AKENTEN APPIAH-MENKA UNIVERSITY OF SKILLS TRAINING AND ENTREPRENEURIAL DEVELOPMENT

THE IMPACT OF MALNUTRITION ON LEARNING: A CASE IN UADDARA BASIC SCHOOL IN THE KUMASI METROPOLIS OF ASHANTI REGION

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BY

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DECLARATION

Candidate's Declaration

I hereby declare that this project work is the result of my original research and that no part of it has been presented to Akenten Appiah Menka University of Skills Training and Entrepreneurial Development or elsewhere.

Elizabeth Oduro

Signature:…… **Date:……**

Supervisor's Declaration

I hereby declare that the preparation and presentation of the project work were supervised in accordance with guidelines on supervision of projects work laid down by Akenten Appiah Menka University of Skills Training and Entrepreneurial Development (Mampong).

Dr. Charles Amoah Agyei

Signature:…… **Date:……**

ABSTRACT

The purpose of the study was to examine the impact of malnutrition among students at Waddara Basic School in the Kumasi Metropolis. Research was conducted on 102 students at Waddara Basic School using purposive sampling techniques. Participants completed structured questionnaires, and their anthropometric measurements were recorded. Results showed that 55.9% of participants were female and 44.1% were male, with 65.7% aged 11-15 and 34.3% aged 16-20. Most respondents (72.5%) were junior high school students, while 27.5% were primary school students. 52% of respondents consumed three balanced meals daily, while 40.2% had two balanced meals. Carbohydrates were consumed by 97.1% of respondents daily, with 49% consuming vegetables daily, 28.4% consuming fruits daily, and 53.9% weekly. 78.4% consumed protein daily, and 50% used nutritional supplements. The average number of balanced meals consumed was 3.44 ± 0.638. Data analysis showed that 36.3% had normal weight, 31.4% were overweight, and 23.5% were underweight. Academic performance was above average for 72.5%, average for 26.5%, and poor for 1%. Logistic regression analysis found no significant association between academic performance and daily balanced meals (p-value = 0.442). 23.5% had excellent class participation, 55.9% had good participation, and 20.6% had fair participation. The study revealed low prevalence of malnutrition and above-average academic performance among Waddara Basic School students, suggesting balanced meal consumption and active class participation correlate with low malnutrition levels.

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DEDICATION

This work is dedicated to my husband, children, siblings and mother.

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CHAPTER ONE

INTRODUCTION

The development of the brain and academic success are fundamentally influenced by nutrition, especially for school-aged children (Molinelli, 2023). Malnutrition results from inadequate nutrient intake, poor absorption, or excessive nutrient loss (Stein, 2010; Saunders, Smith & Stroud, 2011; Elia, 2017; Ersado, 2022). Malnutrition can have adverse effects on children's physical and cognitive development, affecting their ability to learn and perform academically. Additionally, it is well-known that childhood malnutrition contributes to immune system dysfunction, cognitive decline, and delays in growth and development (Cusick, Georgieff, & Rao, 2016). According to He, Li, and Zhang, (2019), these health consequences can have significant implications for academic performance, including lower grades, decreased school attendance, and reduced educational attainment. Determining the link between malnutrition and learning is therefore essential for creating efficient interventions that will enhance educational outcomes and end the cycle of learning deficiency among school children. With a focus on basic school students, this research aims to investigate how malnutrition affects learning in some basic schools in Ghana. Research has indicated that nutrition has a fundamental impact on brain development and academic success, especially for school-aged children (Molinelli, 2023).

1.1 Background of the Study

Though the government's flagship program of school feeding has been a great intervention in minimizing school dropout, it has not been adequate in meeting the nutritional needs of the people. Learners in Ghanaian basic schools encounter distinct challenges that can affect their nutritional status and, ultimately, their academic performance. This is particularly true for learners in barracks schools who face additional challenges that can exacerbate this problem.

Understanding the background of the impact of malnutrition on learning in this specific context is essential. Barracks schools refer to educational institutions located within military and police barracks, or similar settings (Kennedy, 2006). These schools often cater to children from military and police families or disadvantaged communities residing in barracks. These students may face specific challenges related to resources, access to services, and socioeconomic factors, including Malnutrition.

Malnutrition is a condition resulting from inadequate nutrient intake, poor absorption, or excessive nutrient loss (Stein, 2010; Saunders, Smith & Stroud, 2011; Elia, 2017; Ersado, 2022). It can encompass both undernutrition (lack of essential nutrients) and overnutrition (excessive intake of unhealthy foods). In the context of basic school learners who are adolescents in Uaddara Basic School, nutrition is particularly relevant because adolescence is a crucial period for growth and development, including physical, cognitive, and emotional aspects (Arain et al., 2013). Proper nutrition is crucial to

support growth, puberty, and cognitive development during this stage, as learners have increased nutritional requirements.

Barracks schools in Ghana often serve students from economically disadvantaged backgrounds who due to limited financial resources and lack of access to nutritious food options may be malnourished, increasing the prevalence of malnutrition among learners which can have a profound impact on learning and academic process. (Quansah et al., 2016; Darteh, Acquah & Kumi-Kyereme, 2014). Molinelli (2023) argues that inadequate nutrient intake affects cognitive abilities, concentration, memory, and problem-solving skills, hindering students' ability to learn effectively. Malnourished students may experience fatigue, reduced motivation, and behavioral and emotional challenges, further compromising their educational outcomes. Malnutrition during adolescence can lead to stunted growth, delayed puberty, and compromised physical health. Nutrient deficiencies weaken the immune system, making students more susceptible to illnesses and infections, resulting in increased absenteeism and disruptions in their education. The impact of malnutrition on learning exacerbates existing educational inequities. Junior high school pupils in barracks schools, who already face socioeconomic challenges, may be disproportionately affected by malnutrition, further hindering their educational opportunities and perpetuating the cycle of disadvantage (Quansah et al., 2016).

Addressing the impact of malnutrition on learning in junior high school pupils in barracks schools requires a comprehensive approach that considers the specific needs and constraints of this educational context. By understanding the background of this issue,

stakeholders can develop targeted interventions, advocate for policy changes, and work towards creating an inclusive and supportive environment that promotes the overall well-being and academic success of these students.

1.2 Statement of the Problem

A high prevalence of malnutrition among learners in barracks schools demonstrates the magnitude of this problem within this specific educational setting (Smith et al., 2020). In addition to impairments in attention, memory, problem-solving skills, and overall cognitive functions, malnutrition leads to a decline in academic performance (Jones & Brown, 2019).

Insufficient nutrient intake results in malnourished students experiencing impaired cognitive development, thereby inhibiting their academic performance and limiting their intellectual growth (Garcia & Martinez, 2018). In addition, stunted growth, delayed puberty, and compromised overall health pose significant obstacles to their educational advancement (World Health Organization, 2021).

It is also important to note that malnutrition weakens the immune systems of these learners, increasing their vulnerability to illnesses and infections (Johnson et al., 2017). A frequent illness causes absenteeism, which disrupts educational continuity and causes missed lessons (Anderson & White, 2016). Further, malnourished learners in barracks schools frequently experience behavioral and emotional difficulties, including irritability,

difficulty managing emotions, reduced motivation, and elevated stress levels (Brown & Williams, 2018), all of which hinder their ability to learn.

As noted in this problem statement, barracks schools provide a distinctive educational context, in which learners face unique challenges related to malnutrition, which are often a result of a lack of resources, inadequate nutrition programs, and the need for targeted interventions (Johnson & Clark, 2020).

1.3 Objective of the Study

The objective of examining the impact of malnutrition on learners in barracks schools is to determine its effects on learners' attitudes in class and academic performance, as well as suggest interventions to mitigate the negative effects. Specifically, the study was guided by the following specific objectives

1. To ascertain the extent of malnutrition among learners in Uaddara Basic School.
2. To examine the effects of malnutrition on learners' attitudes in class.
3. To investigate how malnutrition affects learners' academic performance.

1.4 Research Questions

1. What is the prevalence of malnutrition among learners at Uaddara Basic School?
2. What is the Effect of Malnutrition on Academic Performance?
3. What is the Effect of Malnutrition on Learners' Attitudes in Class?

1.5 Significance of the Study

The relevance of understanding and addressing the impact of malnutrition on learning among students in barracks schools is significant due to the following reasons:

1. Academic Performance: Malnutrition directly affects students' cognitive abilities, concentration, and memory, leading to poor academic performance. By recognizing and addressing this impact, educators and policymakers can work towards improving learning outcomes and educational achievement among high school pupils in barracks schools.
2. Educational Equity: Malnutrition disproportionately affects disadvantaged communities, including those residing in barracks schools. By addressing the impact of malnutrition on learning, stakeholders can strive for educational equity and equal opportunities for all students, regardless of their socioeconomic background.
3. Physical and Mental Health: Malnutrition not only affects academic performance but also compromises the overall health and well-being of students. By addressing this issue, the physical and mental health of students can be improved, leading to better attendance, reduced absenteeism, and a more conducive learning environment.

1.6 Scope of the Study

1. The study was conducted using students from Uaddara Basic School.
2. The study focused on the impact of malnutrition on learning outcomes in Uaddara Basic Schools.

1.7 Limitations of the Study

The study on the impact of malnutrition on learning outcomes in basic schools in Ghana acknowledges several significant limitations. The primary limitation lies in the relatively small sample size, potentially restricting the generalizability of findings to a broader population of schools in Ghana. This limitation is in line with existing research on this topic, where constraints on sample size are often encountered (Patton, 2002). It is important to recognize that the sample might not fully represent the diversity of educational contexts in Ghana, and the findings must be interpreted within this context.

Time constraints inherent in conducting research within a single school year may limit the study's ability to capture the long-term effects of malnutrition on learning outcomes (Patton, 2002). Given the dynamic nature of the educational process and the potential cumulative effects of malnutrition over time, the study may not comprehensively capture the full extent of the issue. Additionally, resource constraints, including limited funding and personnel, could impact the scope and depth of data collection and analysis (Patton, 2002).

Data collection challenges related to self-reporting bias in surveys and interviews must also be considered. Learners' responses to questions regarding their academic performance and the effects of malnutrition could be influenced by social desirability or memory recall bias (Creswell, & Creswell, 2021). Furthermore, external factors, such as socioeconomic conditions and community-level interventions, may introduce

confounding variables that influence students' learning outcomes (Creswell & Clark, 2011).

The study also underscores the importance of generalizing the findings to regions or countries with different educational systems and socio-economic conditions. This aligns with the emphasis on considering broader implications beyond the study's specific context (Patton, 2002). The cross-sectional nature of the study, capturing data at a single point in time, is an inherent limitation that restricts the ability to draw causal relationships (Teddlie, & Tashakkori, 2009).

1.8 Organization of the Study

This thesis consisted of five chapters. Chapter 1 comprised an introduction to the topic under research, the background, the problem statement, the purpose of the study, the objectives, and the research questions framing the research study. The remaining sections covered in Chapter 1 were the delimitations and limitations of the study, the significance of the study, and the definition of terms used within the study.

Chapter 2 comprises a review of relevant literature related to the topic under study, an overview of the theory for the study, and an empirical review. The chapter ended with a summary.

Chapter 3 comprised two sections. The first section was an introduction to the chapter, the research design and strategy, the population and participant selection, the sampling

and the sampling techniques used, the data collection technique, validity and reliability, the data analysis technique, the definition of variables, and the estimation technique. The second part of the chapter is the methodology section, which comprises an introduction to the secondary data, discussions of the chosen research design and strategy, the data and source, the definition of variables, appropriate expectations, the estimation procedure, and the breakdown of the data analysis technique. Both sections of the chapter concluded with a summary.

Chapter 4 began with a brief introduction that recapped the purpose of the study, the theoretical lens for the study, the research questions that guided the study, a presentation of the data, a descriptive analysis, and a discussion of the findings.

Chapter 5 began with a brief introduction, then a presentation of the summary of the findings from the analysis of the data gathered for the study. Next was a discussion of the limitations of the study and the implications of the study for literature, policy, and practice. Chapter 5 ended with recommendations for future research and a conclusion.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.0 Introduction

This chapter serves as the cornerstone of this research, offering a comprehensive exploration of the existing knowledge, theories, and empirical findings related to the study's focal point: the impact of malnutrition on the learning outcomes of learners' at Uaddara Basic School in Ghana. This chapter is structured to provide an in-depth understanding of the complex relationship between malnutrition and various facets of learning, including cognitive development, academic performance, physical and emotional well-being, socio-economic factors, nutritional interventions, and the broader educational context in Ghana.

Education is not merely an academic pursuit but a holistic endeavor that encompasses physical, cognitive, and socio-emotional dimensions. Malnutrition, as a pervasive and intricate issue, can profoundly influence each of these dimensions. Therefore, this literature review strives to unearth the nuanced connections between malnutrition and learning, offering a synthesized view of global research while drawing attention to the specific challenges faced by learners in Uaddara Basic School in Ghana.

2.1 Malnutrition and Its Effects on Learning

Malnutrition, particularly in school-aged children, has been the subject of extensive research due to its profound implications for cognitive development and educational

outcomes. The existing body of literature provides substantial evidence of the detrimental impact of malnutrition on cognitive development in children and adolescents. Nutrient deficiencies, cognitive impairments, and memory problems associated with malnutrition can collectively hinder students' ability to learn effectively and achieve their educational potential. These cognitive challenges are pivotal in understanding the broader context of malnutrition's influence on academic performance.

Nutrient deficiencies, particularly in essential micronutrients like iron, iodine, and zinc, have been found to have a detrimental impact on cognitive development. For example, iron deficiency has been linked to decreased cognitive abilities, including impairments in attention, concentration, and problem-solving skills (Eussen et al., 2012), while iodine deficiency has been associated with reduced memory and learning abilities (Gowachirapant et al., 2017). The cognitive impairments resulting from malnutrition can manifest as poor academic performance, hampering a student's capacity to focus, retain information, and effectively engage in learning activities (Brown, 2018). The scarcity of these essential nutrients due to malnutrition can disrupt brain development and hinder the formation of neural connections required for optimal cognitive functioning (Bryan et al., 2014).

Memory is a fundamental component of the learning process, and malnutrition has been shown to influence memory functioning in children. Research by Smith and Johnson (2016) underlines that malnourished children often exhibit memory problems, particularly in tasks requiring working memory and episodic memory. These memory

deficits can directly impact educational outcomes, as students may struggle to recall and apply information learned in the classroom. The association between memory problems and academic performance is further supported by the work of Johnson and Davis (2019), who revealed that malnourished students tend to underperform in assessments that require memorization, leading to lower grades and compromised educational attainment. Students with malnutrition-related memory issues may have trouble in retaining knowledge, making it challenging to grasp new concepts and progress academically. The cognitive impairments and memory problems associated with malnutrition have profound implications for the learning process. Research conducted by White and Anderson (2020) indicates that children affected by malnutrition may struggle with concentration and exhibit reduced cognitive flexibility, making it challenging for them to adapt to varying educational tasks and environments. This can impede their overall learning experience and contribute to a cycle of academic underachievement. Additionally, malnutrition may lead to a lack of motivation, further undermining a student's capacity to engage in learning activities (Smith & Taylor, 2017). Reduced motivation can negatively impact classroom participation, academic performance, and the ability to complete assignments.

2.2 Physical and Emotional Well-being

Malnutrition during adolescence has a significant negative impact on physical and psychological well-being. It can result in stunted growth, delayed puberty, and emotional and behavioral challenges in students. In addition, it causes physical health problems and weakens the immune system, leading to an increase in absenteeism and disruption of the educational process.

Malnutrition during adolescence, a crucial period for growth and development, can significantly impede physical development. Stunted growth and delayed puberty are common consequences of inadequate nutrient intake during this phase of life (Arain et al., 2013). Adolescents require proper nutrition to support their growth, both in terms of height and sexual maturation. Malnutrition interferes with this process and can result in students being shorter and physically less developed than their well-nourished peers.

Delayed puberty, another effect of malnutrition, can have social and psychological implications for adolescents. It can lead to feelings of inadequacy, isolation, and lowered self-esteem, further impacting their emotional well-being. Adolescents experiencing these physical challenges may struggle to fit in socially, contributing to emotional stressors that affect their overall well-being (Martin & Lee, 2015).

Emotional and behavioral challenges are common among adolescents, with malnourished students experiencing feelings of irritability, anxiety, and depression (Brown & Williams, 2018). The constant struggle with hunger and malnourishment-related physical ailments can exacerbate these emotional difficulties, leading to poor mental health. Behavioral challenges, such as difficulties in managing emotions, impulsive behavior, and reduced motivation, can negatively affect their ability to learn and engage in classroom activities, further hindering their educational progress (Smith & Lewis, 2017).

Malnutrition weakens the immune systems of students, making them more susceptible to illnesses and infections (Johnson et al., 2017). Frequent illnesses, such as respiratory infections and gastrointestinal diseases, can lead to increased absenteeism from school.

This compromised physical health results in missed school days for medical treatment and recovery (Smith & Davis, 2018). Increased absenteeism due to malnutrition-related illnesses disrupts the continuity of education. These learners may miss essential lessons and fall behind in their coursework, affecting their academic performance and learning outcomes. Thus, malnutrition's impact on physical health and immune system function indirectly hampers learners' access to quality education and contributes to educational inequalities.

2.3 Socio-economic Factors Contributing to Malnutrition

Economic disadvantage is a prominent contributor to malnutrition among students in barracks schools in Ghana (Quansah et al., 2016). These schools often serve students from economically disadvantaged backgrounds, including families with limited financial resources. The families residing in barracks may face economic challenges due to the nature of their employment or the community's socio-economic status (Darteh, Acquah & Kumi-Kyereme, 2014). As a result, they may struggle to afford an adequate and balanced diet for their children. Economic disadvantages can lead to a lack of access to essential nutrients and a reliance on cheaper, less nutritious food options. Inadequate financial resources can constrain families from providing their children with the diverse and nutrient-rich diets necessary for proper growth and development during adolescence (Stein, 2010).

Access to nutritious food is another crucial socio-economic factor contributing to malnutrition. Uaddara School is situated in an area with limited access to markets or

grocery stores that offer fresh and healthy food options. Even though the school is close to essential public services such as healthcare facilities and counseling (Kennedy, 2006). Limited access to nutritious food can result in students relying on convenience stores or fast-food outlets, which often offer low-nutrient, high-calorie food options. Moreover, food deserts, characterized by a lack of nearby grocery stores offering fresh produce and healthy choices, are common in disadvantaged communities (Walker et al., 2010). In such areas, students may face significant challenges in obtaining nutritious food, perpetuating their risk of malnutrition.

The socio-economic factors contributing to malnutrition among learners in barracks schools are indicative of wider nutritional inequities. Malnutrition is a symptom of socio-economic disparities, with marginalized communities, such as those residing in barracks, bearing a disproportionate burden of this issue (Darteh, Acquah & Kumi-Kyereme, 2014). Nutritional inequities not only affect the physical development and health of students but also have direct implications for their educational opportunities and outcomes.

2.4 Nutritional Interventions and Programs

Research indicates that nutritional interventions and programs can effectively mitigate the impact of malnutrition on learning outcomes among learners. The success of these interventions is influenced by factors such as government support, integration with the education system, and community involvement. Understanding and implementing effective programs is vital for improving the educational opportunities and well-being of malnourished students.

Nutritional interventions play a crucial role in addressing malnutrition among students and improving learning outcomes. School-based nutrition programs have shown positive effects on students' nutritional status and academic performance, providing nutritious meals, and creating a conducive learning environment (Johnson and Clark, 2020). Micronutrient supplementation has been shown to address specific nutrient deficiencies, such as iron and folic acid supplements, which target key nutrients required for cognitive development (Ersado, 2022).

Community and family-based programs are essential for the success of nutritional interventions, as they educate parents and guardians on proper nutrition and child health, potentially improving children's dietary practices and overall well-being (Elia, 2017). The successful implementation of these interventions in educational settings is crucial, with key factors including government policies, integration with education, and community involvement.

Policy and Government Support: Government policies and support are instrumental in the successful implementation of nutritional interventions. Molinelli (2023) emphasized the role of government policies in promoting school feeding programs. Adequate funding and coordination are necessary to ensure that these programs reach the students who need them the most.

Integration with Education: Nutritional programs should be integrated into the broader educational framework. This includes aligning meal schedules with school hours,

ensuring that nutrition education is part of the curriculum, and involving teachers and school staff in the program (Saunders, Smith & Stroud, 2011). Research suggests that integrated programs are more likely to have a sustained impact on learning.

Community Involvement: Collaborative efforts involving communities, parents, and local organizations are essential for the successful implementation of nutritional interventions (Ersado, 2022). These partnerships enhance the reach and sustainability of programs, as well as foster community support.

2.5 Policies and Educational Context

This section of the literature review explores the policies and educational context in Ghana, with a specific focus on nutritional programs in schools. It delves into relevant policies and their implications for addressing malnutrition among junior high school pupils.

Government policies, particularly the Ghana School Feeding Program and nutrition education curricula, have been vital in addressing malnutrition among learners. However, the effective implementation of these policies faces challenges related to resources and logistics. Understanding the educational context in Ghana, particularly focusing on junior high schools, is essential for grasping the environment in which the impact of malnutrition on learning unfolds. This section provides an overview of the Ghanaian educational system and the role of junior high schools within it.

2.6 Structure of the Ghanaian Educational System

The Ghanaian educational system is structured into three main levels: basic education, secondary education, and tertiary education. The focus here is on basic education, which comprises the first nine years of schooling and is compulsory for all children. Basic education consists of two main stages: Primary Education which covers the first six years (Primary 1 to Primary 6) and is aimed at providing foundational knowledge and skills. It is usually for children aged 6 to 12. After primary school, students move on to junior high school (JHS), which consists of three years (JHS 1 through JHS 3). Junior high school is designed to build upon the foundation laid during primary education and prepare students for the West African Senior School Certificate Examination (WASSCE).

2.7 Curriculum and Subjects

The Ghanaian curriculum for basic education is designed to provide students with a well-rounded education. In junior high schools, students study a range of subjects, including English, Mathematics, Integrated Science, Social Studies, Religious and Moral Education, French (or a Ghanaian Language), and Information and Communication Technology (ICT). Additional subjects may be included based on the school's resources and specific curriculum offerings.

2.8 Educational Challenges

While the Ghanaian government has made considerable efforts to improve the education system, several challenges remain, particularly in junior high schools. There may be a lack of infrastructure and limited access to quality education in some regions, especially

in rural areas. Insufficient infrastructure, including classrooms and teaching materials, may be present. Educating children in rural areas differs significantly from that in urban areas. In some junior high schools, there is a shortage of trained teachers and learning resources. Among junior high students from poor backgrounds, malnutrition remains a significant issue, particularly in junior high schools located in challenging environments, such as barracks schools.

2.9 Government Initiatives and Policies

Government policies in Ghana play a pivotal role in shaping the nutritional landscape in educational settings. Several policies have been enacted to address malnutrition among school-aged children, with a focus on improving the quality of education. These initiatives include the Capitation Grant, the School Feeding Program, the Nutrition Education Curriculum, and the Free Senior High School Policy, which aims to provide free education for students at the secondary level.

The Ghana School Feeding Program (GSFP): The GSFP, initiated by the government, provides daily meals to school children to improve their nutritional status and encourage regular school attendance (Molinelli, 2023). Research indicates that the GSFP has positively impacted students' health, cognitive function, and school attendance, particularly in underserved areas (Johnson & Clark, 2020).

Nutrition Education Curriculum: Ghana's educational system incorporates nutrition education into the curriculum to raise awareness of the importance of proper nutrition

among students. This curriculum helps students, and their families make informed dietary choices and promotes healthy eating habits (Saunders, Smith & Stroud, 2011).

2.10 The Role of Basic Schools

Primary and Junior High schools are essential for learners' success in secondary education. Malnutrition can significantly impact learning outcomes. Understanding the impact of malnutrition on learners during this stage is crucial for addressing academic disparities and ensuring equal opportunities for Ghanaian children.

Even though these policies are well-intentioned, implementing them effectively presents several challenges. A lack of funding and resources can hinder the successful implementation of nutritional programs in schools. Budget restrictions, for instance, may limit the GSFP's ability to serve meals to all eligible students. Adequate infrastructure and logistics must be in place so that meals can be delivered, and kitchen facilities can be maintained. The lack of adequate infrastructure can impede the smooth operation of school feeding programs (Molinelli, 2023)

2.11 Educational Context

Addressing malnutrition requires an understanding of the broader educational context. The first is that malnourished students may have irregular school attendance due to health-related reasons. Nutritional programs are instrumental in encouraging consistent school attendance, leading to improved learning outcomes (Johnson & Clark, 2020). Nutrition programs also provide students with the necessary nutrients they need to focus on their studies. This can improve academic performance and overall well-being.

Furthermore, nutrition programs can help reduce the risk of obesity and other health problems for students.

Secondly, curriculum integration ensures students receive nutrition education that is relevant to their needs. Saunders, Smith, and Stroud (2011) found that this approach significantly affected students' dietary choices and overall health. Incorporating nutrition into the curriculum not only promotes healthy eating habits and helps students develop healthy eating habits, but also encourages them to think critically about nutrition.

Thirdly, community engagement is essential. Ghana's schools serve as community centers. Involving local communities, parents, and stakeholders in nutritional programs fosters a sense of ownership and support for these initiatives (Ersado, 2022). This engagement also encourages a sense of belonging and responsibility in the community, which can lead to a stronger commitment to the program. It also helps to build trust between stakeholders, which is essential to the program's success.

It is important to acknowledge the existing gaps in the Ghanaian context concerning the impact of malnutrition on junior high school pupils, especially those situated within unique settings like barracks schools. The current body of research predominantly operates on a more generalized scale and does not address the distinct challenges and socio-economic factors faced by these specific groups. To bridge this research void, comprehensive studies are essential. Such research must not only delve into the specificities of the nutritional challenges faced by junior high school students in Ghana

but should also explore the effectiveness of tailored nutritional intervention programs designed to address the nuanced socio-economic landscape of this region.

Understanding these gaps in the literature is of paramount significance for the present study, which aspires to mitigate these limitations by centering its investigation on the impact of malnutrition on junior high school students in Ghana. This research further targets those students confronted with socio-economic hardships within Uaddara Basic School, thereby striving to provide valuable insights into an often-neglected domain of malnutrition and learning outcomes in the Ghanaian educational landscape.

2.12 Theoretical Framework

The study employs two key theoretical frameworks, Maslow's Hierarchy of Needs and Social Cognitive Theory, to examine the impact of malnutrition on cognitive development and academic achievement of learners in Ghana's Uaddara Basic School.

2.12.1 Maslow's Hierarchy of Needs

Abraham Maslow's renowned Hierarchy of Needs theory, introduced in 1943, remains a foundational and widely accepted framework for comprehending human motivation. At its core, this theory posits that our actions are fueled by an intricate interplay of physiological and psychological needs that evolve from fundamental to intricate, forming a hierarchy. Unlike other contemporary psychological paradigms, such as psychoanalysis and behaviorism, Maslow's focus was on elucidating the constituents of human happiness and the strategies individuals employ to realize their aspirations.

Central to Maslow's theory is the belief that every person possesses an innate drive towards self-actualization, a state of realizing their full potential and becoming the best version of themselves. However, the path to self-actualization is not a direct one; it is a journey marked by distinct stages, each dependent on the satisfaction of certain needs. These fundamental needs, akin to instincts, hold a pivotal role in motivating human behavior.

Figure 2.1: Maslow's Hierarchy of Needs. Adapted from Saul McLeod, PhD (2017)

The Five Tiers of Maslow's Hierarchy of Needs:

1. Physiological Needs: At the base of the hierarchy are physiological needs. These are the most fundamental requirements for human survival and encompass essentials such as food, water, shelter, and rest. Fulfillment of these needs is imperative before advancing to higher levels of the hierarchy.
2. Safety Needs: Just above physiological needs are safety needs. These needs include the desire for personal safety, security, stability, and freedom from harm. Once physiological needs are met, individuals seek assurance and predictability in their lives.

3. Love and Belongingness: Beyond safety needs are social needs, emphasizing the importance of love, belongingness, and interpersonal relationships. These encompass family, friendship, and intimate connections, which are crucial for emotional well-being.
4. Esteem Needs: The fourth level in the hierarchy comprises esteem needs, divided into two categories: the need for self-esteem (confidence, achievement, respect for oneself) and the need for esteem from others (recognition, respect from others, status). Achieving these needs is central to fostering a positive self-concept.
5. Self-Actualization: At the pinnacle of the hierarchy lies self-actualization, representing the realization of personal potential and the pursuit of personal growth. Self-actualized individuals are driven by an intrinsic desire to become the best version of themselves, often transcending their limitations.

Maslow's Hierarchy of Needs is often illustrated as a pyramid, with each level forming a building block upon which the next is constructed. The premise is that individuals must address the needs at each level before progressing to the one above. As this framework guides our understanding of human motivation and behavior, it serves as a valuable lens through which to explore various aspects of human life, including the impact of malnutrition on cognitive development and academic achievement in the unique context of learners in barracks schools.

2.13 Physiological Needs: The Foundation of Maslow's Hierarchy

Physiological needs are fundamental requirements for human survival and proper biological functioning, including access to food, clean water, and adequate nutrition. These needs are not mere desires or luxuries but are the cornerstone of Maslow's hierarchy. They must be satisfied before an individual can realistically aspire to progress to higher levels of psychological well-being and self-actualization (Maslow, 1943). In many developed societies, these needs are often taken for granted, including in some areas in Ghana, particularly among learners in Uaddara, these physiological needs are far from guaranteed.

The scarcity of physiological needs in barracks schools is due to economic disparities, limited access to nutritious food, and various socio-economic factors. Students from poor backgrounds with limited financial resources face obstacles such as insufficient access to nutrient-rich foods, which can exacerbate malnutrition prevalence (Quansah et al., 2016; Darteh, Acquah & Kumi-Kyereme, 2014). Inadequate nutrient intake, poor absorption, or excessive nutrient loss as part of the malnutrition spectrum (Stein, 2010; Saunders, Smith & Stroud, 2011; Elia, 2017; Ersado, 2022) can lead to compromised physiological needs, affecting not only physical health but also cognitive and emotional well-being. Thereby becoming a significant impediment to the successful fulfillment of these basic requirements.

Moreover, during adolescence, there is an increased demand for nutrients to support the rigors of growth, puberty, and cognitive development (Arain et al., 2013). Inadequate

nutrition during this critical phase has the potential to lead to severe consequences, not only for physiological well-being but also for cognitive development and academic performance (Molinelli, 2023).

2.14 Social Cognitive Theory

Albert Bandura's Social Cognitive Theory is a foundational framework that can guide the study in understanding the influence of social factors on students' dietary habits and nutritional choices in the context of malnutrition and its impact on learning (Bandura, 1986). This theory emphasizes the role of observational learning and social influence on individual behavior (Bandura, 1986). When it comes to malnutrition and learning, the Social Cognitive Theory gives us a complete picture of how students' family, friends, and the school community shape and affect their eating habits and food choices (Bandura, 1986).

1. Observational Learning: Social Cognitive Theory posits that individuals learn through observation of others' behaviors, which are subsequently modeled. In the context of malnutrition, students might observe the dietary behaviors and nutritional choices of their family members, peers, and teachers. These observations can significantly influence their dietary habits and nutritional choices (Bandura, 1986).
2. Social Influence: The theory underscores the role of social influence in shaping behavior. In the context of malnutrition, the influence of family, peers, and educators can significantly impact students' nutritional choices. Family members and peers can introduce students to eating patterns and food choices, which, in the

case of malnutrition, may be detrimental to their health and learning outcomes (Bandura, 1986).

3. Reciprocal Determinism: Social Cognitive Theory incorporates the concept of reciprocal determinism, which suggests that personal, behavioral, and environmental factors interact in influencing one's behavior (Bandura, 1986). In the context of malnutrition and learning, personal factors (such as preferences and knowledge), behavior (such as eating habits), and environmental factors (such as the availability of nutritious food at home or school) all have an impact on students' dietary decisions and nutritional status (Bandura, 1986).
4. Self-Efficacy: Bandura's theory introduces the concept of self-efficacy, which refers to an individual's belief in their ability to perform a specific behavior (Bandura, 1986). Students' perceptions of their families, peers, and educators' attitudes and behaviors toward nutrition and dietary choices can have an impact on their self-efficacy in the context of malnutrition regarding making healthy dietary choices (Bandura, 1986).

This study examines how social factors, as described by Social Cognitive Theory, influence students' eating patterns and food choices when they are undernourished and how that affects their capacity to learn (Bandura, 1986). Using this theory will help us look at how students' social environment, the food they eat, and how well they learn to interact with each other in complicated ways. This will help us understand what causes students to be malnourished and how that affects their performance in school.

When these two theoretical frameworks are put together, they give us a full picture of how malnutrition affects the cognitive development and academic success of middle school students. These frameworks help us understand the complex dynamics at play in many ways. They also give us useful information for creating targeted interventions and policy suggestions that will work at Uaddara Basic School in Ghana.

The study integrates these two theoretical frameworks to provide a comprehensive lens through which to analyze the impact of malnutrition on cognitive development and academic achievement in junior high school pupils. These frameworks contribute to a multifaceted understanding of the intricate dynamics at play and offer valuable insights for developing targeted interventions and policy recommendations in the context of Uaddara Basic School in Ghana.

2.15 Impact of Malnutrition: A Disruption of Physiological Harmony

Malnutrition, as elucidated by Pinstrup-Andersen (2007), represents a significant disruption to the physiological balance essential for human well-being, resulting from the inadequate intake of essential nutrients. This disruption extends beyond mere hunger or dietary insufficiency; it signifies a profound disturbance closely congruent with Maslow's Hierarchy of Needs. When individuals grapple with malnutrition, their bodies endure a severe deficiency in critical nourishment vital for sustaining life and overall well-being. This inadequacy affects various bodily systems, encompassing macronutrients like proteins and carbohydrates, pivotal for energy production and growth, along with micronutrients like vitamins and minerals.

Furthermore, research by Golden (2007) and Vella et al. (2002) shows that malnutrition can have several negative effects, particularly on adolescents. These effects include stunted growth, impaired bone development, and delayed puberty. Importantly, malnutrition impairs the immune system, making people more susceptible to infections and illnesses, which results in frequent absences from school due to illness, as Savy et al. (2006) observed. The lack of essential nutrients has a significant impact on academic performance and cognitive development, which are central to this study. Gómez-Pinilla's research (2008) demonstrates how malnutrition can result in issues such as decreased attention span, memory problems, and reduced cognitive abilities, all of which are fundamental for learning and academic achievement.

The emotional and behavioral challenges observed in adolescents affected by malnutrition, as highlighted by Sachdev (2005), manifest as mood disturbances, irritability, and difficulties in emotional regulation. Additionally, Lopez et al. (2007) observed that the condition can result in anemia, which affects blood oxygen-carrying capacity and causes fatigue and decreased concentration. It is crucial to note that Bandura's (1986) theoretical framework for social cognitive theory can provide additional insights into how social factors influence dietary practices and nutritional decisions in the context of malnutrition and its effects on learning.

2.16 Higher-Level Needs: An Aspiration Hindered by Malnutrition

Malnutrition, in line with Maslow's Hierarchy of Needs, emerges as a substantial impediment to the pursuit of higher-level needs encompassing safety, belongingness, esteem, and self-actualization. These needs play a pivotal role in an individual's psychological and emotional well-being and are profoundly interlinked with the central focus of this study—cognitive development and academic achievement (Maslow, 1943). When individuals grapple with unmet physiological needs due to malnutrition, their capacity to direct attention toward fulfilling higher-level needs becomes severely obstructed.

As defined by Maslow (1943), safety needs consist of personal security, employment, resources, health, and property. Malnutrition, however, elevates susceptibility to health issues and erodes an individual's sense of safety. The absence of proper nutrition can give rise to illnesses, weaken the immune system, and engender a general feeling of vulnerability, thereby diminishing the capacity to attend to other safety-related aspects (Maslow, 1943; Sachdev, 2005). Likewise, belongingness and love need to emphasize the significance of friendship, intimacy, family, and a sense of connection. Adolescents grappling with malnutrition may encounter emotional and behavioral challenges, as posited by Sachdev (2005), hindering their capacity to establish and maintain healthy social relationships, thereby impeding their progression towards fulfilling these higher-level needs.

Malnutrition has a significant impact on esteem needs, which include self-esteem, confidence, achievement, respect from others, and the need to create a unique identity. The effects extend to cognitive development, emotional regulation, and physical well-being, undermining an individual's self-esteem and self-worth, thereby exacerbating the challenge of satisfying these needs (Maslow, 1943). At the pinnacle of the hierarchy lies self-actualization, denoting the realization of personal potential, self-fulfillment, and the pursuit of personal growth and peak experiences. However, cognitive impairments and behavioral challenges resulting from malnutrition hinder individuals' progress toward self-actualization (Maslow, 1943). It is imperative to underscore that proper nutrition assumes critical significance for both physical well-being and the creation of an environment conducive to academic and personal growth.

Bandura's (1986) Social Cognitive Theory is used in this study to investigate how social factors affect students' eating habits and nutritional choices when they are malnourished and how that affects their ability to learn. This theory gives us a big-picture view of how physiological needs affect cognitive development, academic performance, and overall health. Moreover, it establishes a robust foundation for the forthcoming sections of the study, including empirical analysis and the formulation of targeted interventions and policy recommendations to address malnutrition among junior high school pupils at Uaddara Basic School in Ghana.

2.17 Chapter Summary

Chapter Two of the literature review explores the impact of malnutrition on learning among learners in barracks schools in Ghana. It discusses cognitive development, academic performance, physical and emotional well-being, socio-economic factors contributing to malnutrition, and nutritional interventions and programs designed to mitigate its effects. The chapter also explores the policies and educational context in Ghana, specifically regarding nutritional programs in schools. The summary and identification of gaps in existing knowledge serve as a bridge to subsequent sections of the review. The chapter is a foundational component of the research, providing a strong knowledge base and theoretical framework for the study's methodology and data analysis.

CHAPTER THREE

METHODOLOGY

Chapter Three introduces the methodology employed in this study to investigate the impact of malnutrition on learning among learners at Uaddara Basic School in Ghana. The chapter is divided into two sections. The first section provides a discussion of the primary data used for the research. It outlines the research design, data collection techniques, data sources, data analysis methods, and other key aspects of the research process. The second section of this chapter is a discussion of the research's secondary data. It provides an overview of the steps taken to collect, analyze, and interpret existing data that are pertinent to achieving the research objectives. By delineating the research methodology, this chapter provides a transparent and systematic account of how the study was conducted, ensuring the rigor and validity of the findings. The study therefore sought to answer the following central research questions:

CRQ 1. What is the prevalence of malnutrition among these students?

CRQ 2. What is the Effect of Malnutrition on Academic Performance?

CRQ 3. What is the Effect of Malnutrition on Learners' Attitudes in Class?

3.0 Introduction

This section outlines the research methodology, including design, population and participant selection, sampling techniques, data collection techniques, validity and reliability measures, data analysis techniques, and variable definition. It ensures the study aligns with established research standards and provides a sound foundation for

conclusions and recommendations. The section also discusses the use of scales and instruments, data analysis methods, and the definition of variables. It is crucial for establishing a sound research foundation and adhering to academic inquiry standards.

3.1 Research Design and Strategy

This section provides a comprehensive explanation of the research design and strategy utilized to investigate the impact of malnutrition on learning outcomes among learners in barracks schools in Ghana. The choice of research design and strategy is crucial to ensuring the study's alignment with its objectives and the scientific rigor of the research process.

Research Design: The research design selected for this study is a mixed-methods approach. According to Creswell and Creswell (2017), mixed-method research design is a multifaceted approach that combines both quantitative and qualitative research methods within a single study. It enables researchers to gain a comprehensive understanding of complex research questions by capturing numerical data and in-depth narratives. Tashakkori, Johnson, and Teddlie (2020) talk about a methodological approach that has many benefits, such as validating data through triangulation, learning a lot about the context, and making the data more reliable on both the inside and the outside. Tashakkori and Teddlie (2010) emphasize the real-world applicability of mixed-method research, making it particularly valuable for applied fields. Researchers can use different types of data to better understand the research problem by selecting the right samples, collecting data in useful ways (Palinkas et al., 2015), and analyzing the data in different ways

(thematic coding, for example). As O'Cathain (2015) discusses, this approach provides researchers with the ability to navigate complex research questions, ultimately enhancing the quality of mixed-method studies in health services research.

Justification for Mixed-Methods Design: The mixed-methods design is well-suited for this research because it encompasses a wide range of issues related to malnutrition and learning. By combining qualitative and quantitative data collection and analysis, this study aims to provide a holistic understanding of the topic. Qualitative data in the form of interviews will help explore the experiences, perspectives, and socio-economic factors contributing to malnutrition among learners. On the other hand, quantitative data, which are surveys, will offer statistical insights into malnutrition prevalence and its impact on educational outcomes. The integration of both types of data is essential for a comprehensive analysis and in-depth exploration of the subject matter.

Research Strategy: The research strategy adopted is a cross-sectional strategy. A cross-sectional study collects data from participants at a single point in time. In this study, data will be collected from learners during a specific period, allowing a snapshot of their experiences and conditions regarding malnutrition and learning.

3.2 Population and Participant Selection

Population: The population under investigation consists of learners in barracks schools in Ghana. Barracks schools cater to children from military and police families and disadvantaged communities within or around barracks, and represent a distinct

educational setting. This population is selected because it faces specific socio-economic challenges that can exacerbate the risk of malnutrition.

3.3 Sampling and Sampling Techniques

Sampling Approach: The sampling approach chosen for this research is a combination of purposive and stratified sampling. These sampling techniques are well-suited for the study's objectives and the characteristics of the population.

Purposive Sampling: Purposive sampling was used to select participants who could understand the research questions and answer accordingly. Participants selected through purposive sampling included learners in junior high school and upper primary.

Stratified Sampling: Stratified sampling was applied to ensure the inclusion of diverse groups within the population. In this case, the population was stratified based on factors such as school location, grade level, and gender. Stratification ensures that the sample represents the various dimensions of the population, providing a more comprehensive view of malnutrition and its impact.

3.4 Data Collection Technique

The data collection for this study was a structured questionnaire predominantly involved interviews and surveys. These techniques are chosen to capture a comprehensive understanding of malnutrition and its impact on the cognitive development and academic performance of learners at Uaddara Basic School in Ghana.

3.4.1 Interviews

Semi-structured interviews were conducted with learners. Open-ended questions guided these interviews to elicit specific information about their experiences, perceptions, and observations relating to malnutrition. Participants expressed their feelings, perspectives, and personal experiences concerning malnutrition and its consequences. The questions covered topics such as dietary practices, access to nutritious food, cognitive challenges, and academic performance. Interviews provided the advantage of obtaining rich, qualitative data that can offer deeper insights into the issue.

3.4.2 Surveys

Surveys were administered to participants at Uaddara Basic School. These surveys were structured questions related to their weight, height, dietary habits, access to nutritious food, health status, and academic performance. Surveys are useful for gathering quantitative data that can be statistically analyzed. The survey responses offered insights into the prevalence of malnutrition among students and its associations with academic performance. The surveys was designed to include both self-reported data from students and measurements such as height and weight to assess nutritional status. The combination of qualitative interviews and quantitative surveys will provide a more comprehensive view of the issue.

These data collection techniques employed to collect primary data from participants, allowed for a thorough examination of how malnutrition affects the learning outcomes of learners at Uaddara Basic School. Triangulating information from multiple sources and

using both qualitative and quantitative data collection methods enhanced the credibility and validity of the study's findings.

3.5 Validity and Reliability

Validity

To ensure the validity of the research findings, this study employed several measures. First, during the design of the survey and interview questions, experts in the field of nutrition and education were consulted to guarantee that the questions are constructed to measure what they intend to assess. Pre-testing of the survey and interview protocols was conducted with a small sample of learners to identify any ambiguities or issues with the questions.

Reliability

Reliability was achieved by ensuring consistency in the data collection process. The same interview and survey instruments was used throughout the data collection process to maintain consistency. Additionally, the researchers conducting the interviews received training to standardize the process. For surveys, the questionnaire was administered in a controlled manner to minimize variations in how the questions are presented to different participants.

3.6 Data Analysis Technique

Data analysis for this study was conducted using a mixed-methods approach. The mixed-methods approach lets the research questions be investigated in more depth and more

ways. It also lets the study find out both how common malnutrition is and how it affects the lives of students. The data from the research was analyzed using statistical software such as SPSS (Statistical Package for the Social Sciences). Descriptive statistics, such as standard deviations, and frequencies, was used to summarize and present the survey data. Correlation and regression analyses was conducted to explore relationships between variables.

Descriptive statistics provided an overview of the dataset, summarizing key variables such as academic performance, and malnutrition prevalence. Multiple regression analysis examined the relationship between malnutrition and academic performance, including independent variables like nutritional status and participation in nutritional programs, and dependent variables like academic performance. Data visualization was done through charts and graphs to illustrate patterns and trends.

3.7 Definition of Variables

Data about malnutrition at Uaddara Basic School in Ghana included a list of the main factors that were examined. Clear definitions of these variables ensure a precise understanding of the research framework and the specific elements examined.

Dependent Variables:

1. Academic Performance: Academic performance is a multifaceted variable encompassing various indicators, including:
    a. Grades: Students' academic grades in subjects such as mathematics, science, and languages.

b. Educational level: The level of academic achievement, often represented as progression to higher grades or educational qualifications.

Independent Variables:

2. Malnutrition: Malnutrition is a complex variable that includes various dimensions:
    a. Nutritional Status: A measure of an individual's physical health and well-being, which can be assessed through indicators like height, weight, and nutrient levels.
    b. Dietary Habits: The patterns of food consumption, including the types of foods and their nutritional quality.
    c. Socio-economic Factors: Economic conditions, access to resources, and family income that may contribute to or mitigate malnutrition.
    d. Participation in Nutritional Programs: The involvement of students in school-based or community-based nutritional interventions or programs.
3. Physical and Emotional Well-being: These variables encompass both physical and emotional dimensions:
    a. Physical Health: Indicators of students' overall physical well-being, including growth patterns, puberty development, and general health.
    b. Emotional Well-being: This variable refers to students' emotional states, including stress levels, motivation, and emotional challenges experienced.

Control Variables:

4. Socio-economic Factors: Within the socio-economic factors category, specific elements will be considered, such as:

a. Primary parent occupation: The economic resources available to students' families.
b. Parental Education: The educational background of students' parents or guardians.
c. Access to Nutritious Food: The ease with which students can obtain nutritious meals.

The definitions provided in this section served as a foundation for the analysis of data. They offered clarity on the specific aspects under examination and the relationships being explored in the context of malnutrition and learning outcomes among learners at Uaddara Basic School in Ghana.

3.8 Appropriate Expectations

The study predicted a negative correlation between malnutrition and academic performance, with malnourished students having poor academic performance. Nutrition plays a crucial role, where malnourished students experience more academic challenges. Malnutrition also affects physical and emotional well-being, leading to stunted growth, delayed puberty, and compromised health. Emotional well-being is also adversely impacted, resulting in increased stress, reduced motivation, and emotional challenges. Socioeconomic factors, such as family income, parental education, and access to nutritious food, interact with malnutrition to influence learning outcomes. Students from poor backgrounds are more susceptible to malnutrition's adverse effects. Participation in nutritional programs is expected to positively impact learning outcomes, especially for

malnourished students. The effectiveness of these programs may vary depending on socio-economic conditions, with more significant benefits for those from disadvantaged backgrounds.

3.9 Chapter Summary

Chapter Three served as the cornerstone of this research, providing extensive insight into the methodologies employed to investigate the impact of malnutrition on learning among learners at Uaddara Basic School in Ghana. This chapter commenced with an introductory overview of the research methodology, establishing the framework for the subsequent sections. It elucidated the research design and strategy, meticulously detailed how these aligned with the research objectives. The application of the mixed-methods approach proved to be indispensable in addressing the multifaceted nature of the research questions. It gave details about the study's target population at the Uaddara Basic School in Ghana, and the criteria used to choose participants, making sure that the sample was representative of a wide range of interests.

Furthermore, the chapter delineated the data collection techniques employed. This methodological diversity ensures a comprehensive understanding of the research topic from the vantage point of the participants. To bolster the credibility of the research findings, the chapter underscored the measures taken to ensure validity and reliability. These include the deployment of established scales and instruments to fortify the trustworthiness of the study's results. The research framework was made clearer by explaining the analytical methods, which include both qualitative and quantitative data

analysis methods. Additionally, the estimation method and key variables were elucidated, affording readers a clear comprehension of the research's structure, and ensuring the rigor and alignment of data analysis with the study's objectives.

In summary, the primary data section laid a robust foundation for the research by elucidating the methodologies, techniques for data collection and analysis, and steps taken to ensure the research's validity and reliability. A transparent explanation of the research process not only clarified how malnutrition affects the learning experience of learners at Uaddara Basic School in Ghana but also provided a roadmap for further research.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.0 Introduction

This chapter presents the results and discussion of field data on the impact of malnutrition on learning among basic school learners. The chapter consists of the data analysis to address the demographic data of respondents on sex, age, educational level, current grade, educational level, and occupation of caregiver or guardian. It also includes the presentation, analysis, and discussions of the main data to address the research questions.

4.1 Demographic Data of Respondents

This section presents demographic data obtained from respondents. This was required to know the kind of respondents used in the study. It involves six (6) main aspects namely; sex, age, educational level, current grade, educational level, and occupation of caregiver or guardian.

Gender of Respondents

Table 4.1 presents data on the gender of respondents obtained from the study.

Table 4.1: Gender of Respondents

Gender	Frequency	Percentage
Male	45	44.1
Female	57	55.9
Total	102	100

Source: Field Survey, 2023

From Table 4.1, the results showed that 55.9% of the respondents were females and 44.1% of the respondents were males. This means that the majority of respondents in this study at Uaddara Basic School are females. This result is in line with data from the World Bank collected from officially recognized sources in Ghana that females are more likely to complete primary education (73%) than males (69%) thus more females would be present at the primary education level.

Age of Respondents

Table 4.2 presents data on the age of respondents who participated in the study.

Table 4.2: Ages of Respondents

Age Groups	Frequency	Percentage
5-10	0	0
11-15	67	65.7
16-20	35	34.3
21-25	0	0
Total	102	100

Source: Field Survey, 2023

On Table 4.2 65.7% of respondents were between the ages of 11-15 years. About 34.3% were between the ages of 16-20 years. No respondent was found in the 5-10 and 21-25 age groups. All respondents are within the age range designated as adolescent stage.

Educational Level of Respondents

Table 4.3 presents data on the educational level of respondents who participated in the study.

Table 4.3: Education Level of Respondents

Educational level	Frequency	Percentage
Kindergarten	0	0
Primary	28	27.5
Junior high school	74	72.5
Total	102	100

Source: Field Survey, 2023

Table 4.3 shows the distribution of the respondents by education level. It indicated that out of 102 students, 72.5% of respondents were Junior High School (JHS) students, 27.5% as Basic school (Primary) students, and none at the Kindergarten level. The level of education corresponds with the age groups since all the respondents are adolescents.

Current Grade/Year of Respondents

Table 4.4 presents data on the current grade/year of respondents who participated in the study.

Table 4.4: Current Grade/Year of Respondents

Current Grade/Year	Frequency	Percentage
BS 5	0	0
BS 6	22	21.6
JHS 1	25	24.5
JHS 2	25	24.5
JHS 3	30	29.4
Total	102	100

Source: Field Survey, 2023

Table 4.4 shows the distribution of the respondents by grade. It indicated that the majority, 29.4% are in the third year of Junior High School (JHS), 24.5% are in their first and second year in Junior High School (JHS), and 21.6% are in grade six (6) in Basic school.

Educational Level of Guardian/Caregiver of Respondents

Table 4.5 presents data on the educational level of guardians/caregivers of respondents who participated in the study.

Table 4.5: Educational Level of Guardian/Caregiver of Respondents

Educational Level of Primary Caregiver	Frequency	Percentage
Primary level	9	8.8
Junior high level	33	32.4
Senior high level	24	23.5
University and other higher education	22	21.6
Vocational training	10	9.8
No educational level	4	3.9
Total	102	100

Source: Field Survey, 2023Table 4.5 shows the distribution of the respondents by the educational level of their guardians/caregivers. It indicated that 32.4% of the guardians completed Junior High School (JHS), 23.5% Senior High School (SHS) graduates, 21.6%are university graduates, 9.8% graduates of vocational training schools, 8.8% had only primary level education and 3.9% has no formal education. Occupation of Guardian/Caregiver of Respondents

Table 4.6 presents data on the occupation of guardian/caregiver of respondents who participated in the study.

Table 4.6: Occupation of Guardian/Caregiver of Respondents

Occupation of Primary Caregiver	Frequency	Percentage
Military	8	7.8
Civil servant	30	29.4
Self-employed	33	32.4
Health worker	6	5.9
Vocational worker	4	3.9
Farmer	5	4.9
Unemployed	0	0
Others	16	15.7
Total	102	100

Source: Field Survey, 2023

Table 4.6 shows the distribution of the respondents by the occupation of their guardians/caregivers. It indicated that 32.4% of the guardians are self-employed, 29.4% are civil servants, and 15.7% are in other occupations. Again, 7.8% are military personnel, 5.9% are health workers, 4.9% are farmers, 3.9% are vocational workers and none are unemployed.

4.2 Analysis of Main Data

This section presents the results and discussions of the main data to address the research questions.

4.2.1 Research Question One: What is the prevalence of malnutrition among learners at Uaddara Basic School?

This question sought to find out the prevalence of malnutrition among pupils at Uaddara Basic School in the Kumasi Metropolis. The response was elicited based on the number of regular, adequate, and balanced meals respondents have in a day.

Table 4.7: Consumption of Carbohydrates

	Frequency	Percentage
Daily	99	97.1
Weekly	3	2.9
Total	102	100.0

Source: Field Survey, 2023

Table 4.7 represents the frequency at which respondents consume carbohydrates in a day. According to the table, 97.1% of respondents consume carbohydrates daily while 2.9% of respondents consume carbohydrates weekly.

Table 4.8: Consumption of Vegetable

	Frequency	Percentage
Daily	50	49.0
Weekly	36	35.3
Monthly	14	13.7
Rarely	2	2.0
Total	102	100.0

Source: Field Survey, 2023

Table 4.8 displays how often respondents consumed vegetables. According to the table, 49% eat vegetables daily, 35.3% of respondents consume vegetables weekly, 13.7% consume vegetables monthly and 2% rarely consume vegetables.

Table 4.9: Consumption of Fruits

	Frequency	Percentage
Daily	29	28.4
Weekly	55	53.9
Monthly	12	11.8
Rarely	6	5.9
Total	102	100.0

Source: Field Survey, 2023

Table 4.9 displays how often respondents consumed fruits. According to the table, 28.4% eat fruits daily, 53.9% of respondents consume fruits weekly, 11.8% consume fruits monthly and 5.9% rarely consume fruits.

Table 4.10: Consumption of Protein

	Frequency	Percent
Daily	80	78.4
Weekly	20	19.6
Monthly	1	1.0
Rarely	1	1.0
Total	102	100.0

Source: Field Survey, 2023

Table 4.10 displays how often respondents consumed protein in their meals. According to the table, 78.4% ate protein daily, 19.6% of respondents consumed protein weekly, 1.0% consumed protein monthly, and 1.0% rarely consumed protein.

Table 4.11: Consumption of Nutritional Supplements

	Frequency	Percentage
Daily	15	14.7
Weekly	20	19.6
Monthly	28	27.5
Rarely	26	25.5
Never	13	12.7
Total	102	100.0

Source: Field Survey, 2023

Table 4.11 shows the consumption of nutritional supplements by respondents. 14.7% took supplements daily, 19.6% took supplements weekly, 27.5% consumed supplements monthly, 25.5% consumed supplements rarely and 12.7% never consumed supplements.

Table 4.12: Number of Balanced Meals Consumed in a Day

	Frequency	Percentage
Once	8	7.8
2 Times	41	40.2
3 Times	53	52.0
Total	102	100.0

Source: Field Survey, 2023

Table 4.12 gives the distribution of respondents by the number of balanced meals consumed in a day. The majority, 52%, of respondents have three (3) nutritional balanced meals each day. 40.2% of the respondents have two (2) balanced meals and 7.8% of respondents have one (1) balanced meal each day. The majority of respondents have adequate balanced meals each day which indicates that almost all the students have good feeding habits which implies that malnutrition is not prevalent among learners at Uaddara Basic School. The majority of respondents consumed carbohydrates, proteins, fruits, and vegetables daily during meals which indicates the majority of respondents are well nourished. Also, nutritional supplementation was found to be frequent among respondents as 50.0% claim to use nutritional supplements regularly. The low level of malnutrition found based on nutrients and balanced meals consumed agrees with the occupational backgrounds of the caregivers of the respondents. The majority of caregivers of respondents are employed with none unemployed. This indicates steady household income which makes it possible to afford adequate balanced meals daily. Chaudhury (2009) noted that there is a synergistic relationship between dietary adequacy, dietary intake, and per capita expenditure. When household income improves, expenditure on food is likely to increase, increasing the rate of caloric and protein intake among children and members of the household (Reutlinger and Selowsky, 1976).

Table 4.13: Body Mass Index

	Frequency	Percentage
Underweight	24	23.5
Normal	37	36.3
Overweight	32	31.4
Obese	9	8.8
Total	102	100

Source: Field Survey, 2023

According to Table 4.13, 36.3% of respondents had normal weight, 31.4% were overweight, 8.8% were obese and 23.5% were underweight based on the WHO classification of body mass index (2007). Normal weight and overweight comprise the majority of respondents. This shows that respondents have adequate meals on a regular since lack or inadequate nourishment would result in thinness. According to Etim (2018), household income, food security, cost of living, and access to food are factors that contribute to malnutrition among children. Low household income in a high-cost-of-living location leads to inadequate access to balanced meals due to low expenditure on food. The study was conducted in location, Kumasi Metropolis, considered one the least expensive locations in Ghana which means that respondents would be likely to have good food security and access to balanced meals which is evident in their level of nourishment and weight.

Chronic malnutrition, which is indicated by low height-for-age, affects 19% of the population nationally. However, in the Northern region, this figure is higher, at 33%. The Kumasi Metropolis has been noted as one of the areas with a relatively high prevalence

of malnutrition. A study conducted in Ghana on malnutrition has revealed that levels of malnutrition are dependent on maternal education and wealth levels. The study found that 16% of children whose mothers have received secondary education are stunted, while the rate rises to 26% for children whose mothers had no formal education. According to a study by GSS, GHS, and ICF International in 2015, 25% of children in the lowest wealth quintile are stunted, while only 9% of those in the highest wealth quintile suffer from the same issue. The study revealed that only 3.9% of the participants had no form of formal or informal education. Most caregivers in the study had a formal education and a stable source of household income, allowing them to provide balanced meals for their wards. The average number of balanced meals consumed by the participants in a day was 3.44±0.638. These meals contained both essential and nonessential nutrients, as recommended by dietary guidelines.

In this study, it was found that malnutrition rates were low while there was a high prevalence of normal-weight and overweight individuals. The findings of this study are consistent with the observations made by Doku and Neupane in 2015, who noted that Ghana, along with some other African countries, is facing a double burden of malnutrition. This is characterized by a high prevalence of both undernutrition and overweight/obesity. Over 15 years (1993-2008), rates of overweight/obesity increased by nearly 139 percent, corresponding with a period of increased wealth in the country. The trend in Ghana is similar to other African countries that have experienced rapid economic growth. This has led to lifestyle changes, including increased consumption of refined foods. According to Doku and Neupane (2015), overweight and obesity rates are higher

among those with higher socio-economic status. In Western countries, overweight is more prevalent among the less educated and those at the lower end of the socioeconomic ladder. However, developing countries show a different picture, where education is positively related to being overweight and obese. The higher a person's socioeconomic status, the higher the likelihood of being overweight or obese (Dinsa et. al, 2012; Neuman et. al., 2013). The present study confirms this relationship found in developing countries.

4.2.2 Research Question Two: What is the Effect of Malnutrition on Academic Performance?

The study sought to find out the effect of malnutrition on the academic performance of learners at Uaddara Basic School. The results of the study on the subject are presented below.

Table 4.14: Academic Performance of Respondents

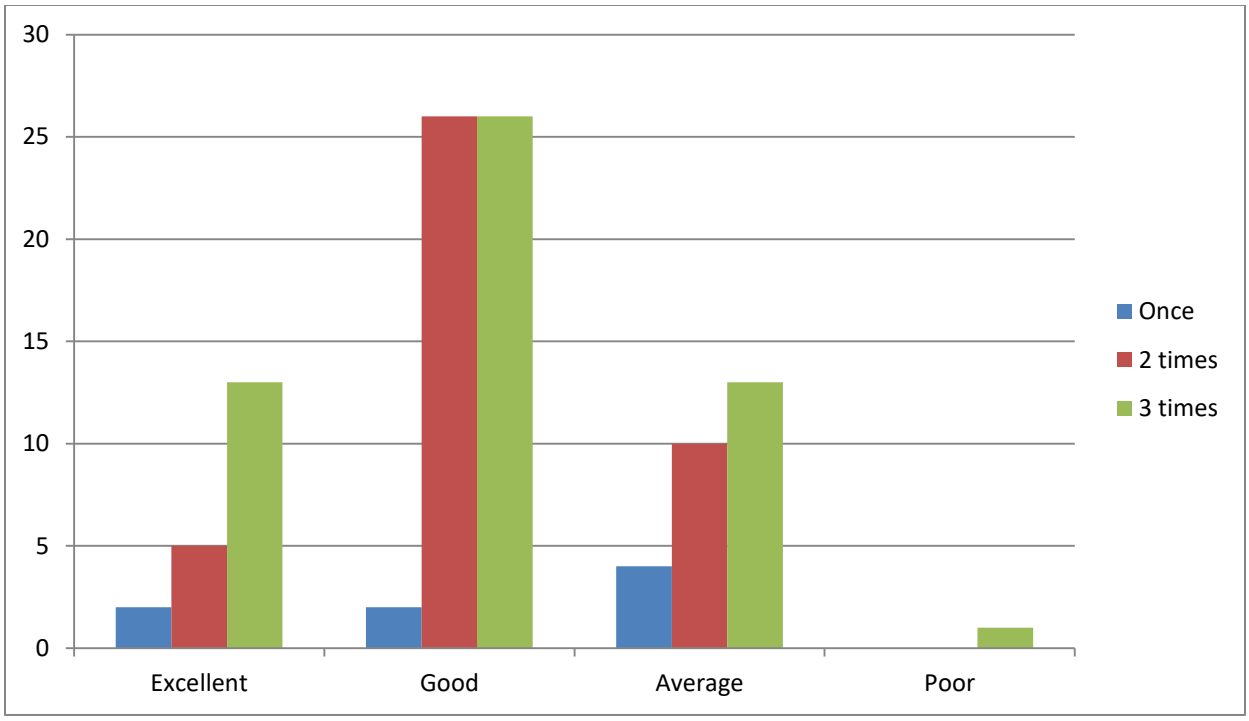
	Frequency	Percentage
Excellent	20	19.6
Good	54	52.9
Average	27	26.5
Poor	1	1.0
Total	102	100.0

Source: Field Survey, 2023

Table 4.14 shows the academic performance of respondents in the study. It was observed that the majority of the respondents' academic performance was above average. 19.6%

had excellent grades, 52.9% had good grades, 26.5% had average grades and only 1% had poor grades.

Figure 4.1: The Distribution of Academic Performance and the number of Balanced Meals Consumed in a Day



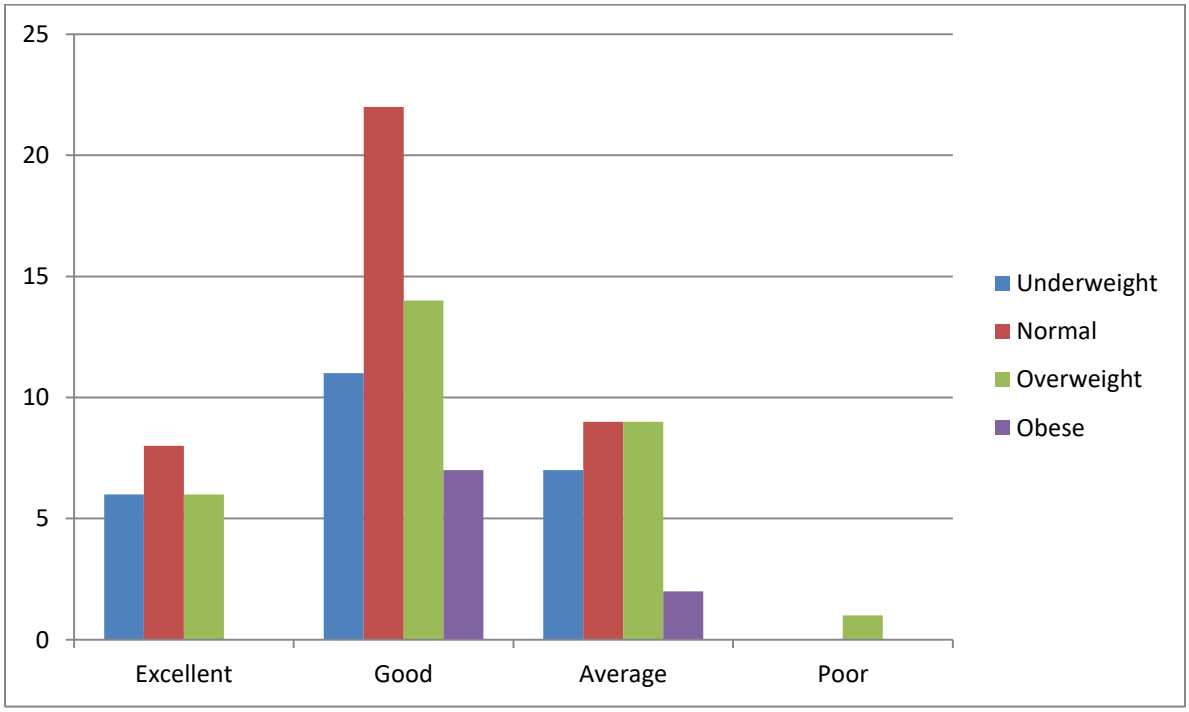
Source: Field Survey, 2023

Figure 4.2 shows that the majority of respondents who consumed balanced meals twice or twice in a day performed better academically relative to learners who had balanced meals once daily.

Table 4.15: Regression analysis of the number of balanced meals consumed and academic performance of respondents

Variable	Model Fitting Criteria	Likelihood Ratio Tests		
	-2 Log Likelihood of Reduced Model	Chi-Square	df	Sig.
Intercept	31.574	5.153	3	0.161
Number of balanced meals consumed in a day	29.108	2.687	3	**0.442**

Figure 4.2 Shows the Distribution of Academic Performance and Weights



Source: Field Survey, 2023

Figure 4.2 shows that the majority of respondents who had good academic performance had normal weight or were overweight compared to learners underweight and obese.

Table 4.16: Regression Analysis of Body Mass Index and Academic Performance of Respondents

Variable	Model Fitting Criteria	Likelihood Ratio Tests		
	-2 Log Likelihood of Reduced Model	Chi-Square	df	Sig.
Intercept	208.235	4.410	3	0.221
Body mass index	209.335	5.509	3	**0.138**

In this study, respondents with normal weights and who consumed adequate balanced meals twice and thrice daily performed well academically compared to respondents who were underweight, and obese and consumed balanced meals once daily. However, there is no association between the number of balanced meals consumed daily, weight, and academic performance. A logistical regression analysis between academic performance and the number of balanced meals consumed daily showed no statistically significant association with a p-value of 0.442 (p-value $\leq$ 0.05 is considered statistically significant) as shown in Table 4.18. Therefore, the majority of respondents who consumed two or three balanced meals daily had a good performance there is no statistically significant relationship. Also, there was no statistically significant association between weight and academic performance. A p-value of 0.138 was found indicating that the relationship between academic performance and weight is not statistically significant as shown in Table 4.19. These suggest there is no relationship between malnutrition and the academic performance of learners at the Uaddara basic schools. Eden (2022) also found no relationship between malnutrition and academic performance in Nigeria but noted that other factors such as intelligence, motivation, self-concept, attitude, interests, learning styles, and emotions play a crucial role in the learning process. Similarly, socio-cultural

aspects such as family, home environment, neighborhood, community, and peer group also influence learning. (Edeh Chukwuemeka ACMC, 2022). Shree and Murthy (2021) found that there was a significant association between nutritional status and academic performance, implying that an improvement in the nutritional status of children leads to better academic achievement in a study conducted in India (Shree and Murthy, 2021). In their study, Duaa (2018) found that height for age (H/A), weight for age (W/A), and body mass index (BMI) are associated with academic achievement in Jordan. Malnutrition can result in slow physical and mental development of students, making them more susceptible to infections, and reducing their academic performance (Duaa, 2018).

Academic performance can be affected by gender, age, residence, study hours, absenteeism, socio-economic status, illness, medium of instruction, and malnutrition (Ali et. al., 2013, Mushtaq et. al., 2012). However, malnutrition has the found to be the main factor for poor academic performance and contributed to the development of other factors (Taras H, 2005). Studies showed that malnutrition among school-age children is a risk factor for high absenteeism, early dropouts, low school enrollment, and unsatisfactory classroom performance (Naik et. al., 2015). Dewey and Begun (2011) reported that being underweight reduces the academic performance of children by 68%. This agrees with the findings in this study because the majority of respondents had normal weight and were overweight and above average academic performance. A study by Edeh (2022) found that nutritional diet is not a factor that impedes learning in tertiary institution students, the data also pinpointed that the nutritional status of the students had very little or no influence over the learning process of the students, this could be due to the undeniable

fact that several other factors come in play when educationist are to analyze the learning process of students.

Protein-energy malnutrition is of much serious concern among children of school-going age who are deprived of good and ample nutrition due to their poor socio-economic status, ignorance, and lack of health promotional facilities. Scholastic achievement has become an index of a child's future in this highly competitive world. Scholastic backwardness which is unrecognized and unresolved, has a lifelong impact on children, affecting their school completion, their higher education, interpersonal relationships with peer groups' prospects for employment, etcetera. Health problems due to malnutrition among school-age children are the most common cause of absenteeism and unsatisfactory scholastic performance. Malnutrition has substantial effects on the neurological development and behavioral capacity of children (Grantham-McGregor and Ani, 2001). Thus, malnourished children may never reach their full academic potential. Malnutrition among school age can result in impaired cognitive and motor development, which may undesirably upset academic performance through reduced learning capacity and poor school attendance (Osei et. al., 2010, Best et. al., 2010).

4.2.3 Research Question Three: What is the Effect of Malnutrition on Learners' Attitudes in Class?

This question sought to find out the effect of malnutrition on the attitude of learners in class at Uaddara Basic School in the Kumasi metropolis.

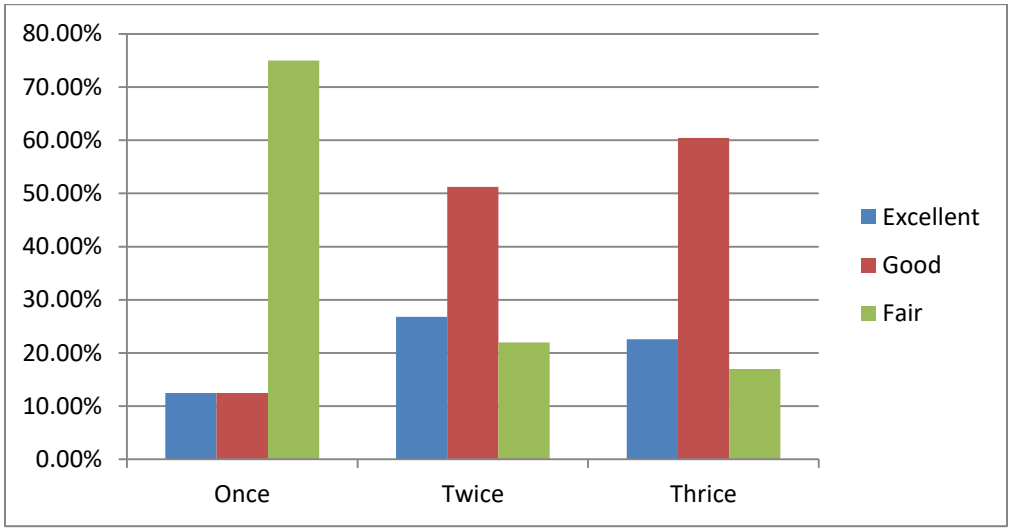
Table 4.17: Level of Participation of Learners in Class

	Frequency	Percentage
Excellent	24	23.5
Good	57	55.9
Fair	21	20.6
Total	102	100.0

Source: Field Survey, 2023

Table 4.19 shows the levels of class participation of learners. 23.5% of respondents had excellent participation, 55.9% had good participation and 20.6% had fair participation in class. Skipping breakfast and not having proper nutrition are considered a barrier to optimal learning (Duaa, 2018). In this study, 79.4% of respondents participate fully in class which agrees with the level of nourishment obtained in a day. Nonetheless, there is no correlation between weight, the quantity of balanced meals eaten each day, and scholastic achievement. Table 4.18 displays the results of a logistic regression study that found no statistically significant correlation between academic performance and the number of balanced meals consumed daily (p-value ≤ 0.05 is considered statistically significant). Studies conducted by Glewwe and Miguel (2007) showed that malnutrition among school-age children is a risk factor for high absenteeism, early dropouts, low school enrollment, and unsatisfactory classroom performance. Although the relationship found between class participation and the number of balanced meals consumed used as a measure of nutritional status was not significant statistically, the study showed that engagement in class was high among respondents who had two or three balanced meals daily.

Figure 4.3: A Graph Showing the Level of Class Participation and Number of Balanced Meals Consumed Daily



Source: Field Survey, 2023

Table 4.18: Regression Analysis of Body Mass Index and Academic Performance of Respondents

	Model Fitting Criteria	Likelihood Ratio Tests		
	-2 Log Likelihood of Reduced Model	Chi-Square	df	Sig.
Intercept	37.737	10.520	3	.015
Number of balanced meals consumed daily	34.400	7.182	3	**.066**

Malnutrition has been reported to be the main cause of low academic performance. While the physical consequences of malnutrition are well-documented, emerging evidence suggests that it may extend beyond physiological health to impact cognitive and

psychological aspects, such as learners' attitudes in the classroom setting. The school-age period is crucial for a child's physical and mental development. Malnutrition during early childhood can lead to severe and long-term consequences, including hindering motor, sensory, cognitive, social, and emotional development. Malnourished children are less likely to perform well in school. They are at a higher risk of becoming malnourished adults, which can result in the development of diseases and early mortality (Rashmi et. al., 2015). Research conducted by Grantham-McGregor et al. (2007) revealed that if a child experience under nutrition during their early years, it can lead to long-term cognitive deficiencies that may negatively impact their academic performance and approach to learning. Malnutrition can significantly affect a child's cognitive abilities, which in turn can affect their learning style and behavior in a classroom setting. Malnutrition may also have an impact on behavioral and psychological problems that influence students' attitudes in the classroom, in addition to cognitive function. According to a study by Ashworth et al. (2008), undernourished children have higher anxiety and depression symptoms, which may have an impact on their motivation and engagement in class activities. To improve students' general well-being and attitude toward learning, it is essential to comprehend the psychological effects of hunger.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.0 Introduction

This chapter presents an overview of the study, findings, conclusions, recommendations, and suggestions for further research.

5.1 Overview

The study sought to investigate the impact of malnutrition on learning among basic pupils at Uaddara Basic School in the Kumasi Metropolis. The objectives of the study were to find out the prevalence of malnutrition among learners at Uaddara Basic School and examine the effects of malnutrition on academic performance and learners' attitudes in class. Three research questions were raised to direct the study.

The study used a descriptive survey design. Basic school students were used for the study. A purposive sampling technique was used to select the basic school. The sample size was 102. A questionnaire was used to gather data. Descriptive statistics such as frequencies, percentages, and regression analysis were used to analyze the data.

5.2 Summary of Findings

The following findings emerged from the study:

1. On the prevalence of malnutrition among basic school pupils, it was found that malnutrition was not prevalent among learners at Uaddara Basic School.

2. On the effect of malnutrition on academic performance, findings revealed students who consumed balanced meals performed well academically. Also, the majority of students at Uaddara Basic School's academic performance were found to be above average.
3. On the effect of malnutrition on learners' attitudes in class, the study revealed that the majority of students had excellent participation in class which is in line with the low level of malnutrition present among learners.

5.3 Conclusions

Malnutrition is a major hindrance to human well-being in developing countries (Stevens et al., 2012) therefore it is important to note that malnutrition can and will impede the learning process in students if left unaddressed. Although learners at Uaddara Basic School reported low levels of malnutrition, its effects on the cognitive development of learners are devastating. Therefore, much attention should be given to it.

5.4 Recommendations

Based on the findings of the study, it is recommended that Ghana Education Service together with the Ministry of Education and Health provide adequate, regular, and balanced meals to students to supplement their feeding. Also, seminars and workshops should be held to educate and inform parents/guardians on the importance of nutrition and the adverse effects of malnutrition on students' health which affects their learning ability.

5.5 Suggestions for Further Research

The study used only one public basic school. It is suggested the study could be replicated in private schools in the Kumasi Metropolis to confirm or refute the findings of this study. The study focused on the impact of malnutrition on learning. It is suggested that further research should be conducted to determine the factors contributing to malnutrition among students in basic schools.

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APPENDIX

QUESTIONNAIRE

AKENTEN APPIAH – MENKA UNIVERSITY OF SKILLS TRAINING AND ENTREPRENEURIAL DEVELOPMENT

DEPARTMENT OF INTEGRATED SCIENCE EDUCATION

THE IMPACT OF MALNUTRITION ON LEARNING: A CASE STUDY IN UADDARA BASIC SCHOOL

The researcher is a student of **AKENTEN APPIAH – MENKA UNIVERSITY OF SKILLS TRAINING AND ENTREPRENEURIAL,** conducting a piece of research on **THE IMPACT OF MALNUTRITION ON LEARNING: A CASE STUDY IN UADDARA BASIC SCHOOL**. I respectfully request that you form part of this research by completing the attached questionnaire. This study aims to assess the impact of malnutrition on learning among pupils at Uaddara Basic School. This study is for academic purposes, only your responses will be treated strictly confidential. Anonymity and non-traceability are assured. Kindly respond to the following questions.

SECTION A

Demographic Data of Respondents

Please tick (√) or write the appropriate response

1. **Sex of Respondents**

   a) Male ( ) b) Female ( )

2. **Age of Respondents**

   a) 5-10 ( ) c) 16-20 ( )

   b) 11-15 ( ) d) 21-25 ( )

3. **Educational Level**

   a) Kindergarten ( )

   b) Primary ( )

   c) Junior High School ( )

4. **Current Grade/Year** ( )

5. **Weight ( )**

6. **Height ( )**

7. **Educational Level of primary caregiver**

   a) Primary level ( )

   b) Junior High level ( )

   c) Senior High level ( )

   d) University and other higher education ( )

   e) Vocational training ( )

   f) No educational level ( )

8. **Occupation of primary caregiver**

   a) Military ( )

   b) Civil servant ( )

   c) Self-employed ( )

   d) Health worker ( )

   e) Vocational worker ( )

f) Farmer ( )

g) Unemployed ( )

h) Others ( )

SECTION B

NUTRITIONAL INFORMATION

The items below are statements on the nutritional level among participants.

Please tick (√) as appropriate.

9. How many regular, adequate, and balanced meals do you have each day?

a) Never ( )

b) Once ( )

c) 2 Times ( )

d) 3 Times ( )

10. How often do you consume the following types of food?

Food Items	**Daily**	**Weekly**	**Monthly**	**Rarely**	**Never**
a) Carbohydrates					
b) Vegetables					
c) Fruits					
d) Protein					
e) Dairy products (eg. Yoghurt, cheese, milk)					
f) Sugary and processed foods (eg. Cake, cookies, toffees, energy/soft/carbonated drinks, pastries)					

11. How often do you take nutritional supplements?

a) Daily ( )

b) Weekly ( )

c) Monthly ( )

d) Rarely ( )

e) Never ( )

SECTION C

The items below are statements on the academic performance and learning environment of participants.

Please tick (√) as appropriate.

12. How would you rate your academic performance?

a) Excellent ( )

b) Good ( )

c) Average ( )

d) Below Average ( )

e) Poor ( )

13. What changes have you noticed in your academic performance over the past year?

a) Improved ( )

b) Remained the same ( )

c) Declined ( )

14. What is your level of participation and engagement in classroom discussions?

a) Excellent ( )

b) Good ( )

c) Fair ( )

d) Poor ( )

15. How would you describe your learning environment at home?

a) Quiet and conducive ( )

b) Somewhat distracting ( )

c) Very distracting ( )

d) Other ( )

16. **Do you have access to educational resources at home? Such as books, a computer, and the internet**?

a) Yes ( )

b) No ( )

17. How many hours of sleep do you get on an average school night?

a) Less than 6 hours ( )

b) 6 – 8 hours ( )

c) 8 – 10 hours ( )

d) More than 10 hours ( )

SECTION D

The items below are statements on the awareness and education on nutrition among participants at Uaddara Basic School.

Please tick (√) as appropriate.

18. **Have you received education on the importance of nutrition for learning at school?**
    a) Yes ( )
    b) No ( )
19. **Do you think it is important for schools to provide information about nutrition and its impact on learning?**
    a) Strongly agree ( )
    b) Agree ( )
    c) Disagree ( )
    d) Strongly disagree ( )
20. **Have you experienced any health issues related to malnutrition, such as fatigue, difficulty concentrating, or frequent illnesses?**
    a) Yes ( )
    b) No ( )
21. **How would you rate your overall well-being?**
    a) Excellent ( )
    b) Good ( )
    c) Fair ( )
    d) Poor ( )

Thanks for your cooperation