion: Christian [ ] Muslim [ ] Traditionalist [ ] Other (specify): ……..

SECTION B: EATING PATTERNS

FOOD FREQUENCY TABLE

For the past one week, how often do you eat the following food? (Please tick one)

Food/Dish	**Once a day**	**More than once daily**	**1-2x a week**	**3-4x a week**	**5-6x a week**	**Rarely**	**Never**
BEVERAGES							
Tea							
Cocoa e.g. Milo							
Coffee							
PORRIDGES							
Corn porridge							
Millet porridge							
Oats/wheat							

Rice porridge							
Tombrown							
MILK AND MILK PRODUCTS							
Evaporated							
Powdered							
Brukina							
Cheese/ wagashie							
SPREADS							
Margarine							
Peanut butter							
Jam							
BREAD							
Wheat bread							
White bread							
DEEP FRIED FOODS							
Fried yams							
Fried plantain							
Beans cake(koose)							
FISH AND SEAFOOD							
Salmon							
Herrings							
Tilapia							
Crab/Shrimps							
VEGETABLES							

Carrots							
Green pepper							
Cabbage/lettuce							
Cucumber							

Food/Dish	**Once a day**	**More than once daily**	**1-2x a week**	**3-4x a week**	**5-6x a week**	**Rarely**	**Never**
MEAT AND MEAT PRODUCTS							
Meat (beef, goat meat)							
Chicken							
Offals							
Sausages							
Cow's skin (wele)							
Game (Bush meat)							
Eggs							
STARCHES							

Banku							
Kenkey							
Fufu							
Plantain							
Yam							
Gari							
Cocoyam							
Plain Rice							
Jollof							
Indomie/ spaghetti							
LEGUMES & NUTS							
Black/ red-eyed beans							
Baked beans							
Soy Beans							
SOUPS							
Palm soup							
Groundnut soup							
Light soup							
Okro soup							
STEWS							
Kontomire stew (no agushie)							
Kontomire stew (plus agushie)							
Okro stew							
Ghanaian gravy							

Food/Dish	**Once a day**	**More than once daily**	**1-2x a week**	**3-4x a week**	**5-6x a week**	**Rarely**	**Never**
FRUITS							
Pawpaw							
Pineapple							
Mango							
Banana							
Citrus fruits (Orange, tangerine)							
Apples							
Watermelon							
Avocado pear							
Grapes							
Guava							
Coconut							
DRINKS							
Fanta, coke, sprite etc..							
Fruit juices							
Vitamilk							
Sobolo							
Beer							
Wine/spirits							
SNACKS							
Meat pie							
Cake							
Doughnuts							
Chips							

Plantain chips							
Biscuits							
Roasted groundnut							

1. How many times do you usually eat in a day?

a) Once [ ] b) Twice [ ] c) Thrice [ ] d) Four times or more [ ]

2. During the most recent semester, how often, on average, have you skipped breakfast?

a) Always [ ] b) Often [ ] c) Sometimes [ ] d) rarely [ ] e Never [ ]

3. During the most recent semester, how often, on average, have you skipped lunch or dinner?

a) Always [ ] b) Often [ ] c) Sometimes [ ] d) rarely [ ] e Never [ ]

4. Why do you skip the above meal?

a) Not hungry [ ] b) Lack of time [ ] c) Don't like foods served [ ]

d) Save money [ ] e) loss of appetite f)Other (specify) ……

5. Do you regularly exclude any other foods from your diet (e.g. diary)? Yes [ ] No [ ]

6. What are your favorite types of food?

a) Fast food

b) Traditional dishes

c) International cuisine

d) Vegetarian

e) Other (please specify)

7. Add this. During the most recent semester, how often have you consumed self-cooked meals from raw ingredients?

a. Every day
b. Most days
c. Occasionally
d. Never/rarely

8. Please list any foods that you regularly (>3 days/week) consume that were notlisted in this survey

……

……

……

SECTION C: NUTRITIONAL STATUS

Body measurements:

Height (cm)	
Weight (kg)	
BMI (kg/m^2)	

1. How would you describe your overall health?

   ……

   ……

……

……

2. How often do you exercise: Frequently [ ] Occasionally [ ] Rarely [ ]
3. How many hours of sleep do you get each night:……
4. Have you experienced any nutritional deficiencies? Yes [ ] No [ ]

i. If yes, explain:

……

……

……

SECTION D: FACTORS INFLUENCING EATING PATTERNS

This section seeks to determine the factors that influence the eating patterns of students of the Takoradi Technical University. Using a 5-point Likert scale which measures from "1 = strongly disagree" to "5 = strongly agree" to indicate the strength of the factors that influence the eating patterns of students of the Takoradi Technical University.

	1 Strongly Disagree	**2 Disagree**	**3 Neutral**	**4 Agree**	**5 Strongly Agree**
Nutritional value					
Availability of food					
Cultural Beliefs					

Income					
Level of Study					
Social Environment					
The task/duties I have to perform					
Religion					
I eat foods that are easy to get and eat with respect to time.					

In your opinion, what are some of the factors that influence your choice of food?

……
……..……
……..

SECTION E: CHALLENGES ASSOCIATED WITH EATING PATTERNS

This section seeks to explore the challenges associated with eating patterns of students at Takoradi Technical University in Ghana. Using a 5-point Likert scale which measures from "1 = strongly disagree" to "5 = strongly agree" to indicate the strength of the challenges associated with eating patterns of students at Takoradi Technical University in Ghana.

	1 Strongly Disagree	**2 Disagree**	**3 Neutral**	**4 Agree**	**5 Strongly Agree**
Time constraints					
Limited budget					
Limited access to healthy food					

Social pressures					
Stress and emotional eating					
Irregular schedules					
Lack of knowledge about nutrition					
Cultural and religious restrictions					

1. What other challenges do you face in maintaining a healthy eating pattern?

   ……
   ……
   ……
   ……

2. Have you ever experienced food insecurity?

   ……
   ……
   ……
   ……

Thank you for completing the questionnaire. Your participation will help us gain insight into the eating patterns and nutritional status of students at Takoradi Technical University. Your responses will be treated with utmost confidentiality.