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THE ASSOCIATION BETWEEN SKIPPING BREAKFAST AND ACADEMIC PERFORMANCE AMONG ADOLESCENTS

(10 - 16 YEARS) IN TAMALE METROPOLIS, NORTHERN GHANA

BY

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THIS THESIS IS SUBMITTED TO THE UNIVERSITY OF GHANA, LEGON IN PARTIAL FUFILLMENT OF THE REQUIREMENT FOR THE AWARD OF MPHIL IN NUTRITION DEGREE.

DECLARATION

Apart from citations to other publications that have been properly acknowledged, I hereby certify that the content of this thesis is the result of my research. Additionally, this thesis hasn't been submitted in full or in part to this university or any other institution elsewhere for a degree of any kind.

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DEDICATION

I dedicate this work to my mother Rukaiyatu Issah, my father Abubakari Amadu and my siblings in gratitude for their unending love, care, and encouragement during my studies at the university.

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ACRONYMS AND ABBREVIATIONS

BMI	Body Mass index
ECBAS	Ethics Committee for College of Basic and Allied Sciences
FAO	Food and Agricultural Organisation of Ghana
FGDs	Focus Group Discussions
GSS	Ghana Statistical Service
GES	Ghana Education Studies
AAP	Average Academic Performance
BFS	Breakfast Skipping
MUAC	Mid-Upper Arm Circumference
CI	Confident Interval
USAID	United States Agency for International Development
WFP	World Food Program
WHO	World Health Organisation
PA	Physical Activity
HEI	Healthy Eating Index
SES	Socio Economic Status
GDHS	Ghana Demographic and Health Survey

NSFP	National School Feeding Program
B.D.T	Basic Design and Technology
T. Z	Tuo Zaafi
J.H.S	Junior High School
OWOP	Our World Our People
SBA	School-Based Assessment

ABSTRACT

Background: Breakfast is thought to be an important source of energy metabolism, which enhances the body's ability to perform effectively throughout the day (Fareed & Waseer, 2017). The adolescent stage requires a lot of energy for growth and development. There is limited information on how breakfast affects the academic performance of in- school adolescents.

Objectives: To assess the association between skipping breakfast and the academic performance of adolescents between the ages of 10 - 16 years in the Tamale metropolitan.

Methodology: A mixed-method study was used for this study. A semi-structured questionnaire, physical assessment, and focus group discussion were used in the collection of data. The association between breakfast skipping and nutritional status was determined using bivariate and multivariate binary logistic regression analysis. Data were entered and coded in an excel sheet, then later exported onto SPSS software version 26, and WHO Anthro software for cleaning and analysis. Statistical significance was set at p-value of less than 0.05. Factors that influence breakfast skipping was determined through focus group discussion and thematic analysis was used for the analysis.

Results: The prevalence of breakfast skipping was 28%. Within those who skipped breakfast, more than half (76.8%) of female participants skipped breakfast than the males (23.2%). Also, breakfast skipping, and gender had a significant association as p = 0. 001. Breakfast skipping was inversely correlated (- 0.29) with academic performance and it had a p-value of 0.000.

The factors that influenced breakfast skipping among in-school adolescents were lack of time, economic reasons, social reasons, and health implications.

Conclusion: Nutrient intake had no significant association with breakfast skipping except for vitamin C and calcium**.** Breakfast skipping had a weak significant association with academic performance at $p = 0.01$.

CHAPTER ONE

1.0 INTRODUCTION TO STUDY

1.1 Introduction

This chapter provides the background of the study and gives a precise and brief understanding of the study. Again, it contains the problem statement, rationale, and study objectives.

1.2Background

An adolescent is defined as the stage where one grows from childhood to adulthood. It normally begins with physiologically normal puberty and ends with an adult character. This period of physiologically normal puberty to adult character is between 10 and 19 years (Sacks, 2003). Because adolescence is a process of growth, a nutritious breakfast is extremely important (Khurshid, Mahmood, Chaudhry, & Paracha, 2018). During adolescence, the nutritional status needs to be improved because it will benefit this generation and the next generation (Tumilowicz et al., 2019). Adolescents who practice healthy eating habits are better able to grow physically, psychologically, and cognitively, and they are also less likely to develop chronic disorders related to diet in adulthood. However, since adolescents are moving toward greater independence from their parents about dietary choices, they are more vulnerable to nutrition issues than younger children.

After a night's sleep, breakfast is the first meal consumed in the morning. Breakfast is thought to be essential because it replenishes the body's energy and nutrient stores. In this study, breakfast is considered as any food eaten before 10:00am and it contains nutrients. Previous studies have shown that adolescents who eat breakfast regularly are more likely to consume a quality diet and nutrient-dense foods such as dietary fibre, protein, and other nutrients to help them meet the

recommended micronutrient for growth (Fayet-Moore et al., 2016). In contrast, an adolescent who skips breakfast regularly would end up consuming energy-dense foods like sugary, salty, and fatty foods (Intiful & Lartey, 2014). Furthermore, studies have associated skipping breakfast with hypertension, diabetes, and cardiometabolic disorders (Odegaard et al., 2013: Geliebter et al., 2014; Ballon et al., 2019).

Breakfast is the most popular meal skipped by many people around the world. According to a survey conducted among adolescent school children in Spain, which used data from the 2019–2020 DESK cohort project showed that the prevalence of skipping breakfast every day was 19.4% in girls and 13.7% in boys (Esquius et al., 2021). Breakfast skipping and the type of breakfast consumed in children and adolescents have been linked to nutritional intake and weight status.

Adelle Davis, a nutritionist said in the 1960s "eat breakfast like a king, lunch like a prince, and supper like a pauper" (Sifferlin, 2013). A study shows that breakfast contributes about 300 – 500 (15% – 25%) of our daily calories (Spence, 2017). Faye et al., (2021) conducted a study on adolescent breakfast skipping and its association with poorer academic performance. This study reported that 41.3% of adolescents skipped breakfast and their reasons were lack of access to food, lack of appetite, and concern about gaining weight.

Academic performance refers to the accomplishments of a student in their studies, and they are usually assessed using a variety of methods such as tests, assignments, assessments, and final grades. It shows how well a student is doing academically and indicates their level of understanding in a given subject or course, comprehension of the subject matter, and capacity to apply knowledge. The grades a student earns in specific courses or areas are the most direct measure of their academic achievement. Grades are frequently displayed on a scale, and they could also include grade points or other numerical values (Tadese et al., 2022). Several studies have

shown that breakfast skipping affect academic performance of children and adolescents (Smith et al., 2017; Boschloo et al., 2012; Adolphus et al., 2016).

A study was also done among day and boarding teenage students by Khurshid et al., (2018) on factors related to skipping breakfast and academic performance, which revealed that those who ate breakfast did better academically. Also, breakfast skippers were more likely to feel lazy and have a high level of irritation. In comparison, boarding students may skip breakfast due to inadequate food, poor appetite, late-night dinner, and concern to maintain body shape. Another study conducted among Chilean adolescents showed breakfast skipping to be more strongly associated with lower cognitive performance among adolescents who were overweight or obese and regularly skipped breakfast compared to other adolescents with a normal body mass index (BMI) (Pea-jorquera et al., 2021). Breakfast is an opportunity to consume essential nutrients such as vitamins, minerals, protein, and fiber. Skipping breakfast may lead to insufficient intake of these vital nutrients, contributing to malnutrition over time.

The northern region of Ghana, despite numerous interventions at their disposal, the region is the second poorest (50.4%) region in the country, with the highest malnutrition burden (GSS, 2014a; GDHS, 2014). They also experiences a high rate of food insecurity (31%) (WFP, 2020). Households that are food insecure often consume less diverse food groups due to various factors related to limited resources, financial constraints, and access to nutritious foods. This food insecurity can led to breakfast skipping among adolescents, in context to a study conducted in the northern region which proved that adolescents in this region skip breakfast (30%) (Abiba et al., 2012). The region also faces educational disparities, including inadequate parental support, teenage pregnancy, early marriage, poverty, peer influence, and access to quality education (Bariham & Edmond, 2017). Research has shown that there is a significant association between

skipping breakfast and academic outcomes, particularly among adolescents. Skipping breakfast may lead to temporary hypoglycemia (low blood sugar), affecting attention, memory, and overall cognitive abilities (Galioto & Spitznagel, 2016).Hence, studying the association between breakfast skipping and academic performance among in-school adolescents in the Tamale Metropolis will provide facts that may be leveraged to develop, prioritize, and implement evidence-based intervention programs targeted at enhancing the nutritional and academic performance of adolescents.

1.3 Problem statement

The act of skipping breakfast can have significant negative effects on adolescent due to the importance of proper nutrition during the critical stage of adolescence. However, adolescents are more likely than younger children to be left to make breakfast choices, which leads them to skipping breakfast. Skipping breakfast may have a negative effect on a student's academic performance (Galioto & Spitznagel, 2016). According to studies, adolescents who eat breakfast perform better on assessments and are more likely to be able to concentrate and pay attention in class(Gao et al., 2021).

Breakfast's significance in regard to academic performance has been widely studied, but results have been inconsistent. Some studies suggest that consuming breakfast is good for academic performance, while other study showed that it depend on the amount of breakfast taken in terms of calorie and macronutrient composition was related to the participants' academic performance (Feye et al., 2021; Adolphus,2015; Arimi et al., 2018). One reason for the conflicting results may be poor-quality breakfast choices that may not provide the nutrients needed for optimal brain function. Another reason to consider is the timing of breakfast in relation to the start of the school

day. In Ghana, breakfast skipping measured among school-going children between the age of 9 to 16 years in the Eastern region showed a prevalence of 14.5 % (Intiful and Lartey 2014). The study limited breakfast skipping prevalence to the day the data was collected and academic performance was not assessed because it was not part of the study objectives.

According to a survey conducted in Malaysia among university students to ascertain how frequently breakfast is consumed as well as their knowledge, attitudes, habits, and barriers. Only 35.9% of students, according to the study's findings, ate breakfast six to seven days per week. The study discovered that Malaysian students were significantly less likely to have breakfast ($p=0.03$) because of expensive breakfasts (Jayaveloo et al., 2021). In the study, the participants were from only one university, which limited the ability to compare other participants from other universities.

With northern region having the greatest percentage (33.8%) of malnutrition (GDHS, 2014), and the second poorest region (50.4%) (GSS, 2014a) with 31% of the population suffering from food insecurity. High food insecurity in Tamale Metropolis may led to adolescents skipping breakfast due to limited access, and availability, households struggle to afford nutritious food. Even though much research has been done to evaluate the relationship between skipping breakfast and academic performance both globally and in Africa. There are limited studies conducted on breakfast skipping and academic performance in Ghana. The few ones that were conducted among in-school adolescents only measured breakfast prevalence and nutritional status (Intiful and Lartey 2014; Owusu et al., 2017; Buxton, 2014; Abiba et al., 2012). In the Northern region, no research has been conducted on the relationship between breakfast skipping and academic performance among in-school adolescents.

1.4 Rationale

Breakfast is recognized as a crucial meal that provides essential energy for daily activities and supports cognitive function, particularly in the learning environment (Adolphus et al., 2013). Understanding the impact of skipping breakfast on academic performance is essential for promoting the overall well-being of in-school adolescents. Existing research, as highlighted by Adolphus et al., (2013), emphasizes the nutritional contributions of breakfast, including energy intake and nutrient consumption. This study aims to explore how skipping breakfast may affect the dietary habits of adolescents in Tamale, with potential implications for their academic performance. Building on Deshmukh-Taskar et al., (2010) findings, the study seeks to investigate the association between breakfast eating habits and dietary patterns among in-school adolescents. Specifically, it aims was to identify variations in carbohydrate, fiber, fat, and cholesterol intake based on breakfast habits. Research has shown that adolescents who skip breakfast may experience a temporary low blood sugar (hypoglycemia) condition that can impair memory, concentration, and cognitive function (Galioto & Spitznagel, 2016). This condition led to in-school adolescent having poor academic performance.

The meta-analysis conducted by Ofori-asenso et al., (2019) has shown that there are other health implications to skipping breakfast. Some of these implications are the increased risk of being overweight or obese, high blood pressure, unfavorable lipid profiles, diabetes, and metabolic syndrome. Investigating the nutritional status of in-school adolescents in the Northern Region proved that, 6.3% and 6.0% were underweight and overweight/obese, respectively (Abizari and Ali, 2019). A systematic review was conducted to determine whether there is a relationship between obesity and academic performance. The study revealed an insufficient evidence to support

a direct link between obesity and poor academic performance in school age children (Santana et al., 2017)

Most previous studies in Ghana focused on breakfast habits among senior high pupils and tertiary students in the southern part of the country. This study uniquely targets in-school adolescents (10-16 years) in the Tamale Metropolis. Recognizing the cultural and socio-economic diversity of the region is crucial for understanding the specific challenges and opportunities in this situation.

Even though, majority of non-governmental organizations in Ghana are headquartered in the northern region and have carried out numerous interventions to improve the nutritional situation of the population, the northern region is the second poorest region (50.4%) (GSS, 2014a) and has the highest burden of malnutrition (GDHS, 2014) in Ghana. Also, regions in the northern part of Ghana, have the highest food insecurity percentage in the country. With the largest population of food-insecure people found in the Northern region, Tamale metropolis was the third region to have high food insecurity (31%) (WFP, 2020). Due to a confluence of access, availability, utilization, and stability issues, the Tamale Metropolis continues to have extremely high levels of food insecurity which may led to breakfast skipping among adolescents (Moses, 2020). As food-insecure households struggled to afford an adequate and nutritious food supply. In these situations, breakfast options may be limited, leading individuals to skip breakfast due to lack of available and affordable of food.

According to a study done in the Northern Region, it was proven that 30% of adolescents skipped breakfast, and 37% of them snack twice a day (Abiba et al., 2012). Coupled with all these challenges, the Northern region, also faces educational disparities characterized by various challenges, such as inadequate parental support, instances of teenage pregnancy and early

marriage, prevailing poverty, influence from peer groups, and accessing quality education (Bariham & Edmond, 2017). This research endeavors to bridge existing gaps in the literature, provide context-specific insights, and contribute to the development of targeted interventions aimed at improving the nutritional and academic well-being of in-school adolescents in Tamale Metropolis.

1.5 Objectives

1.5.1 Main objective

To determine the association between breakfast skipping, nutritional status, and academic performance of adolescents between the ages of 10 - 16 years in Tamale Metropolis.

1.5.2 Specific objectives

1. To determine breakfast skipping prevalence among in-school adolescents in public and private schools in Tamale Metropolis.
2. To determine the dietary intake and nutritional status (BMI-for-age and MUAC) of in-school adolescents in public and private schools in Tamale Metropolis.
3. To determine factors that influence the skipping of breakfast among in-school adolescents in public and private schools in Tamale Metropolis.
4. To determine the association between skipping breakfast and the nutritional status of in-school adolescents in public and private schools in Tamale Metropolis.
5. To determine the association between skipping breakfast and academic performance among in-school adolescents in public and private schools in Tamale Metropolis.

CHAPTER TWO

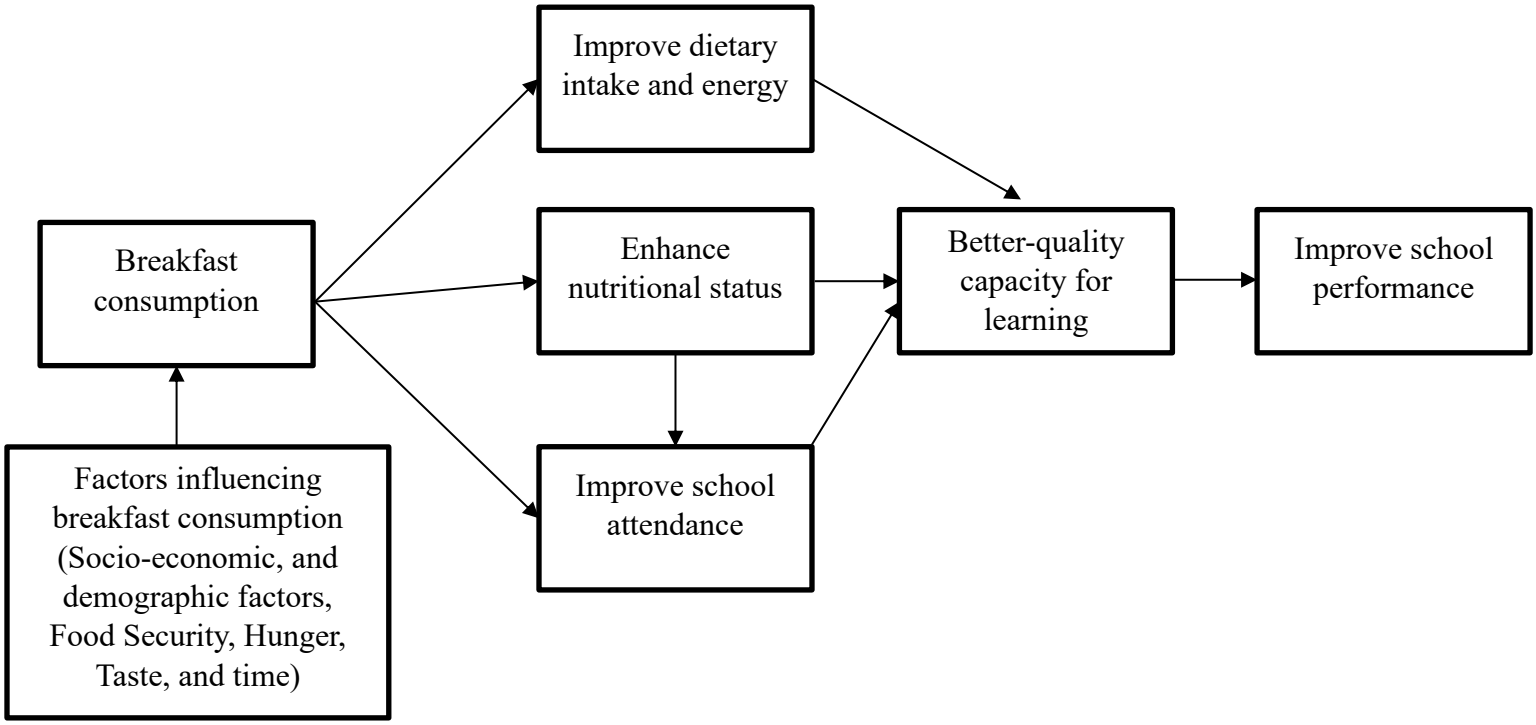
2.0 LITERATURE REVIEW

2.1 Introduction

In this chapter, relevant literature that relates to the topic under study is discussed. There is an overview of the concept of skipping breakfast among adolescents, breakfast and academic performance of adolescents, breakfast skipping, and nutritional status of in-school adolescents. The empirical literature related to the study and the conceptual framework guiding the study is further discussed.

2.2 Conceptual framework

Figure 2. 1: Conceptual framework



The conceptual framework above illustrates factors that influence breakfast skipping, dietary intake, nutritional status, and school attendance of in-school adolescents. Breakfast is a crucial meal for everyone, but especially for young children and adolescents. Adolescents require a lot of energy to support rapid growth. The growth of adolescents is significantly influenced by the availability of micronutrients such as calcium, vitamin D, vitamin A, and iron. Adolescents' nutritional status is also influenced by their food intake and other elements like hygiene and sanitation. By enhancing appetite, food diversity is a major factor that influences an individual's nutrient consumption. A diverse diet increases the bioavailability of some micronutrients in addition to boosting food consumption. For instance, iron and zinc in a diet might be more completely absorbed when vitamin C from fruit is consumed. Dietary diversity is influenced by socioeconomic and demographic characteristics like income, education, age, and household size in many ways. The variety and quantity of food that makes up a household's diet can be influenced by household incomes.

2.3 Conceptual review

2.3.1 Breakfast skipping

Breakfast skipping is the practice of not eating breakfast on any day during the study or evaluation period, or skipping breakfast on the majority of these days. It is also possible to define breakfast skipping in more qualitative terms, such as if it is typically, regularly, usually, or occasionally skipped (Rampersaud, 2009). According to Rampersaud (2009), it is difficult to compare the findings of different studies since breakfast and breakfast consumption frequency are described in so many ways. The term "breakfast skipping" refers to not eating breakfast on the survey day, which may not accurately reflect one's long-term breakfast consumption patterns.

A one-day nutritional survey or a 24-hour meal recall can be used to determine “breakfast consumption” behaviour. In other research, breakfast eating was evaluated regularly, throughout the specified period, or a fixed number of days per week. Breakfast skipping occurs when a person skips breakfast on most days throughout the study or evaluation period or doesn't eat it at all. Due to changes in family life, skipping breakfast has become ordinary in modern society (Nadarajah & Vishnukumar, 2017). When this occurs frequently among school children, it may lead to their having less-than-optimal growth and development, which is crucial for the future expansion of human resources. Breakfast is the first meal of the day usually eaten in the morning**.** It is said that breakfast is "the most essential meal of the day" (Feye et al., 2021).

Breakfast consumption is associated with better nutritional intake in children, including increased intake of dietary fiber, total carbohydrates, and lower total fat and cholesterol (Adolphus et al., 2015). The daily intake of micronutrients is also significantly influenced by breakfast. When compared to children who skip breakfast, children who consistently eat breakfast had higher levels of iron, B vitamins (folate, thiamine, riboflavin, niacin, vitamin B6, and vitamin B12), and vitamin D (Balvin Frantzen et al., 2013). Having breakfast can also help you keep your body mass index (BMI) within the usual range (Nunan et al., 2010).

Additionally, 14.0% of young children skipped breakfast on at least one school day, compared to 2.5% of students who skipped breakfast every day (Boschloo et al., 2012; Gibney et al., 2018; Mullan & Singh, 2010). The assumptions on the advantages of breakfast for children’s learning are substantially supported by data from laboratory-based experimental studies that show breakfast has immediate effects on children’s cognitive ability. Despite the conflicting findings, studies typically show that breakfast improves children's cognitive performance, especially in the areas of memory and attention (Wesnes et al., 2012).

A study conducted among Ghanaian Junior High School adolescents found that 62.8% usually skipped breakfast (Buxton, 2014). Similarly, a study conducted in Tamale also revealed that 30% skipped breakfast, 73% did not consume eggs and 37% ate twice a day. (Abiba et al., 2012). The northern region is the second poorest region (GSS, 2022) and has the highest burden of malnutrition in the country despite the fact most non-governmental organizations in Ghana are based in the Northern region and have implemented several interventions to improve the nutritional status of the population. This could be because interventions and initiatives implemented so far are not evidence-driven.

2.3.2 Academic performance

One of the most changeable lifestyle factors that might affect brain development and, as a result, cognition and academic achievement is nutrition. In this regard, a prior longitudinal study that lasted for three years revealed that adolescent students' cognitive control and academic performance were influenced by lifestyle choices (such as eating breakfast) (Magalhães et al., 2020). Many underdeveloped countries have a wide range of food and health problems that affect school children. A child's ability to learn may also be impacted by the frequent lack of essential utilities in schools (Abebe et al., 2022). According to a study conducted by Rampersaud et al., (2005), having poor behavioral and psychological issues, frequent absences from school, and a decreased likelihood of exercising, children who miss breakfast are more likely to start drinking alcohol and smoking cigarettes. Between 1.7% and 30.0% of people, according to reports, are said to skip breakfast. Forgoing breakfast every school day was a habit for 39% of 13-year-olds and 45% of 15-year-olds, respectively (Abebe et al., 2022).

Furthermore, breakfast's benefits are more readily apparent in undernourished young children, which is typically defined as having a height or weight that is one standard deviation below what is considered normal for their age according to the US National Center for Health Statistics (NCHS) reference. Evidence from a more recent study contrasts breakfast foods with varying glycaemic loads (GL), glycaemic indices (GI), or both. Children's cognitive function is often improved with a reduced postprandial glycaemic response (Hallström et al., 2011). Additionally, it is still not apparent whether this effect is directly brought on by GI, GL, or both, and by additional effects unrelated to the glycaemic response.

Academic results and cognitive-behavioral outcomes are not separate variables. Behavioral changes will likely reflect changes in cognitive ability. Lesson on-task behavior may rise if students pay more attention after breakfast than they would have otherwise. Like how school performance and academic results may vary, changes in cognitive performance may similarly have a cumulative effect on children (Annan et al., 2020). The benefits of having breakfast on cognitive performance are anticipated to be transient, particularly in the morning in which breakfast is consumed, and to certain types of cognitive processes. These instantaneous or acute results may result in advantages for academic performance with habitual or regular breakfast eating, however, this has not been assessed in most studies (Annan et al., 2020; Jayaveloo et al., 2021; Owusu et al., 2017; Tandoh et al., 2021).

Therefore, with regular breakfast eating, short-term changes in cognitive function during lessons (such as memory and attention) may translate to significant changes in academic achievement by improving the ability to pay attention to and retain knowledge. There are significant effects of classroom behavior on academic performance (Jayaveloo et al., 2021). This is because maintaining focus and attention in class is a requirement for academic learning. Student's ability to learn may

be affected in the long term if they concentrate more in school and engage in active studying (referred to as on-task conduct). These components are probably connected to a school experience which is more effective (Ackuaku-Dogbe & Abaidoo, 2014a; Intiful & Lartey, 2014a).

Academic achievement and behavior in the classroom or at school were not considered ecologically meaningful outcomes (Hoyland et al. 2009). Even though direct measures of academic performance are the most ecologically valid, and pertinent to students, parents, teachers, and educational policymakers, they may also have the greatest impact on the personal development of adolescents. The most accurate measurement of the impacts of breakfast may not be crude assessments of academic performance (Adolphus et al., 2015; Nadarajah Vishnukumar, 2017).

2.3.3 Adolescent nutrition

Adolescents go through a period of rapid physical, cognitive and psychosocial development, which has an impact on how adolescents interact with their environment and manage their own emotions, thoughts, and decision-making processes (Kanthi & Johnson, 2021). Throughout the life cycle, this stage of development has one of the highest nutrient needs due to the biological and behavioral changes that take place there. Adolescents, however, are more at risk for nutrition problems than younger children due to the move to more independence from their parents regarding dietary choices (Pena-Jorquera, Nunez, Sadarangani, Ferrazi, Aguilera & Cristi-Montero, 2021). Similarly, to this, during adolescence peer and media influences have a significantly bigger influence on dietary choices, frequently favoring items with less good nutritional value (Pena-Jorquera, Nunez, Sadarangani, Ferrazi, Aguilera & Cristi-Montero, 2021). Adolescence is a vital stage in the development of the brain because myelination, synaptic pruning, and several neural

connections, especially in the prefrontal cortex, all take place during this time (Adolphus et al., 2015).

Adolescents are socially and culturally expected to attend school, healthily interact with their peers physically and socially, and develop to their full potential (Kohl & Cook, 2013). Their rate of growth acceleration as they mature is second only to that seen during the first year of life. They now experience puberty, which is accompanied by menarche, genital growth, and sexual maturation. They also reach their peak bone mass, full body size, and fat deposition at this time (Christie & Viner, 2005). As a result, this stage has extremely high nutritional needs. In addition, a comprehensive analysis found modest correlations between academic performance and healthier eating practices, such as having breakfast every day and consuming fewer energy-dense foods and those with low nutritional content (Intiful & Lartey, 2014; Paul et al., 2020). Nsiah-Asamoah (2017) found that adolescents who usually engaged in unhealthy dietary habits failed to meet their daily nutritional needs.

Low nutrient-dense foods are those that contain calories but just trace levels of micronutrients, occasionally none. Those that are high in nutrients include whole and enriched grains, fruits, vegetables, legumes, low-fat versions of dairy products and meat, as well as nutrient-dense foods (Owusu et al., 2017). To help achieve nutritional consumption targets while staying within daily calorie demands, nutrient-dense meals should be picked first from each food group (Tandoh et al., 2021). Typical breakfast foods that would be considered nutrient-dense include whole-grain and fortified cereals or other grains, fruit and 100% fruit juice, low-fat dairy products, and lean meats. On the other hand, foods containing added sugars, saturated fats, and trans fats would not normally be regarded as nutrient-dense (Rampersaud, 2009). Consequently, failure to consume an adequate diet can disrupt normal growth and development (WHO, 2023). According to the Ghana

Demographic Health Survey, (2014), 14% of adolescents in Ghana are underweight. Also, a study in the Northern Region revealed that 6.3% and 6% of adolescents were underweight and overweight respectively (Abizari & Ali, 2019).

The dietary requirements of adolescents are stated to peak at the rate of development (weight and height), which varies depending on the individual but is believed to occur at a mean age of 13.5 years for males and 12 years for girls (Story & Stang, 2005). Males experience this stage later in puberty than females do, and it lasts for around six to twelve months before female menarche (Jenkins, 2005). At the end of this development phase, female adolescents gain a mean of 17.5 kg and gain 120% body fat, whereas male adolescents gain 23.7 kg and shed 12% body fat, resulting in a gender-based difference in body mass index between the sexes (Story & Stang, 2005). The adiposity rebound, also known as fat gain, can increase the chance of becoming overweight in people who encounter it early in life (Olatona et al., 2022).

The nutritional effects of breakfast on brain activity and related cognitive, behavioral, and academic consequences may be particularly susceptible in children. Compared to adults, children have a higher rate of brain glucose metabolism. Additionally, the nightly depletion of glycogen stores might occur due to the extended overnight fasting phase brought on by the higher sleep demands of youth and adolescents than those of adults. Breakfast eating may be crucial in ensuring sufficient energy for the morning because this greater metabolic rate requires a continual supply of energy produced from glucose (Wesnes et al., 2012). However, breakfast is the meal that is most usually skipped. Hoyland, Dye & Lawton (2009) were only able to locate 45 studies on the effects of breakfast on objectively measured cognitive performance in the period of 1950-2008 in their systematic review, despite intense public and scientific interest and a widely promoted consensus that breakfast improves concentration and alertness. They concluded that eating

breakfast improves cognitive outcomes more than skipping it and that these advantages are particularly pronounced in children who are regarded to be undernourished.

There is evidence that adolescents and children who eat breakfast are more likely to absorb more nutrients and maintain appropriate and healthy diets. Compared to non-consumers, breakfast consumers tend to intake more calories per day, and while some research suggests that breakfast eaters had greater absolute intakes of carbohydrates, protein, and total fat, other studies find no differences between the groups (Fareed & Waseer, 2017). Breakfast consumption is regularly linked to greater intakes of various nutrients, including vitamin A, vitamin C, riboflavin, calcium, zinc, and iron, in studies that compare the daily intakes of breakfast eaters and non-eaters. Higher daily nutrient intakes expressed as a percentage of nutrient intake guidelines (such as the Recommended Dietary Allowance) have also been linked to eating breakfast more frequently (Rampersaud, 2009). Regular breakfast consumption has generally been linked to better appetite, weight, and blood sugar control, fewer chronic disease markers, cognitive alertness, and academic performance in adults (Adolphus et al. 2016, Purslow et al. 2008, Rong et al. 2019), as well as academic performance in younger adults, such as in-school adolescents (Pengpid and Peltzer 2020). It should be noted, however, that most of these studies have been carried out in higher educational institutions. Understanding how and where to implement interventions is important for enhancing both in LMICs when undernutrition is a problem (as is the case in nations in sub-Saharan Africa).

Additionally, breakfast eaters ingest more fiber than skippers, a nutrient that both children and adults in developed nations significantly lack. According to numerous studies, eating breakfast increases calcium intake, an essential vitamin for adolescent's bone development. The importance of breakfast as a chance to assist young children and adolescents in fulfilling daily nutrient intake

objectives is highlighted by the fact that youth who skip breakfast typically do not make up for missed energy or nutrient intake through other daily meals. Higher Healthy Eating Index (HEI) scores 51 or other diet quality indices show that adolescents and children who eat breakfast more frequently have diets that are more likely to be healthy (Rampersaud, 2009; Fareed & Waseer, 2017; Tandoh et al, 2021). Breakfast eaters make better eating choices, such as consuming more fruits, vegetables, dairy products, or high-fiber, low-fat foods, and they may choose healthier snacks less frequently. Compared to girls who typically skipped breakfast, those who ate breakfast more frequently reported decreased intakes of sweets, salty snacks, and non-alcoholic beverages (Rampersaud, 2009).

2.4 Empirical literature review

2.4.1 Prevalence of breakfast skipping among adolescents

Research conducted in Oslo, Norway, highlighted the prevalent practice of skipping breakfast among adolescent students, suggesting potential emotional distress and compromised academic performance as consequences. This behaviour was noted not only among the general adolescent population but also specifically among medical students, both pre-clinical and clinical (Ackuaku-Dogbe & Abaidoo, 2014; Feye et al., 2021; Khurshid et al., 2018). Globally, 10–30% of adolescents aged 11–18 may skip breakfast, with a higher prevalence among girls and those with lower educational levels. These breakfast skippers often exhibit unhealthy dietary patterns, higher BMI, and more unrestrained behaviour compared to their breakfast-consuming counterparts (Boschloo et al., 2012; Byrne et al., 2012; Keski-Rahkonen et al., 2003; Rampersaud et al., 2005). Adolescents living in hostels or aspiring scholars may adopt irregular breakfast patterns, relying on snacks and fast food, potentially leading to sedentary lifestyles and weight gain. Studies suggest

that developing healthy breakfast consumption habits is crucial for weight management and academic success (Khurshid et al., 2018; Rampersaud, 2009).

In Ghana and other African regions, breakfast skipping is a phenomenon not restricted to developed countries. Similar prevalence rates are observed, but cultural, socio-economic, and lifestyle factors contribute to variations in outcomes (Olatona et al., 2022; Owusu et al., 2017; Paul et al., 2020; Tandoh et al., 2021). Children and adolescents in Ghana often provide reasons such as time constraints, lack of hunger, or a preference for sleep when explaining their breakfast-skipping behaviour. Dieting practices, particularly among females aiming to lose weight, are also identified as contributing factors (Rampersaud, 2009).

A cross-sectional study conducted in a developed setting with 605 adolescents aged 11–18 indicated that regular breakfast eaters tended to outperform breakfast skippers in terms of academic performance. This underscores the significance of breakfast in academic success, with attention-related issues identified as potential mediators (Boschloo, Ouwehand & Dekker, 2012). Globally, skipping breakfast becomes more prevalent as adolescents transition into adulthood, with girls more frequently skipping than boys. Socioeconomic factors, such as poor socioeconomic backgrounds, are associated with an increased likelihood of breakfast skipping (Rampersaud, 2009). Also, in developed nations like the USA and Canada, patterns of breakfast skipping among comparable age and gender populations align with global trends. However, variations in lifestyle, food choices, and cultural factors contribute to distinctions between developed and developing countries (Olatona et al., 2022; Owusu et al., 2017; Paul et al., 2020; Tandoh et al., 2021). The prevalence of skipping breakfast among adolescents is a global concern with implications for health and academic performance. While international patterns are evident, the literature emphasizes the need to consider regional nuances in Ghana and Africa, where cultural,

socioeconomic, and lifestyle factors contribute to distinct breakfast habits. Understanding these dynamics is crucial for designing targeted interventions that address the specific challenges faced by adolescents in different contexts.

According to the 2018 Global Nutrition Report, data from 195 countries show both male and female adolescent obesity rates are increasing by 6.5% and 4.7%. Also, 15% of adolescents in Africa are overweight. Ghana is one of the few sub-Saharan African countries at a later stage of the nutrition transition where diet changes are already affecting the academic performance of school children. In Tamale, the dietary habits of adolescents are influenced by poverty, educational environment, and cultural practices (Abubakar and Yussif, 2023). Adolescents from resource-constrained households have limited access to healthy foods which puts them at risk of malnutrition. A study conducted by Abiba et al., (2012), revealed that about 73% of adolescents in Tamale do not get to eat eggs and meat occasionally while 56% of them also consume both light and heavy food as snacks.

The dietary intake among adolescents in the Northern region especially Tamale is of concern as most traditional diets predominantly cereal and tuber-based, fresh fruits and vegetables, and foods low in fat) are gradually being replaced with more Westernized diets which lack diversity and are high in calories (Ochola & Masibo, 2014). Adolescents spend most of their time in school coupled with the autonomy to make food choices while in school making them vulnerable to sub-optimal dietary habits. (Abdulai & Yussif, 2023). Adolescents who spend most of their time in school with their peers are usually left with no option but to eat what is available to them.

2.4.2 Dietary intake and nutritional status of adolescents

Smith et al., (2022) demonstrated that individuals skipping breakfast in adulthood, whether consistently or sporadically, exhibited concerning dietary patterns. They were more likely to consume fast food, fall short of recommended fruit and dairy intake, and neglect lean meat. These findings underscore the lasting impact of breakfast habits on dietary choices in adulthood. The study by Smith et al., (2022) revealed the detrimental effects of breakfast skipping on cardio-metabolic health. Participants skipping breakfast in both childhood and adulthood showed adverse indicators, including larger waist circumference, higher fasting insulin levels, and unfavourable cholesterol concentrations. Despite study limitations, these findings emphasize the need for holistic health interventions.

Nutrient deficiencies, particularly affecting adolescent females in sub-Saharan Africa, contribute to anaemia (Feye et al., 2021; Khurshid et al., 2018; Tandoh et al., 2021). Breakfast skippers are reported to consume more fat, cholesterol, and energy but less fiber, vitamins, and minerals, elevating their risk of gastrointestinal diseases (Fareed & Waseer, 2017). Ghana faces severe nutritional challenges, ranking 135th out of 187 nations in terms of malnutrition severity. The prevalence of stunting, low serum retinol, iron deficiency anaemia, and undernutrition is alarming (Tandoh et al., 2021). Effective interventions are crucial to address these issues and enhance the overall well-being of adolescents.

2.4.3 Factors that influence breakfast skipping among adolescents

Khurshid et al., (2018) conducted a study in Australia, identifying multiple factors influencing breakfast skipping among adolescents. Key determinants included Body Mass Index (BMI), language spoken at home, and childhood smoking. Adolescents who consistently skipped breakfast were more likely to come from non-English-speaking households, specifically with parents born

in Southern Europe or Asia. In adulthood, skipping breakfast correlated with single marital status, lower education levels, smoking, sedentary behaviour, and television watching. The study acknowledged a constraint in sample size, affecting the prevalence understanding of breakfast skipping. In a similar study in Ethiopia, breakfast skipping was significantly associated with worse academic performance. Factors that influenced breakfast skipping among adolescents in Ethiopia included socio-economic background, lifestyle choices and time (Feye et al., 2021). Contrarily, among adolescents living in hostels in a study in Nigeria, reasons for breakfast skipping were distasteful food, uncooked well, and inadequate amount of time (Olatona et al., 2022). Dogbe & Baidoo, 2014 also identified time constraints as the main factor that influenced breakfast skipping among medical students.

A study in Kuala Lumpur explored the reasons behind breakfast skipping among university students, revealing that personal preferences and time constraints were the primary factors. Lack of appetite, oversleeping, and morning lectures contributed to students missing breakfast. A separate survey highlighted various issues, including health problems, laziness, and time constraints (Moy et al., 2009). Lack of time before the first lecture emerged as a predominant reason for breakfast omission (Moy et al., 2009).

Olatona et al., (2022) also, conducted a study in Nigeria, revealing insufficient knowledge of breakfast among adolescents. While most students maintained stable nutritional status, breakfast skippers exhibited lower dietary intake. However, the study faced limitations due to a small sample size and a questionnaire originally designed for English participants. Replicability in an African context may be challenging due to the study's original design. In Ghana, Owusu et al., (2017) investigated undernutrition among adolescents participating in school feeding programs. The study highlighted a high occurrence of undernutrition, with age identified as a significant predictor of

stunting. However, the research's scope was limited to two schools in the capital city. Limited generalizability due to the study's exclusive focus on two schools. Contrarily, Fareed & Waseer, 2017 identified the causes of breakfast skipping as more personal choices by adolescents such as having no time, having no appetite, did not like to take it early and oversleeping in the morning.

Pena-Jorquera et al., (2021) also explored the impact of breakfast on cognitive performance globally, emphasizing its influence on adolescents with different BMI categories. While those with normal BMI and overweight or obesity exhibited higher performance when having breakfast, the study lacked specificity in assessing breakfast composition and quantities, and it did not explore causality among the variables. Lack of in-depth analysis regarding the specific components of breakfast. In a similar vein, Smith et al (2022) identified that adolescents who skipped breakfast had a lower cognitive development while the adolescents who consumed breakfast had a higher cognitive performance. Understanding the factors influencing breakfast skipping among adolescents requires a nuanced perspective that considers cultural, socioeconomic, and regional variations. Global insights contribute to a comprehensive understanding, allowing for tailored interventions to promote consistent and healthy breakfast habits among adolescents in diverse contexts. Future research should address the limitations identified in existing studies, aiming for broader generalizability and a more in-depth exploration of the factors at play.

2.4.4 Association between breakfast skipping and nutritional status

According to Annan et al., (2021), the prevalence of being overweight surpasses thinness in children, and 40% of adolescents exhibit poor physical fitness. The presence of a double burden of malnutrition during adolescence poses long-term health risks. This situation can persist into

adulthood, emphasizing the need for targeted interventions. In Jayaveloo's, (2021) study, adolescents demonstrated good knowledge about breakfast consumption but struggled to translate this awareness into healthy eating habits. Financial constraints, existing unhealthy eating patterns, and food preferences emerged as critical determinants of nutritional status. The cross-sectional design of the study, however, limited its ability to establish causation among the identified variables. Food accessibility was the main reason people missed breakfast. Sixty-six percent of pupils reported having easy access to breakfast, twenty-eight percent reported having trouble getting it, and sixteen percent reported having no access to it (Feye et al., 2021). In contrast to this argument, students enrolled in institutions, and students who lived with their families did not experience any availability issues (Fareed & Waseer, 2017). However, the gap that exists in this study is the use of convenient sampling as a result of proximity. Purposeful in-school adolescents who mostly skipped breakfast were excluded.

Studies have shown that regularly skipping of breakfast has been associated with unhealthy lifestyle choices, including poor dietary habits and reduced physical activity. Smith et al., (2022) highlighted that breakfast skippers tend to have higher daily intakes of fat, cholesterol, and energy, coupled with lower intakes of fiber, vitamins, and minerals. These patterns may contribute to an increased body mass index (BMI) and cardiometabolic risk factors. This assertion is supported by Adolphus et al., (2015) who investigated the repercussions of skipping breakfast on the nutritional status and cognitive function of school-aged children. Significant differences were noted between breakfast-skippers and non-skippers, affecting parameters such as memory, concentration, academic grades, and attendance. The study emphasized the dual impact of skipping breakfast on both nutritional well-being and academic performance. Similarly, Ackuaku-Dogbe & Abaidoo, (2014) conducted a descriptive cross-sectional study on breakfast consumption patterns among

medical students at Korle Bu-Accra, University of Ghana Medical School. The study revealed a high prevalence (71.92%) of students skipping breakfast, with associated consequences like fatigue and decreased attention during clinical sessions.

Studies conducted by Adolphus et al., (2015), Intiful & Lartey (2014), and Paul et al., (2020) emphasized the difficulty of compensating for lost energy and nutrients when breakfast is skipped. Micronutrient deficiencies, including vitamin A, thiamine, vitamin C, iron, calcium, and zinc, were more pronounced in individuals who skipped breakfast. Notably, breakfast consumption did not significantly impact calcium intake, possibly attributed to cost barriers and dietary patterns in Ghana's rural areas. This study is supported by another finding from Rampersand (2007) which concluded that eating breakfast more often helps adolescents to maintain a healthy weight. It also provides benefits for cognitive function and academic achievement. Encouraging breakfast consumption among in-school adolescents is a way to ensure that adolescents meet their daily nutrient and energy intakes (Intiful & Lartyey, 2014).

The literature suggests a complex association between skipping breakfast, nutritional status, and broader health outcomes among adolescents globally. From disparities in overweight prevalence to the impact on cognitive function and micronutrient intake, breakfast emerges as a pivotal factor in shaping the health trajectory of adolescents. The challenges identified, including knowledge-practice gaps and socioeconomic barriers, necessitate holistic strategies for promoting regular and nutritious breakfast consumption, particularly in diverse contexts such as Ghana and other international settings.

2.4.5 Association between breakfast skipping and academic performance

Numerous studies highlight the widespread practice of skipping breakfast among young individuals, particularly adolescents. In Oslo, scientists observed a prevalent trend of breakfast omission among adolescents, raising concerns about potential impacts on mental well-being and academic performance (Lien, 2007). In a similar vein, Ackuaku-Dogbe & Abaidoo (2014a) also identified a connection between weariness experienced by medical students and eating behaviors, especially breakfast skipping. The study suggested a potential link between skipping breakfast and subpar academic performance among medical students. These findings were supported by experimental studies, such as the one conducted by Widenhorn-Muller et al., (2008), involving boarding school students which revealed the negative effects of skipping breakfast on mood and short-term memory. Verbal memory in girls and visuospatial memory in boys were primarily impaired, accompanied by lower mood and decreased alertness. Adolescents who skip breakfast often exhibit unhealthy lifestyles, including habits such as drinking, drug use, smoking, and infrequent exercise. These lifestyle choices can have broader implications for their overall well-being (Widenhorn-Muller et al., 2008).

Similarly, So (2013) study in Korea explored the association between breakfast frequency and academic performance. Increased breakfast consumption was positively correlated with improved academic performance in both male and female healthy adolescent populations, considering various covariates. However, the study's limitation lies in its country-specific focus, limiting generalizability to other regions like Ghana. Male in-school adolescents skipped breakfast more than female in-school adolescents. As a result, female in-school adolescents had a higher academic performance than male school children (Fareed & Waseer, 2017). There is a high prevalence of undernutrition in males compared to females in a study conducted in Ghana in the school-feeding

program (Owusu et al., 2017). In a related study, Akeredolu et al., (2015) used a descriptive survey in Lagos State, Nigeria, to reveal a substantial correlation between skipping breakfast and academic achievement, particularly in English language and Mathematics. The limitation of the study was the sample size and limitation in geographical location.

Active class participation was identified as a positive outcome of not skipping breakfast, contributing to improved academic success. This assertion is supported by Paul (2020) who highlighted a high prevalence of habitual breakfast skipping among medical students, leading to neuroglycopenic symptoms that impact lesson performance. The limitation of the study was its focus on one university, reducing its generalizability. Similarly, Khurshid et al., (2018) also, found a prevalence of negative emotional status among breakfast skippers, leading to poor class assessment and academic results. The study acknowledged limitations related to self-reporting and the narrow focus on a single day of breakfast skipping.

The association between skipping breakfast and academic performance in adolescents is a global concern, as evidenced by studies spanning Oslo, Korea, Nigeria, and beyond. While positive correlations between regular breakfast consumption and academic achievement have been identified, the challenge lies in addressing this issue comprehensively, considering diverse socio-cultural contexts, such as those in Ghana and other African nations. Strategies to promote regular breakfast habits may contribute not only to improved academic outcomes but also to overall adolescent well-being.

CHAPTER THREE

3.0 METHODOLOGY

3.1 Introduction

This chapter presents various methods that were used in carrying out this study. The chapter consists of the study design, the study area, the study population, sample size determination, selection of participants and sampling techniques, inclusion and exclusion criteria, data collection methods, data analysis and ethical considerations.

3.2 Study design

This mixed method study, including both quantitative (cross-sectional) and qualitative (focus group discussion) components, was conducted in both private and public schools in the Tamale metropolis. Using a convenient sampling technique, four schools from the Tamale metropolitan area were selected as potential study area. Based on the school's desire to participate in the study, the decision was taken.

3.3 Study area

The research was conducted at the Tamale metropolis in the Northern region of Ghana. The Tamale Metropolitan Assembly developed the district analytical report based on the 2010 population census through a legislative instrument (LI 2068) which elevated the then Municipal Assembly into a Metropolis in 2004. From the 2021 population census, the Tamale metropolis has a population of 730,000.

In the country, Tamale Metropolis is currently one of the six Metropolitan Assemblies and the only one among the five regions in Northern Ghana. Northern region's capital city is Tamale,

which has 16 districts. It is situated in the region's center, bordering the Sagnarigu District to the west and north, Mion District to the east, East Gonja to the south, and Central Gonja to the southwest. Although the Dagombas make up the majority, the Metropolis is also a home to various ethnic groups from the Upper East region, including the Gonjas, Mamprusis, Akan, and Ewe. Other Africans and citizens of other nations can also be found in the Metropolis. According to the census, there are just 8.8% of Christians and 90.5% of Muslims in the Tamale Metropolis. Only 0.2% of people identify as being atheist. Catholics (3.0%) make up the largest percentage of Christians followed by Pentecostal/Charismatics (2.4%) and Protestants (2.4%). Traditionalists make up 0.3% of the population of the Metropolis. Approximately 5.7% of the metropolis's population aged three and above presently attends an institution of higher education. There are 304 primary schools, 94 kindergartens, 112 junior high schools, and 14 senior high schools in Tamale, for a total of 524 basic schools. According to the 2014 GSS survey, 81.5 percent of students were enrolled in basic education (kindergarten, primary, JHS) and 11.6 percent are enrolled in secondary school (SHS). According to the same research, males are enrolled in all levels of school at a higher rate than females.

3.4 Study population

The participants for this study were adolescents between the ages of 10 to 16 years who were attending schools, as well as their mothers or caregivers for data collection and analysis. The study worked with these age group because they can remember what they ate the previous day and are of age where they are allowed to make their own food choices. It also works with ages between 10 to 16 and not 10 to 19 because from age 17 in-school adolescents will be in senior high school. And the senior high schools in Ghana breakfast are being provided for them. Enrollment of

participants was done individually in each school and it was done on the second visit to the school. Participants of this study leaved in either Tamale metro or Sarnarigu district but schooled in Tamale metro.

3.5 Sample size determination

In calculating the sample size, the estimated proportion of population based on previous studies (14.5%), confidence level of 95% and a desired level of precision of 0.05 was used (Charan and Biswas 2013).

$$N = \frac{Z_{1-a}{}^2 p(1-p)}{d^2}$$

Where;

N is the sample size

$Z_{1-a}{}^2$ = standard normal curve that cut-off an area at the tail (1-equals the desired confidence level, 95%) which is the critical value of 1.96.

P = estimated proportion of population based on previous studies = 14.5%. Which is the prevalence of people who skipped breakfast. Therefore, the prevalence (p) of skipping breakfast is equal to 14.5% (P=0.145) (Intiful and Lartey, 2014).

d = the desired level of precision was 5% = 0.05

$$\mathrm{N} = \frac{1.96^2 * 0.145(1-0.145)}{0.05^2}$$

$$\mathrm{N} = \frac{3.8416 * 0.145(0.855)}{0.0025}$$

$$N = \frac{3.8416 * 0.123975}{0.0025}$$

$$N = \frac{0.47626236}{0.0025}$$

$$N = 190.504944$$

The sample size (N) of the study was 191 but after a 10% contingency rate, it was rounded up to 200 participants. Based on the sample size (200), 48 participants were randomly selected for the focus group discussion (qualitative).

3.6 Selection of participants and sampling technique

The selections were done using a convenient and simple random sampling. A convenient sampling method was used in selecting the schools and a simple random sampling method was further used to choose the participants for the study based on their attendance. In selecting the adolescents, a simple random sampling was done by giving the adolescents a paper to choose. The paper contained a yes or no response. Those who chose yes and had their consent letter signed by parent were selected.

3.7 Inclusion and exclusion criteria

3.7.1 Inclusion criteria

Adolescents who were within the study age range of 10 to 16 years and have been in the selected schools for at least two terms before the study and their parents or caregiver have consented for them to participate in the study were included. Furthermore, as part of the inclusion criteria, the chosen schools were required to adhere to the new GES curriculum School-based assessment

(SBA). Additionally, the teachers within these schools were mandated to hold a minimum qualification of a diploma or bachelor's degree and possess a valid teaching license.

3.7.2 Exclusion criteria

Schools that have not recently evaluated the academic performance of their students were excluded. Also, participants who were not in the study age range and whose parents or caregivers refused to sign the consent form were excluded.

3.8 Data collection methods and instruments

The data of the study was collected through primary source and secondary source of data collection. Primary data served as the main source of data for the study. The collection of primary data was done using semi-structured questionnaires, 24-hour recall, anthropometric measurement, and a focus group discussion (FGD). The data was collected among the in-school adolescents in Police Barracks Basic school, Elsie Lund's school, Tishigu Anglican school, and SOS Hermann Gmeiner school in Tamale metropolis. The questionnaire was in English, and the researcher administered the questionnaires to the participants in their various schools. The questionnaire for this study was designed based on previous studies by Feye et al., (2021). The semi-structured questionnaire was adapted and used in the context of Ghana to collect complete and accurate information regarding the association of skipping of breakfast and academic performance.

An introductory letter from GES was submitted to the selected schools and base on that, the schools approved for the study to be conducted and a date was scheduled for the administration of the questionnaires. Before the questionnaire was administered, a simple random sampling was done to select participants. After the adolescents were selected, they were given consent form for their

parents or caregivers to sign before they can partake in the survey. Selected adolescents, were asked to send the questionnaires home for their parents to sign the consent form. The data was then collected through the questionnaire and 8 FGDs which formed the main data for analysis of the study.

3.8.1 Training of field assistant and pretesting of tools

Two field assistants were recruited and trained for the data collection. The field assistants were fluent speakers in English, Twi, Ga and Dagbani. They received a three-day training that covered all the research tools needed to properly gather the necessary data. A pilot study was initiated and carried out by testing the instrument on some few students. This help to understand the perceptions and challenges in responding to the instrument by adolescents.

3.8.2 Socio- demographic characteristic of participants

The age, marital status, level of education, occupation and monthly income of mother or caregiver was collected through phone interview and was filled in the questionnaire. For in-school adolescents, their age, gender, grade, ethnicity was all collected using a semi- structured questionnaire.

To determine the socioeconomic status, data on the number of rooms in households, the source of drinking water, the type of bed, the type of kitchen and toilet facility, the source of lighting, the source of energy for cooking, the type of building materials, and the ownership of specific items were gathered.

3.8.3 Breakfast skipping prevalence, and dietary intake

The prevalence of breakfast skipping was done with the questionnaire and when someone stated that they skipped breakfast for more than three times in a week, was referred to as breakfast skipping. For participants dietary intake a 24- hour dietary recall was done where participants listed the time and type of food, they had consumed for the past 24 hours. In the dietary measurement the quantity of the food was measured with the help of the food model.

3.8.4 Nutritional status of adolescents

Body mass index for age and MUAC were used to assess the nutritional status of in-school adolescents. Anthropometry of adolescents were measured, where the weight and height of adolescent were taken with the help of a bathroom weighing scale and stadiometer. It was ensured that things such as shoes, heavy cloths, and hair accessories that will affect the measurements were removed and the scale was adjusted to the nearest 0.1kg. for the weight of the adolescent. The height of adolescents was measured in centimetres and later converted to meters. The measurement for both weight and height were taken three time and later the average value was calculated.

3.8.5 Factors that influence breakfast skipping

A focus group discussions (FGDs) comprising of 12 adolescents each from the selected schools was also conducted to gather relevant data for the study. These 48 participants were selected from the sample size (200) using a simple random sampling. In selecting the adolescent, they were given paper to choose which contained a yes or no response. Those who picked the paper were then selected for the FGDs. In the FGDs,12 participants were selected and divided into two subgroups.

Six participants were from upper primary and the other six from junior high. The first subgroup consisted of 1 female and male each from grade 4,5, and 6 while the other subgroup had 2 females and 1 male each from grade 7,8, and 9. The FGD was conducted between 1st to 18th of August 2022.

3.8.6 Academic performance

The assessment of participants' academic performance relied on secondary data obtained during data collection. The sample included participants from various schools with varying teaching and learning conditions. Specific criteria were applied in the selection of these schools, requiring adherence to the new GES curriculum School-based assessment (SBA), a minimum qualification of a diploma or bachelor's degree for teachers, and possession of a valid teaching license. To measure academic performance, subject scores for both the first and second terms were systematically gathered, aggregated, and subsequently averaged for each individual. This averaged score was then used for the analysis.

3.9 Data analysis

The data collected were entered and coded in an excel sheet. After it was coded it was then exported into the statistical package for social sciences (SPSS) software version 26 for cleaning and analysis. WHO Anthro plus was used to classify adolescent BMI- for-age into various undernutrition cut-offs such as underweight, normal, overweight, or obese.

Descriptive statistics were used to summaries the data: continuous variables were summarized as mean ± SD and categorical variables as frequencies and percentages. Bivariate (Chi-square) and

multivariate binary logistic regression analysis were used to determine factors that influence the skipping of breakfast among adolescents and the association between skipping breakfast and the nutritional status (BMI- for-age and MUAC) of adolescents. A focus group discussion (FGD) was used in the qualitative study to determine factors that influence the skipping of breakfast among adolescents and a thematic analysis was used. It was done by coding the data, reviewing the codes and organised them into groups then later themes and subthemes were developed.

In the analysis of academic performance, to compensate for variability exposure of adolescent in different school, a standardizing procedure was done on the grades of each participant to facilitate a fair comparison. The standard deviation and the average grade scores of each participant was then used for the analysis. Multiple linear regression analysis was also used to assess the association between skipping breakfast and academic performance among in- school adolescents in public and private schools. Results with a p-value <0.05 were considered statistically significant.

3.10 Ethical considerations

Ethical approval was obtained from the University of Ghana's Basic and Applied Science ethical committee. Permission was soughed from the Tamale metro education service and head teachers at various schools.

During data collection, privacy and confidentiality were upheld, and one-on-one interviews were held at a location far from where academic activities were taking place. Before conducting the interviews, parents or other caregivers of the selected participants provided a signed informed consent.

CHAPTER FOUR

4.0 RESULTS

4.1 Introduction

This chapter presents the data gathered through the questionnaire and focused group discussion. It also describes the procedures used in the analysis of the data collected. The most appropriate statistical technique that was used for the quantitative section of this study was descriptive statistics, regression, and correlation. For the qualitative section, thematic analysis was used. All the participants in this study were eligible subjects and all participants' information was included in the analysis. Findings were then used to answer the research objectives. In addition, tables are included to present the data collected.

4.2 Socio-demographic characteristics of participants

The study consisted of 200 in-school adolescents aged 10 -16 years and their caregivers. The study comprised 116 (58.0%) females and 84 (42.0%) males. The mean age of the adolescents was 13.43 ± 1.792 and that of caregivers was 40.95 ± 6.264. The grade or class of adolescents was grouped into two, with each having the same frequency (100) and percentages (50%). Majority of the participants (60.5%) were Dagombas, with 80% being Muslims, and 20% being Christians. Most caregivers (75.5%) of participants were married. Many caregivers had education till junior high school (21.5%) and 60% were traders. With their income, 37.5% had a monthly income of >600 – 990 cedis, 30.5% had 1000 to 3000 cedis, 24.4% had no idea or nothing, and 7.5% received more than 3000 cedis for monthly incomes. Majority (65.5%) of adolescents were taken care of by both parents. In determining the household size of participants, 76.5% had a household number of 1-5,

21.0% were having 6-10 members, and 2.5% were having a household of >10. Almost all (97.0 %) all the adolescents attended school seven days in a week.

Most houses (86.5%) had 1 to 4 bedrooms. Also, many participants had indoor kitchens, and a private pipe served as their primary supply of drinking water (62.5%). According to table 4.1 below, 33.5% of participants were categorized as low, middle and high class in terms of socio-economic position.

Table 4. 1:Socio-demographic characteristics of adolescents

Variables	Frequency (N)	Percentage (%)/Mean ± SD
Age of child (years)	200	13.43 ± 1.79
Gender		
Female	116	58.0
Male	84	42.0
Grade		
4 & 6	100	50.0
7 – 8	100	50.0
Religion		
Christians	40	20.0
Muslims	160	80.0
Adolescent lives with		
Both parent	131	65.5
Single parent	36	18.0
Other relatives (auntie, uncle, grandparents, stepmother)	33	10.5
Household size		
1-5	153	76.5
6-10	42	21.0
>10	5	2.5

S.D: Standard deviation

Table 4. 1: Continued

Variables	Frequency (N)	Percentage (%)/Mean ± SD
Ethnicity		
Dagomba	121	60.5
Moshi	19	9.5
Akan	17	8.5
Frafra	14	7.0
Ewe	9	4.5
Gonja	8	4.0
Others (Ga, kasina and waala)	12	6.0
Weekly school attendance		
two times a week	1	0.5
three times a week	1	0.5
four times a week	4	2.0
five times a week	194	97.0

S.D: Standard deviation

Table 4. 2 Socio-demographic characteristics of participant's mothers or caregivers

Variables	Participants (N)	Percentage (%)/Mean ± SD
Age of mother/caregiver (years)	200	40.95 ± 6.264
Marital status		
Single	19	9.5
Married	151	75.5
Divorced	18	9.0
Others (widowed and co-habiting)	12	6.0
Educational level		
None	40	20.0
Primary	42	21.0
Middle /JHS	43	21.5
S.H. S	37	18.5
Tertiary	23	11.5
Vocational training	15	7.5
Occupation		
None	21	10.5
Professional	20	10.0
Military service	8	4.0
Trader/business	120	60.0
Manual worker	31	15.5
Household monthly income		
Nothing or had no idea	49	24.5
> 600 to 990	75	37.5
1000 to 3000	61	30.5
More than 3000	15	7.5

S.D: Standard deviation

Table 4. 3: Housing characteristics of participants

Variables	Frequencies (N)	Percentages (%)
Building materials used for the walls		
Cement	190	95.0
Tiles/terrazzo	7	3.5
Mud	3	1.5
Building materials used for the windows		
Louvre blades	107	53.5
Wood	47	23.5
Glass	46	23.0
Building materials used for the roof		
Aluminum sheet	189	94.5
Bricks	4	2.0
Galvanized sheet	7	3.5
Building materials used for the floor		
Cement	101	50.5
Tiles/terrazzo	96	48.0
Dirty floor	1	0.5
Others (wood)	2	1.0
Type of bed used in household		
Mattress	182	91.0
Mat	18	9.0
Source of drinking water		
Public pipe	73	36.5
Borehole	7	3.5
Purchase from tanker	14	7.0
Private Pipe	106	53.0

Table 4.3: Continued

Variables	Frequencies (N)	Percentages (%)
The main source of energy for lighting		
Electricity	196	98.0
Lantern	3	1.5
Torchlight/rechargeable light	1	0.5
The main source of energy for cooking		
Charcoal	109	54.5
Gas	87	43.5
Electricity	4	2.0
What type of kitchen does the household have?		
Outdoor Kitchen	75	37.5
Indoor Kitchen	125	62.5
Type of toilet facility in household		
Private flush toilet	97	48.5
Private pit latrine/ KVIP	19	9.5
Public flush toilet	34	17.0
Compound pit latrine/ KVIP	21	10.5
No toilet facility	29	14.5
Number of rooms in the household		
1 – 4	173	86.5
5 -8	19	9.5
9 and above	8	4.0
Car		
Yes	53	26.5
No	147	73.5

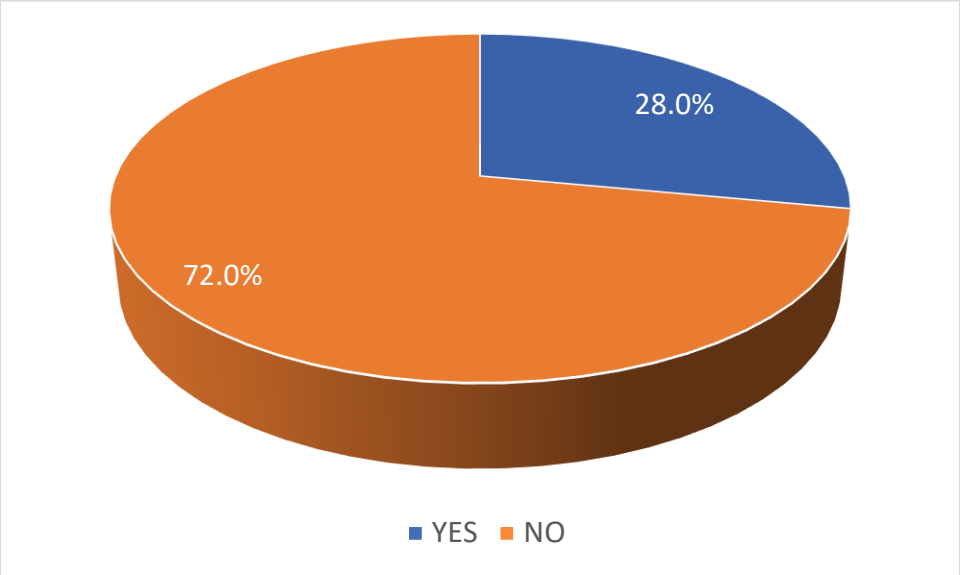
Table 4. 3: Continued

Variables	Frequencies (N)	Percentages (%)
Motorcycle		
Yes	168	84.0
No	32	16.0
Generator		
Yes	22	11.0
No	178	89.0
Computer		
Yes	63	31.5
No	137	68.5
SES		
Low	53	26.5
Medium	103	51.5
High	44	22

4.3 Breakfast skipping prevalence among adolescents

The prevalence of breakfast skipping among adolescents was 28.0% as shown in figure 4.1. From table 4.12, among those who skipped breakfast 76.8% of females skipped breakfast as compared with 23.2% males.

Figure 4. 1: Prevalence of breakfast skipping among adolescents 10-16 years



4.4 Dietary intake and nutritional status of adolescents

Of the participants who consumed breakfast, 68.8% had breakfast six to seven time during the week. When students were asked the reason for not consuming breakfast among those who skipped breakfast, 46.4% mentioned they had no time to eat whiles 16.1% stated that they did not feel hungry. For those who stated that they were not pleased with the food choices, breakfast makes them feel lazy and less energetic in class, and others and their family who did not eat breakfast were 14.3%, 10.7%, 7.1%, and 5.4% respectively. Many (39.5%) students said breakfast consumption makes them energetic in class when asked about the benefit of breakfast consumption. Based on those who consumed breakfast, 29.0% of the respondents bought from food vendors. The majority (43%) of adolescents consumed their breakfast dishes at home.

Table 4. 4: Breakfast practices of adolescents in Tamale metropolis (N = 200)

Variables	Frequency	Percent (%)
Weekly consumption of breakfast		
Two to three times a week	5	3.5
Four to five times a week	40	27.8
Six to seven times a week	99	68.8
Reason for skipping breakfast		
No time to eat breakfast	26	46.4
Don't like the food choices	8	14.3
Don't feel hungry	9	16.1
My family doesn't eat breakfast, so I don't also eat	3	5.4
Breakfast makes me feel lazy and less energetic in class	6	10.7
Others (inadequate feeding money, stomach upset)	4	7.1
The benefit of eating breakfast		
Breakfast consumption helps me grow and increase in weight	53	26.5
Breakfast consumption makes me energetic in class	79	39.5
Breakfast consumption increases my concentration in class	51	25.5
Others (prevent me from being weak, me lively and active, satisfy hunger)	17	8.5
Where breakfast was taken		
None	56	28.0
Home	86	43.0
Outside	58	29.0

Table 4. 4: Continued

Variables	Frequencies (N)	Percentages (%)
Who prepares breakfast for you?		
None	55	27.5
Mother	45	22.5
Sister	8	4.0
Self	28	14.0
Food Vendors	58	29.0
Others (aunties, stepmothers)	6	3.0

4.4.1 Energy and micronutrient intake of respondents

The respondents' dietary intake over the previous 24 hours was assessed for two macronutrients and seven micronutrients (Table 4.5). The energy and nutrient intakes of those who ate breakfast and those who skipped breakfast were compared. In general, vitamin C and calcium were significant at a p-value of < 0.05 when nutrients intake of individuals who ate breakfast and those who did not was compared.

Table 4. 5: Nutrient intake among in-school adolescents

Nutrients	Mean ±SD (Total)	Mean ±SD (Female)	Mean ±SD (Male)
Energy (kcal)	1913.87 ± 670.60	1909.51 ± 666.89	1919.90 ± 679.93
Protein (g)	51.41 ± 22.23	51.25 ± 23.62	51.63 ± 20.29
Vitamin A (mcg)	323.67 ± 480.06	337.54 ± 492.89	304.50 ± 464.00
Vitamin C	82.65 ± 51.75	89.24 ±57.66	73.56 ± 40.88
Calcium (mg)	321.92 ± 142.27	307.86 ± 134.70	341.33 ± 150.79
Iron (mg)	13.06 ± 6.66	12.90 ± 6.47	13.28 ± 6.95
Riboflavin (mg)	1.17 ± 1.11	1.17 ± 1.04	1.16 ± 1.21
Thiamine (mg)	1.38 ± 1.05	1.35 ± 0.98	1.43 ± 1.15
Zinc (mg)	8.68 ± 5.59	8.55 ± 5.49	8.87 ± 5.75

Table 4. 6: Nutrient intake between adolescents who consumed breakfast and adolescents who skipped breakfast (N=200)

Nutrients	Consumed breakfast (N=144) (Mean ±SD)	Skipped breakfast (N=56) (Mean ±SD)
Energy (kcal)	1918.01 ± 652.60	1903.25 ± 720.87
Protein (g)	50.93 ± 19.52	52.64 ± 28.20
Vitamin A (mcg)	316.36 ± 481.74	342.45 ± 475.54
Vitamin C	95.85 ± 64.95	77.52 ± 44.83
Calcium (mg)	338.54 ± 141.82	279.16 ± 135.51
Iron (mg)	13.21 ± 6.60	12.69 ± 6.87
Riboflavin (mg)	1.17 ± 1.10	1.16 ± 1.17
Thiamine (mg)	1.39 ± 1.04	1.37 ± 1.09
Zinc (mg)	8.61 ± 5.34	8.86 ± 6.23

4.4. 2 Nutritional status of adolescents

Most of the in-school adolescents were classified as normal in figure 4.2 below. However, when their BMI -for- age was compared among gender, the findings showed that 27.4% and 7.1% of male were overweight/obese and thin (underweight) respectively. For their MUAC, 25% of males and 21.15% females are moderately at risk of developing malnutrition.

Figure 4. 2: BMI- for- age of adolescent in Tamale metropolis

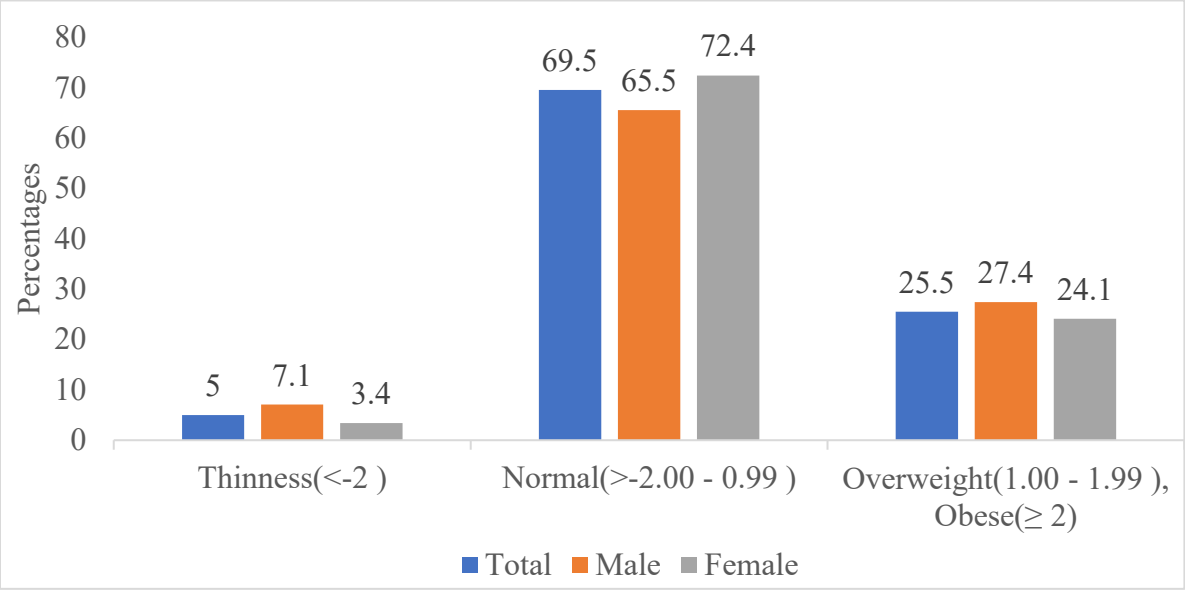
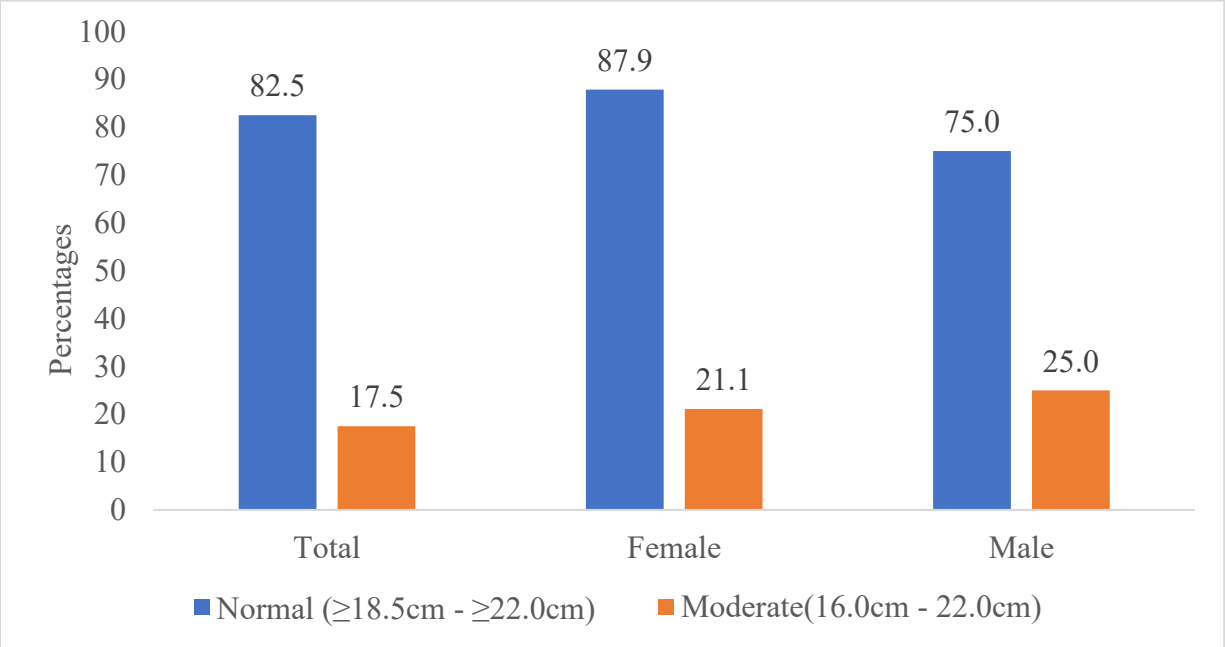


Figure 4. 3: MUAC of adolescent in Tamale metropolis



4.5 Factors that influence the skipping of breakfast among adolescents

In looking at factors that influence skipping of breakfast among in-school adolescents, the prevalence of breakfast skipping was compared with socio- demographic characteristics of the participants and socio-economic status. The findings (Table 4.7) showed a significant association between breakfast skipping prevalence, gender ($p<0.001$), and grade or class (p- value = 0.027). However, age of adolescents, mother or female caregiver educational level and occupation had no association with children consumption of breakfast.

Table 4. 7 Association between factors that influence breakfast skipping among in-school adolescents in Tamale Metropolis (N =200)

Variables	Total N (%)	Skipped breakfast N (%)	Consumed breakfast N (%)	P-value
Gender				
Female	116 (58.0)	43 (76.8)	73 (50.7)	0.001
Male	84 (42.0)	13 (23.2)	71 (49.3)	
Age				
10 -13	95 (47.5)	22 (39.3)	73 (50.7)	0.147
14 -16	105 (52.5)	34 (60.7)	71 (49.3)	
Grade (class)				
4 – 6	100 (50.0)	21 (37.5)	79 (54.9)	0.027
7 & 8	100 (50.0)	35 (62.5)	65 (45.1)	

Table 4. 7: Continued

Variables	Total N (%)	Skipped breakfast N (%)	Consumed breakfast N (%)	P-value
Marital Status				
Married	151(75.5)	39 (69.6)	112 (77.8)	0.230
Unmarried	49 (24.5)	17 (30.4)	32 (22.2)	
Mother or female caregiver's Occupation				
Non-Professional	172 (86.0)	49 (87.5)	123 (85.4)	0.703
Professional	28 (14.0)	7 (12.5)	21 (14.6)	
Caregivers educational level				
None - tertiary	177 (88.5)	49 (87.5)	128 (88.9)	0.782
Tertiary	23 (11.5)	7 (12.5)	16 (11.1)	
SES				
Low	156 (78.0)	44 (78.6)	112 (77.8)	0.903
High	44 (22.0)	12 (21.4)	32 (22.2)	

4.5.1 Predictors of factors that influence breakfast skipping

From the findings below, all the variables were not significantly association with in-school adolescents breakfast skipping except for gender which had significant association (AOR= 0.34 (0.167 - 0.695)).

Table 4. 8: Predictors of factors that influence breakfast skipping

Variables	N (200) n (%)	Unadjusted OR	95%CI	P- value	Adjusted OR	95%CI	P- value
Grade							
4 – 6	100(50)	0.49	0.262 – 0.930	0.029	1.74	0.902-3.391	0.098
7 & 8	100(50)						
Gender							
Female	116(58)	0.31	0.154-0.627	0.001	0.34	0.167-0.695	0.003
Male	84(42)						
Marital Status of caregiver							
Married	151(75.5)	1.52	0.764-3.048	0.232	1.24	0.603-2.583	0.551
Unmarried	49(24.5)						
Occupation of caregiver							
Professional	28(14)	1.19	0.478-2.991	0.703	1.27	0.488-3.353	0.616
None-professional	172(86)						
SES							
Low	156(70.0)	0.955	0.451-2.020	0.903	1.001	0.456-2.196	0.998
High	44 (22.0)						

4.5.2 Focus group discussion (FGD)

The focus group discussion (FGD) was conducted personally by the researcher in the various schools of the participants which were adolescents from grade 4 to grade 8. The discussion and interview were centered on breakfast skipping among in-school adolescents in the Tamale Metropolis. The other discussion was understanding of breakfast, why adolescents take breakfast, healthy breakfast and factors influencing breakfast skipping among in-school adolescents. Table 4.9 shows the participants demographic characteristics and Table 4.10 shows the general themes, major themes and sub-themes that were derived from the focus group discussion (FGD).

Table 4. 9:Participants socio-demographic characteristics (N= 48)

Name of School	No of FGD	No of participants
SOS Hermann Gmeiner	2	6 in a group
Police Barracks Basic school	2	6 in a group
Tishigu Anglican	2	6 in a group
Elsie Lund's	2	6 in a group

Table 4. 10:Themes and sub-themes

General theme	Theme	Sub-themes
Breakfast	First meal of the day.	• Meal taken in the morning. • First meal of the day. • Cooked morning meal. • Solid or liquid morning food.
Breakfast Eaten	Health	• To gain energy to perform daily activities. • To prevent stomach pains and weakness. • To become lively and active. • To satisfy hunger. • To gain a strong body.
Healthy Breakfast	Nutritious Food	• Nutritious breakfast. • Balanced diet. • Solid food. • Liquid food. • Hot mea
Factors of Breakfast Skipping	Time	• Lateness to school • Lack of time • Laziness
	Economic factors	• Inadequate feeding money • Poor socio-economic background
	Social factors	• Religious reason • Cultural reason
	Health implications	• Drowziness and dizziness • Stomach upset

4.5.3 Understanding of breakfast

During the focus group discussion (FGD) and class interactions, in- school adolescents were asked what they understood about breakfast. From the responses gathered, almost all the in-school adolescents understood the meaning of breakfast. Notably, the students emphasized the health benefits of breakfast and highlighted some examples of breakfast meals taken in that part of the country. The students also acknowledged that, they had been taught breakfast as part of one of the subjects they learn in school to complement their understanding of breakfast.

One student controversially described a breakfast as a snack, and he explained that because it was the first meal taken before any other meal is taken and breakfast is normally light. These were some of the views expressed by the students when asked what their understanding of breakfast were.

"You break your fast. A breakfast is the first meal taken in the morning to gain energy to do any work. It is the early morning food we take in everyday life". (P48, Elsie Land)

"Breakfast is the food we eat in the morning. Breakfast is a snack we take early in the morning". (P40, Elsie Land). "Breakfast is solid or liquid food substances we eat in the morning before we go to our workplaces. Breakfast is the meal we take in the morning to make our body strong". (P42, Elsie Land)

"It is a cooked meal that we eat in the morning to help us do our work. It is the food that we eat in the morning which helps our body to grow and perform physical activities". (P33, Tishigu Anglican)

"It is anything liquid or solid that we take in the morning to give us energy. It is a meal that we take into the body for the meantime to work". (P12, SOS)

"Breakfast is a meal taken in the morning". (P18, Police Barracks)

4.5.4 Breakfast eaten

Most students answered that they take breakfast 5 or 4 times in a week. The only time, they do not take the breakfast is during the weekend because they perform household chores early in the morning. The students indicated that unlike many parts of the country where liquid foods are taken

as breakfast, in their part of the country it is mostly solid foods that is taken even as early as the morning. The main reasons provided for students for taken breakfast was health wise. Below are some of the information the in-school adolescents gave when asked why do they take breakfast every day?

"Why should we take a breakfast? The reason why we should take breakfast is we are young, and some parts of our body are developing. We need nutrients, energy, and food to develop. Some people eat fast foods and junkie foods. There are some nutrients that will give you retentive memory and some makes you sharp". (P39, Elsie Land)

"Me my stomach will be bouncing if I don't take breakfast in the morning before coming to school. So, I always take breakfast in the morning". (P41, Elsie Land)

"And me my head will be paining me, if I don't take breakfast early in the morning". (P45, Elsie Land).

4.5.5 Healthy breakfast

The findings from the study revealed that most in-school adolescents knew what a healthy breakfast is. This is because of the knowledge derived from the subject Basic Design and Technology (BDT) that was taught in Junior High School (JHS). Some of them concluded that the breakfast they take in their part of the country was not healthy since sometimes they eat reheated leftover food and solid foods such as TZ, jollof rice, banku, rice balls and yam even early in the morning.

Most of the participants in the focus group discussion (FGD) agreed that a healthy breakfast should be a liquid or light food such as tea, porridge, tombrown, oats, rice water and wheat with

accompaniments such as bread or any available pastries. Specifically, they responded in the following, when asked what is their understanding of breakfast?

"A palatable breakfast, good breakfast, food that would make your body to function". (P38, Elsie Land)

"A breakfast should contain carbohydrate, protein, vitamins, fats and oil and body building foods". (P46, Elsie Land). "The breakfast should contain all the six classes of foods". (P48, Elsie Land)

"It is a special food we eat in the morning that contains all the food nutrients such as protein, carbohydrate, fats and oils and vitamins". (P36, Tishigu Anglican)

"There should be vegetables. They should have all the classes of foods like carbohydrates, protein, fats and oil, and vitamins". (P15, Police Barracks).

"No, it should contain carbohydrate, protein, fats, and oils. But it should not contain Vitamins". (P16, Police Barracks)

4.5.6 Factors influencing breakfast skipping

With regards to the factors that influence the breakfast skipping among the in-school adolescents in the Tamale Metropolis, the participants stated that their feeding money was not enough so they leave the breakfast feeding fee to top up the lunch feeding fee so that they can buy enough food.

Other respondents indicated lack of time, lateness to school, cultural factors and in some cases religious reasons, stomach upset and laziness as some of the reasons for skipping breakfast. Even though some of the participants would want to take breakfast every day to gain energy and

participate actively in class in the morning, the poor socio-economic background and lack of available nutritious or healthy food serve as an impediment to this desire. Below are some of the quotations of the participants from the various schools that engaged in the focus group discussion (FGD).

"Because the money is little so we decide to add the money to the lunch money so that we can buy a lot of food during the second break. (P32, Tishigu Anglican)

"No, there are some foods you can eat and concentrate but some food you cannot eat and concentrate. Some food you will eat and still get hungry but some food you will eat, and you will not be hungry. Some food you will eat and be over-dozing in class". (P30, Tishigu Anglican)

"Some of us do not take breakfast because in our homes we don't eat breakfast". (P22, Police Barracks)

"When you take Koko or tea you will feel hungry so you will have to eat food again. I disagree with this point, most people in Tamale takes porridge as breakfast and it makes you feel lazy and sleep in the classroom. Breakfast is supposed to be light, but they take heavy food and it makes them sleep in the class". (P23, Police Barracks)

"Because of the time we normally come to school, if we are to eat breakfast in the morning, we will be late". (P44, Elsie Land).

"When we eat very early in the morning and we come to school, we sleep in the classroom. Sometimes too we feel drowsy or dizziness in the class. This affects our concentration on the lesson ongoing. (P18, Police Barracks)

4.6 Association between breakfast skipping and nutritional status of adolescent

In comparing adolescent nutritional status to breakfast skipping prevalence their nutritional status, there was no significant association between the two variables with p- value set at < 0.05.

Table 4. 11:Comparing participants breakfast skipping and nutritional status

Variables	Total N (%)	Skipped Breakfast N (%)	Consumed Breakfast N (%)	P-value
BMI-for-age				
<-2 (thinness)	10 (5.0)	3 (5.4)	7 (4.9)	
>-2.00 to 0.99 (Normal)	139 (69.5)	39 (69.6)	100 (69.4)	0.986
1.00 to ≥ 2 (Overweight/obese)	51(25.5)	14(25.0)	37 (25.7)	
MUAC				
Normal	165 (82.5)	50 (89.3)	115 (79.9)	0.115
Moderate	35 (17.5)	6 (10.7)	29 (20.1)	
Grade				
Upper Primary	100 (50.0)	21 (37.5)	79 (54.9)	0.027
J.H.S	100 (50.0)	35 (62.5)	65 (45.1)	
Gender				
Female	116 (58.0)	43 (76.8)	73 (50.7)	0.001
Male	84 (42.0)	13 (23.2)	71 (49.3)	

4.6.1 Binary logistic regression analysis of association between nutritional status and breakfast skipping

The table below shows that all the variables had a significant association with adolescent breakfast skipping except for BMI -for- age which was not significantly associated because it adjusted odds ratios was less than 1.

Table 4. 12: Binary logistic regression analysis of association between nutritional status and breakfast skipping

Variables	N (200) N (%)	Unadjusted OR	95%CI	P- value	Adjusted OR	95%CI	P- value
BMI-for-age group 1							
<-2 (thinness)	10 (5.0)						
>-2.00 to 0.99 (Normal)	139 (69.5)	0.88	0.20-3.90	0.869	0.96	0.52-1.77	0.917
1.00 to ≥ 2 (Overweight/ obese)	51 (25.5)						
Gender							
Female	116 (58.0)	0.31	0.15-0.62	0.001	3.22	1.59-6.51	0.001
Male	84 (42.0)						

Table 4. 12: Continued

Variables	N (200) N (%)	Unadjusted OR	95%CI	P- value	Adjusted OR	95%CI	P- value
MUAC							
Normal	165 (82.5)	2.10	0.82-5.37	0.121	2.34	0.90-6.09	0.080
Moderate	35 (17.5)						
Grade							
4 - 6	100 (50.0)						
7 & 8	100 (50.0)	2.02	1.07-3.81	0.029	2.15	1.13-4.09	0.019

4.7 Association between skipping of breakfast prevalence and academic performance of adolescents in public and private schools.

In Table 4.13 the average academic performance of both schools (public and private) was compared with breakfast skipping prevalence. From the findings, all variables had a negative correlation when they were compared with academic performance.

But when comparison was done between SES and academic performance it was markedly low and negligible positively correlated.

Table 4. 13:Correlation analysis of the association between breakfast skipping and academic performance of adolescents in public and private schools

Variables	N	AAP	
BFS Private	66	-	0.14 (0.247)
BFS Public	134	-	0.37 (0.000)
BFS Both	200	-	0.29 (0.000)
Caregiver's educational level	200	-	0.03 (0.623)
Caregiver's occupational level	200	-	0.02 (0.779)
SES	200		0.00 (0.905)

4.7.1 Linear regression analysis of the association between skipping of breakfast prevalence and academic performance of adolescents in public and private schools

In comparing breakfast skipping and academic performance in both schools (private and public). From the result F (1,198) = 19.43 and a p-value of 0.000, the predictor variable in both schools with an R^2 value of 0.089 explained 8.9% variance in the outcome variables.

The results showed that skipping breakfast in both schools had a negative impact on academic performance ($\beta = 0.299$, p-value of 0.000). But when this same analysis was done among private and public schools, it showed F (1,64) = 1.368 and a p-value of 0.247, the predictor variable in private schools with an R^2 value of 0.021 explaining 2.1% of the variance in the outcome variables. Results of these findings showed that skipping breakfast in private schools had no impact on academic performance ($\beta = 0.145$, p-value of 0.247). With F (1,132) = 21.50 and a p-value of 0.000, the predictor variable for the public schools had an R^2 value of 0.140 and explained 14% of the variance in the outcome variables. The results also showed that skipping breakfast has a

negative effect on academic performance (β = 0.374, p-value of 0.000). The summary of the results is shown in the table below.

Table 4. 14:Linear regression coefficients of skipping of breakfast prevalence and academic performance of adolescents

Variables		β	R^2	F	P-value
Both schools	AAP ⟹ BFS	- 0.29	0.08	19.43	0.000
Private school	AAP ⟹ BFS	- 0.14	0.02	1.36	0.247
Public school	AAP ⟹ BFS	- 0.37	0.14	21.50	0.000
AAP ⟹ Caregiver's educational level		0.03	0.00	0.24	0.623
AAP ⟹ Caregiver's occupational level		- 0.02	0.00	0.79	0.779
AAP ⟹ SES		- 0.00	0.00	0.01	0.905

Dependent variable: Average academic performance (AAP); **Predictor**: Breakfast skipping (BFS), Caregiver's educational level, Caregiver's occupational level and Socio-economic status (SES)

CHAPTER FIVE

5.0 DISCUSSION

5.1 Introduction

This study was carried out to assess the prevalence of in-school adolescents who skipped breakfast, the association between dietary intake and nutritional status of adolescents, factors that influence breakfast skipping among adolescents, the association between skipping of breakfast and nutritional status, and the association between breakfast skipping and academic performance. The chapter presents information from the results of this study and compared it to the results of previous similar studies.

5.2 Prevalence of skipping breakfast among adolescents

Based on the results obtained from breakfast skipping among adolescents in the Tamale metropolis, it was reported that majority (72%) of adolescents consumed breakfast whiles 28% of in-school adolescents skipped breakfast. Khurshid et al (2018) also reported in a study that the prevalence of adolescents who skipped breakfast was 30% and adolescents who consumed breakfast was 70%.

Another researcher confirmed that 55.0% of students said they never skipped breakfast, 17.4% said they did so occasionally, 18.0% said they did it frequently, and 9.5% said they did so always. Comparing breakfast prevalence (breakfast consumption and skipping of breakfast) from previous studies to this study, their prevalence was quite higher than this study. Although there was an increase in the prevalence of skipping breakfast in these earlier studies, it is necessary to consider

sample differences as well as variations in how breakfast consumption in earlier studies was assessed.

From the results, in-school adolescents in public schools skipped breakfast more often compared to in-school adolescents in private schools. The factors causing the disparity between breakfast skipping in public and private schools was the fact that in-school adolescents from public schools mostly come from a poor socio-economic background and those who are given breakfast feeding money deliberately skip breakfast to be able to buy more lunch. On the part of the private schools, the in-school adolescents were mostly allowed to consume breakfast at home, or it was packaged for them to eat it in school. Those who were given money for breakfast bought it because lunch has been provided for them in the school. This finding is similar to that of Jayaveloo et al (2021), which revealed that in-school adolescents from developed countries such as China had the most frequent breakfast per week and high KAP scores than in-school adolescents from developing countries such as Malaysian and Indian students.

From the data, it showed that 76.8% of adolescent females skipped breakfast while 23.2% of males were also found to be skipping breakfast. Contrarily to this finding, the prevalence of breakfast skipping among female adolescents was quite higher than among male children (Intiful & Lartey, 2014). The most likely rationale is that girls, especially adolescent girls, are more likely to be concerned about their weight and are consequently more likely to skip breakfast to manage their weight.

5.3 Dietary Intake and Nutritional Status of Adolescents

From the data gathered, comparisons were made between the mean dietary intake of males and females. It was observed that the mean nutrients or dietary intake of the adolescents had no significant association in all nutrient intake between males and females except vitamin C. The finding showed that females vitamin C consumption was high than that of males.

The mean nutrient of those who skipped and those who eat breakfast were compared, vitamin C and calcium were the only nutrients that were significant. The result implies that, adolescents who ate breakfast had a higher intake of vitamin C and calcium nutrient than those who skipped breakfast.

Out of 72.0% who consumed breakfast, 95% were reported eating breakfast at home, this indicates that parents made a significant effort to make sure that their wards were receiving the necessary nutrients and energy to help them grow. This finding can be supported with the study conducted by Intiful et al (2014), who argued that encouraging breakfast consumption is a way to ensure that adolescents meet their daily nutrients and dietary intakes.

Also, based on the WHO growth criteria for BMI, when their BMI -for- age was compared among gender, the findings showed that 27.4% and 7.1% of male were overweight/obese and thin (underweight) respectively. For the MUAC performance, 82.5% adolescents were within the normal range and 25% of males and 21.15% females were moderately at risk of developing malnutrition.

Generally, it could be deduced that the MUAC status of adolescents in the Tamale metropolis were within the normal range when compared to WHO criteria. This is supported by Olatona et al (2022), who also reported that adolescents had normal nutritional status but those who skipped

breakfast had a lower dietary intake than those who ate breakfast. Comparing findings of this study to a study done by (Intiful & Lartey, 2014) children who skipped breakfast were found to have normal nutritional status in the study.

As it was expected, more of the children had their breakfast made to replace nutrients lost. Some adolescents also ate breakfast at home (12.4%) than at school or on the way and it was also found that breakfast consumers were significantly higher in school (87.6%). However, among those who skipped breakfast, lack of time (15.4%) on the part of parents and children was one of the reasons. Without breakfast, many of the children will have consumed sugary beverages which could lead to excess energy and would not have met their daily nutrient requirements. Encouraging breakfast consumption among school children is a way to ensure that they meet their daily nutrient and energy intakes (Olatona et al., 2022).

Another study proved that, overweight was also much higher than thinness in adolescents in the government schools since most of them skipped breakfast to consume sugary foods and had less understanding on benefits of a healthy breakfast (Annan et al., 2020). From previous studies, most of the adolescents in the northern part of Nigeria had normal nutritional status but in-school adolescents who skipped breakfast had a lower dietary intake than those who consumed breakfast (Olatona et al., 2022).

There was a high prevalence of malnutrition among in-school adolescents participating in a school feeding program (Owusu et al., 2017; Tandoh et al., 2021). National School Feeding Programs (NSFP) was introduced to provide healthy and nutritious lunch for in-school adolescents, but adolescents in public schools in the Tamale metropolis still fall short of dietary intake and daily nutritional requirements because it not been done any more.

5.4 Factors that influence skipping of breakfast among adolescents

From the findings, gender and grade had a significant association with skipping of breakfast. This means that, gender and grade influence adolescent breakfast skipping. But for age of adolescents, mother or female caregiver educational level and occupation had no association with adolescent consumption of breakfast. As contributing causes to adolescents skipping breakfast, several studies have connected low socioeconomic status and educational level of parents (Olatona et al., 2022).

5.4.1 Focus group discussion

Understanding of what breakfast is among in-school adolescents

Breakfast is the first meal of the day which plays a crucial role in the life of adolescents for their physical, social and cognitive development. From the focus group discussion (FGD), it was observed that most of the adolescents understood the concept of breakfast and the health benefits of taking breakfast on a regular basis. The benefits of breakfast as outline by the in-school adolescents are in three folds. In terms of physical development, eating breakfast more often helps in-school adolescents to grow healthy.

This is confirmed by a study which was conducted by Adolphis et al (2013), about the beneficial effects of breakfast on physical and cognitive activities of school children in classroom. The benefits were so obvious among well-nourished in-school adolescents than malnourished in-school adolescents.

Another effect of breakfast is on the emotional and social development of in-school adolescents. The participants in the FGD indicated that when they take breakfast in the morning or break periods, it enhanced their socialization skills since they are able to participate in social gatherings and extra-curricular activities such as sports, entertainment, debates and class participations. From the result, the study recommends that, the school feeding program should be implemented again and this time around they should add breakfast to the lunch to boost the social and psychological development of in-school adolescents. In a study by Khurshid et al (2018), negative emotional status was observed more in adolescents who skipped breakfast than those who consumed breakfast. Effective nutritional interventions in the form of food fortification and supplementation should be provided, to prevent other food deficiencies which would hamper the social and psychological development of in-school adolescents (Tandoh et al., 2021).

According to the participants of the focus group discussion (FGD), breakfast has a lot of benefits on crucial development of in-school adolescents. Some participants indicated that they cannot concentrate in class or even perform academic activities when they have not eaten. There is a positive relationship between habitual breakfast frequency and the quality of academic scores (Adolphus et al., 2015). Although most of the students indicate that they took breakfast but some of the participants reiterated that they did not take breakfast since it has detrimental effects on their academic performance such drowsiness, and fatigue.

5.4.2 Breakfast eating habits

The participants in the focus group discussion (FGD), mentioned several diets that served as breakfast in their part of homes. Their main concern was the fact that it was not a normal practice

for some households to prepare nutritious meal as breakfast. They mentioned that most of their parents reheat leftover foods or prepare any available staple food without considering its balanced diet. Encouraging breakfast consumption among in-school adolescents is a way to ensure that adolescents meet their daily nutrients and energy intake (Intiful & Lartey, 2014).

In the study area, most of the in-school adolescents consume breakfast but the dynamics is the nutritional composition of the meal. Apart from that, most adolescents in the northern part of the country suffer from malnutrition than those in the southern part of the country (Sienso & Lyford, 2018). In-school adolescents with a normal BMI who is neither overweight/obese, and mostly consumes breakfast in the study area had a higher academic performance during an academic evaluation than their counterparts who did not consume breakfast on a regular basis (Peña-Jorquera et al., 2021). The main reason for the skipping of breakfast among in-school adolescents is the fact that most of their parents, guardians or caregivers are not able to afford 3 nutritious square meal a day and those who can afford also gives the money to their wards. The adolescents who skipped breakfast in order to use their feeding fee to buy more lunch which can provide them with the adequate nutritional and dietary intake. Several studies have cross examined the benefits of breakfast on academic performance but the limitation is on how breakfast is measured and the nutritional composition of breakfast. Divergent definitions of breakfast and classifications are employed in the cross-sectional studies of effects of breakfast on academic performance (Adolphus et al., 2015).

The prevalence of habitual breakfast skipping is high among in-school adolescents from the public schools than the private schools. Most of the in-school adolescents are either given feeding money or do not take breakfast in their homes but their counterparts in the private schools mostly eat their breakfast before coming to school or are given breakfast to come to school. Tishigu Anglican and

Police Barracks basic school which are public schools had not constructed canteen, but hawkers are allowed to come and sell food on the school premises. On the other hand, the in-school adolescents in SOS Hermann Gmeiner had a well-constructed canteen where they take breakfast during break periods. The other private school Elsie Lund's did not have a well-constructed canteen but an eatery where most of the school children took their breakfast regularly and most of took their breakfast at home before coming to school.

5.4.3 Understanding of healthy breakfast

From the results of the study, it was revealed that in-school adolescents in private schools namely SOS Hermann Gmeiner and Elsie Lund's consume healthy breakfast on a regular basis than in-school adolescents in public school, Tishigu Anglican and Police Barracks basic school. Most of the adolescents in the private school consume light and liquid foods such as tea, porridge, tombrown, oats, wheat, ricewater. On the other hand, in-school adolescents in Tishigu JHS consumed solid foods such as TZ, jollof rice, yam and banku tends to make them a little sleepy or fatigued as a result of the fermentation. Another observation from the focus group discussion (FGD) is that adolescents in the private schools had knowledge, positive attitude and understanding of a healthy breakfast than their counterparts in the public school.

5.4.4 Factors influencing breakfast skipping

From the findings of the study, it was identified that skipping breakfast over a long period may affect the health, physical, social, and cognitive abilities of in-school adolescents. Promoting the benefits of eating breakfast could be a simple and important public health message (Smith, Gall,

McNaughton, et al., 2010). There are so many factors that influence in-school adolescents breakfast skipping. The focus group discussion (FGD) revealed that public in-school adolescents had the most frequent breakfast skipping in the Tamale metropolis. In-school adolescent in Tishigu Anglican had good knowledge of breakfast, nutrition, and a healthy breakfast partly due to the subject Basic Designs and Technology (BDT) that was taught in their curriculum but did not practice accordingly especially in school due to financial constraints, and food preferences. In perspective with other studies, students in the tertiary schools skipped breakfast than adolescents students (Jayaveloo et al., 2021). The habitual skipping of breakfast is prevalent among medical students since they have heavy coursework and inadequate time for other activities. These student in the tertiary schools experience variety of neuroglycopenic symptoms to a level that it affects their performance during their academic activities and clinical sessions (Paul et al., 2020.)

For possible factors that influence breakfast skipping were more personal choices such as having no time to consume breakfast, did not like to take it early, having no appetite or oversleeping (Fareed & Waseer, 2017). The FGDs later deduced that factors influencing breakfast skipping can be categorized into health, finance, time, economic reasons, social reasons. Most of the in-school adolescents in the Tamale metropolis skip breakfast because there was no feeding money, to avoid lateness, laziness to prepare a meal, health implications such as drowsiness in class, and social beliefs. In most communities in the Tamale metropolis, the option of breakfast is limited to overnight leftover foods or staple food such as porridge.

The frequent patronage of this food as breakfast causes boredom and monotony among the school children which discourages them from consuming the breakfast on a regular basis.

5.5 Association between skipping of breakfast and nutritional status

Breakfast skipping has no risk associated with BMI -for- age because the adjusted odds ratio was less than 1.Chi-square analysis revealed breakfast skipping had no significant association with the BMI and MUAC of the adolescents. Contrarily to this major finding, other studies by Smith et al (2022), indicated that adolescents who skipped breakfast in both childhood and adulthood had a larger waist circumference, higher fasting insulin, total cholesterol and cholesterol concentration than those who consumed breakfast. Again, eating breakfast more often among adolescents help to maintain a healthy weight (Paul et al., 2022; Rampersaud, 2009).

5.6 Association between skipping of breakfast and academic performance

In analyzing the association between breakfast skipping and average academic performance, all variables had a negative correlation when they were compared with academic performance. The association between breakfast skipping and academic performance among public and both schools were negatively significant. The findings shows that when adolescent skip breakfast then they will have poor academic performance but if they consumed breakfast then they will have good academic performance.

In linear regression, when breakfast skipping is compared with academic performance within both school, there is 8.9% probability of the breakfast skipping having a negative effect on academic performance, but when breakfast skipping and academic performance is compared between schools, then there is 2.1% probability that breakfast skipping will negatively affect academic performance in public school but in private school, there is 14% probability of breakfast skipping not having an effect on academic performance. Comparing the results of this study to Adolphus et al., (2019), breakfast has positive benefits on many adolescents' academic performance. The frequency of habitual breakfast and the quality of academic results are positively correlated.

Similarly, in a study by Feye (2021), it was revealed that breakfast skipping had an effect on academic performance. However, breakfast skipping was limited to that day while data on academic performance was cumulative over a period of time.

5.7 Limitation of the study

The study was only done in a small portion of the region; therefore it cannot be applied to the entire population. The study employed a convenience sample approach to choose the schools, hence not generalizing the population. Absenteeism of student may also affect the finding of academic performance. Also, as a result of the study's participants providing their own information, there can be social desirability and recall bias.

CHAPTER SIX

6.0 CONCLUSION AND RECOMMENDATION

6.1 Conclusion

It was revealed that there was low prevalence of breakfast skipping among adolescents in both the private and the public schools. About two-third of the in-school adolescents consume breakfast at home and consume breakfast throughout the week. The factors that influenced breakfast skipping among in-school adolescents were grouped into lack of time, economic reasons, social reasons, and health implications.

There was no significant association between breakfast skipping and nutritional status. Breakfast skipping had significant association on academic performance of both the private school and the public school. However, the effect of breakfast skipping on academic performance was higher in the public schools than the private schools. It can be concluded that breakfast skipping had a significant association with academic performance when it was compared between both private and the public schools.

6.2 Recommendations

To improve the probability of breakfast consumption among in-school adolescents in the Tamale metropolis and reduce the prevalence of breakfast skipping among students, the following recommendations are suggested.

- Nutrition education should be given to parents or care givers and the adolescents on the importance of breakfast to their health and growth.
- Education on what a healthy or nutritious breakfast is should be given to parents and adolescents to avoid them making wrong food choices.
- Based on the findings of this study were 27.4% male and 24.1% female were overweight/obese. A nutrition intervention should be done to reduce overweight and obesity prevalence among adolescents.
- It is recommended that school feeding program should also include breakfast and not only lunch.

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APPENDICES

Appendix i: Parent or Caregiver Consent form

Section A – BACKGROUND INFORMATION

Title of Study: The Association Between Skipping Breakfast and Academic Performance Among Adolescent Children (10 - 16 Years) In Tamale Metropolis, Northern Ghana

Section B – GENERAL INFORMATION ABOUT THE STUDY

Please you are welcome to part take in this research. This study is to assess the association between skipping breakfast and the academic performance of adolescents between the ages of 10 - 16 years in the Tamale metropolis. This research will provide more information on adolescent nutrition while also providing global health with information on adolescent well-being and health. If you agree to participate in this study, you will be asked questions about the parent or caregiver's age, gender, educational level, marital status and others, mother or caregiver's knowledge of the importance of breakfast, adolescent age, gender, educational level, and others, adolescent knowledge on the importance of breakfast, household assets, 24-hour dietary recall, measuring of adolescent heights and weights, and adolescent academic performance.

It will take 15 to 20 minutes of your time to complete this interview.

Benefits of the study

There is no direct benefit for you in this study, but the finding of this study would benefit you indirectly, as it going to be used in making policies to help solve nutritional problems among adolescence.

Risk of the study

There will not be any foreseeable risk to the participants but some of the questions may intrude on your privacy.

Confidentiality

Information collected by this study will be stored in the investigator's file and identified by a code number only. The code key connecting your name to specific information about you will be kept

in a separate, secure location. Information contained in your records may not be given to anyone unaffiliated with the study. However, the Institutional Review Board of the College of Basic and Applied Sciences, of the University of Ghana may audit research records as part of its auditing program, but these evaluations will only examine the researcher's responses and activities.

Compensation

You will not be paid for taking part in this study.

Withdrawal from Study

You have the option to opt-out of this study if you don't want to participate. If you later change your mind about participating in this study, you may withdraw with no penalty.

Contact for Additional Information

For any questions or information, participants should kindly contact

Miss Hamdiyatu Abubakari- 0244899602

Dr. Audain Keiron – 0548272005

Dr. Husein Mohammed - 0559369505

The University of Ghana, Department of Nutrition and Food Science

If you have any issues with your rights as a participant you can contact the address below:

Administrator, Ethics Committee for Basic and Applied Sciences

College of Basic and Applied Sciences

University of Ghana

P. O. Box LG 68

Legon – Accra

IP No.: 3014

Email: ethicscbas@ug.edu.gh

Section C – VOLUNTEER AGREEMENT

"I have read or have had someone read all of the above, asked questions, received answers regarding participation in this study, and I am willing to give consent for me, my child/ward to participate in this study. I have not waived any of my rights by signing this consent form. Upon signing this consent form, I will receive a copy for my personal records."

_____

Name of Volunteer

_____ _____

Signature or mark of volunteer Date

If volunteers cannot read the form themselves, a witness must sign here:

I was present while the benefits, risks, and procedures were read to the volunteer. All questions were answered, and the volunteer has agreed to take part in the research.

_____

Name of witness

_____ _____

Signature of witness Date

I certify that the nature and purpose, the potential benefits, and possible risks associated with participating in this research have been explained to the above individual.

_____

Name of Person who obtained Consent

_____ _____

Signature of Person who obtained Consent Date

Appendix ii: Adolescent children and mother or caregiver questionnaire

STUDY QUESTIONNAIRE

DEPARTMENT OF NUTRITION AND FOOD SCIENCE

UNIVERSITY OF GHANA, LEGON

THE ASSOCIATION OF SKIPPING BREAKFAST AND ACADEMIC PERFORMANCE IN ADOLESCENTS (10 – 16 YEARS) IN SCHOOLS AT TAMALE METROPOLIS.

INFORMED CONSENT

Good morning/afternoon/ evening. My name is Hamdiyatu Abubakari, and I am an MPhil. Student from the above institution. I wish to have a conversation with you on the above topic and would much appreciate your participation. This interview would take 15 to 20 minutes of your time. The finding of this study would benefit you directly or indirectly, as it going to be used in making policies to help solve nutritional problems. All information that you will provide will be confidential and will not be seen by anyone other than members of the team. Your participation in this study is voluntary and you are at liberty to opt-out. However, I hope you will participate fully in this survey since your opinion is important. Can we begin the interview now?

Participant signature: ……

Date of interview: __/ __/2022

1. Name of school/ community: _____
2. Name of district: _____
3. Name of child: _____
4. Questionnaire ID: _____

SECTION A: SOCIO-DEMOGRAPHIC CHARACTERISTICS OF MOTHER

5. Age of parent/ caregiver ……(years)
6. What religious faith do you practice? 6.[ ]

   1= Christianity 2= Islam 3= ATR 4= Others, specify…….
7. What is your marital status? 7.[ ]

   1= Single 2= Married 3= Divorced 4= Widowed 5= Others, specify……
8. Which ethnic group do you to belong? 8.[ ]

1= Dagomba 2= Mamprusi 3= Moshi 4= Akan 5= Frafa 6= Ewe 7= Gonja

8= Others, specify…….

9. What is your educational level? 9.[ ]

1= None 2= Primary 3= Middle/ J.H.S 4= S.H.S 5= Vocational training 6= Tertiary

7= Others, specify…….

10. What is the occupation of the parent/ caregiver? 10.[ ]

1= None 2= Professional 3= Service 4= Trader/ business 5= Manual worker

6= Agriculture/farmer 7= Others, specify…….

11. How many children do you have? 11.[ ]

1= 1 to 5 2= 6 to 10 3= >10

12. Approximately how much is your household monthly income? 12.[ ]

1=Nothing or had no idea 2= > 600 to 990 3= 1000 to 3000 4= More than 3000

SECTION B: SOCIO-DEMOGRAPHIC CHARACTERISTICS OF ADOLESCENT

13. How old are you?.....

14. What is your sex? 14.[ ]

1= Female 2= Male

15. What grade/class are you? .....

16. How often do you attend school in a week? 16.[ ]

1= two times a week 2= three times a week 3= four times a week

4= five times a week

17. Who do you live with? 17.[ ]

1= Both parents 2= Single parent 3= Other relatives

18. Do you receive breakfast-feeding money for school? 18.[ ]

1= Yes 2= No

19. If yes how much do you receive?.....

SECTION C: ADOLESCENT KNOWLEDGE OF THE IMPORTANCE OF BREAKFAST AND FACTORS THAT INFLUENCE BREAKFAST SKIPPING

20. Do you usually eat breakfast? 20.[ ]

1= Yes 2= No

21. If yes how many times a week do you eat breakfast? 21.[ ]

1= two to three times a week 2= four to five times a week

3= six to seven times a week

22. If **No** what is your reason? 22.[ ]

1= No time to eat breakfast 2= Don't like the food choices 3= Don't feel hungry 4= I want to lose weight 5= My family don't eat breakfast, so I don't also eat

6= Breakfast makes me feel lazy and less energetic in class

7= others, specify…….

23. What benefit do you get when you eat breakfast? 23.[ ]

1= Breakfast consumption helps me grow 2= Breakfast consumption helps me increase in weight 3= Breakfast consumption makes me energetic in class

4= Breakfast consumption increases my concentration in class

5= others, specify…….

24. Where do you eat your breakfast? 24.[ ]

1= Home 2= School 3= Outside

25. Who prepares breakfast for you? 25.[ ]

1= Mother 2= Sister 3= Self 4= others, (specify)…….

26. A healthy breakfast should contain protein, fiber, fat or oil, and carbohydrate. 26.[ ]

1= True 2= False

27. Consumption of a healthy breakfast helps in losing weight. 27.[ ]

1= True 2= False

28. Eating breakfast that is high in fibre makes you feel full for a longer time. 28.[ ]

1= True 2= False

SECTION C: HOUSING CHARACTERISTICS AND POSSESSIONS

29. How many rooms are there in the house? …….

30. Building materials used for your house.

a. Walls: 1= cement 2= tiles/terrazzo 3= mud 4= others, specify……30a. [ ]

b. Windows: 1= louvre blades 2= wood 3= glass 4= others, specify……...30b. [ ]

c. Roof: 1= aluminium sheet 2= bricks 3= galvanized sheet

4= others, specify……... 30c. [ ]

d. Floor: 1= cement 2= tiles/terrazzo 3= dirty floor 4= others, specify…… 30d. [ ]

31. What type of bed does the household use? 31. [ ]

1= Mattress 2= Mat 3= Others (specify)…….

32. What is your source of drinking water? 32. [ ]

1= Public pipe 2= Borehole 3= Purchase from tanker 4= Private pipe

5= others, specify…….

33. What is your main source of energy for lighting? 33. [ ]

1= Electricity 2= Lantern 3= Candle 4= Torchlight/rechargeable

5= Others (specify)…….

34. What is your main source of energy for cooking? 34. [ ]

1= Charcoal 2= Gas 3= Electricity 4= Others (specify)……

35. What kind of kitchen does the household have? 35. [ ]

1= Outdoor kitchen 2= Indoor kitchen

36. What type of toilet facility do you have in your house? 36. [ ]

1= Private flush toilet 2= Private pit latrine/ KVIP 3= Public flush toilet
4= Compound pit latrine/ KVIP 5= No toilet facility 6= Others (specify)…….

37. Household possessions. (These are a list of things people normally have. Please let me know whether your household has each of that item).

Items	Response (1= Yes; 2= No)	Items	Response (1= Yes; 2= No)
Mobile phone/telephone		Bicycle	
Television		Fridge/ freezer	
Fan		Computer	
car		Air conditioner	
Motorcycle		Tablet	
Generator		Washing machine	
Sawing machine		Others	

SECTION D: DIETARY ASSESSMENT (24-HOUR RECALL)

Approximate time for eating food	Type of meal	Quantity eaten	Food consumed

SECTION F: ANTHROPOMETRY ASSESSMENT

Measurements	MUAC	Height(cm)	Weight(kg)
First recording			
Second recording			
Third recording			

SECTION G: ACADEMIC PERFORMANCE OF ADOLESCENTS

38. Terminal scores for each subject

Subjects	First-term score	Second term score
Science		
Ghanaian		
English		
History		
Social Studies		
Mathematic		
R.M. E		
Career Technology		
OWOP		
Computer		
Creative Art		

Appendix iii: Focus group discussion guidelines

Guideline for focus group discussion

GENERAL

1. When you hear of breakfast, what comes to mind?
2. What do you think breakfast should contain?
3. When you hear of a healthy breakfast what comes to mind?
4. What foods do most of your peers in this part of the country consume as breakfast?

SECTION ONE

5. What time do you consider appropriate to consume breakfast?
6. What time do you think is late to consume breakfast?

SECTION THREE

7. Factors that affect the behaviour of skipping breakfast
8. Do you think finance (money)influences your skipping of breakfast.
9. Apart from the finance, what other things influence your skipping of breakfast?

Appendix iv: Ethical approval (ECBAS)

UNIVERSITY OF GHANA
ETHICS COMMITTEE FOR BASIC AND APPLIED SCIENCES (ECBAS)
P. O. Box LG 1195, Legon, Accra, Ghana

Ref. No: ECBAS 022/21-22

26th May, 2022.

Miss. Hamdiyatu Abubakari
Department of Nutrition and Food Science
University of Ghana
Legon, Accra

Dear Miss.Abubakari,

ECBAS 022/21-22: THE ASSOCIATION OF SKIPPING BREAKFAST AND ACADEMIC PERFORMANCE AMONG ADOLESCENT CHILDREN (10-16 YEARS) IN TAMALE METROPOLIS.

This is to inform you that the above referenced study has been presented to the Ethics Committee for Basic and Applied Sciences for a full board review and the following actions taken subject to the conditions and explanation provided below:

Expiry Date:	08/05/2023
On Agenda for:	Initial Submission
Date of Submission:	09/03/2022
ECBAS Action:	Approved
Reporting:	Annually

Please accept my congratulations.

Yours sincerely,

ETHICS COMMITTEE FOR BASIC AND APPLIED SCIENCES
APPROVED
26 MAY 2022
UNIVERSITY OF GHANA

Professor Dorcas Osei-Safo
ECBAS Chairperson

Appendix v: Introductory letter (GES)

GHANA EDUCATION SERVICE

In case of replythe date and reference number of this letter should be quoted

Our Ref: GES/NR/MEO/ TT.12/VOL.3
Your Ref: .....

Email: *tmetroedu@gmail.com*

REPUBLIC OF GHANA

Metropolitan Education Office
P. O Box 6, TM
Tamale, Northern Region
Tel: 037-2022090

Date: July 18, 2022

LETTER OF INTRODUCTION

HAMDIYATU ABUBAKARI

Reference your letter NFS/AC.4 dated 13th June, 2022 on the above subject matter, and I wish to introduce the above mentioned fellow to you for your kind engagement.

Miss Hamdiyatu Abubakari is an M.Phil Part II Student in the department of Nutrition and Food Science University of Ghana.

She is working on a project titled **"The Association between Skipping Breakfast and Academic Performance of Adolescent Children (10 – 16) in the Tamale Metropolis"**

She has been given permission to enter selected Schools to enable her make enquires to obtain information to determine appropriate schools for the study and make informed decisions about sampling to undertake the study.

However, the permission is granted on the assurance that the Student fully comply with requirements such as noninterference of academic work and confidentiality of selected students.

Find attached his personal letter and concept notes for your attention.

Counting on your usual cooperation.

(ALHASSAN KASSIM)
DEPUTY DIRECTOR - HRMD
For: METROPOLITAN DIRECTOR OF EDUCATION
TAMALE

ALL HEADMISTRESSES/HEADMASTERS OF
SCHOOLS CONCERN
TAMALE