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FOOD AND NUTRITION SECURITY IN WEST GONJA MUNICIPAL IN GHANA

ZUBAIDATU AMINGO AMIDU

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FOOD AND NUTRITION SECURITY IN WEST GONJA MUNICIPAL IN GHANA

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ZUBAIDATU AMINGO AMIDU

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DECLARATION

I, ZUBAIDATU AMINGO AMIDU hereby declare that this dissertation/thesis is the result of my original work and that no part of it has been presented for another degree in this University or elsewhere.

ZUBAIDATU AMINGO AMIDU	…….	……
(Student)	Signature	Date

I hereby declare that the preparation and presentation of the dissertation/thesis was supervised following the guidelines on supervision of dissertation/thesis laid down by the University for Development Studies.

PROF. MOOMIN ABU	…….	……
(Supervisor)	Signature	Date

DR. HYPOLITE BAYOR	…….	……
(Head of Department)	Signature	Date

ABSTRACT

This study assessed the security of West Gonja Municipality's food and nutrition. Food and nutrition security (FNS) is a critical indicator of a population's well-being and development. The West Gonja Municipal, located in the Savannah region of Ghana, faces numerous challenges related to food availability, access, utilization, and stability. This study employed a mixed-method approach, incorporating quantitative data from household surveys and qualitative insights from interviewing critical informants and discussing with focus groups. About 67% of the study's participants were found to be severely food insecure while only 2% were food secure. The FNS status varied with socioeconomic characteristics of the households. There was an inverse association between FNS status and size of households. Larger households most likely had lower FNS status than smaller households. Educational status greatly influenced households' FNS. More households with basic and informal education experienced more food insecurity compared to those with comparatively higher education such as senior high, technical/vocational and tertiary. Gender influenced households' FNS status. The study's findings indicated that as the severity of FNS increased, the percentage gap between women and men affected widened. The percentage of women who were severely food insecure stood at 40% as against 27% for men. Households in the West Gonja Municipal employed several coping strategies to mitigate food shortages. Majority of them (95%) reported depending on cheap and less patronized food, and 92% said they borrowed to get food.

Skipping meals, restricting portion size of meals and limiting adult intake in favour of children were also practised by 85%, 87% and 65% of respondents respectively. A greater percentage (76%) of respondents indicated they would skip eating for whole days as a last

resort. Rising food prices, Covid-19 at the time of the study, climate change, poverty, gender inequality, conflicts and political instability, food waste and loss, poor access to land, and prolific population growth were the major factors identified as challenges to FNS. The research also underscored the significance of multisectoral collaboration, involving government agencies, non-governmental organizations, and related stakeholders including chiefs, queen mothers, market queens, food vendor, and farmers in the course of achieving FNS in the West Gonja Municipal. Strengthening recommended agricultural practices, promoting recommended market linkages, and disseminating recommended nutrition education are also recommended for enhanced food and nutrition security in the West Gonja Municipal.

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DEDICATION

I dedicate this work to God Almighty, my lovely husband Mr. Ibrahim Alhassan, my sons Ibrahim Faaiz Mandeya and Ibrahim Fawzan Katari and my late parents Mr. Abubakari Sulemana Amidu and Madam Abibata Jebuni.

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CHAPTER ONE

1.0 INTRODUCTION

1.1 Background

The concept of food security originated after World War II to address food shortages. It evolved throughout the late 20th century to include physical and economical access to food, food quality, nutrition, food sovereignty and cultural aspects (Aliaga et al., 2020). When all people at all times have economic, physical and social access to sufficient nutritious and safe foods that meet their food and nutrition needs and preferences in a setting with proper sanitation and health services, they can live active, healthy lives is known as FNS (FAO, 1996; FAO, 2009a). Any material that humans consume or drink to sustain life and growth is referred to as food in this context.

The definition of FNS lays emphasis not only on food availability and accessibility but also on utilization (Klennert, 2005). To assess and track FNS at all levels, measures of FNS combine self-reported behaviours (subjective) and consumption (quantitative) variables (Kirkland et al., 2011). Some scholars claim that FNS is primarily at the home setting, hence their campaign for usage of households as the analysis unit (Maxwell, 1996; Kirkland et al., 2011).

When a household cannot uptake, lessen, or offset the effects of a drop-in food availability, accessibility and consumption, they are considered to be experiencing food insecurity (Misselhorn, 2005; Webb et al., 2006). Food insecurity is more common in homes, and it takes precise measurements to identify food security in households (Misselhorn, 2005; Webb et al., 2006). Despite greater theoretical understanding, there exists no standard

methodology for gauging FNS, and no "perfect single measure" currently exists (Webb et al., 2006).

According to Maxwell & Frankenberger (1992), food insecurity can exist permanently (chronic), temporarily (transitory), or in cycles. Therefore, any evaluation of food and nutrition security must take accessibility, sufficiency, or sustainability into account. Consequently, it is essential to comprehend how different indicators affect vulnerable family profiles. By analyzing the three widely patronized determinants of household FNS such as food diversities, hunger and ameliorating measures, Kirkland et al. (2011) showed that selecting the right indicator is important for knowing susceptible households and creating interventions that are targeted at the most vulnerable individuals.

Food insecurity can be measured using five approaches that are frequently used in national surveys. These include the FAO method for determining the number of calories available per capita nationally; individual dietary consumption; anthropometry; and experience-based food insecurity measurement scales (Pérez-Escamilla & Segall-Corrêa, 2008).

FNS is a critical issue for many regions worldwide, particularly in developing countries where access to adequate and nutritious food remains a challenge. Both the industrialized and developing worlds have been impacted by food insecurity, while the latter has been more severely so.

Approximately 12 percent (928 million) of the world's population in 2020 suffered food insecurity, about 19 percent higher than the following year’s value, according to FAO et al. (2021). One in three people, or 2.37 billion people worldwide, were predicted to lack access

to sufficient food in 2020. Half of the total were Asians, 799 million Africans and 11% were Latin Americans and Caribbeans.

One of the United Nations' sustainable development goals is to attain FNS and eradicate hunger (United Nations, 2015). Security of food and nutrition is one of Africa's most pressing issues. Complex social, economic, and political considerations coupled with environmental stresses are the reason for the challenge's continuance (Kirkland et al., 2011). Poverty in developing countries hampers access to nutritious food, leading to malnutrition. Food production is affected by resource scarcity and climate change, while population growth increases demand. International trade policies can impact food availability and prices (Klennert, 2005; Kirkland et al., 2011).

Achieving food and nutrition security requires sustained collaboration at all levels to create an equitable, resilient, and sustainable food system that prioritizes the well-being of all people and the environment. Governments and the private sector can address these issues by investing in agriculture, providing support for vulnerable populations, promoting sustainable practices, managing water resources, and encouraging responsible family planning (FAO, 2013).

There is a need for rigorous assessment in order to understand and implement appropriate measures to address FNS issues. Evaluation of FNS encompasses a multidimensional approach that incorporates various aspects of FNS such as availability, affordability/accessibility, stability and consumption. It requires the use of specific methods, tools, and indicators to gather relevant data and analyze the different aspects of FNS comprehensively. These assessments enable policy makers and stakeholders to

identify the root causes of food insecurity and design appropriate interventions to achieve sustainable accessibility to nourishing foods by the population (Kirkland et al., 2011; FAO, 2008; Maxwell & Frankenberger, 1992).

- The access aspect of FNS has been captured by a number of measures. These include the following:

- Household food insecurity scale, which uses a discrete ordinal scale to assess the level of food insecurity (inaccessibility) in the household during the preceding month.

- The household dietary diversity scale counts the variety of food types that are ingested within 24 h, 48 h or 7 days given periods.

- The household hunger scale quantifies the impact of food deprivation in a household using a series of consistent responses that are obtained via a survey and condensed into a scale.

- The coping strategies index rates and evaluates household actions in response to a range of recognized behaviors related to coping with food shortages. The research's technique is predicated on gathering information around a particular question about what one does in times of insufficient food and insufficient money to buy food (Maxwell, 1996; Maxwell et al., 2008).

1.2 Problem Statement

Ghana continues to struggle to attain FNS, according to the World Food Program (WFP) (WFP, 2021). According to reports, 1.2 million people, or around 5% of Ghana's

population, experience food insecurity (Darfour & Rosentrater, 2016). The FAO has it that about 2 million people in Ghana could experience food insecurity. The majority of rural households in the Greater Accra region (31%) and the Upper East region (94%) depend on agriculture for survival. It follows that a large proportion of those experiencing food insecurity reside in rural areas and, unfortunately, work in the food producing industry (FAO, 2009).

About 11.7 percent of Ghana's population, or 3.6 million people, are considered food insecure. 5.2 percent (1.6 million) of the 3.6 million individuals experiencing food insecurity are extremely food insecure, whereas 6.5 percent (2.0 million) are moderately food insecure (WFP, 2020a).

The Savannah Region has a population that is as high as 22.6% food insecure, according to Ghana's 2020 Comprehensive Food Security and Vulnerability Analysis (CFSSA) (WFP, 2020a). One of the main sources of income in the area is agriculture, however a lot of people rely on the conventional agricultural systems, which are primarily rain-fed and are under pressure to produce enough food and income, resulting in food insecurity (MoFA, 2019).

The West Gonja Municipal, located in the Savannah Region of Ghana, is a region that has been grappling with food insecurity and malnutrition issues. Despite the agricultural potential and natural resources present in the West Gonja Municipal, there is a significant prevalence of food insecurity and malnutrition in the municipality.

The prevalence of poverty, coupled with limited employment opportunities, compounds the issue, making it challenging for households to afford an adequate and diverse diet.

Insufficient access to potable water and sanitation facilities also contribute to poor health outcomes, further exacerbating malnutrition.

To address these challenges and improve FNS in the municipality, it is crucial to conduct an assessment that encompasses a range of methods, tools, and indicators. This study will enable stakeholders to gain a holistic understanding of the underlying causes and identify appropriate interventions that address the root causes of food and nutrition insecurity, promote sustainable agriculture, enhance livelihoods, and strengthen the resilience of communities.

It is against this backdrop that this study is being conducted to help in designing and implementing evidence-based interventions to achieve significant improvements in the FNS status and to contribute to the overall well-being and socio-economic development of the district's population.

1.3 General Research Objective

The general objective was to assess the food and nutrition security status in the West Gonja Municipal in the Savannah region of Ghana.

1.3.1 Specific Objectives

1. To identify and determine the demographic characteristics of respondents
2. To determine the main sources of household food supply.
3. To determine the interactive association between FNS and demographic characteristics of respondents.
4. To determine household coping strategies adopted in times food shortage
5. To determine the challenges to household FNS in the area

6. To determine the FNS status in West Gonja Municipal

1.4 Research Questions

1. What are the demographic characteristics of Household heads in West Gonja Municipal?
2. What are the main sources of household food supply West Gonja Municipal?
3. What is the association between FNS and demographic characteristics of respondents?
4. What coping strategies do households in West Gonja Municipal adopt in times food shortage?
5. What challenge to household FNS do people in West Gonja Municipal face?
6. What is the FNS status of households in West Gonja Municipal?

1.5 Justification of the Study

This study stands to provide an overview of the methods, tools, and indicators commonly employed in the assessment of FNS. It will also provide a snap shot of FNS situation in the west Gonja municipal. By understanding the methodologies used in previous studies and initiatives, researchers and policymakers can gain insights into effective approaches and tailor their assessments to the specific context of the West Gonja municipal.

Overall, findings of this study will contribute to the existing knowledge on assessing FNS in Ghana by focusing on the methods, tools, and indicators employed in FNS assessment as in the West Gonja municipal. Through a comprehensive examination of these aspects, it is hoped that this study will provide valuable insights for policymakers, researchers, and practitioners working towards enhancing FNS in the region and Ghana as a whole.

The academic community will finally gain from this study since it will provide a significant and important contribution to knowledge, which will encourage others to conduct in-depth, higher-level research on the barriers to enhancing the security of food and nutrition.

1.6 Organization of study

There are five primary chapters in this study's framework. The introduction, or chapter one, covers the problem statement, background information, goals, and rationale for the investigation. The study's review of the literature is covered in Chapter 2. The details of the research approach are examined in Chapter 3. The examination and discussion of the data gathered and submitted for the study are the main topics of Chapter 4. The study's summary, conclusion, and recommendations are included in Chapter 5.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 The Concept of Food and Nutrition Security

FNS was first mentioned during a world food conference in 1974. During the meeting, the term "food security" was used to characterize the guarantee of the availability and stability of fundamental foods at both national and international levels (FAO, 2006). Since then, the idea has developed through several definitions and paradigms until coming to be recognized as the accepted definition (Matemilola & Elegbede, 2017). Food and nutrition security exists when all people at all times have economic, physical and social access to sufficient nutritious and safe foods that meet their food and nutrition needs and preferences in a setting with proper sanitation and health services (FAO, 2008).

2.2 Operational Definition of FNS

Different components are emphasized in the definitions of FNS. The definitions provided by the FAO and Ghana's food and agriculture ministry (MoFA) will be used in this study. FNS, by MoFA's operational definition, is the availability of wholesome food that is hygienically packaged, aesthetically pleasing, and reasonably priced and must also be provided in adequate quantities year-round and at the appropriate location (Bawa, 2019). According to the FAO, there is food and nutrition security when everyone has access to enough food and physical resources to match the diet needs and choices of all people for healthy and active living at all times. FNS is achieved when there is a sufficient amount of physical food supplies available overall, when households have appropriate access to these supplies and when the use of these supplies is suitable to meet each person's unique dietary needs (FAO, 2013).

2.3 Pillars of food and nutrition security

FAO has classified FNS into four aspects namely: availability, accessibility, utilization and stability (FAO, 2014; FAO, 2008).

2.3.1 Food availability

The seasonality, amount and quality of food supply in an impacted location is referred to as food availability. It encompasses all regional food production methods, such as farming, raising animals, fishing, and gathering food from the wild (Bawa, 2019).

It speaks of the quantity of food that is physically accessible in a given area. Such cuisine must satisfy people's dietary requirements and tastes. Food production in the area, stock levels, imports, and net trade in food products all greatly influence food availability. Food availability suggests that all persons must have social, economic and physical access access to adequate wholesome food (Matemilola & Elegbede, 2017). Food availability is mostly determined by the existence of efficient market mechanisms that can consistently supply food to the region in sufficient quantities and of a high enough quality (Bawa, 2019).

The quantity and quality of food that is readily available are two of the main elements affecting food and nutrition security. Although there might be a sufficient quantity of food available, it might not be diverse enough to provide the macro and micronutrients required for a healthy existence. Food balance sheets are commonly used to collect aggregate data on the food that is available for consumption. These sheets offer information on the daily amount of energy and protein that is available to everyone at all levels. The discrepancy between energy requirement and food supply can be clarified by looking at indicators like dietary energy supply and food adequacy (FAO, 2014).

2.3.2 Food accessibility

This is a reference to a household's capability to obtain enough food to meet each member's nutritional demands. The household's capability to obtain food within a specific time frame through home-based production, stock buying, exchanging, aids, borrowing, or food assistance is known as food accessibility (Bawa, 2019; FAO, 2013; FAO, 2008).

The problem of hunger and starvation will persist if there is inadequate distribution of readily available food among the population. It is therefore crucial that all individuals have both financial and physical access to food. The primary factors affecting food access are household and individual income, social support capabilities, and food pricing (Bawa, 2019; FAO, 2008). Apart from economic access, physical access to food is improved by the presence of well-functioning transportation system and good road network that connect farming communities with urban, rural, and marketing centers where food items are required (Bawa, 2019). It is important to point out that a sufficient supply of food at the national or international level does not provide food and nutrition security for households. Governments and developing partners should ensure policy focus on market prices, incomes and expenditures to achieve food and nutrition security (FAO, 2008).

2.3.3 Food utilization

The term "food utilization" describes how a household uses the food that is available to it, including how it is distributed across the household and how it is processed, stored, and prepared. Additionally, it describes a person's capacity to take in and use the nutrients found in food in order to maintain optimal bodily function, fend off illness, and avoid malnourishment (FAO, 2013; FAO, 2008; Matemilola & Elegbede, 2017).

Food consumption quantifies an individual's capacity to consume enough food and absorb it within a specified time frame (Hauck & Youkhana, 2008; Banerjee & Duflo, 2011). Improvements in food availability and accessibility are not always correlated with improvements in food consumption. Food utilization is influenced by food handling, food preparation, and food storage (Bawa, 2019; FAO, 2008; FAO, 2013).

2.3.4 Food Stability

Food stability is the ability to use food risk-free at all times, as well as the stability of food that is available and accessible. This requires that those three elements always exist at the same moment. The main risks that could significantly affect availability, access, and consumption include extreme weather, energy scarcity, social unrest, and inadequate global market functioning (Pangaribowo et al., 2013; FAO, 2008; Matemilola & Elegbede, 2017). Therefore, even if someone has regular insufficient access to food that could lead to a decline in their nutritional status, they are still deemed food insecure even if they have adequate access to wholesome food today (Matemilola & Elegbede, 2017).

Having safeguards in place to guarantee food's availability, accessibility, and usage, all of which are subject to change as dangers arise, is crucial to its stability. Production systems must be encouraged and supported in order to mitigate these risks. Additionally, market governance must be strengthened and sustainable investments in rural development must be made. (Bawa, 2019).

According to Maxwell and Frankenberger (1992), stability or sustainability is a vital aspect of nutrition security, focusing on the time frame in which food and nutrition security is considered. They explained that food and nutrition security is often divided into two main

types: chronic food and nutrition insecurity, which refers to the ongoing inability to meet food needs, and transitory food insecurity, which is a temporary inability to meet food needs. Transitory food insecurity can be further categorized into cyclical and temporary forms. Cyclical food insecurity occurs in a regular pattern, such as the "lean season" or "hungry season" that precedes the harvest period. Temporary food insecurity, on the other hand, arises from short-term, external shocks like droughts, floods, or civil conflicts. It is worth noting that civil conflicts, although temporary in nature, can have long-lasting negative impacts on food and nutrition security. (Maxwell & Frankenberger, 1992)

2.4 Levels of FNS

Four levels of perception exist for FNS: national, family, global, and individual. These tiers connect to the person level from the higher global level via the country and household tiers. Although not causal, the connections are sequential (FAO, 2014). Household or national FNS is not guaranteed by global food and nutrition security. Individual FNS is not a given at the household level. Stated a different way, the FNS condition at a higher level of the linkage does not always create the food and nutrition insecurity at a lower level. On the other hand, FNS at lower levels of the interconnections may be significantly influenced by food and nutrition security at higher levels (FAO, 2014).

At each level, there are differences in the main challenges related to FNS. The combined production and availability in international markets are the main global concerns about FNS. It is a well-known fact that although the world produces enough food, many emerging nations do not have enough food. Their lack of access to the world's food supply is a result of limited foreign exchange (FAO, 2014; Kirkland et al., 2011).

The ability to import food supplies and the overall amount of food produced domestically are the main issues with FNS nationally. Revenues and food and non-food prices are the main household concerns when it comes to food and nutrition security since they impact the ability to obtain enough of the available food. Many households still have problems with FNS, even though the net food supply is frequently sufficient at the national level. The two main issues with FNS on an individual basis are food safety and nutritional adequacy (calorie intake). Even if a household may have enough food, certain members—especially women and children—may be severely malnourished. This is comparable to the findings of FAO, which state that there are sequential rather than causative relationships between FNS and that national FNS is not assured by global FNS. This suggests that the state of FNS at a higher level of the connection does not always cause the food and nutrition insecurity at a lower level (FAO, 2014).

2.5 Food and nutrition security situation in Ghana

Ghana must overcome the difficult task of significantly enhancing food and nutrition security. According to data from the World Food Programme, 0.8% and 7.7% of Ghanaians, respectively, experienced severe and moderate food insecurity (WFP, 2020 b). This is due to the fact that, over the past 15 years, food aid and commercial food imports have provided 4.7% of its food needs (Ayifi, 2017). About 5% of Ghana's population, experience food insecurity (Darfour & Rosentrater, 2016). About 2 million people in Ghana could experience food insecurity. One and half million of them reside in rural regions (FAO, 2009 b; WFP, 2012).

Agriculture is most rural households' primary income source. It follows that a large number of those experiencing food insecurity reside in rural areas and, strangely, work in the food-

producing industry. Less than 1% of Ghana's arable land is irrigated; the majority of the country's agriculture is rain-fed (MoFA, 2019). Because they have two distinct rainy seasons as opposed to the north's single, producers in southern Ghana are thus able to cultivate more food. Additionally, 25–50% of the yield is wasted as a result of inadequate post-harvest handling of food crops (UNDP, 2007). This ultimately causes food prices to rise, which limits households' access to food (UNDP, 2007; Kuiper & Cui, 2021).

Due to food shortages, particularly in the northern regions, many households in Ghana face a considerable level of food insecurity that lasts for three to seven months (Quaye, 2008). These food insecure households frequently experience crop failure and seasonal challenges in getting adequate food during lean seasons (WFP, 2012). In spite of cultivating and selling crops, rural farm households face hunger and food insecurity. Numerous studies indicate a rise in food insecurity and malnourishment among rural households (Kuwornu et al., 2013 (WFP, 2020 b; Armah et al., 2019).

2.6 Food and nutrition security measurement methods

The five most widely used techniques to evaluate food and nutrition security are an individual's nutritional intake, anthropometry, household income and expenditure surveys, and experience-based food insecurity measuring scales (Pérez-Escamilla & Segall-Corrêa, 2008).

2.6.1 The Food and Agricultural Organization (FAO) Method

This approach focuses on estimating dietary energy consumption at the national level on a per-capita basis. Per capita energy intake (measured in calories) is determined using food balance sheets from household income and expenditure surveys. The portion of the

distribution that falls below a certain minimum energy requirement level is known as the undernutrition percentage of the population. The minimum permissible body weight for a specific height for all sex-age groups and adult activity levels is used to further adjust this minimum calorie intake for the country's population's sex and age distribution (FAO, 2003).

Among this method's benefits are:

- *Comprehensive Assessment:* FAO's approach to measuring food and nutrition security considers multiple dimensions, including availability, access, utilization, and stability. This comprehensive assessment provides a more holistic understanding of FNS issues.

- *Global Comparability:* FAO's standardized indicators and methodologies allow for the comparison of FNS across different countries and regions, enabling a better understanding of the global FNS situation.

- *Longitudinal Analysis***:** By tracking FNS indicators over time, FAO can identify trends and changes, helping policymakers and stakeholders to implement more effective interventions and monitor the impact of FNS programs.

- Early Warning System: FAO's monitoring and analysis can act as an early warning system for potential food crises, enabling timely responses and interventions to mitigate adverse effects on vulnerable populations.

The disadvantages of the FAO method include but not limited to:

- *Data Limitations*: Accurate and up-to-date data is crucial for effective food and nutrition security measurement. However, data collection in some regions might be limited, leading to potential gaps and inaccuracies in the assessment.

- *Complexity:* Food and nutrition security is a multifaceted issue with various interacting factors. FAO's comprehensive approach can be complex and resource-intensive, making it challenging to capture all nuances accurately.

- *Contextual Variation*: Different regions and communities have unique food and nutrition security challenges, and a one-size-fits-all approach may not fully capture the specific needs and complexities of each situation.

- *Subjectivity in Indicators*: The selection of indicators and thresholds for defining food and nutrition security can involve subjective judgment, potentially impacting the accuracy and comparability of assessments.

- *Rapidly Changing Circumstances*: FNS is susceptible to rapid changes including conflicts, economic shocks or climate changes. Static measurement methods may struggle to capture these dynamic shifts adequately.

- *Potential Manipulation*: In some cases, data on food and nutrition security might be politically sensitive, leading to potential manipulation or underreporting of the severity of the situation in certain regions.

Overall, FAO's methods for measuring food and nutrition security are widely respected and have been instrumental in raising awareness about global hunger and guiding policy

responses. However, like any approach, there are limitations and challenges that need to be continuously addressed to improve the accuracy and relevance of food and nutrition security assessments. As mentioned earlier, it's essential to consult the latest FAO publications for the most recent updates on their food and nutrition security measurement methods and their associated pros and cons.

2.6.2 Household Expenditure Survey Method (HESM)

This is a straightforward approach to gathering data from homes. In a given time period, such as a week or month, the households must report how much they spend on food and other necessities, particularly how much is spent on a nutritionally sufficient diet (Bickel et al., 2000; Rose & Charlton, 2001). The process necessitates gathering data regarding the food quantities purchased and the expenses made on each food item taken in and outside the home. Foods cultivated on-site as well as foods given or received by any member of the household are also included in the method's data collection. Taking into account the availability of food that is appropriate for the culture, this method calculates the average daily consumption of calories per person (Pérez-Escamilla & Segall-Corrêa, 2008).

This method's benefits include:

- flexibility in identifying vulnerable households, which enables mapping of the determinants at the local and national levels;
- dietary quality data that can aid in understanding the dimensions of FNS.
- It is applicable to the assessment of federal nutrition and food initiatives.

Limitations of the HESM include:

- measuring the amount of food available rather than the amount consumed within a specific time period;
- not accounting for food consumed outside the home, such as food consumed while visiting family and friends;
- difficulty comparing estimates across countries, regions, and purchasing power parities due to differences in data collection methods worldwide; and
- significant assumptions that can lead to measurement errors when converting available food to calorie intakes.

2.6.3 Dietary Intake Assessment (DIA)

The recall method (24 hours, 7 days, or 30 days), meal frequency questionnaires, and food records (individually or by an observer) are typically used in the measurement of dietary intake. Studies that measure the security of food and nutrition often employ these methods (Jenson & Miller, 2010). While the meal records rely on the recording of food intake data, the recalls and food frequency questionnaire, for example, rely on the participants' memories. The estimates are based on the recollections of the interviewees; alternatively, foods before and after eating may be assigned weighted values. The purpose of these adjusted calculations is to estimate nutrient intakes.

Advantages:

This method has various special properties when compared to the FAO and HESM methods. The shared benefits are as follows:

- It directly measures the food consumed rather than the food available;

- It tackles calorie intakes and dietary quality at the individual level;
- It permits mapping; and
- It is very useful in helping to understand recent and long-term dietary intake trends.

The method's shortcomings include:

- It heavily relies on the memory of the respondents, which can result in errors;
- assessing adjusted recall estimations is a challenging task that can result in high measurement errors;
- applying recall methods in a national survey is expensive; and
- conducting the interviews and data entry into spreadsheets requires highly qualified and experienced researchers (Pérez-Escamilla & Segall-Corrêa, 2008).

2.6.4 Anthropometry

The measuring of distinct human features is used in anthropometry. According to the cultural contexts of the research areas, general data on food provisioning, preparation, and consumption behaviors are gathered (Gittelsohn et al., 1998). Lately, the collection of data has expanded to include body weight, size, proportions, and, lastly, food composition (Wolfe & Frongillo (Jr.), 2000). The indicators assess the effects of food and nutrition security, health, and persons' nutritional status.

The advantages of this approach are twofold: (1) it makes mapping nutritional security from the local to the national levels possible; and (2) the highly standardized measures of weight and height are highly reproducible across people.

The following are some of the disadvantages of this approach: it is expensive, both in terms of money and time; additionally, these indicators measure nutritional status, which is a function of the relationship between health status and food and nutrition security, making it an indirect way to assess food and nutrition security (Pérez-Escamilla & Segall-Corrêa, 2008).

2.6.5 Food Insecurity Experience-based Measurement Scales (FIEMS)

The respondents' reported perceptions or experiences form the basis of this methodology. A number of questions, some of which rely on subjective and qualitative evaluations, determine the degree of severity (Rose & Charlton, 2001). Similar to the previously stated ways, this approach offers certain benefits and drawbacks.

The benefits include the following:

- it captures the psychosocial aspects of FNS in addition to physical experiences;
- it can be applied to mapping that improves knowledge of the origins and effects of hunger and food insecurity;
- it measures the phenomenon of FNS directly based on specific experiences.

The limitations are:

- It is challenging to set up household food insecurity classification limits;
- If used to determine eligibility for social and food assistance programs, the scales can lose their validity;
- Difficulty in making generalizations due variations in cultures worldwide (Rose & Charlton, 2001; Pérez-Escamilla & Segall-Corrêa, 2008);
- The lack of questions on water access, food and water safety hazards such as pathogens and other pollutants.

2.7 Tools used to assess food and nutrition insecurity

A number of single- and multi-item instruments have been created to assess the incidence of food insecurity in both individual and population samples.

2.7.1 Household Food Security Survey Module (HFSSM):

The Household Food Security Survey Module (HFSSM) collects data on households' behavioral and subjective reactions to the condition of having enough food or money to meet basic food demands (Leroy et al., 2015). The survey consists of eighteen items and has a 12-month reference period. It evaluates the aspect of financial resources' impact on food access. Of the eighteen questions, ten focus on the experiences of the people living in the home, and the remaining eight ask about the experiences of the children below the age of eighteen (Leroy et al., 2015).

There are four universal categories and subdomains of household food insecurity represented by the nine questions that make up the HFIAS. The four domains and subdomains include social unacceptability (eating foods that are shameful or embarrassing to eat), insufficient amount, inadequate quality, and ambiguity about food. During a 30-day recall period, households answer nine occurrence items regarding dietary changes or patterns of food intake brought on by a lack of means to purchase food (Leroy et al., 2015). Households receive a score between 0 and 27 based on how they answered the nine questions and how frequently they occur. A greater number denotes a greater degree of food insecurity. According to the results, homes were categorized as:

- Food secure (score = 0); households with minimal or no food insecurity.

- Mildly food insecure (score = 1-5); households with occasional food and nutrition security concerns.
- Moderately food insecure (6-10); households with more frequent food-related problems, and
- Severe food insecure (11-27); households experiencing significant and chronic food shortages.

2.7.2 Food Insecurity Experience Scale (FIES):

It is a metric of food security for households or individuals that is based on experience. It is comprised of eight questions about people's ability to obtain enough food, and it is easily included into different kinds of population surveys. The survey's primary focus is on self-reported food-related behaviors and experiences linked to growing challenges in getting food because of limited resources. It can be administered with either a 1-month or 12-month recall period (Lele et al., 2016; Leroy et al., 2015).

2.7.3 Household Hunger Scale (HHS):

This novel, straightforward metric measures household hunger in situations when there is a shortage of food. It has three questions and a four-week reference period. The scale makes it possible to calculate the percentage of homes that fall into one of three categories of household hunger severity (Leroy et al., 2015).

2.7.4 Global Hunger Index (GHI):

The Global Hunger Index (GHI), which was first released in 2006, highlights both policymakers' failures and achievements in the fight against hunger. Three equally weighted components were initially used: the prevalence of undernourishment, the child

death rate (for children under five), and the prevalence of underweight in children (for children under five). Two equally weighted measures—the prevalence of stunting and wasting in children (both under five)—replaced the underweight metric in 2015. The current index is based on the weights of 1/6 for child stunting and wasting, and 1/3 for child mortality and prevalence of undernourishment. The index is released annually, although variations from year to year are typically mostly caused by variations in undernourishment because mortality, stunting, and wasting are not assessed annually (Lele et al., 2016; Leroy et al., 2015).

2.7.5 Global Food Security Index (GFSI):

It is a multifaceted instrument for evaluating food security trends at the national level. According to Lele et al. (2016), the index employs thirty parameters in total across three domains: availability, affordability, quality/safety and security of food. The index takes into account 20 factors related to food quality, safety, availability, and affordability, and it covers 109 nations (Lele et al., 2016).

2.7.6 Food Consumption Score (FCS):

It uses 7-day recall data to combine information on meal frequency and dietary diversity. The respondent details how frequently eight food groups are consumed in their household. The WFP classifies food into eight key categories: grains and tubers; pulses; milk and dairy; meat, fish, and eggs; vegetables; fruits; oils and fats; and sugar. Its enhanced Food Consumption Score Nutrition module takes into account seven more subgroups (WFP, 2015). WFP mainly uses it in emergency situations (WFP, 2008). It captures the household's consumption of pre-specified food groups using the home as the analytical unit.

To calculate the FCS, data on the frequency and incidence of food consumption from various food categories are multiplied by a weight assigned to each group, and the resulting results are then added together. Based on each food group's energy, protein, and micronutrient densities, a team of analysts gave weights to each (meat, milk, and fish = 4, pulses = 3, staples = 2, fruits and vegetables = 1, sugar and oil = 0.5). Food intake levels in homes are categorized as poor (0–21), borderline (21.5–35), and acceptable (>35) based on the FCS value.

2.7.7 Dietary Diversity Scores (DDS):

Another popular metric for gauging household food access is dietary diversity. A qualitative indicator of food consumption that takes into account a household's access to a range of foods is the Household Dietary Diversity Score (HDDS). Dietary diversity is a useful indicator of total dietary energy and diet quality, as well as overall food access (Leroy et al., 2015; Lele et al., 2016).

2.7.8 Coping Strategies Index (CSI):

According to Leroy et al. (2015), coping strategies are the reactions people have to adversities such household food insecurity and the steps they take to lessen or minimize their effects. Food security is evaluated using a participative method via the Coping Strategies Index (CSI). To create a numerical score, it asks questions about how households handle food shortages. According to Leroy et al. (2015), the index can be used to target food aid, track its effectiveness, and project long-term changes in FNS. The index is built around the plethora of responses to a single query: “What do you do when you do not have sufficient food and/or the money to buy it?” Before CSI surveys are deployed, focus groups in the community define the list of potential responses for each survey (Lele et al., 2016).

2.8 Determinants and drivers of food and nutrition insecurity

There are several intersecting concerns in the development of people and societies that are related to FNS.

2.8.1 Poverty

FAO (2008) outlined in a vicious cycle the relationship between poverty, malnutrition and food insecurity (Figure 1).

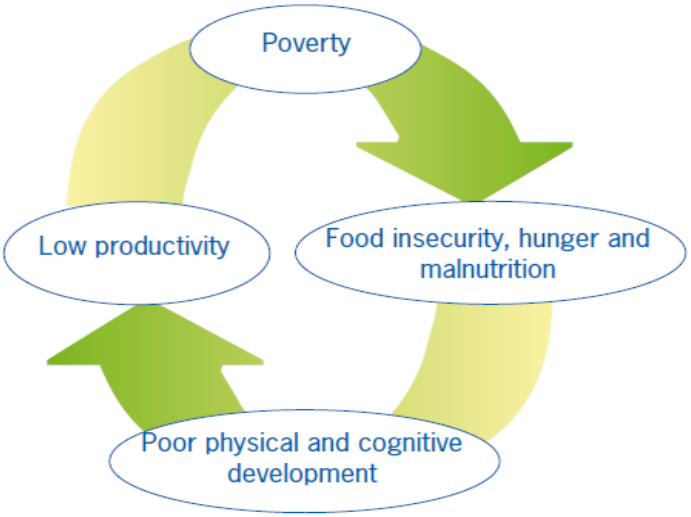

Figure 1: Food insecurity, malnutrition and poverty relationship

Source: (FAO, 2008)

A person's ability to consume and have access to food, health, education, rights, voice, security, dignity, and decent job are all considered aspects of poverty (FAO, 2008). It impacts access, availability, use, and stability in relation to food security.

Poverty restricts people's ability to afford an adequate quantity and quality of food. Individuals living in poverty often struggle to access nutritious food due to financial constraints, limited transportation options, and inadequate availability of affordable and

healthy food sources. According to Loopstra et al. (2019) poverty is a major contributor to limited food access and is associated with higher odds of food insecurity. Food and Agriculture Organization further explains that poverty-related food insecurity often leads to malnutrition, particularly in terms of inadequate intake of essential nutrients such as proteins, vitamins, and minerals. Insufficient access to nutritious food can contribute to the development of various health issues, including stunted growth, underweight, micronutrient deficiencies, and increased vulnerability to diseases (FAO et al., 2021). Studies reveal that household income and product prices have a significant influence on food choices and consumption (Lo et al., 2012). Low-income populations typically favor inexpensive, high-energy foods over those with higher nutritional content (Monsivais & Drewnowski, 2007; Kettings et al., 2009; Sharma, 2012).

Poverty-induced food insecurity may have lasting consequences on individuals and communities. Children growing up in food insecure settings are prone to physical and mental growth impairments and educational challenges. This perpetuates a food insecurity-poverty cycle, as these children are more likely to face economic hardships in their adult lives (FAO et al., 2021).

Poverty makes individuals and communities more vulnerable to economic and environmental shocks, such as natural disasters, conflict, or economic downturns. These shocks can disrupt food production, distribution systems, and livelihoods, exacerbating food insecurity. The World Bank emphasizes the vulnerability of poor populations to shocks in their report on the impacts of COVID-19 on global poverty and food security (World Bank, 2016). Food insecurity often leads to difficult trade-offs for individuals and households. When faced with limited resources, people may sacrifice other basic needs,

such as healthcare, education, and housing, to ensure access to food. They may also resort to coping strategies like reducing the quality or quantity of meals, relying on cheaper but less nutritious food options, or skipping meals altogether (FAO, 2018).

2.8.2 Gender inequality

Food insecurity is both a cause and an effect of gender inequality. It is estimated that females make up 60% of chronic hunger globally, with the majority of them (98%) residing in the global south. Assuring women's equitable access to food has not advanced much (WFP, 2009; Spieldoch, 2011)

Women are crucial to the maintenance of all four pillars of food security because they are farmers and business owners, they make decisions about the food and nutritional security of their families and communities, and they act as managers of the sustainability of food supplies during hard economic times (Otaha, 2013). In developing nations, they make up approximately 43% of the agricultural labor force, with percentages ranging from 20% in Latin America to 50% in Eastern and South Eastern Asia and Sub-Saharan Africa. They also engage in subsistence farming and serve as unpaid family workers. Nevertheless, prejudice against women persists in their access to technology, banking, land, credit, and other services (WFP, 2009).

Otaha (2013) suggested that women might increase their yields by 20–30% and increase the total agricultural output in poor nations by 2.5–4% if they had the same access to productive resources as males. Even though these are only estimates, narrowing the gender gap in agricultural output would have a big impact (FAO, 2011; Otaha, 2013).

Unfortunately, there remains prejudice against women when it comes to land access. Customary rules in most Ghanaian communities, particularly in the northern region, prohibit women from owning land (Lambrecht et al., 2017).

2.8.3 Climate Change

Climate change is another significant driver of food insecurity that cannot be underrated. The phenomenon is now one of the key divisors that is redefining the global food equation and hence having severe impact on the food and nutrition security developing nations (Matemilola & Elegbede, 2017). Climate change has been described by some researchers as a time bomb that is already ticking and waiting to explode.

Climate change refers to a shift in the state of the climate detectable by variations in atmospheric weather conditions over a long period of at least 30 years (IPCC, 2007). These changes can be directly or indirectly influenced by human activities that alter the atmosphere's composition (UN, 1992).

Even though developed nations are largely responsible for emission of greenhouse gas, developing countries bear the brunt of the resultant climate change (Behnassi et al., 2011). Climate change and food and nutrition security are closely interrelated, with the former significantly impacting the latter. Changes in climate patterns, such as rising temperatures, changing precipitation patterns, and extreme weather events, have profound effects on agricultural productivity, food production, and food availability. As a result, climate change poses a considerable threat to global food security (Behnassi et al., 2011; IPCC, 2014).

Climate change is felt in all the six ecological zones of Ghana increasing temperatures, fewer and more variable rainfall totals, increasing sea levels, and a high frequency of extreme weather events and natural disasters (NCCAS, 2012).

Rising temperatures would lower the production of main staple crops such as cassava, yams, plantains, maize, and rice (Agyemang-Bonsu et al., 2008). They predicted that while the production of cassava will increase by 29.6% by 2080, maize and other cereal crops will decrease by 7% by 2050. Furthermore, due to climate fluctuation, Kyei-Mensah et al. (2019) found that the yield of cassava, cocoyam, and plantain in Ghana's Fanteakwa District decreased by an average of 16%.

The relationship between climate change and food and nutrition security is complex and multi-dimensional, with various factors interplaying to impact food production, distribution, and access. Addressing climate change and its effects on food and nutrition security requires comprehensive and coordinated efforts, including climate mitigation strategies, adaptation measures, sustainable agricultural practices, and support for vulnerable communities (IPCC, 2014).

2.8.4 Covid 19 pandemics

COVID-19's impact on food and nutrition security in Ghana can be understood through various channels, including disruptions to food supply chains, reduced incomes, and changes in agricultural activities.

During the pandemic, lockdowns, movement restrictions, and border closures affected the transportation and distribution of food, leading to potential shortages and price increases for essential commodities. These disruptions could have particularly affected vulnerable

populations who rely on informal markets and face difficulties accessing food during such periods. The pandemic also led to economic downturns and job losses in various sectors, including tourism, hospitality, and informal markets. The loss of income resulted in reduced purchasing power and increased food insecurity for many households. Moreover, COVID-19-related restrictions affected agricultural activities, including planting, harvesting, and labour availability. The closure of markets and disruptions in the supply of agricultural inputs had negative effects on agricultural productivity, leading to food production challenges (WFP, 2020 a; FAO, 2021).

2.9 Strategies to improve food security

Food insecurity is a complex phenomenon that encompasses several interconnected factors. Achieving food and nutrition security involves more than just increasing food production. While availability of food is important, addressing food and nutrition security requires attention to all the four components: availability, accessibility, utilization, and stability. For instance, even with sufficient food availability, a person who cannot afford to buy it remains food insecure (Ogbonna et al., 2013; Omorogiuwa, et al., 2014).

According to Ilaboya et al. (2012) the strategies for achieving food and nutrition security are categorized into economic, social, environmental and technological strategies.

Economic strategies include promoting employment in agriculture, diversifying rural economies, and providing credit and incentives for farmers. Social strategies involve fostering social networks among farmers, accessible education, and improving infrastructure. Environmental strategies encompass managing industrial effluents and regulating fertilizer and agrochemical use. Technological strategies include crop rotation,

irrigation systems, mechanized farming, and cautiously adopting agricultural biotechnology (Ilaboya et al., 2012).

2.10 Key food and nutrition security strategies employed in Ghana

These include:

- **Planting for Food and Jobs (PFJ) Program:** The initiative was launched in 2017 with the aim to increase food production by providing farmers with subsidized inputs, extension services, and market access. It focused on staple crops like maize, rice, sorghum and vegetables (MoFA, 2017).
- **Establishment of National Buffer Stock Company (NAFCO):** NAFCO was established to maintain a strategic stock of food commodities to stabilize prices and ensure food availability during times of scarcity. It serves as a safety net for consumers and producers by intervening in the market to prevent extreme price fluctuations (Abokyi et al., 2018).
- **Climate-Smart Agriculture**: Given the challenges posed by climate change, Ghana has been working on implementing climate-smart agricultural practices, including sustainable land management and water conservation, to build resilience among farmers and reduce vulnerability to climate-related shocks (Agyemang-Bonsu et al., 2008).
- **Livelihood Empowerment Against Poverty (LEAP):** While not exclusively a food and nutrition security program, LEAP provided cash transfers to vulnerable households, which could contribute to improving their access to food (UNICEF, 2018)

- **Promotion of Agro-processing**: The government has been encouraging the growth of agro-processing industries. By adding value to raw agricultural products, these industries create jobs and reduce post-harvest losses, thereby contributing to overall food security (Owoo & Lambon-Quayefio, 2017).

2.11 General indicators of food and nutrition security

2.11.1 Food Consumption Score (FCS)

The basis for this proxied indicator of family food access at the moment is:

- **Dietary diversity**: It is the number of different foods ingested over a reference period.
- **Food frequency**: It is the number of days (last week) that a certain food item has been consumed.
- **Nutritional importance**: It is the weighting of food groups according to their nutritional significance.

Households are divided into three categories by the FCS: Acceptable, Borderline, and Poor. Higher dietary diversity and frequency of those items consumed are correlated with higher FCS levels. A household's likelihood of achieving nutritional adequacy is increased by a high food consumption score (WFP, 2015).

2.11.2 Coping Strategy Index (CSI)

Among the food access metrics is the Coping Strategy Index (CSI). It offers insight into how households function and get by during periods when food is scarce. The frequency and intensity of various coping methods form the basis of the CSI. The likelihood that food insecurity affects the household increases with CSI score. The inquiry of CSI is often based

on finding out what one does in the midst of food and/or money scarcity. The likely responses are a range of actions taken by households to deal with a decrease in food available for eating.

"Reduced" CSI and country-specific CSI are the two categories of CSI. Context-specific severity scores and a number of context-specific techniques form the foundation of country-specific CSI. The topic of whether or not anyone in the household had to engage in certain behaviours in the past thirty days owing to food scarcity or no money to purchase food is addressed.

Conversely, "reduced" CSI uses the same severity weights and a similar selection of five coping mechanisms. It answers whether or not there were times in the past week one did not have sufficient food or money to purchase food and therefore had to engage in certain behaviours. It also permits comparisons across regions and nations. The CSI provides a half-quantitative mark that indicates whether or not household FNS is getting better or getting worse (Humanitarian Global, 2021).

2.11.3 Food expenditure

Understanding household expenditures provides insight into how households allocate limited resources and prioritize conflicting priorities. Data on household expenditures can be employed as a proxy of purchasing power. Households are considered vulnerable to food deprivation if they frequently spend a significant amount of their income or resources on food. This is because, irrespective of their current food consumption status, individuals would probably experience a decrease in food intake or in the quality of food they eat if they were to encounter a fall in income (WFP 2015). Household share of expenditure on

food above 75% is rank very high, 65-75 is high, 50-65 is medium and below 50 is low in terms of vulnerability to food insecurity (WFP 2015).

2.11.4 Nutrition

Malnutrition is the nutrition indicator for measuring food security. Types of malnutrition include acute malnutrition (wasting), chronic malnutrition (stunting) and underweight (WHO, 2017).

Deficits in any or all of the essential nutrients (micronutrients and macronutrients) result in acute malnutrition. Rapid weight loss or inability to gain weight results in wasting or thinness. Waste is calculated using height and weight. Long-term nutritional deficiencies and/or recurrent illnesses combined with insufficient catch-up growth lead to chronic malnutrition. Stunting or shortness is the end outcome. Age-related stunting is quantified by height. Stunting and wasting combined result in underweight (WHO, 2017).

2.12 General indicators of food and nutrition insecurity

Food insecurity is a complex issue with numerous indicators that reflect the extent to which individuals or communities lack consistent access to adequate and nutritious food. These include:

i. **Hunger and Malnutrition**: The prevalence of hunger and malnutrition, such as undernutrition or micronutrient deficiencies, can be strong indicators of food insecurity. This can be assessed through various nutrition surveys and anthropometric measurements (FAO, 2019).

ii. **Income and Poverty Levels**: Low income and poverty rates are closely linked to food insecurity. A substantial percentage of households that struggle to afford food fall below the poverty line (Nord et al., 2020).

iii. **Food Expenditure**: The percentage of household income spent on food can be an indicator of food insecurity. Households with a high percentage (75 +) of their income allocated to food may be at greater risk (Coleman-Jensen et al., 2019).

iv. **Dietary Diversity**: A lack of dietary diversity can indicate food insecurity. Food insecure households tend to have access to a limited variety of foods, which is important for a balanced and nutritious diet (Swindale & Bilinsky, 2006).

v. **Employment and Income Stability**: The stability and adequacy of employment and income sources are crucial indicators. Seasonal employment or irregular income can lead to food insecurity (Nord et al., 2020).

CHAPTER THREE

3.0 METHODOLOGY

3.1 Study area

This study took place in Ghana's Savannah region, specifically the West Gonja Municipality. The Municipality is one of Ghana's 261 Metropolitan/Municipal/District Assemblies (MMDAs). The Municipality's administrative capital is Damongo, which serves as the main economic and commercial center of the district. The Municipality lies within longitude $1^{\circ}5^{1}$ and $2^{\circ}58^{1}$ West, and latitude $8^{\circ}32^{1}$ and $10^{\circ}2^{1}$ North. It shares borders with Central Gonja to the South, Bole to the West, Sawla-Tuna-Kalba District to the to the North, the and North Gonja to the East.

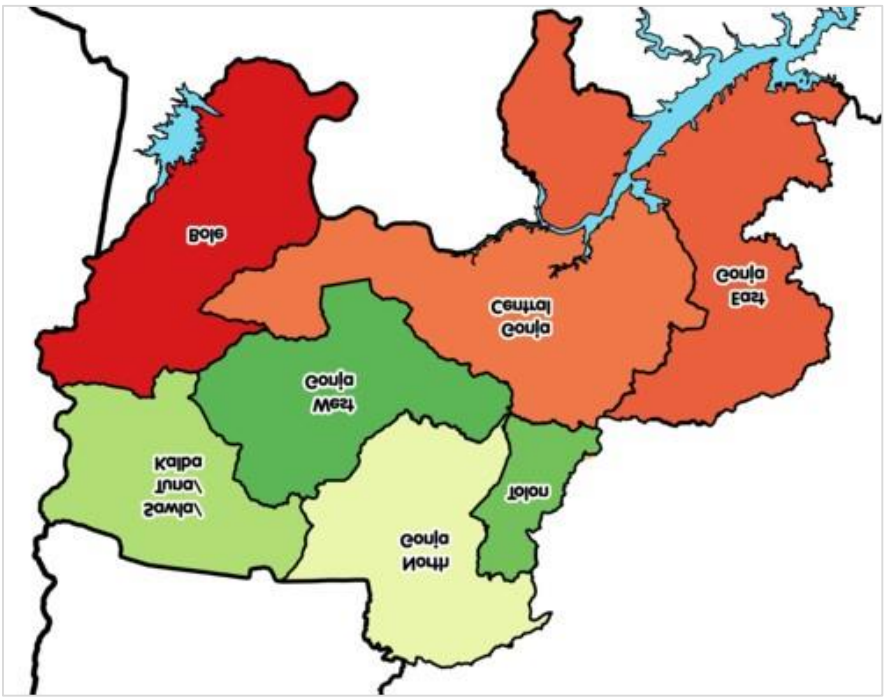

Figure 2: Map of Savannah Region showing the study area

As per the 2021 population and housing census, the Municipality has 63,449 residents, comprising 32,270 males and 31,179 females. The Municipality encompasses a diverse landscape, including rivers, forests, grasslands, and agricultural areas.

Agriculture is the primary economic activity in the West Gonja Municipal. The fertile land supports the cultivation of crops such as maize, millet, sorghum, yam, cassava, groundnuts, cowpea, fruits and vegetables. Livestock rearing, including cattle, goats, sheep, and poultry, also contributes to the local economy. Fishing is significant along the White Volta River, providing employment and a source of livelihood for many residents. Trade and commerce, particularly in the town of Damongo, play a vital role in the local economy.

The West Gonja Municipal is known for its rich cultural heritage, with diverse ethnic groups such as Gonjas, Bimobas, Mosi, Hanga, Kamara, Dagomba, Tampulma, Frafra and Dagaaba. The traditional palaces and festivals of these communities offer a glimpse into the local culture and traditions. The Mole National Park, located in the southern part of the municipality, is a popular tourist destination. It is Ghana's largest national park and is home to various wildlife species, including elephants, antelopes, baboons, lions, and leopards, among others.

The municipal is predominantly rural. Like many rural areas in Ghana, the West Gonja Municipal faces several challenges, including limited access to quality healthcare, inadequate infrastructure, and the need for improved agricultural practices and technologies. The Municipal also faces environmental challenges including devastation of the forest and associated plant and animal species, arable land and various water bodies which affect agriculture and livelihoods.

3.2 Research Design

Research designs are outlined strategies and processes for conducting research that range from making general assumptions to selecting specific techniques for gathering and analyzing data. (Creswell, 2009). The study used a mixed research methodology, also known as a quasi-experimental research design, which combines quantitative and qualitative techniques for gathering and analyzing data. Focus groups, key informant interviews, and observation were among the qualitative data collecting techniques, while a survey of a cross-section of household heads was used for the quantitative data gathering.

3.3 Population and sample size for the study

The target population included household heads who are involved in food and nutrition security and agricultural activities in the West Gonja Municipal.

3.3.1 Sample Size Determination:

The study's sample size was estimated as outlined by Yamane (1967) as follows:

$$\mathbf{n} = \frac{N}{1+N(e^2)} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.1)$$

Where N = Total population of West Gonja Municipal

n = Sample size;

e = 0.1 (10% confidence level);

1 = Constant of proportionality.

The population of West Gonja Municipal, per the 2021 population census, is 63,449.

Therefore, using this sample size formula; $n=\frac{63449}{1+63449(0.1^2)} = 99.8 \approx 100$

3.4 Sampling procedure

The study employed a multistage sampling approach. First, three communities (Damongo, Larabanga and Busunu) within the West Gonja Municipal were conveniently selected from the Damongo area council, Larabanga and Busunu area councils respectively. Second, households within these communities were picked using systematic random sampling. Forty (40) households were picked in Damongo, thirty (30) each from Larabanga and Busunu making a total of 100. Household heads were then interviewed. Additional qualitative data was gathered from five (5) Key Informants, ten (10) focus group members, three (3) food vendors, and five (5) other community members purposively picked from the West Gonja Municipal irrespective their community affiliation but based on their expertise and involvement food and nutrition security in the study area.

3.5 Data type and collection instruments

Quantitative data was collected using questionnaire. The pre-testing of the questionnaire was done in Damongo and the necessary adjustments made and finalized for administration. The final questionnaire was administered to a representative sample of household heads to collect data on household demographics, income, food consumption patterns, dietary diversity, and access to food resources.

Key Informant Interviews (KII) and Focus Group Discussions (FGDs) were used to collect qualitative data. In-depth interviews were conducted with members of key stakeholders (MoFA, Ghana Health Service, NGOs, etc.), food vendors, and other community leaders, to understand the socio-economic factors affecting food security in the study area. FGDs

were carried out using other community members to identify their perceptions, experiences, and challenges related to FNS in the study area.

3.5.1 Data analyses

The Household Food Insecurity Access Scale (HFIAS) was employed to gather the quantitative data. Standardized structured questionnaires created by Food and Nutrition Technical Assistance (FANTA) were verified by the HFIAS. With a 30-day recall period, it consists of nine items that assess both frequency and incidence, representing the general dimensions linked to household food insecure access (Coates et al., 2007).

Microsoft Excel (version 2019) and statistical package for social sciences (SPSS 20) were used to process and analyze the data. Tables and Figures were used to display the results.

3.6 Ethical Considerations

Prior to data collection, informed consent was obtained from all participants, ensuring they were aware of the research objectives, their rights, and the confidentiality of their responses.

CHAPTER FOUR

4.0 RESULTS AND DISCUSSION

4.1 Demographic characteristics of respondents

The survey participants' demographic attributes encompassed age, sex, marital status, educational attainment, and household size. Table 1 displays the respondents' distribution based on these attributes.

In terms of gender, more than half (53%) of the study sample were males. The modal age range was 35 to 44 years. There were more married household heads (91%) than those single (5%), divorced (3%) and widowed (1%). About 80% of household heads interviewed reported household numerical strength of three (3) or more household members. In terms of educational attainment, 66% of the respondents had at least basic education.

The above demographic characteristics were selected because of the crucial role they play in house hold food and nutrition security.

Gender plays a crucial role in household food and nutrition security, with women often facing unique challenges including limited access to resources and unequal participation in decision-making. Marital status also impacts food security, with single-parent households at higher risk. Educational levels, and household size also impact food security, with educated women making informed decisions about family nutrition and health; and larger families or households with multiple dependents (aged and children) may have higher food-related expenses, potentially increasing food insecurity (FAO et al., 2021; Tefera & Fikadu, 2014; Maharajan & Khatri-Chihetri, 2006; WFP , 2020 a).

Table 1: Demographic characteristics of respondents

Variable	Number of households	Percentage of respondents
Sex		
Male	53	53%
Female	47	47%
Age		
15-24	2	2%
25-34	15	15%
35-44	54	54%
45-54	15	15%
55-64	12	12%
65 +	2	2%
Marital status		
Single	5	5%
Married	91	91%
Divorced	3	3%
Widowed	1	1%
Household size		
Less than 3	3	3%
3 to5	10	10%
6 to7	60	60%
More than 7	27	27%
Educational level		
informal education	34	34%
Non-formal education	0	0%
Basic education	45	45%
Senior High School/Vocational/Technical education	18	18%
Tertiary education	3	3%

4.2 Household's main source of household food supply

The study revealed that households in West Gonja Municipal sourced most of their food from own crop production (Figure 3). From the result, 87% of the households consumed the food they produce while 10% buy or purchase. The remaining 3% received food from relatives and friends as gift.

Food purchase was attributed to two factors (sale of produce to purchase other foods or non-food items needed by the households and food shortage as a result of low production). The latter agrees with FAO's study finding which indicated that few households in developing countries e.g., Ghana produce enough food to meet all consumption requirements (FAO, 2007).

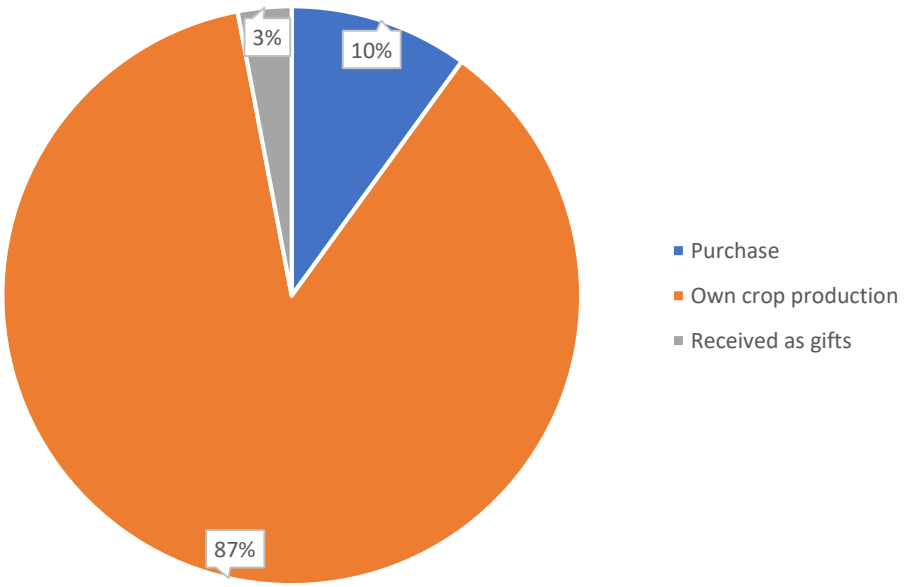

Figure 3: Sources of food consumed in West Gonja Municipal

4.3 Food and nutrition security status of the households

The HFIAS was employed to evaluate the level of food security inside households. With the aid of this instrument, respondents were presented with nine basic questions from USAID's FANTA incidence household food insecurity access scale (Ozaltin et al., 2010; Coates et al., 2007).

These inquiries were meant to ascertain whether households had altered their eating habits or diets as a result of having less money to buy food during the previous 30 days.

According to the study's findings, which are displayed in Figure 4, up to 67% of the households were classified as severely food insecure, 27% as moderately food insecure, and 4% as slightly food insecure. Merely 2% were assured of food. The aforementioned study findings point to a worrying degree of food insecurity in the investigated area. With 27% of households experiencing moderate food insecurity and 67% of homes experiencing severe food insecurity, it is clear that a sizeable section of the population in the study area struggles to get access to a sufficient and consistent quantity of food. Only 2% of households being food secure is quite alarming, as food and nutrition security is crucial for the well-being and development of communities. This underscores the need for interventions and support to address the underlying causes of food and nutrition insecurity such as poverty, poor access to resources, and climate change in the municipal and for that matter the region.

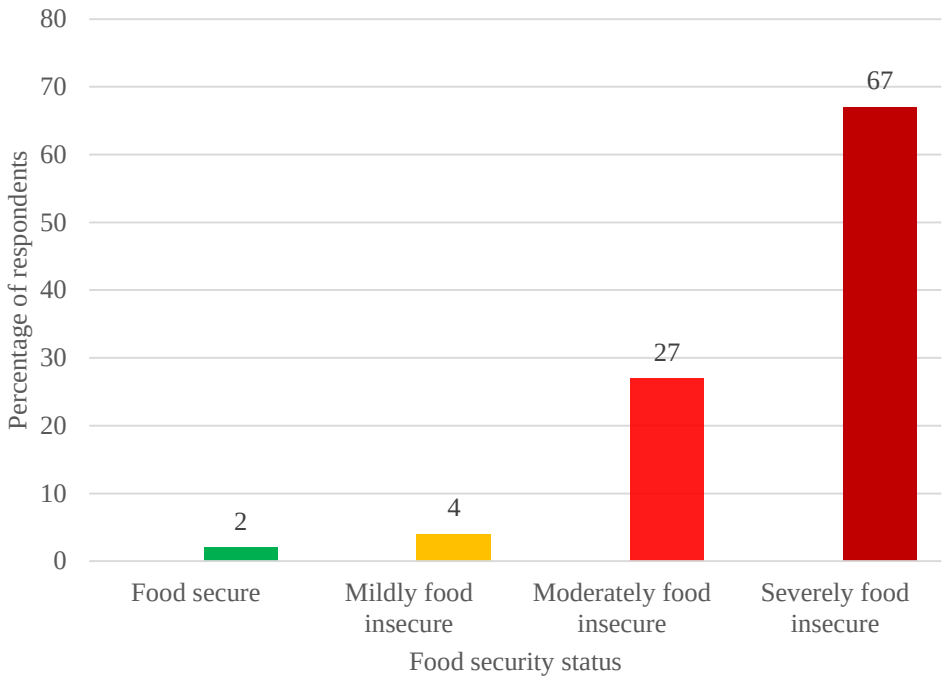

Figure 4: Household food and nutrition security status

4.3.1 Relationship between household food and nutrition security status and some demographic characteristics

4.3.1.1 Household size in relation to household food and nutrition security status

There is an inverse link between household size and the level of FNS in the household, according to the results shown in Figure 5. Compared to smaller homes, larger households are more susceptible to food insecurity. In a study, Tefera and Fikadu (2014) found a direct and negative correlation between family size and the state of food and nutrition security in households. They recommended that family planning, health extension services, awareness-raising, and adult education be used to curb uncontrollably high population growth in order to ensure FNS. Similar trend has been reported by WFP in its 2020 Ghana CFSVA report (WFP , 2020 a).

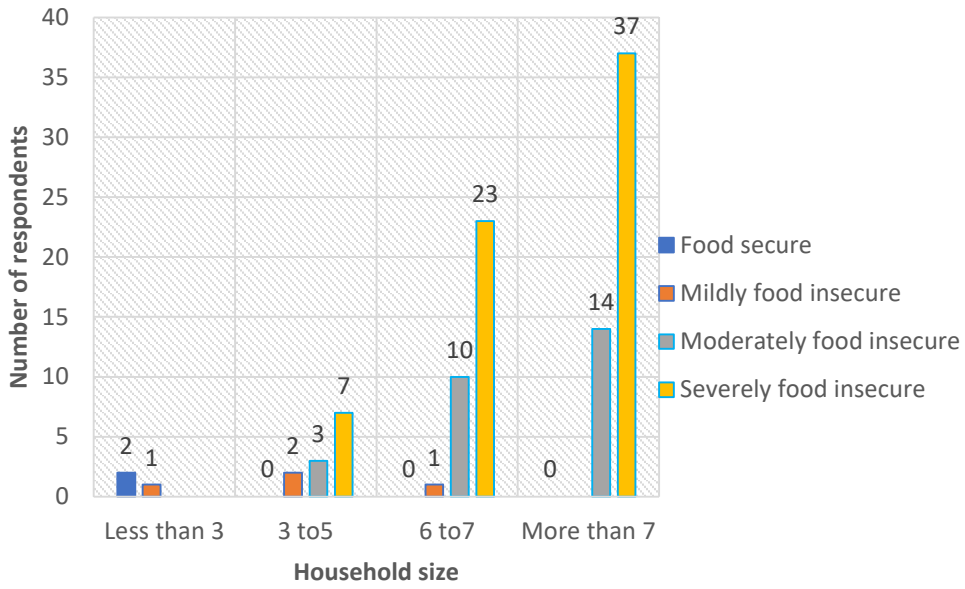

Figure 5: Household size in relation to household food and nutrition security status

4.3.1.2 Educational level in relation to household food and nutrition security status

Educational status plays a very important role in household FNS. All things being equal, higher education opens up better employment opportunity which help to increase the access to food through increase in income level. From the study result as depicted in Figure 6 below, households with basic and no formal education experienced severe food insecurity compared to their counterparts who had higher education. This confirms the argument that education does help much to improve the FNS level of households (Tefera & Fikadu, 2014; Maharajan & Khatri-Chihetri, 2006; WFP , 2020 a).

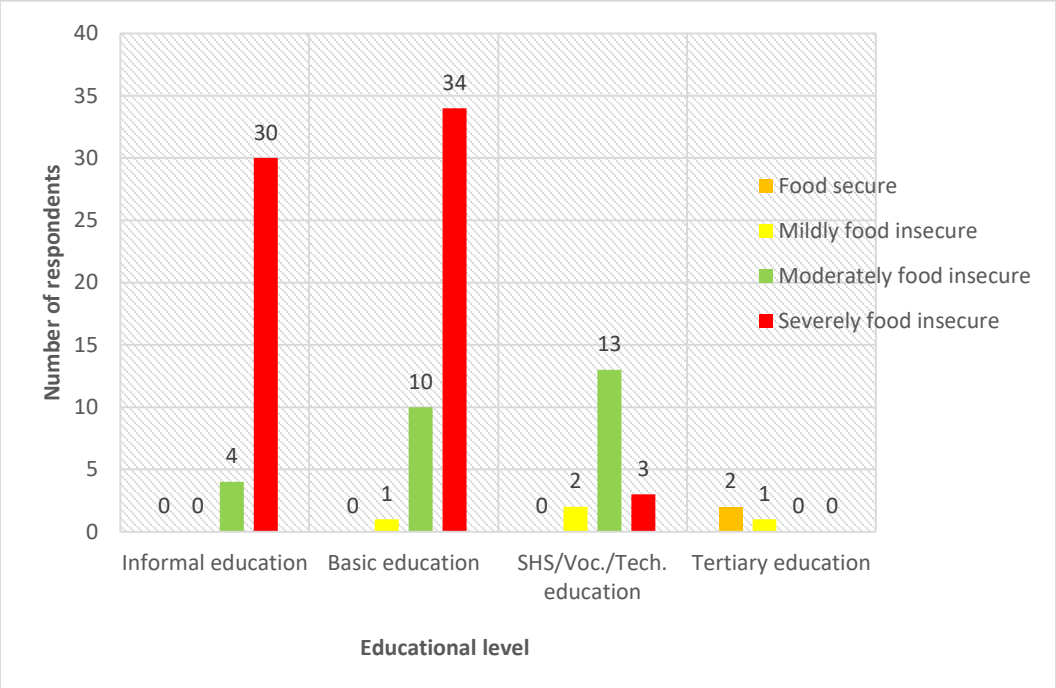

Figure 6: Educational level in relation to household food and nutrition security status

4.3.1.3 Sex in relation to household food and nutrition security status

The study results as presented in Figure 7 show that as the severity of food insecurity increased, the gap between the percentage of women and men affected widened. The percentage of women who were severely food insecure stood at 40% as against 27% for men.

FNS and gender are intertwined in complex ways, impacting both men and women differently. In some instances, women play a central role in household food production, preparation, and nutrition. Despite this, they frequently face barriers that limit their access to decision-making power and resources, influencing their ability to achieve food and nutrition security (Otaha, 2013; WFP, 2009). The FAO pointed out that women's lack of access to productive resources, education, and employment opportunities can undermine their capacity to contribute to food security (FAO, 2018). Gender disparities in land

ownership and inheritance rights often disadvantage women, limiting their ability to access productive land particularly in the northern part of Ghana (Lambrecht et al., 2017).

Addressing gender disparities is crucial for achieving food security. It involves recognizing and rectifying unequal access to resources, opportunities, and decision-making power. Policy efforts that empower women, promote gender equality, and safeguard women's rights can contribute to more equitable and sustainable food and nutrition security (Doss et al., 2014; Quisumbing et al., 2015).

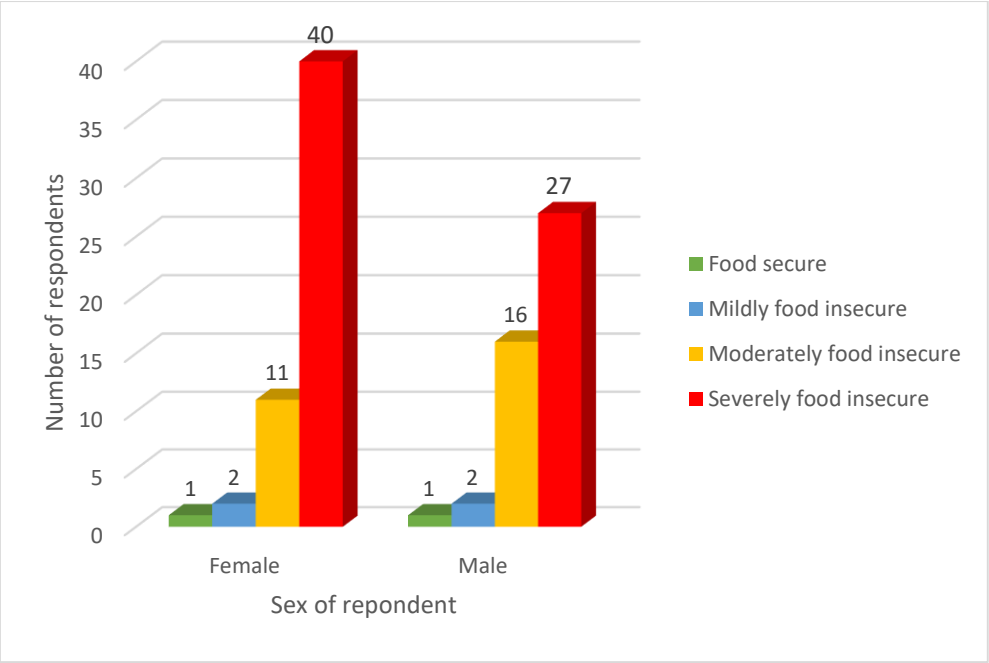

Figure 7: Sex in relation to household food and nutrition security status

4.4 Identified household coping strategies in the study area.

Amidst food scarcity and inadequate money to buy food, households employ several strategies as coping mechanisms. Household coping strategies entails what households do when they do not have enough food, and also do not have enough money to buy food (Debebe et al., 1998; Tefera & Fikadu, 2014). In response to the question "*what do you do*

when you don't have enough food and don't have enough money to buy it?", respondents mentioned six (6) food-based coping strategies as presented in Figure 8 below.

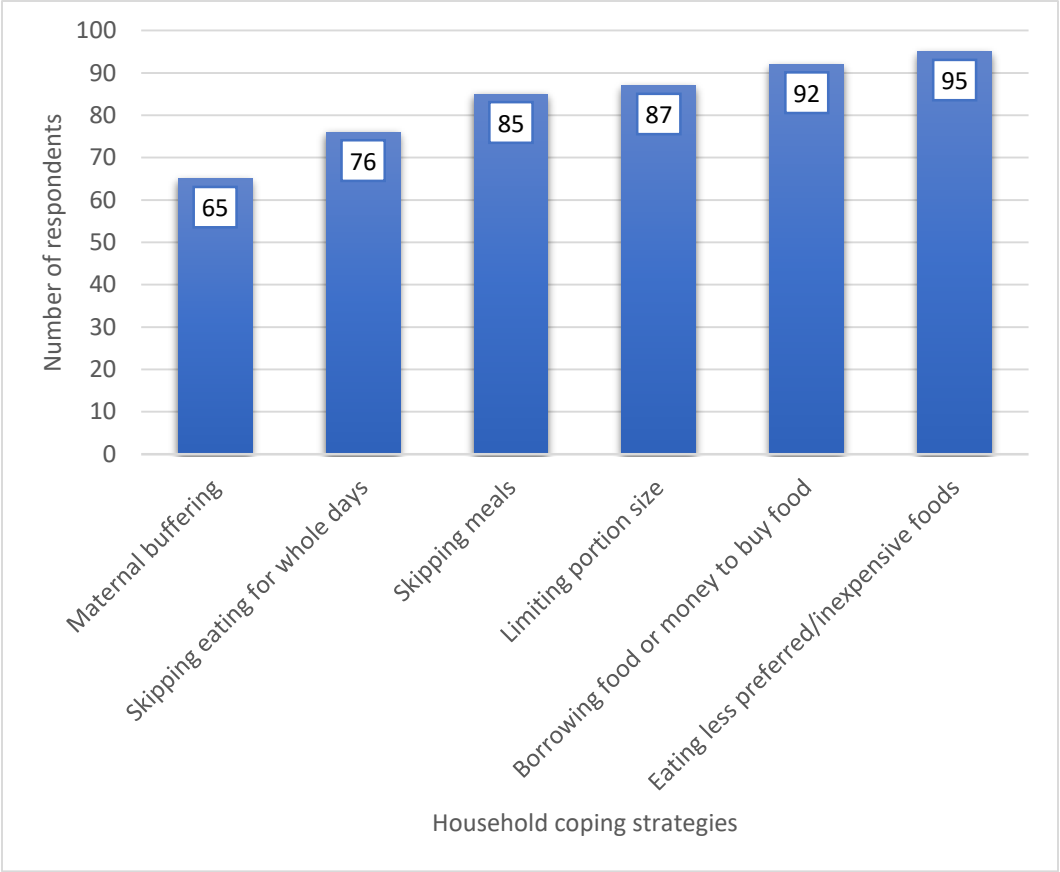

Figure 8: Identified household coping strategies in the study area.

The study results revealed that households in the West Gonja Municipal employed several coping strategies to mitigate food shortages. Majority of them (95%) reported relying on less preferred/inexpensive food and 92% said they borrowed food or money to buy food. Limiting portion size at meal times, skipping meals, and distribution of food available to only children were also practiced by 87%, 85% and 65% of respondents respectively. A greater percentage (76%) of respondents indicated they would skip eating for whole days as last resort. This result agrees with research finding elsewhere (Mjonono et al., 2009; Debebe et al., 1998; Tefera & Fikadu, 2014).

During focus group discussions, participants explained that when faced with food scarcity, they ate foods that were less preferred or less expensive as a means of adapting to lower real incomes. As the situation persisted, they resorted to limiting the quantity of food served to an individual. Cutting back the amount of food each person in the household gets, they said, is roughly comparable to eating less preferred. The manner in which limiting portion size was done varied among the participants; some employed uniform reduction where the portion size reduction affected everyone in the household. Others also adopted redistribution of food available in favour of children. The latter was sometimes referred to as "maternal buffering". The act of a woman purposefully restricting her own consumption to make sure that her children, typically, recently-weaned toddlers, get enough to eat is known as maternal buffering. (Quaye, 2008).

Majority of the respondents hinted that if the reduction in the quantity of food served was too much, adults would skip meals (reduce the number of meals in a day), in favour of children. Respondents further reported borrowing food or money to buy food when they ran out of food. Borrowing food from a relative or friend was the most common in the study area even though the practice could lead to permanent indebtedness which consequently made households more vulnerable in the long-run. In the worst-case scenario, household heads in the study area indicated that they would skip meals for whole days as last resort as a means of dealing with food insufficiency.

4.5 Identified challenges to household food and nutrition security in the study area.

Security of food and nutrition is a complicated subject impacted by many different variables. During focus groups and key informant interviews, participants identified a number of obstacles to the security of food and nutrition. Rising food prices, Covid-19,

climate change, poverty, gender inequality, conflicts, political instability and unrest, food waste and loss, poor access to land, and an ungovernable population growth were the major factors identified as challenges to food security.

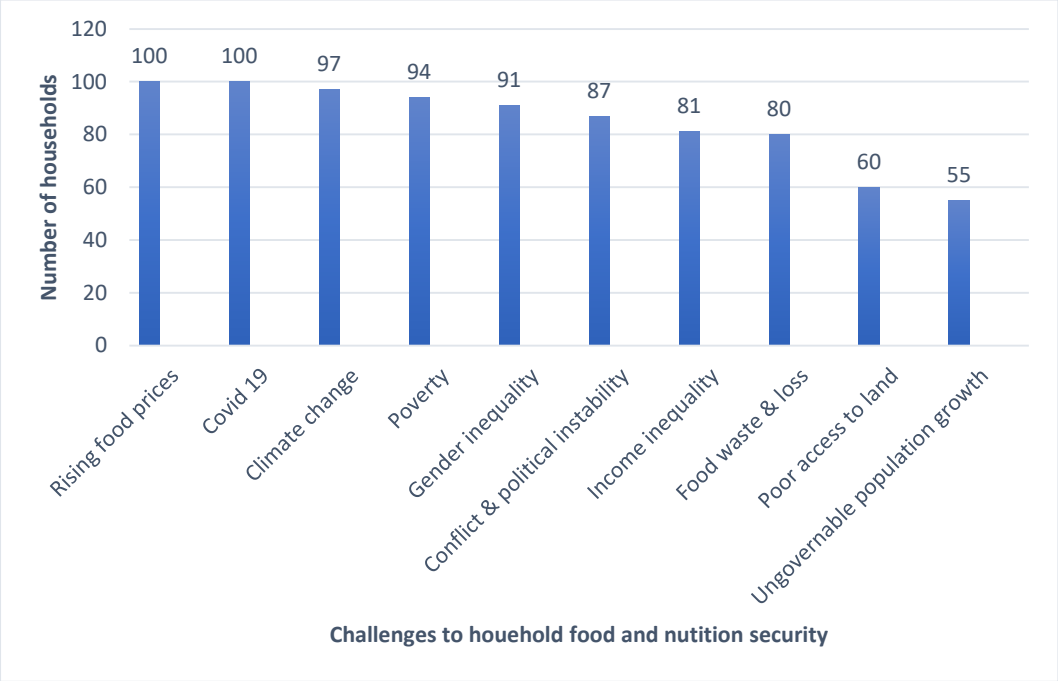

Figure 9: Identified food and nutrition security challenges in the study area

Conflicts can have significant and far-reaching effects on food security, leading to negative impacts on both the availability and access to food for affected populations through disruption of agricultural activities, displacement and loss of livelihoods, market disruptions and price inflation among others. According to the FAO, conflicts can cause a decline in agricultural output by as much as 20-30% in affected areas (FAO, 2018). Respondents acknowledged that effects of conflicts have no boundaries and made reference to the Russia-Ukraine war which affected availability and price of fertilizers in Ghana. Similarly, Covid – 19 impacted negatively on household food and nutrition security in Ghana through disruptions to food supply chains, reduced incomes, and interruption in

agricultural activities which eventually led to hikes in food prices limiting household food affordability (FAO et al., 2021).

Late on-set of rains, early cessation of rains, flooding, dry spells, droughts, rising temperatures were cited as evidences of climate change that affected food production in the study area. This coupled with limited access to land especially by women, low incomes, high cost of inputs, and high post-harvest losses reduced food availability and access. Moreover, the world population continues to grow; it is projected to reach 9.7 billion by 2050. This places increased pressure on food production and distribution systems and thus affects food and nutrition security of households (UN, 2019).

CHAPTER FIVE

5.0 SUMMARY, CONCLUSION, AND RECOMMENDATIONS

5.1 Summary

The study employed a mixed-methods approach. A sample size of 100 comprising 53 male and 43 female household heads were interviewed. To gather qualitative information about food and nutrition in the research area, focus groups and key informant interviews were held.

According to this survey, a significant portion of the study area's households—67%—were extremely food insecure. Merely 2% were assured of food. The level of FNS varied depending on the household heads' demographic traits, who spoke for the households. The size of the household and the level of food and nutrition security were inversely correlated. Compared to smaller homes, larger households were more susceptible to food insecurity. The degree of schooling had a big impact on how secure food was in the home. More households with basic and informal education experienced severe food insecurity compared to their counterparts who had higher education. Sex was discovered to affect the FNS of households. The study's findings showed that the proportion of women and men impacted by food insecurity grew with the severity of the problem. The percentage of women who were severely food insecure stood at 40% as against 27% for men.

The study results revealed that households in the West Gonja Municipal employed several coping strategies to mitigate food shortages. Majority of them (95%) reported relying on less preferred/inexpensive food, and 92% said they borrowed food or money to buy food. Restricting adult consumption in favor of children, skipping meals, and limiting portion sizes at mealtimes were also practices followed by 87%, 85%, and 65% of respondents,

respectively. A greater percentage (76%) of respondents indicated they would skip eating for whole days as a last resort.

Rising food prices, Covid-19, climate change, poverty, gender inequality, conflicts, political instability and unrest, food waste and loss, poor access to land, and un manageable population growth were the major factors identified as challenges to food security.

5.2 Conclusion

Demographic characteristics of household heads had significant impact on FNS status of households. Household size and FNS level were inversely correlated. Compared to smaller homes, larger households were more susceptible to food insecurity. The degree of schooling was another important factor in household food security. Compared to homes with higher levels of education, a greater number of households with only a basic education and no formal education faced acute food insecurity. The level of FNS in households was influenced by sex; among women, about 40% were severely food-insecure, compared to 27% for males.

Main sources of household food supply were own crop production, purchases and food gifts. Majority (87%) of the households in study area sourced most of their food from own crop production. Some the households (10%) purchased the food they consumed while others (3%) received food from relatives and friends as gifts.

Households in the West Gonja Municipal employed several coping strategies to mitigate food shortages. Majority of them (95%) reported relying on less preferred/inexpensive food, 92% said they borrowed food or money to buy food. Limiting portion size at meal times, skipping meals and restricting adult consumption in favour of small children were

also practiced by 87%, 85% and 65% respectively. A greater percentage (76%) of respondents indicated they skipped eating for whole days.

Rising food prices, Covid-19, climate change, poverty, gender inequality, conflicts and political instability, food waste and loss, access to land and population growth were the major factors identified as challenges to food security.

The study found that more than half (67%) of the households in the study area were severely food insecure. Only 2% were food secure.

5.3 Recommendations

The study underscored the importance multi-faceted nature of FNS in West Gonja Municipal. FNS is crucial for human and economic development. Improving FNS requires a holistic approach which does not only focus on increasing food production but also addresses the underlying causes of food insecurity, including poverty, inequality, and environmental sustainability.

There is a need to promotes sustainable agricultural practices that consider long-term environmental impacts through crop diversification, regenerative agriculture, and efficient water management to ensure food production remains resilient in the face of climate change so as to increase overall food availability and accessibility. There is also the need to intensify nutrition education to raise awareness on the importance of a balanced diet and dietary diversity in order to improve eating habits to ensure good utilization of food.

Promoting equitable access to resources such as land, credit, and agricultural inputs for small-scale farmers, particularly women is fundamental in building resilience and reducing

vulnerabilities to food insecurity. Targeted social safety net programmes should also be implemented to support vulnerable populations during times of food scarcity or economic shocks.

REFERENCES

Abokyi, E., Folmer, H. & Asiedu, K., 2018. Public buffer stocks as agricultural output price stabilization policy in Ghana. *Agric & Food Secur,* 7(69).

Agyemang-Bonsu, W. K., Dougherty, B., Fencl, A. & Kemp-Benedict, E., 2008. *Ghana Country Report: Netherlands' Climate Assistance Program (NCAP)*.

Aliaga, M. A., Ribeiro, S. M., Dos Santos, C. S. M. & Trad, A. B. L., 2020. Participatory food and nutrition security assessment in a. *Ciencia & saude coletiva,* 25(7), p. 2595–2604.

Armah, A., Nti, C. & Otoo, G., 2019. Climate change and food and nutrition security in the Bibiani-Anhwiaso Bekwai district in the Western Region of Ghana. *Cogent Environ Sci.,* 5(1), pp. 168-1613.

Ayifi, R., 2017. *Food security and sustainability. J Food Process Techno.,* s.l.: s.n.

Banerjee , A. V. & Duflo , E., 2011. *Poor economics: A radical thinking of the way to fight global poverty, public affairs..* New York: s.n.

Bawa, A., 2019. Agriculture and Food Security in Northern Ghana. *Asian Journal of Agricultural Extension, Economics & Sociology,* 31(2), pp. 1-7.

Behnassi, M., Draggan, S. & Yaya, S., 2011. *Global Food Insecurity: Rethinking Agricultural and Rural Development Paradigm and Policy. In: Food Crisis Mitigation. The Need for an Enhanced Global Food Governance,* New York: Springer Science + Business Media.

Bickel, G., Nord, M., Hamilton, W. & Cook, J., 2000. *Guide to measuring household foodsecurity. Analysis, Nutrition and Evaluation, Food and Nutrition Service, USDA, USA,* s.l.: s.n.

Coates, J., Anne , S. & Paula, Bilinsky, 2007. *Household Food Insecurity Access Scale (HFIAS) for Measurement of Household Food Access: Indicator Guide (v. 3),* Washington, D.C: Food and Nutrition Technical Assistance Project, Academy for Educational Development.

Coleman-Jensen, A., Rabbitt, M. P. & Gregory, C. A. &. S., 2019. *Household Food Security in the United States in 2018,* Washington DC: United States Department of Agriculture, Economic Research Service...

Creswell, J. W., 2009. *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches.* 3rd ed. Los Angeles, CA: Sage.

Darfour, B. & Rosentrater, K., 2016. *Agriculture and food security in Ghana.In: 2016 ASABE annual international meeting American Society of Agricultural and Biological Engineers,* s.l.: s.n.

Debebe, H., Daniel, C. C. & Daniel Molla, 1998. *Food Aid Targeting in Ethiopia: A Study of Household Food Insecurity and Food Aid Distributions Michigan State University, Famine Early Warning System Project, USAID/Ethiopia, Ministry of Economic Development and Cooperation,* s.l.: s.n.

Doss, C., Meinzen-Dick, R. & Bomuhangi, A., 2014. Who owns the land? Perspectives from rural Ugandans and implications for land acquisitions. *Feminist Economics,* 20(1), pp. 76-100.

FAO, 1996. *Rome Declaration, in the World food Security and World Food Summit Plan of Action,* Rome: FAO.

FAO, 2003. *Socio-economic and gender sensitive indicators in the management of natural resources. FAO, Statistics Division, Socio-Economic Statistics and Analysis Service,,* s.l.: United Nations.

FAO, 2006. *Food Security. FAO's Agriculture and Development Economics Division (ESA) with Support from the FAO Netherlands Partnership,* Amsterdam: FAO.

FAO, 2007. *The Millennium Development Goals: The road ahead,* s.l.: FAO.

FAO, 2008. *An Introduction to the Basic Concepts of Food Security. In: Food Security Information for Action: Practical Guides , EC-FAO Food Security programme,* Rome: FAO.

FAO, 2009 b. *Nutrition country Profle: Republic of Ghana,* s.l.: s.n.

FAO, 2009. *Stimulating Agricultural Productivity in Developing Countries, Report Paper for Developing Countries,* Washington DC,USA: FAO.

FAO, 2011. *The state of food and agriculture women in agriculture: closing the gender gap for development,* Rome: FAO.

FAO, 2013. *The State of Food Insecurity in the World 2013 - The Multiple Dimensions of Food Security,* Rome: FAO.

FAO, 2014. *FAO Statistical Yearbook 2014 on Africa Food Statistical Yearbook 2014 on Africa Food,* Accra: Food and Agriculture Organization of the United Nations Regional Office for Africa.

FAO, 2018. *The State of Food and Agriculture 2018: Migration, Agriculture and Rural Development,* Rome: FAO.

FAO, 2019. *The State of Food Security and Nutrition in the world,* Rome: FAO.

FAO, 2021. *Assessing the impact of the COVID-19 pandemic on agriculture, food security and nutrition in Africa,* Accra: FAO.

FAO, et al., 2021. *The State of Food Security and Nutrition in the World 2021. Transforming food systems for food security, improved nutrition and affordable healthy diets for all,* Rome: FAO.

Gittelsohn, J., Mookherji, S. & Pelto, G., 1998. Operationalizing household food security in rural Nepal. *Food Nutrition Bulletin,* 19(13), pp. 210-222.

GSS, 2022. *Ghana Household Income and Exppenditure Survey: Quaterly Food Inseucrity Report,* Accra: Ghana Statistical Service.

Hauck, J. & Youkhana, E., 2008. *Histories of water and fisheries management in Northern Ghana,* s.l.: s.n.

Humanitarian Global, 2021. *humanitarianglobal.com.* [Online] Available at: humanitarianglobal.com/indicators-of-food-security/ [Accessed 15 10 2023].

Ilaboya, I. et al., 2012. Causes, Effects and Way forward to Food Insecurity. . *Iranica Journal of Energy & Environment,* Volume 3, pp. , 180-188.

IPCC, 2007. *Fourth Assessment Report. Climate Change 2007 ,* UK: Cambridge University Press.

IPCC, 2014. *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change,* s.l.: Cambridge University Press.

Jenson, R. & Miller, N., 2010. A revealed preference approach to measuring hunger and under-nutrition. Working paper no. 16555, NBER Working Paper Series.

Kettings, C., Sinclair, A. & Voevodin M, A., 2009. Healthy diet consistent with Australian health recommendations is too expensive for welfare dependent families. *Aust NZ J Public Health,* Volume 33, p. 566–572.

Kirkland, M. T., Kemp, S. R., Hunter, M. L. & Twine, W., 2011. *Toward Improved Understanding of Food Security: A Methodological Examination Based in Rural South Africa,* s.l.: s.n.

Klennert, K., 2005. *Achieving Food and Nutrition Security Actions to Meet the Global Challenge.* s.l.:s.n.

Kuiper, M. & Cui, H., 2021. Using food loss reduction to reach food security and environmental objectives—a search for promising leverage points. *Food policy,* Volume 98.

Kuwornu, J., Suleyman, D. & DPK, A., 2013. Analysis of food security of farming households in the forest belt of the Central region of Ghana. *Rus. J Agric Soc Sci,* 1(13), pp. 26-42.

Kyei-Mensah, C., Kyerematen, R. & Adu-Acheampong, S., 2019. *Impact of Rainfall Variability on Crop Production within the Worobong Ecological Area of Fanteakwa District, Ghana,* s.l.: s.n.

Lambrecht, I., Schuster , M., Asare, S. & Pelleriaux , L., 2017. *Changing gender roles in agriculture? Evidence from 20 years of data in Ghana. IFPRI Discussion,* Washington, DC:: nternational Food Policy Research Institute, Development Strategy and Governance Division.

Lele, U. et al., 2016. *Measuring Food and Nutrition Security: An Independent Technical Assessment and User's Guide for Existing Indicators. Measuring Food and Nutrition Security Technical Working Group,* Rome: Food Security Information Network.

Leroy, J. L. et al., 2015. Measuring the Food Access Dimension of Food Security: A Critical Review an Mapping of Indicators. *Food and Nutrition Bulletin,* 36(2), pp. 167-195.

Loopstra, R., Reeves, A. & Tarasuk, V., 2019. The rise of hunger among low-income households: an analysis of the risks of food insecurity between 2004 and 2016 in a population-based study of UK adults. *J Epidemiol Community Health,* Volume 73, pp. 668-673.

Lo, Y.-T., Chang, Y.-H., Lee, M.-S. & Wahlqvist, M. L., 2012. Dietary diversity and food expenditure as indicators of food security in older Taiwanese. *Appetite,* 58(1), pp. 180-187.

Maharajan, K. L. & Khatri-Chihetri, A., 2006. *Household Food Security in Rural Areas of Nepal: Relationship between Socio-economic Characteristics and Food Security Status. Poster paper prepared for presentation at the International Association of AgriculturaEconomics Conference,* Gold Coast, Australia: s.n.

Matemilola, S. & Elegbede, I., 2017. The Challenges of Food Security in Nigeria. *Open Access Library.*

Matemilola, S. & Elegbede, I., 2017. The Challenges of Food Security in Nigeria. *Open Access Library Journal,* Volume Journal , 4: e4185..

Maxwell , S. & Frankenberger, T., 1992. *Household food security: Concepts, indicators, measurements: A technical review,* Rome: FAD/UNICEF.

Maxwell, D., Caldwell, R. & Langworthy, M., 2008. Measuring food insecurity: Can an indicator based on localized coping behaviors be used to compare across contexts. *Food Policy,* 33(6), p. 533–540..

Maxwell, G. D., 1996. "Measuring Food Insecurity: The Frequency and Severity of "Coping Strategies.". *Food Policy,* 21(3), pp. 291-203.

Maxwell, S. & Frankenberger, T. R., 1992. *Household Food Security: Concept, Indicators, Measurements. A Technical Review,* New York: IFAD.

Misselhorn, A., 2005. What drives food insecurity in southern Africa? A meta-analysis of household economy studies. *Global Environmental Change,* Volume 15, pp. 33-43.

Mjonono, M., Ngidi, M. & Hendriks, P. S. L., 2009. *Investigating household food insecurity coping strategies and the impact of crop production on food security using Coping Strategy Index (CSI). Farm Management 17th International Farm Management Congress,* Illinois, USA: Bloomington/Normal.

MoFA, 2017. *Planting for Food and Jobs: strategic plan for implementation (2017- 2020),* Accra: MoFA.

MoFA, 2019. *Agriculture in Ghana. Facts and figures,* Accra, Ghana: Statistics research and information directorate.

Monsivais, P. & Drewnowski, A., 2007. The rising cost of low-energy-density foods. *Journal of the American Dietetic Association,* 107(12), p. 2071–2076.

NCCAS, 2012. *National Climate Change Adaptation Strategy of Ghana,* s.l.: s.n.

Nord, M., Hopwood, H. & Carlson, A., 2020. *Household Food Security in the United States in 2019,* Washington DC: United States Department of Agriculture, Economic Research Service..

Ogbonna, J., Nomura, N. & Aoyagi, H., 2013. Bioenergy Production and Food Security in Africa. *Academic Journals,* Volume 12, pp. 7147-7157.

Omorogiuwa, O., Zivkovic, J. & Ademoh, F., 2014. The Role of Agriculture in the Economic Development of Nigeria. *European Scientific Journal,* Volume 10, pp. 113-147.

Otaha, I., 2013. Food Insecurity in Nigeria: Way Forward. *An International Multidisciplinary Journal,* Volume 7, pp. 26-35.

Owoo, N. S. & Lambon-Quayefio, M. P., 2017. *The agro-processing industry and its potential for structural transformation of the Ghanaian economy, WIDER Working Paper, No. 2017/9, ISBN 978-92-9256-233-5,* Helsinki: The United Nations University World Institute for Development Economics Research (UNU-WIDER).

Ozaltin, E., Hill, K. & Subramanian, S. V., 2010. Association of maternal stature with offspring mortality, underweight, and stunting in low-to middle-income. *Journal of the American Medical Association,* 303(15), p. 1507.

Pangaribowo, E. H., Gerb, N. & Torero , M., 2013. *Food and nutrition security indicators: A review Zentrumfür Entwicklungs forschung (ZEF) Working Paper Series 108,* onn, Germany: Center for Development Research.

PÉREZ-ESCAMILLA, R. & SEGALL-CORRÊA, A. M., 2008. Food insecurity measurement and indicators. *Revista De Nutrição,* Volume 21, p. 15s–26s.

Quaye, W., 2008. Food security situation in northern Ghana, coping strategies and related constraints. *African J ournal of Agric Research.,* 3(5), pp. 334-342.

Quisumbing, A. R. et al., 2015. Closing the gender asset gap: Learning from value chain development in Africa and Asia. *Food Policy,* Volume 55, pp. 1-14.

Rose, D. & Charlton, K., 2001. Prevalence of household food poverty in South Africa: results from a large, nationally representative survey. *Public Health Nutrition,* 5(3), p. 383–389.

Sharma, K. R., 2012. Malnutrition in children aged 6–59 months in Mugu district. *Journal of Nepal Health Research Council,* 10(21), p. 156–159.

Spieldoch, A., 2011. *The Right to Food, Gender Equality and Economic Policy,* s.l.: Center for Women's Global Leadership (CWGL).

Swindale, A. & Bilinsky, P., 2006. *Household Dietary Diversity Score (HDDS) for Measurement of Household Food Access: Indicator Guide (v.2),* s.l.: Food and Nutrition Technical Assistance Project.

Tefera, T. & Fikadu, T., 2014. Determinants of Households Food Security and Coping Strategies for Food Shortfall in Mareko District, Guraghe Zone Southern Ethiopia. *Journal of Food Security,* 2(3), pp. 92-99.

UN, 1992. *UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE,* s.l.: s.n.

UN, 2019. *World Population Prospects 2019: Highlights,* s.l.: United nations.

UNDP, 2007. *Ghana human development report: towards a more inclusive society,* Accra: Ghana office.

UNICEF, 2018. *Ghana LEAP 1000 Programme: Endline Evaluation Report,* Ghana: UNICEF.

Webb, et al., 2006. Measuring Household Food Insecurity: Why It's So Important and Yet So Difficult to Do?. *Journal of Nutrition,* pp. 1404S-1408.

WFP , 2020 a. *Comprehensive Food Security and Vulnerability Analysis (CFSVA),* Accra: MoFA.

WFP, 2008. *Food Consumption Analysis: Calculation and Use of the Food Consumption Score in Food Security Analysis,* s.l.: s.n.

WFP, 2009. *World Food Programme Gender Policy Report,* Rome: s.n.

WFP, 2012. *Ghana Comprehensive food security & vulnerability analysis 2010: focus on Northern Ghana,* Accra: Ministry of Food and Agriculture, Ghana Statistical Service.

WFP, 2015. *Food Consumption Score Nutritional Quality Analysis (FCS-N) - Technical Guidance Note,* s.l.: s.n.

WFP, 2020 a. *Comprehensive Food Security and Vulnerability Analysis (CFSVA),* Accra: MoFA.

WFP, M. G. U., 2020 b. *Food Security and Nutrition Monitoring System (FSNMS) Ghana,* s.l.: s.n.

WHO, 2017. . *Nutrition in the WHO African Region,* Brazzaville: World Health Organization.

Wolfe, W. & Frongillo (Jr.), E., 2000. *Building household food security measurement tools from the ground up. Background Paper, Food and Nutrition Technical Assistance Projec,* Washington, DC: s.n.

World Bank, 2016. *Food Security and COVID-19.* s.l.:s.n.

Yamane, T., 1967. *Statistics: An introductory analysis.* 2nd Edition ed. New York: Harper and Row.

APPENDIX

Appendix 1: Questionnaire

UNIVERSITY FOR DEVELOPMENT STUDIES

FACULTY OF AGRICULTURE, FOOD AND CONSUMER SCIENCES

DEPARTMENT OF HORTICULTURE

FOOD AND NUTRITION SECURITY IN WEST GONJA MUNICIPAL IN GHANA

QUESTIONNAIRE FOR HOUSEHOLD HEADS

1. Respondent [ ] Male [ ] Female
2. Marital status [ ] Single [ ] Married [ ] Divorced [ ] Widowed
3. Age of respondent [ ] 15-24 [ ] 25-34 [ ] 35-44 [ ] 45-54 [ ] 55-64 [ ] 65 +
4. Household size [ ] less than 3 [ ] 3-5 [ ] 6-7 [ ] more than 7
5. Respondent educational level [ ] No formal education [ ] non formal education [ ] basic (primary/JHS) [ ] SHS/Vocational/Technical [ ] Tertiary
6. What is your main source of food supply? [ ] own crop production [ ] purchase [ ] gifts [ ] other (specify): ……
7. In the past four weeks, did you worry that your household would not have enough food? [ ] Yes [ ] No

   If yes how often did this happen? [ ] Rarely (once or twice) [ ] Sometimes (three to ten times)[ ] Often (more than ten times)

8. In the past four weeks, were you or any household member not able to eat the kinds of foods you preferred because of a lack of resources? [ ] Yes [ ] No

   If yes how often did this happen? [ ] Rarely (once or twice) [ ] Sometimes (three to ten times)[ ] Often (more than ten times)

9. In the past four weeks, did you or any household member have to eat a limited variety of foods due to a lack of resources? [ ] Yes [ ] No

   If yes how often did this happen? [ ] Rarely (once or twice) [ ] Sometimes (three to ten times)[ ] Often (more than ten times)

10. In the past four weeks, did you or any household member have to eat some foods that you really did not want to eat because of a lack of resources to obtain other types of food? [ ] Yes [ ] No

    If yes how often did this happen? [ ] Rarely (once or twice) [ ] Sometimes (three to ten times) [ ] Often (more than ten times)

11. In the past four weeks, did you or any household member have to eat a smaller meal than you felt you needed because there was not enough food? [ ] Yes [ ] No

    If yes how often did this happen? [ ] Rarely (once or twice) [ ] Sometimes (three to ten times)[ ] Often (more than ten times)

12. In the past four weeks, did you or any other household member have to eat fewer meals in a day because there was not enough food? [ ] Yes [ ] No

    If yes how often did this happen? [ ] Rarely (once or twice) [ ] Sometimes (three to ten times)[ ] Often (more than ten times)

13. In the past four weeks, was there ever no food to eat of any kind in your household because of lack of resources to get food? [ ] Yes [ ] No

    If yes how often did this happen? [ ] Rarely (once or twice) [ ] Sometimes (three to ten times)[ ] Often (more than ten times)

14. In the past four weeks, did you or any household member go to sleep at night hungry because there was not enough food? [ ] Yes [ ] No

If yes how often did this happen? [ ] Rarely (once or twice) [ ] Sometimes (three to ten times) [ ] Often (more than ten times)

15. In the past four weeks, did you or any household member go a whole day and night without eating anything because there was not enough food? [ ] Yes [ ] No

    If yes how often did this happen? [ ] Rarely (once or twice) [ ] Sometimes (three to ten times)[ ] Often (more than ten times)

16. What strategies do you employ to cope with food shortage?

    i. ……

    ii. ……..……..

    iii. ……

    iv. ……

17. What are your challenges to food security?

    i. ……..……

    ii. ……..

    iii. ……..……

    iv. ……..……