Factors Associated with High Prevalence of Stunting among Children under Five in Ghana

Augusta Ahiakonu

Department of Global Health Policy and Financing
Division of Global Health Policy and Financing
Graduate School of Public Health
Yonsei University

Factors Associated with High Prevalence of Stunting among Children under Five in Ghana

Directed by Professor Sang Sook Beck

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Augusta Ahiakonu

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This certifies that the Master's thesis

of Augusta Ahiakonu is approved.

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Thesis Committee Member: Prof. Sang Sook Beck

_____

Thesis Committee Member: Prof. Yuri Lee

_____

Thesis Committee Member: Prof. Dong Hyun Lee

Graduate School of Public Health

Yonsei University

December 2022

DECLARATION

I, Augusta Ahiakonu declare that this work **"Factors Associated with High Prevalence of Stunting among Children under Five in Ghana"** is my original work as a student of Yonsei University

All the sources that I have quoted have been acknowledged through complete references. This is submitted as a Thesis for the Master's Degree program in Health Policy and Financing Capacity Building, at Yonsei University, Seoul.

This thesis has never been submitted either in whole or in part for the award of any degree in any other institution.

Augusta Ahiakonu

DEDICATION

I dedicate this piece of work to all orphans under five years of age, especially those in war-torn countries, and everyone who has lost a benefactor.

ACKNOWLEDGEMENT

I am grateful to God for His faithfulness throughout all the seasons of my life, especially in South Korea.

My heartfelt thanks to my advisor Professor Sang Sook Beck for always availing herself to direct, guide, and mentor me.

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LIST OF ABBREVIATIONS

ANC	Antenatal care
CHPS	Community-based health planning and services
DHIMS	District health management system
DHS	Demographic and health surveys
FAO	United Nations Food and Agricultural Organization s
GHS	Ghana Health Service
MOH	Ministry of Health
MICS	Multiple-indicator cluster surveys
OR	Odds ratio
UNICEF	United Nations Children's Fund
WHO	World Health Organization

ABSTRACT

Background: Stunting is a burden for affected children under five years of age, their families, and their communities. Many children under five years lose their lives through stunting. Survivors often have impaired intellectual and physical growth. It predisposes them to progressive cancers and diabetes later in life. Stunting occurs as a result of insufficient nutrient consumption. Hence, it is an urgent public issue that needs to be addressed to save the lives of children.

Objective: To assess the factors associated with the prevalence of stunting among children under five years of age in Ghana.

Methods: A descriptive cross-sectional design was used for the study. The study used secondary data collected by multiple-indicator cluster surveys (MICS) for Ghana (2018–2019). A total of 8,861 children under five years of age were the target participants.

Results: The prevalence of stunting was 17.1% in Ghana. The findings established that two groups, children aged 36–47 months, and children aged 24-months, were the most severely affected. It also revealed a significant association between stunting and mothers with non-formal educations (OR 2.376, p-value 0.000, 95% CI 1.510—3.739). Lastly, breast-fed children had a significantly lower risk of stunting (OR 0.307, p-value 0.002, 95% CI 0.148-0.636), though children who ate grains had a 50% increased risk of stunting (OR 1.501, p-value 0.000, 95% CI 1.203—1.872) and those who ate beans had 20% higher risk of stunting (OR 1.484, p-value 0.003, 95% CI 1.144-1.927).

Conclusion: The study shows that 17 out of every 100 children were stunted. Male children had a higher risk of being stunted than female children. Children aged between 36 and 47 months had a higher risk of being stunted.

CHAPTER ONE:
INTRODUCTION

Chapter 1 of this study comprises the background, problem statement, objectives of the work, significance of the study, and operational definition. The purpose is to determine the factors associated with the high prevalence of stunting among children under five years of age in Ghana.

1.0 Background

Stunting is a huge public health challenge that poses serious and lifelong social, medical, developmental, and economic burdens for people, societies, nations, and the world. It exposes the affected child to degenerative diseases like diabetes and some cancers (WHO Team, 2015). Also, children who are nutritionally stunted are more likely to have arterial hypertension (Soliman et al., 2021). Stunting occurs due to insufficient intake of nutrients within the first thousand days of a child's life (UNICEF, 2013). Stunting shows chronic undernutrition among children (Fanzo et al., 2019). Stunting is mostly not reversible (WHO, 2014).

Stunting is one of the major causes of morbidity and mortality in the world.

Approximately 6.6 million children aged below five years died as a result of stunting in 2012 (WHO, 2015). Almost 45% of mortality among children under five was connected to undernutrition. These are mostly found in countries with low- and middle-income (World Health Organization, 2021). However, stunting is preventable with healthy eating habits before and during pregnancy, adequate and exclusive breastfeeding for the first six months of a child's life, and complementary feedings such as eating food containing milk

and milk products, eggs, vegetables, and cooked cereals (WHO, 2014a). Unfortunately, women's nutritional status is poor in many countries in the world. Women, especially adolescents are not getting the required nutrition services for healthy living and to enable the survival, growth, and development of their babies (UNICEF, 2022).

Malnutrition is a disorder that occurs because the body lacks micronutrients like minerals, vitamins, and other necessary nutrients that it requires for the healthy maintenance of organs, tissues, and cells (Johns Hopkins University, 2022). It develops in individuals who are over-nourished or undernourished. Stunted children may have weak immunity that makes them vulnerable to infections, be short for their age, be tiny or bloated, or have mood swings, anxiety, and other symptoms (Johns Hopkins University, 2022). Stunted children have impaired intellectual development and a greater risk of mortality from pneumonia, measles, and diarrhea (Black et al., 2013). A stunted child may be anemic too (Rahman et al., 2019). All forms of malnutrition pose significant health risks to human beings (World Health Organization, 2018).

It was estimated that 89% of stunted children lived in developing countries, resided in rural areas, and had mothers with no formal education (FAO, 2022). The stunting prevalence is increasing in nearly 30% of countries in each of the subregions of Northern Africa, Oceania, and the Caribbean. The target to reduce stunted children by 50% by 2030 is not being met by these countries (FAO, 2022). According to Harding et al. (2018), undernourished children who are anemic may suffer from stunting.

In 2020, 149.2 million children below age five years were stunted (Global Nutrition Report, 2021). In Sub-saharan Africa, 32.5% of children were stunted in 2020 (UNICEF/WHO/World Bank, 2022). This rate is greater, compared to the global mean of 22%.

In Ghana, stunting among children between ages 0 and 59 months was 17.5%, in 2018 (Global Nutrition Report, 2022b). A target of reducing stunting by 40% in 2025 was instituted by the world health assembly in 2012 (WHO, 2014b). Many countries including Ghana are committed to working tirelessly towards achieving this target. As a result, Ghana has carried out health promotion activities on childhood nutrition, case management, and salt iodination.

1.1 Problem Statement

Ghana has adopted interventions such as good feeding practices education and promotion, Child Nutrition; a Growth Assessment Training Package developed by the World Health Organization; free antenatal care with the aim of antenatal care registrants seeking the early initiation of exclusive breastfeeding for at least six months; iron-folic acid supplementation to pregnant women; vitamin A supplementation to children at six, twelve, and 18 months; encouraging mothers to practice complementary feeding after six months of birth; introducing school feeding programs; deploying community health nurses to community-based health planning and services (CHPS) compounds to provide child welfare services (immunizations, growth monitoring, and education) in communities across the country. Despite the implementation of these interventions, stunting continues to be 17.5% prevalent in Ghana. This rate is lower than the global mean of 22%. However, reducing it more would be better.

The data from District Health Management System 2 (DHIMS2) reveals that 34,884 and 41,393 children under the age of five were stunted in 2020 and 2021 respectively. These numbers are unacceptably getting higher yearly, per the data collected by the Ghana Health Service. Therefore, this study seeks to determine the factors associated with the

prevalence of stunting among children under five years in Ghana. Figure 1 shows the number of stunted children under five years from 2017 to 2021 in Ghana.

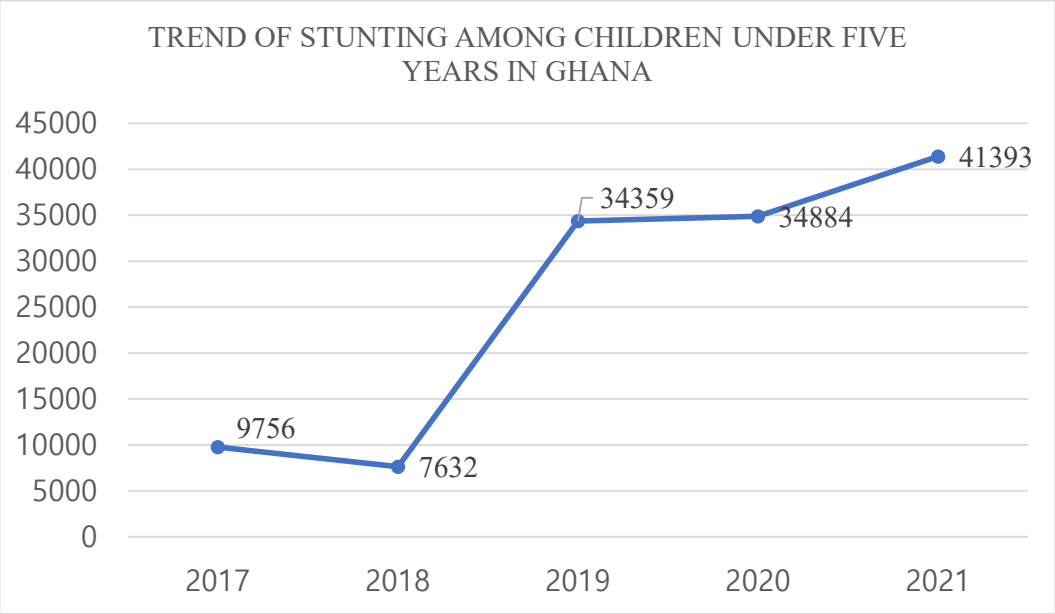

Figure 1.1: Trends of stunted children under five years from 2017 to 2021 in Ghana

(GHS DHIMS 2, 2022)

Fig. 1 shows a slight reduction in stunting figures recorded by Ghana Health Service in 2018 with 2124 over 9,756 cases in 2017. However, stunting among children under age five continues to increase in 2019, 2020, and 2021. More cases of stunting have been detected in recent years because of nutritionists being assigned to certain health facilities, and the wider distribution of height measurement devices.

1.2 Objectives of the Study

1.2.1 Aim

To assess the factors associated with the high prevalence of stunting among children under five in Ghana.

1.2.2 Specific Objectives

1. To assess the prevalence of stunting among children under five years in Ghana.
2. To describe demographic and socioeconomic factors of children under five years and their mothers in Ghana
3. To determine the association between sociodemographic factors of children under five years and stunting in Ghana.

1.3 Research Questions

I. What is the prevalence of stunting among children under five years in Ghana?
II. What are the demographic and socioeconomic factors of children and mothers and stunting?
III. What is the association between sociodemographic factors of children under five years and stunting?

1.4 Significance of the Study

Discovering the factors associated with malnutrition among children under five years will lead to:

Nation and Region: This study will inspire government, policymakers, directors and all those in authority to examine the existing interventions and the strategies being used to deliver them. Also, it will motivate them to institute and implement

effective health policies and interventions for good nutrition among children under five.

Guardians and Parents: This will guide all the caregivers to take the right decisions to improve the nutrition of their children under five years.

Children Under Five: This study will help reduce the suffering related to stunting among children under five.

Researchers: This research will assist upcoming researchers to study the impact of interventions on the nutrition of children under five.

1.6 Operational Definition of Terms

The operational terms are given to better comprehend and interpret this study.

Child under five: A child between 0 and 59 months of age.

Stunting: Height or length for age of less than minus two (≤−2) standard deviations of the median. It refers to a condition that is considered an inability to grow and develop properly because the body lacks essential nutrients for a long time. The affected child becomes shorter than normal for his or her age (WHO, 2015) and (DHS, 2018).

CHAPTER TWO

LITERATURE REVIEW

This section contains literature reviews on malnutrition among children under five years. Information collected in this chapter is related to the objectives of the study. This information has been gathered to assess the factors associated with the high prevalence of stunting among children under five years in of Ghana.

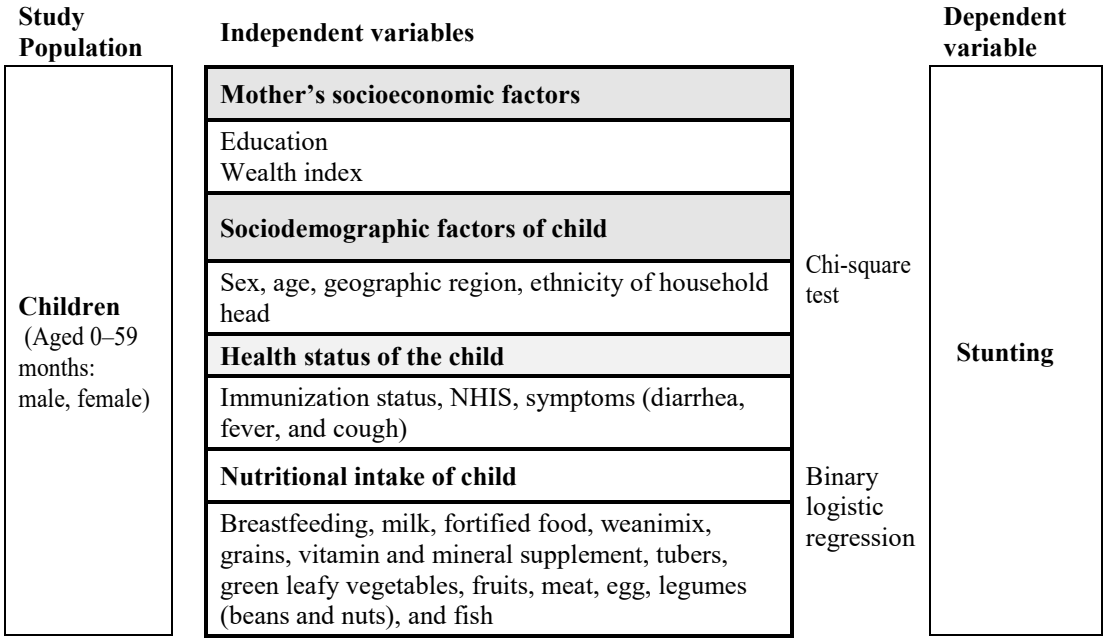

Figure 2.1: Frame of the study

Fig. 2.1 illustrates how the risk factors for stunting may contribute to stunting in children under five years old in Ghana. The factors that cause stunting are interrelated. Several

demographic and socioeconomic variables influence under-five stunting. This includes a child's age, mother's education, and feeding practices, which have immediate effects on under-five stunting. This study has modified the nutrition conceptual framework developed by UNICEF. Hence, it does not contain all the variables in the UNICEF conceptual framework (UNICEF, 2021).

2.1 Nutrition

Nutrition has been defined as a process where food is taken in and the body uses it for the development, metabolism, and maintenance of cells, tissues, and organs (MedicineNet, 2021). Good nutrition gives children energy and provides the first line of defense against infections. Problems related to nutrition as a result of a poor diet have negative effects on children's well-being and their learning abilities. It compromises the future with serious consequences for the affected individuals as well as nations (FAO, 2022).. In a nutshell, nutritional status reflects how the body utilizes the food it consumes. The status of nutrition could be good or poor(Food Science, 2016).

2.2 Nutrition Requirement for a Child

A child's nutritional needs are based on similar principles as an adult's nutrition, with nutrients such as proteins, vitamins, fats, carbohydrates, and minerals. Nonetheless, a child needs a different quantity of each nutrient at a certain age for growth and mental development (Mayo Clinic, 2022). Table 2.1 contains the nutrient-dense foods and the quantity the child needs to eat based on age and sex.

Table 2.1: Daily nutrient-dense food requirement for children under five years

Ages 2 to 4: Daily guidelines for girls	
Calories	1,000 to 1,400, depending on growth and activity level
Protein	2 to 4 ounces
Fruits	1 to 1.5 cups
Vegetables	1 to 1.5 cups
Grains	3 to 5 ounces
Dairy	2 to 2.5 cups
Ages 2 to 4: Daily guidelines for boys	
Calories	1,000 to 1,600, depending on growth and activity level
Protein	2 to 5 ounces
Fruits	1 to 1.5 cups
Vegetables	1 to 2 cups
Grains	3 to 5 ounces
Dairy	2 to 2.5 cups

(Mayo Foundation for Medical Education and Research (MFMER), 2022)

2.3 Malnutrition

Malnutrition is a pathological condition caused by nutrient deficiencies or excesses in the diet that can either be manifested clinically or visible physically, biochemically, or functionally (Philippine Statistic Authority, 2017). According to Saunders and Smith (2010), malnutrition is prevalent among patients but it is usually undiagnosed and untreated. UNICEF (2018) found that a variety of factors such as illnesses from water-borne diseases and malarial mosquitoes), sanitation, diet, insufficient child feeding, restricted access to potable water, and ignorance that hygiene practices cause malnutrition in children, not just

a shortage of food. Malnutrition could be overnutrition or undernutrition. Undernutrition is present in four sub-forms like micronutrient deficiencies, underweight, stunting, and wasting (World Health Organization, 2021).

2.4 Consequences of Stunting

The audiovisual material produced by the WHO Team on stunting and its consequences (2015) states that these consequences are both short and long-term. It notes that nutrient deficiency affects brain development in newborns and fetuses and stunted children may develop chronic diseases later in life. Also, stunted children grow up to be stunted adults who earn 20% less than non-stunted people of the same age. Furthermore, inadequate nutrient consumption is the direct cause of stunting. Again, children who suffer from stunting cannot gain height just like weight is regained because it is not reversible. Moreover, a stunted child is more likely to fall sick (WHO, 2015).

Stunting and all forms of malnutrition have economic, health, physical, and psychological consequences on individuals, communities, society, and nations. As a result, the World Health Organization has developed standards for monitoring children's growth and providing a guide to identify a child's nutritional status after birth and throughout the development. This guide is available for use in all WHO member countries.

2.4 Prevalence of Malnutrition among Children under Five Years

Stunting is a big problem in the world. Surprisingly, several factors are involved and demand several interventions to curb it. The prevalence of stunting is common among children under five years in low and lower-middle-income countries as it affects 37.8 million children in low-income countries where daily average income is less than $2.80 per person per day (Global Nutrition Report, 2018). Another 101.1 million children are in lower-middle-income countries whose incomes are less than $11 per person per day.

Murarkar et al. (2020), in determining the prevalence of malnutrition and determinants among children under five years in urban slums and rural areas, stated that the prevalence among children under five was high because 45.9% of children were stunted. Mawa and Lawoko (2018) also found that 33.4% of children aged between six and 59 months were stunted and wasted. Similarly, a cross-sectional study conducted by Gebre et al. (2019), the "Prevalence of Malnutrition and Associated Factors among Under-Five Children in Pastoral Communities of Afar Regional State, Northeast Ethiopia" found that the prevalence of stunting was 43.1% (95% CI: 38.4%–47.9). Also, Gudu et al. (2020) used an unmatched case-control study to find out factors related to malnutrition among hospitalized children (79 participants) in Kenya and found that 84% of participants were undernourished and 16% were over-nourished. They revealed that stunting among undernourished was 46%, while 38% were stunted severely. Furthermore, Habaasa (2015), in a cross-sectional investigation to identify the factors of malnutrition in children under five in two selected districts (Nakaseke and Nakasongola) in Uganda, found the prevalence of stunting to be 38.5%. Similarly, Bhutia (2014) investigated protein energy malnutrition among children in India. The researcher wrote that children under five have the highest prevalence of stunting, accounting for 48% in the world. He added that the deficiency of nutrition increases the risk of infection in children and contributes to increased mortality in children. Deficiency of nutrition increases the risk of infection in children and contributes to increased mortality in children. This depicts the deadly nature of stunting in children.

Akombi et al. (2017) conducted a study in Nigeria on stunting among children under five. They showed that children who had diarrhea two weeks before the study were stunted. Furthermore, these authors indicated that children who suffered from fever for two weeks before the study were likely to suffer from stunting.

2.5 Relationship between Demographic Factors and Malnutrition

The demographic factors (sex, age, and birth order of children) had an association with stunting among under five years children. Ndemwa et al. (2017) studied the association between nutrition and demographic factors among children less than 24 months old in Kenya. The findings showed that the likelihood of stunting was higher among children aged 12–23 months compared to children aged between 11 and 24 months old. According to Fenta et al. (2021) there was a 22% higher risk of malnutrition in boys under-five children than in girls under-five children. The researchers indicated that malnutrition was more likely to affect children with comorbidity than those free from comorbidity. Again, children aged between 12 months and 23 months were reported to be more stunted compared to children between 6 and 11 months (Bhutia, 2014).

2.6 Socioeconomic Status of Parents

One study found that maternal factors such as income, higher age of the mother, family size, occupation, and education level have a link with stunting in children under five. Gudu et al. (2020) searched for factors responsible for malnutrition among children admitted to the hospital using an unmatched case-control study. Their findings confirmed that children with illiterate mothers, being fifth or higher in birth order, and family sizes greater than six were more vulnerable to undernutrition. Also, Irarrázaval et al. (2018) worked on the influence of eating practices among children in Haiti. The researchers found that the primary cause of malnutrition was progressive poverty in large families with older mothers and more children. They suggested that by focusing on education and support in early childhood, these risk factors might be modifiable. An adequate diet and a clean environment for the child are influenced by the education of the mother (Irarrázaval et al., 2018). Additionally, Bhutia (2014) found in his study that the mother's nutritional status and the area of stay have a bearing on the nutrition of the child. He revealed that stunting was more in children living in rural areas compared to those in urban areas.

2.3 Feeding Practices

Feeding practices are essential to prevent malnutrition among infants and young children. In addition, nutrition and health can be achieved and maintained through appropriate evidence-based feeding practices (World Health Organization, 2003). According to Fanzo et al. (2019), about 74.6% of children between the ages of six and 23 months lack enough diet diversity to be healthy. The World Health Organization recommends complementary feeding at six months of age, and eating meals that contain all the nutrients in the right proportion for children's development and growth with consideration of the number of times, adequacy, and safety of the food (World Health Organization, 2003). It boils down to the type of food the children eat, the quality of the food, the frequency of breastfeeding, and even giving the child colostrum right after birth. For several reasons, several of these items can be compromised, which affect the nutritional status of the child. According to (Zhou et al., 2012), the breastfeeding duration is shortened for children under 36 months old, and exclusive breastfeeding is rare for children below six months of age and for those breastfeeding for at least one year. These researchers found that many of the study subjects aged between six and eight months old ate complementary food to complement the breast milk, but some did not receive any food to complement the breast milk. Also, there was a high prevalence of malnutrition in children who were not given breast milk from birth, and children given mixed feeding before six months had the highest prevalence of malnutrition (Asoba et al., 2019). In a study in Myanmar among children between six months and 36 months of age, 18.6% of children were introduced to food besides breast milk earlier than four months of age, while 72.7% and 9.8% of children were introduced to other food between four and eight months of age, and later than eight months of age, respectively (Zhao et al., 2016).

According to Udoh and Amodu (2016), who assessed complementary feeding in children in Nigeria. They reported that the odds of stunting in children who did not receive the minimum feeding frequency were higher than those who did (OR 1.57; 95% CI 1.53–4.03). Also, Mahfouz et al. (2022) using pre-school participants to explore the connection

between stunting and intake of diet in Egypt showed that 76.3% and 13.1% had eaten required energy and protein-containing foods, respectively, compared to children who were not too short for their age. The team mentioned that there was an association between stunting and fruits, poultry as well as egg intake among the study subjects (stunted children) in comparison with children who were not stunted. Again, inadequate intake of nutrients and dietary diversity during complementary feeding among young children was 62% as reported by (Uwiringiyimana et al., 2019) when they found out complementary feeding and stunting predictors. In addition to the earlier authors, Rizky Maulidiana and Sutjiati (2021), who worked among children under five years old in Indonesia to assess essential amino acid intake and other causal factors of stunting, they disclosed that children who were stunted did not consume all the essential amino acids in their meals in comparison to normal children. However, Nachvak et al. (2020) mentioned that there was no correlation between consumption of food such as meat, vegetables, and fruits, and stunting. They concentrated on special children's food intake and stunting.

CHAPTER THREE

METHODOLOGY

This chapter deals with the methods and instruments that were used to gather data for this work. It includes the research design and sampling technique, the source of the data, the study participants, the profile of the study area, variables, data analysis, and ethical issues.
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3.0 Study Design and Sampling Technique

This was a descriptive, cross-sectional study that analyzed data from the 2018 United Nations Children's Fund (UNICEF) Multiple Indicator Cluster Surveys (MICS) for Ghana. The UNICEF MICS used a stratified two-stage cluster design. In the first stage, clusters were randomly selected from master sampling frames. In the second stage, a systematic sample of households was selected from the clusters. Information on children under five years was obtained from eligible female respondents (aged 15– 49 years) using tablets through face-to-face interviews. This study selected children up to 59 months whose data were available for Ghana to assess factors contributing to malnutrition in the country.

3.1 Data Collection

Respondents eligible for the survey were interviewed using tablets in a face-to-face setting. The interviewing teams comprised the measurers and assistants who measured the children under five years' height. The teams had undergone training to take the measurements appropriately. The measurement criteria used was based on age and sex as shown in Table 3.1.

Table 3.1: Guidelines for Height for Age measurement

Age in months	**Length/Height (cm)**			
	Males		Females	
	Min	Max	Min	Max
0–2	38.5	73.7	38	72.4
3–5	49.2	80.4	47.2	79.3
6–8	54.8	85.4	52.1	84.6
9–11	58.5	90	55.7	89.5
12–14	61.5	94.3	58.6	93.9
15–17	64	98.4	61.1	98.1
18–20	66.1	102.4	63.3	102.1
21–23	67.9	106.1	65.3	105.8
24–26	68.8	109	66.4	108.5
27–29	70.2	112.4	68	111.9
30–32	71.5	115.4	69.5	114.9
33–35	72.7	118.3	70.9	117.9
36–38	73.8	121.1	72.2	120.7
39–41	75	123.6	73.5	123.4
42–44	76.1	126.1	74.7	126
45–47	77.1	128.5	75.8	128.5
48–50	78.2	130.8	76.9	131
51–53	79.2	133.1	77.9	133.4
54–56	80.2	135.4	79	135.7
57–59	81.2	137.8	79.9	138

Data source

The United Nations Children's Fund (UNICEF) MICS data was used for this study. Data collected by the United Nations Children's Fund is credible and nationally representative.

Study Participants

The research studied 8,861 children under five years of age (0 and 59 months).

Exclusion and Inclusion Criteria

The study included children between 0 and 59 months. It excluded children who were exactly five years and above. Also, the children with incomplete demographic information were excluded from the study. Additionally, the study used datasets collected for ten administrative regions in Ghana prior to creation of additional six regions, hence it is limited to the old regions.

2.2 Study Area

Ghana was selected as the study area because it has recorded many stunting cases. Ghana occupies an area in the Western portion of Africa, with a land surface of about 238,535 km^2. It is bounded on the north by Burkina Faso, on the south by the Gulf of Guinea and the Atlantic Ocean, on the west by the Ivory Coast, and on the east by the Republic of Togo. The country has a total population of 30,832,019 as of 2021 with an estimated 6,166,404 children under five and 7,399,685 women of fertility age. It has a population density of 137 per km^2 with the majority (56.7%) of the people living in urban areas while the minority (43.3%) live in rural areas. Figure 2 shows the map of Ghana with the old administrative regions that the study covered (Ghana Statistical Service, 2021).

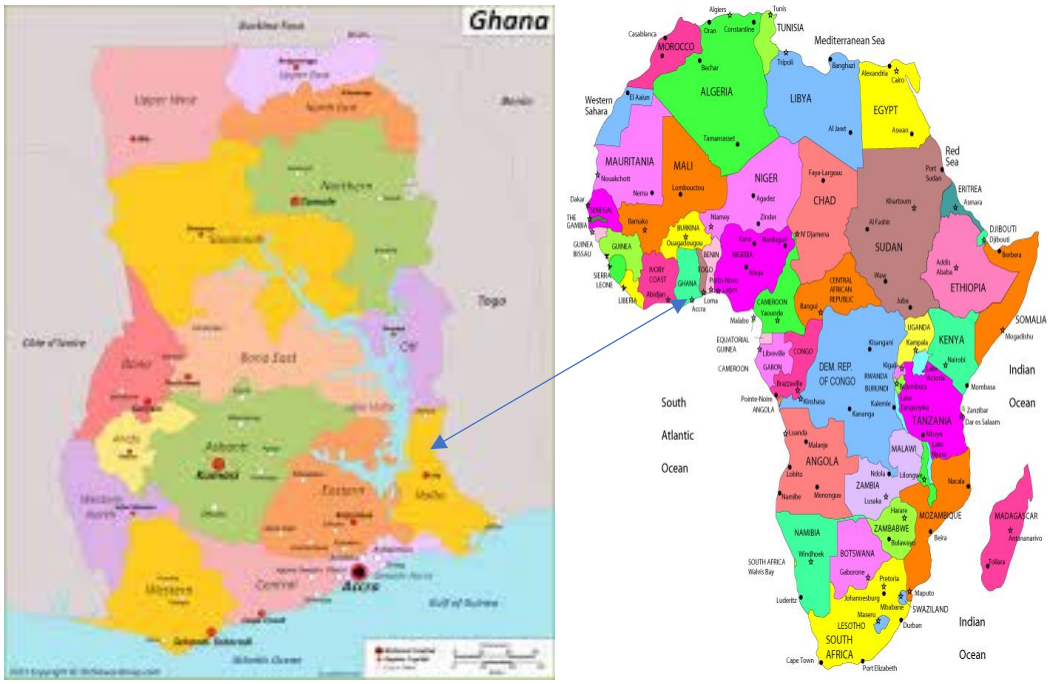

Figure 3.1: **Map** of Ghana (**l**eft) with its location within **Africa** (**r**ight) (Permanent Mission of Ghana to the UN, 2022)

Variables

The dependent variable in this study is stunting. The independent variables were the child's demographic factors and morbidity status and mother's socioeconomic factors.

Statistical analysis

This study used SPSS version 26.0 and Microsoft Excel for the analysis. Logistic regression models to determine the factors associated with stunting. The height for age Z Score (WHO) variable in the dataset was coded and labeled appropriately to indicate stunting and non-stunting. Also, the Chi-square test was run to generate percentages and the significance of the variables. Binary logistic regression (odds ratio with 95% confidence interval) was run on the variables with a significance of less than 0.05 to determine the factors associated with stunting among the study participants. The results are presented in tables and graphs.

Ethical Issues

This study used the data that had been collected by the United Nations Children's Fund (UNICEF). UNICEF MICS sought ethical approval from the ethical review board before data collection. Hence, the approval to use the datasets was obtained from UNICEF MICS before downloading the datasets for analysis.

Limitations of the Study

Only children whose mothers were interviewed during the survey were included in the study. Hence, children who were not part of the survey were excluded. Also, we reviewed literature on the maternal body mass index, but we did not receive data on it for the analysis.

CHAPTER FOUR

RESULTS

4.0 Introduction

This chapter brings to light the results based on the study objectives. The results are presented in frequency tables and graphs. Frequencies, percentages, and other statistical tests were used to achieve the purpose of this study. Below are the details.

4.1 Prevalence of Stunting

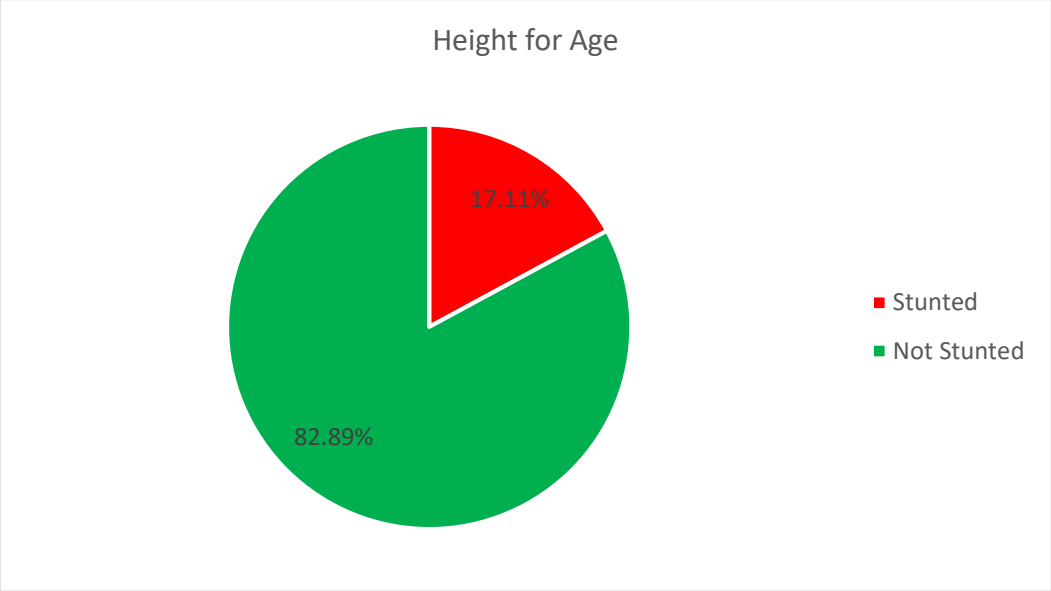

Figure 4.1: Prevalence of stunting among children under five years of age.

4.2 Demographic Factors and Stunting

Table 4.1: Demographic Factors and Stunting

Variable	N=8,861	Stunted		X^2	P
		Yes	No		
Age (in months)					
0–11	1,795	153 (10.1%)	1,642 (22.4%)	155.964	0.000
12–23	1,677	339 (22.3%)	1,338 (18.2%)		
24–35	1,730	375 (24.7,%)	1,355 (18.5%)		
36–47	1,865	389 (25.6%)	1,476 (20.1%)		
48-59	1794	263 (17.3%)	1,531 (20.9%)		
Sex					
Male	4,366	851 (56.0%)	3515 (47.9%)	33.434	0.000
Female	4,495	668 (44.0%)	3827 (52.1%)		
Region					
Western	874	158 (10.4%)	716 (9.8%)	103.573	0.000
Central	853	147 (9.7%)	706 (9.6%)		
Greater Accra	765	97 (6.4%)	668 (9.1%)		
Volta	786	131 (8.6%)	655 (8.9%)		
Eastern	799	125 (8.2%)	674 (9.2%)		
Ashanti	1,120	164 (10.8%)	956 (13.0%)		
Brong Ahafo	836	132 (8.7%)	704 (9.6%)		
Northern	1,179	317 (20.9%)	862 (11.7%)		
Upper East	755	121 (8.0%)	634 (8.6%)		
Upper West	894	127 (8.4%)	767 (10.4%)		
Area					
Urban	3,491	481 (31.7%)	3010 (41.0%)	45.902	0.000

Rural	5370	1,038 (68.3%)	4332 (59.0%)		
Mother's education					
Pre-primary or none	2878	614 (40.4%)	2264 (30.8%)	89.923	0.000
Primary	1662	296 (19.5%)	1366 (18.6%)		
JSS/JHS/Middle	2958	457 (30.1%)	2501 (34.1%)		
SSS/SHS/ Secondary	936	128 (8.4%)	808 (11.0%)		
Higher	427	24 (1.6%)	403 (5.5%)		
Health Insurance					
Yes	5,392	893 (58.8%)	4499 (61.3%)	3.273	0.070
No	3,469	626 (41.2%)	2843 (38.7%)		
Ethnicity					
Akan	3,176	510 (33.6%)	2666 (36.3%)	79.878	0.000
GA/Damgme	580	78 (5.1%)	502 (6.8%)		
Ewe	934	141 (9.3%)	793 (10.8%)		
Guan	360	81 (5.3%)	279 (3.8%)		
Gruma	423	115 (7.6%)	308 (4.2%)		
Mole Dagbani	2,214	408 (26.9%)	1806 (24.6%)		
Grusi	384	54 (3.6%)	330 (4.5%)		
Mande	37	3 (0.2%)	34 (0.5%)		
Other	748	124 (8.2%)	624 (8.5%)		
No Response	5	5 (0.3%)	0 (0.0%)		
Wealth Index					
Poorest	2,685	564 (37.1%)	2,121 (28.9%)	115.276	0.000
Second	1,747	353 (23.2)	1,394 (19.0%)		
Middle	1,612	270 (17.8%)	1,342 (18.3%)		
Fourth	1,409	209 (13.8%)	1,200 (16.3%)		

Richest	1,408	123 (8.1%)	1,285 (17.5%)		
Breastfed					
Yes	5,090	838 (96.8%)	4252 (98.4%)	11.132	0.004
No	96	28 (3.2%)	68 (1.6%)		
Dk	1	0 (0.0%)	1 (.0%)		
Vitamin or Mineral Supplement					
Yes	660	99 (20.1%)	561 (18.9%)	0.577	0.749
No	2801	393 (79.9%)	2408 (81.1%)		
Dk	1	0 (0.0%)	1 (0.0%)		
Milk					
Yes	292	43 (8.7%)	249 (8.4%)	6.114	0.047
No	3169	448 (91.1%)	2721 (91.6%)		
Dk	1	1 (0.2%)	0 (0.0%		
Fortified food					
Yes	542	69 (14.0%)	473 (15.9%)	1.156	0.282
No	2920	423 (86.0%)	2497 (84.1%)		
Weanimix					
Yes	270	42 (8.5%)	228 (7.7%)	0.434	0.51
No	3192	450 (91.5%)	2742 (92.3%)		
Grains					
Yes	2090	350 (71.1)	1740 (58.6%)	27.797	0.000
No	1372	142 (28.9%)	1230 (41.4%)		
Food rich in vitamin (pumpkin)					
Yes	201	28 (5.7%)	173 (5.8)	0.014	0.906
No	3261	464 (94.3%)	2797 (94.2%)		
Tuber (Root)					
Yes	728	140 (28.5%)	588 (19.8%)	25.278	0.085
No	2733	351 (71.3%)	2382 (80.2%)		
DK	1	1 (0.2%)	0 (0.0%)		

Green Leafy vegetables					
Yes	817	155 (31.5%)	662 (22.3%)	22.156	0.000
No	2643	336 (68.3%)	2307 (77.7%)		
DK	2	1 (0.2%)	1 (0.0%)		
Fruits					
Yes	163	27 (5.5%)	136 (4.6%)	0.777	0.378
No	3299	465 (94.5%)	2834 (95.4%)		
Meat					
Yes	348	60 (12.2%)	288 (9.7%)	2.913	0.088
No	3114	432 (87.8%)	2682 (90.3%)		
Egg					
Yes	474	76 (15.4%)	398 (13.4%)	1.814[a]	0.404
No	2986	416 (84.6%)	2570 (86.5%)		
DK	2	0 (0.0%)	2 (0.1%)		
Fish					
Yes	872	156 (31.7%)	716 (24.1%)	13.074	0.001
No	2589	336 (68.3%)	2253 (75.9%)		
DK	1	0 (0.0%)	1 (0.0%)		
Legumes					
Yes	447	95 (19.3%)	352 (11.9%)	20.873	0.000
No	3015	397 (80.7%)	2618 (88.1%)		
Palm Oil					
Yes	672	129 (26.2%)	543 (18.3%)	17.274	0.000
No	2788	363 (73.8%)	2425 (81.6%)		
Dk	2	0 (0.0%)	2 (0.1%)		
Diarrhea					
Yes	1514	317 (20.9%)	1197 (16.3%)	23.866	0.000
No	7344	1200 (79.0%)	6144 (83.7%)		
Dk	3	2 (0.1%)	1 (0.0%)		

Fever					
Yes	2220	428 (28.2%)	1792 (24.4%)	12.697	0.002
No	6637	1089 (71.7%)	5548 (75.6%)		
Dk	4	2 (0.1%)	2 (0.0%)		
Cough					
Yes	2620	457 (30.1%)	2163 (29.5%)	5.445	0.066
No	6238	1060 (69.8%)	5178 (70.5%)		
Dk	3	2 (0.1%)	1 (0.0%)		
Vaccination					
Yes	401	76 (11.4%)	325 (48.9%)	3.024	0.220
No	232	38 (5.7%)	194 (29.2%)		
Dk	31	9 (1.4%)	22 (3.3%)		

NB: X^2 = Chi-square value P = p-value
The total may not add up due to missing variables

Table 4.1 indicates the demographic features of the children under the age five and their mothers. There were 8,861 children under five in the study. The finding shows that 21.0% of the participants were between the ages of 36 and 47 months, 20.3% and 20.2% were between the ages of 0–11 months and 48–59 months respectively. Additionally, participants within the ages of 36–47 months, 24–35 months, and 12–23 months were more stunted as (25.6%, 24.7%, and 22.3% respectively). In all, age is a statistically significant indicator of stunting among the subjects (P=0.000). With respect to sex, 50.7% of the children were female and 49.3% were male; out of these, 56.0% of males were stunted and 44.0% of females were stunted. This shows that males become more stunted than females, hence, sex is a strong determinant of stunting (P= 0.000). Concerning the regional breakdown of the participants, 13.3% were from northern Ghana, 12.6% from Ashanti, 10.1% from the upper west, and 9.9% were from western regions. Similarly, 20.9%, 10.8%, and 10.4% of these children were stunted from the northern, Ashanti, and

western regions accordingly. The region of residence of a child determines stunting (P=0.000). Again, 60.6% of the children in the study resided in rural areas, while 39.4% lived in urban areas; 68.3% of those in rural areas were found to be stunted, whereas 31.7% were stunted in urban areas.

The majority (33.4%) of the mothers of the study children had attended JSS/JHS/middle school, 32.5% had no formal education, and 18.8% had only a primary education. In addition, 40.4% of mothers who did not have formal education had stunted children, 30.1% had a JSS/ JHS/middle school education and 19.5% of mothers with a primary education had stunted children. This shows that mothers' education (p=0.000) determines the nutritional outcome of children aged 0–59 months.

Also, 60.9% of the children were insured and 39.1% were uninsured. Most of the insured were stunted (58.8%), in contrast with 41.2% stunting among non-insured children. However, health insurance is not statistically significance with regard to health stunting (p = 0.07). The household heads were Akan (35.5%), Mole Dagbani (25%), and Ewe (10.8%) with most of the stunting occurring in the household head of Akan (33.6%), Mole Dagbani (26.9%) and Ewe (9.3%). The ethnicity of the head of a household shows statistical significance (chi square= 79.878 p-value 0.000). Looking deeper into the wealth index of the target population, 30.3% were the poorest and were greatly stunted (37.1%), 19.7% were poorer with stunting of 23.3% and 18.2% were poor with a 17.8% of stunting. This is considered statistically significant (p = 0.000).

We found that 98.1% of the children were breastfed and 96.8% of them were stunted. This is statistically significant (0.004). It may well be that these children were not breastfed exclusively.

Regarding consumption of vitamin or mineral supplement, only 3,462 participants answered this question: 80.9% of the children did not take mineral or vitamin supplements, while 19.1% did, and that 79.9% of those who did not consume supplements had stunting while 20.1% of those who did were stunted. This shows that the consumption of mineral or vitamin supplements is statistically insignificant (p =0.75).

Moreover, 91.5% of children did not drink milk, and 91.1% were reported to be stunted compared with the 8.4% who drank milk with a 8.7% stunting rate, which is statistically significant (p = 0.047). For fortified products, more than 84% of the respondents indicated that they did not eat fortified baby food (Cerelac, Gerber, Hero, etc.). Nevertheless, slightly above 15% of the participants ate such fortified food; 86% of the respondents who did not eat fortified food were stunted, while 14% of those who ate it were stunted. Also, 92.3% of the children did not eat fortified food like Weanimix as few (7.8%) ate fortified Weanimix. The report also shows more than 91% of the stunting among non-eaters of fortified food while 8.5% of those who ate the fortified food were stunted. The fortified food is not statistically important (p =0.283 and 0.510). However, 60.4% of the respondents ate food containing grains while 39.6% did not; 71% of the children who ate it were found to be stunted, compared with 28.9% stunted children who did not eat grains. Consumption of grains containing food is significant in the nutrition of children (p = 0.000).

According to the survey, 78.9% of people did not consume tubers (potatoes, yams, manioc, cassava, Etc.) while 21.0% did. The data show that 71.3% of the children who did not eat tubers were stunted, compared to 28.5% of stunted children who ate tubers. However, this is not statistically significant (p=0.085).

Along those lines, 76.3% and 95.3% did not eat green leafy vegetables and fruits (mangoes, pawpaw) respectively. On the contrary, 23.6% and 4.7%, respectively, consumed green leafy vegetables and fruits. Stunting was present more (68.3% and 94.5%) in those who did not eat the vegetables and the fruits. Those who did not eat green leafy vegetables are significantly stunted. Moreover, respondents who did not eat fish were 74.8% compared to 25.2% who ate fish. Likewise, 87.1% ate beans while 12.9% did not. Comparatively, 68.3% and 80.7% were stunted and did not eat food containing fish and beans separately. These children are significantly stunted. Lastly, children who had no record of diarrhea and fever for two weeks prior to the survey were 82.9% and 74.9% individually. However, 79.0% and 71.7% of them with no history of

diarrhea and fever were stunted. In terms of vaccination, 60.4% of children were vaccinated, 34.9% were not, while 4.7% did not know whether they received any vaccinations. Furthermore, 11.4% of vaccinated children were stunted while 48.9% were not stunted. Also, 5.7% of children without vaccination were stunted and 29.2% were not stunted. There was no statistical significance between stunting and vaccination.

4.3 Association between Demographic, Socioeconomic Factors, and Stunting

Table 4. 2: Association between Demographic, Socioeconomic Factors, and Stunting

Predictor	OR	P	95% C.I.	
			Lower	Upper
Age				
48–59		0		
0—	0.551	0	0.445	0.682
12–23	1.512	0	1.263	1.81
24–35	1.664	0	1.394	1.986
36–47	1.592	0	1.337	1.897
Sex				
Male	1.442	0	1.286	1.617
Region				
Upper West		0		
Western	1.561	0.005	1.141	2.137
Central	1.432	0.032	1.031	1.988
Greater Accra	1.457	0.042	1.013	2.094
Volta	1.214	0.297	0.843	1.749
Eastern	1.279	0.146	0.918	1.782
Ashanti	1.349	0.052	0.997	1.826
Brong Ahafo	1.182	0.28	0.873	1.6
Northern	2.123	0	1.661	2.712

Upper East	1.143	0.341	0.868	1.505
Area				
Urban	0.904	0.181	0.779	1.048
Education				
Pre-primary or none	2.376	0.00	1.51	3.739
Primary	2.166	0.001	1.371	3.422
JSS/JHS/Middle	2.014	0.002	1.289	3.145
SSS/SHS/ Secondary	2.191	0.001	1.378	3.484
Wealth Index				
Rich		0.00		
Poorest	0.907	0.233	0.771	1.065
Second	0.762	0.004	0.633	0.917
Middle	0.649	0.00	0.525	0.802
Fourth	0.359	0.00	0.279	0.463
Feeding Practices				
Ever breastfed				
Yes	0.307	0.002	0.148	0.636
Grains				
Yes	1.501	0.00	1.203	1.872
Green leafy vegetable				
Yes	0.214	0.277	0.013	3.446
Beans and related products				
Yes	1.484	0.003	1.144	1.927
Food made with Palm oil				
Yes	3.04E+18	0.999	0.00	.
Fish				
Yes	0.00	1.00	0.00	.
Health Issue				
Diarrhea				
Yes	0.00	1	0.00	
No	0.00	1	0.00	
Fever				
Yes	4.62E+08	1	0.00	
No	3.95E+08	1	0.00	

OR= Odds ratio P=p-value

Table 4.2 shows the odds of a child being stunted was more significantly associated with ages between 24–35 months (OR 1.664, p-value 0.000, 95% CI 1.394—1.986), 36–47 months (OR 1.592, p-value 0.000, 95% CI 1.337–1.897), and 12–23 months (OR 1.512, p-value 0.000, 95% CI 1.263–1.810) compared with a child aged between 43-59 months. The odds of a child being stunted was significantly associated with a male (OR 1.442, p-value 0.000, 95% CI 1.286–1.617) compared with a female child within the same age. Further, the odds of a child being stunted in a region was significantly associated with the northern region (OR 2.123, p-value 0.000, 95% CI 1.661–2.712) and western region (OR 1.561, p-value 0.005, 95% CI 1.141–2.137); however, odds of a child getting stunted was insignificantly associated with Volta (OR 1.214, p-value 0.297, 95% CI 0.843–1.749), Brong Ahafo (OR 1.182, p-value 0.280, 95% CI 0.873–1.600), and upper east (OR 1.143, p-value 0.341, 95% CI 0.868–1.505) compared to the upper west region. Still, the odds of a child getting stunted was not significantly associated with urban areas (OR 0.904, p-value 0.181, 95% CI 0.779–1.048) compared to rural areas.

Also, the odds of a child becoming stunted was significantly associated with pre-primary or none education (OR 2.376, p-value 0.000, 95% CI 1.510–3.739), primary (OR 2.166, p-value 0.001, 95% CI 1.371–3.422), JHS/JSS (OR 2.014, p-value 0.002, 95%CI 1.289–3.145) compared with tertiary. Furthermore, the odds of a child being stunted was (OR 0.907, p-value 0.233, 95% CI 0.77–1.065) for the poorest, (OR 0.762, p-value 0.004, 95% CI 0.633–0.917) for moderately poor, and (OR 0.649, p-value 0.000, 95% CI 0.525 – 0.802) for poor but not rich.

The odds of a child being stunted was significantly associated for children that were breastfed (OR 0.307, p-value 0.002, 95% CI: 0.148-0.636), ate food made of grains (OR 1.501, p-value<0.000, 95% CI 1.203-1.872), and ate beans and peas (OR 1.484, p-value 0.003, 95% CI 1.144-1.927). Lastly, the odds of a child stunted due to diarrhea was (OR 0.000, p-value 1.000, 95% 0.000 - -) and the odds of a child stunted due to fever was (OR 4.6, p-value 1.00, 95% CI: 0.00)

CHAPTER FIVE

5.0 DISCUSSION

This chapter discusses the findings and summary of the work.

Prevalence of Stunting

In this study, stunting among children under five years of age was still prevalent as high as 17.1%. This confirms the prevalence reported by the Global Nutrition Report (2018). It was reported that stunting is prevalent in developing countries. This also agrees with the studies by Gudu et al. (2020) and Gebre et al. (2019), who found a high prevalence of stunting in Kenya and northern Ethiopia. However, this rate is lower than the prevalence rates found in Kenya and Ethiopia. This indicates that the prevalence of stunting differs across countries.

Description of Demographic and Socioeconomic Factors and Stunting

The study indicated that the age of a child was a significant determinant of stunting. The ages of children who were greatly affected were between the ages of 36 and 47, and 24 and 35 months. Perhaps, these children were allowed to choose food based on their preferences, taste, and amount. Hence, parents could not consider the nutrient density of their choices. This contradicts the finding of Ndemwa et al. (2017) and Bhutia (2014), who found stunting to be higher for children aged between 12 and 23 months. Similarly, male children were significantly affected by stunting. This might mean that parents were not abreast with the nutrient requirements for male children, so they were fed the same as female children. This agrees with the findings of Fenta et al. (2021), that boys have a 22% higher rate of malnutrition than girls. Additionally, the study examined regions and showed that children who resided in the northern region were highly stunted compared to children in other regions. It implies that the climate condition in that region could not

support the availability and accessibility of some nutrient-dense foodstuffs. Likewise, the area of residence of a child was a significant indicator of stunting in children: children in rural settings were more stunted than children in urban towns. This could be due to inadequate education on nutrition, as many of the residents in rural areas might not have access to educational audiovisual materials on childhood nutrition. This confirmed the result from Bhutia (2014) that stunting was more in children dwelling in rural areas than in urban settings.

This work looked at the education and wealth index of the mothers of the children in the study. The results show that many of the mothers had no formal education, belonging to pre-primary or non-education groups. This was a significant determinant of stunting. Many of the programs on childhood nutrition are in the official language, so these mothers might not comprehend the content of the messages that would assist them make the right nutritional choices for their children. It is consistent with the study by Irarrázaval et al. (2018) that adequate nutrition of a child was due to maternal education. Furthermore, the wealth index of the mothers showed that many of the mothers were in the two poorest categories. It suggests that many mothers did not have money to buy nutritious food but only focused on how to fill the stomachs of their children. Regarding vaccination, the study found no statistical significance between vaccination and stunting in children under five years of age.

Association between Sociodemographic Factors, and Stunting

There was a significant association between the age of child and stunting. The children between the ages of 24 and 35 had over 60% increase in stunting. Also, the children in the northern region had over 100% increase in stunting. Similarly, children with illiterate mothers were 1.3 times vulnerable to stunting. However, there was no significant association between children from the poorest mother and stunting. Regarding feeding practices, children who were breastfed had a 70% decrease in stunting compared to children who had no breast-feeding history. This means exclusive breastfeeding truly

protects the children from stunting. However, not all children were breastfed, as Asoba et al. (2019) indicated that many of the children were introduced to complementary feeding at an early age. However, exclusive breastfeeding was not assessed in this study.
There was a strong correlation between eating grains (energy-giving food) and stunting. Children who ate grains had a 50% increase in being stunted than children. It implies that these children did not eat from other sources of nutrients. This is similar to the findings of Uwiringiyimana et al. (2019) that inadequate consumption of dietary diversity leads to stunting in children. Again, consumption of green leafy vegetables and fish products had no significant link with stunting. This is in agreement with Nachvak et al. (2020) that there was no association between vegetables and stunting. Nonetheless, children who ate legumes such as beans and nuts had 40% more risk of being stunted than the children who did not.

CHAPTER SIX
6.0 CONCLUSION AND RECOMMENDATION

6.1 Conclusion

This concludes the findings of the study on factors associated with the high prevalence of stunting among children under five years of age.

The study was a descriptive cross-sessional study. The source of data was secondary data obtained from UNICEF MICS data collected for Ghana. The total participants for the study were 8861 children under five years old. The dependent variable was stunting and the independent variables were sociodemographic factors. The data was analyzed using SPSS Version 26.0. Also, Chi-square and binary regression were used to identify and find out the factors associated with stunting.

Regarding the result, the study identified that 17 out of 100 children were stunted. Male children had a higher risk of being stunted than female children. Children aged between 36 and 47 months had a higher risk of being stunted. Again, children in the Northern region were the most affected as the children in rural areas. It also found that children who ate beans had a higher risk of being stunted. Therefore, children should be fed with the required nutrients based on sex and age.

6.2 Recommendation

Based on the findings the following recommendations are made to alleviate the burden of stunting among children under five years:

The Ministry of Health (MOH) as well as Ghana health service should provide training to all community health nurses especially those in rural areas on childhood nutrition so that they can promote the nutrition of the children in their respective communities.

The Ministry of Health as well as GHS should develop a mechanism for capturing and monitoring dietary records of children under five years old at Child welfare clinics across the country.

Policies on food fortification before sales should be enforced in Ghana. The Ministry of Health in collaboration with the Food and Drugs Board should identify the staple food in every region especially in Northern region and ensure they are fortified before sales.

Mothers should be empowered to feed their children with a healthy nutritious diet.

All childhood nutritional programs should be done in local languages so that parents can comprehend the content of the information to improve on the nutrition of their children.

A study should be conducted to evaluate the existing interventions on childhood nutrition.

Also, research should be carried out to assess exclusive breastfeeding among children under five years old in Ghana.

GHS should provide all health facilities with a height measurement device so that nurses can take appropriate height measurements for early detection and management of stunting among children under five.

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