EMERGING THREATS TO FOOD SECURITY AMONG RURAL HOUSEHOLDS IN THE KASSENA-NANKANA MUNICIPALITY

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EMERGING THREATS TO FOOD SECURITY AMONG RURAL HOUSEHOLDS IN THE KASSENA-NANKANA MUNICIPALITY

By

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DECLARATION

I hereby declare that this submission is my own work towards the M.Sc. Development Policy and Planning and, to the best of my knowledge, it contains no material previously published by another person nor material which has been accepted for the award of any other degree of the University, except where due acknowledgement has been made in the text.

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ABSTRACT

Current unfavourable developments in the agricultural sector of most developing countries have brought to the fore renewed interest in the ever persistent challenge of food insecurity. The study examines the emerging threats confronting rural households food security in the Kassena-Nankana Municipality of the Upper East Region of Ghana.

The mixed method approach and the exploratory descriptive study design were employed. Both secondary and primary data sources were relied on. The secondary sources included both published and unpublished documents. The primary data were sought primarily from rural farm household heads. A combination of methods was employed to sample 90 respondents—on the basis of the six (6) Urban/Area councils of the municipality.

The study found that socio-demographic characteristics (sex, age, household size and the number on regular income earners) of the survey respondents are proving to have a negative effect on their food security status. The study also found that climatic conditions in the area are becoming considerably variable with negative effects on agricultural activity and food security. The study further revealed that cultivable land available to rural folks is slowly diminishing with adverse implications for food security. In the area of price volatility, it became evident that expenditure on food outstrips income from farm produce, creating an income gap with obvious negative implications on food security. Finally, rural farm households coping strategies in the face of these threats have been shown to be varying but less effective and sustainable.

The study therefore recommended a comprehensive, holistic and multi-frontal approach which includes: maintaining productive household structures; ensuring effective strategies towards climate induce-stresses; promoting sustainable land use planning to effectively deal with these threats while recommending further and building strong resistance towards food price volatility.

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LIST OF ACRONYMS

ADRA	Adventist Development and Relief Agency
CARE	Cooperative for Assistance and Relief Everywhere
EFA	Entitlement Failure Approach
FAD	Food Availability Decline
FAO	Food and Agriculture Organisation
FID	Food Intervention Decline
GDP	Gross Domestic Product
GECAFS	Global Environmental Change and Food Systems
GSS	Ghana Statistical Service
IFAD	International Fund for Agricultural Development
KNDA	Kassena-Nankana District
KNEDA	Kassena-Nankana East District Assembly
MDGs	Millennium Development Goals
MOF	Ministry of Finance
MoFA	Ministry of Food and Agriculture
NDPC	National Development Planning Commission
NGO	Non-Governmental Organisation
SGER	State of the Ghanaian Economy Report
SPSS	Statistical Product and Services Solution
UNDP	United Nations Development Programme
WFP	World Food Programme
WMO	World Meteorological Organisation

CHAPTER ONE

GENERAL INTRODUCTION

1.1 Background to the study

Food is a necessary requirement for all of us. However, one thing is certain—food insecurity has been a long-standing challenge and a source of mounting concern confronting developing countries, especially rural communities. It has been pointed out and repeatedly by many sources that agriculture and food systems worldwide are greatly being challenged and are bending under intense pressure of critical drivers such as climate variability and extreme weather events, population growth, natural resource constraints, competing demands, and speculative and unpredictable food markets with deleterious impacts on global food security (CARE, 2011: 1; Africa Progress Panel, 2012: 37; FAO, IFAD & WFP. 2012: 30; Mariola, 2012: 703). All these challenges and threats have exhibited signs of leaving especially farm households in rural communities with little or no chance of coping and dealing effectively with their impacts.

Food insecurity is a global phenomenon but with marked regional variations. It has been estimated that in 2011 – 2013, a total of 842 million people (12.0% prevalence of undernourishment) or around one in eight people in the world have been suffering from chronic hunger, regularly not getting enough food to conduct an active life. The share of developed regions was put together at 15 million people (less than 5% prevalence). A greater proportion of hungry people- 827 million of them – live in developing countries with a current prevalence of undernourishment estimated at 14.3 percent (FAO, IFAD & WFP. 2013: 8) (See Appendix 2).

In sub-Saharan Africa, 222.7 million people (28.4% prevalence) are reported to be undernourished/facing food crises (FAO, IFAD & WFP. 2013: 8). Paradoxically and sadly, it has been reported that most of the food insecure in sub-Saharan Africa are rural food producers but net purchasers of food rather than sellers (FAO, 2012: 81; Kuwornu et al. (2013: 26). As emphasized by UNDP (2012: 47), the roots of sub Saharan Africa's food insecurity have always and largely been misguided policies, weak institutions and

failing markets. But, current developments and dynamics in areas such as socio-demographic changes, environmental pressures and climate stresses, growing insecurity of access to land and increasing volatile food prices appear to be adding up to the challenge package on food security.

Placing the spotlight on Ghana, even though agricultural activity constitutes an enduring source of livelihood sustenance, the burden of poverty and food insecurity is borne with striking spatial and regional disproportionateness as revealed by an assessment of agricultural households income, households expenditure on food, and households by regional quintile and annual income (GSS, 2008: 96-109). Thus, the rural poor are apparently disadvantaged in all of the above assessment. This trend undoubtedly comes with consequences and has dire implications for efforts aimed at bridging the gap between the rich and the rural poor.

While rural communities may be identified and set apart by certain general characteristics (for example relatively smaller populations, fragmented land holdings and predominance of agricultural activity) there are obvious considerable variations in terms of spatial location, agro ecological considerations, the local economic activity and socio-cultural dimensions amongst others that may give a particular rural setting a certain degree of uniqueness. There is, therefore, the imperative need for continuous efforts on a sustained basis to make the agriculture sector a more effective vehicle for hunger reduction, social mobility, economic growth and development with much emphasis on the broad and peculiar needs of rural communities.

To make any meaningful progress, such efforts must necessarily embrace lessons learnt from the past and elsewhere (both theoretical and empirical) and the peculiar needs of the current situation given the locality in question. In this regard, as it may be already known, a lot of theories and conceptual approaches (examples include: Malthusian and neo-Malthusian, Food Availability Decline, Food Intervention Decline, and Entitlement Failure Approach) have been propounded to help understand food security (or insecurity) over time. Also, volumes of empirical studies (for instance: Maharjan and Khatri-Chhetri, 2006; Collodi, and M'Cormack, 2009; Edame, Ekpenyong, Fonta, and Duru, 2011; and

Mariola, 2012) have been done bordering broadly on food insecurity status among households in various settings as reviewed in this paper—all in the attempt to better appreciate the seemingly intractable issue of food insecurity which remains a blight on the conscience of modern society.

From the foregoing, the study establishes that the critical issue of food insecurity is factual and its dimensions, causes and consequences vary markedly— across spatial contexts and over time. The study further asserts that there cannot be "one-size-fits all approach" to studying and understanding the phenomenon of food insecurity given its varying contexts. Moreover, this section argues that the most critical questions that should be agitating the minds of many are: why is it that at this time [21st Century] when humanity more than ever before has the capacity and technological wherewithal to effectively secure food security for the people, is food insecurity rather posing a real albatross around the necks of many developing countries?, what are the underlying drivers behind current trends of food insecurity?, what accounts for the spatial variations?, what are the dimensions and consequences?, how effective have efforts aimed at addressing food security challenges been?, and what should the way forward be?

These and many other interesting observations and thought-provoking questions are the motivation behind the Kassena-Nankana Municipality being considered for local context analysis. Thus, to particularly identify and closely assess the emerging threats that potentially could frustrate efforts and erode gains made towards food security and poverty reduction.

1.2 Statement of the problem

The Kassena–Nankana Municipality plays host to relatively larger rural communities with agriculture being a major source of their sustenance. But, evidence is amassing that food systems and food security are apparently strained and threatened: making it difficult to meet food needs. For instance, it has been reported that:

> A substantially high proportion of households in the region have difficulty in meeting their basic food needs, 40.3 per cent, compared to 12.8 per cent at the national level. Most districts have serious difficulty meeting their basic food

> needs, with Kassena/Nankana reporting the highest proportion with difficulty (57.9 per cent) followed by Builsa (52.4 per cent). The lowest proportion in the Region is Bawku East, which is still relatively high, (24.1 per cent), about twice the national average (GSS, 2003: 3).

Besides, there is also manifest recognition of and concern for the food security situation in the area as shown by the number of Non-Governmental Organisations (NGOs) such as ADRA, Rural Aid, Christian Aid, and Oxfam in the municipality working towards the broader issues of environment and poverty (KNDA, 2006 as cited in UNDP, 2012: 20). The situation remains an uncertain, unpredictable and persistent one, as food insecurity concerns have feature prominently in the mission statement of the municipality (KNDA, 2013: 8). This speaks volumes of the poverty and food insecurity situation in the study area.

Given the food insecurity concerns in the area, the underlying emerging threats that determine and influence food systems and consequently food security outcomes as evidenced by literature are apparently playing out. For instance, the demographic structure of the Kassena-Nankana East Municipality like many other areas has shown notable changes over the last decade or so. The total population in 2000 stood at 149491(as at the time the district was not yet split) and by 2010 the population of the East alone stood at 109,944 as compared to that of the West being 35,920 (GSS, 2012). Such changes as literature has shown could influence food security and poverty situation.

Concerning the linkages between climate variability and extremes on food systems and food security in the Municipality, it has been reported that:

> Most households are not food secured during the months of April, May and June. This three-month period marks the onset period of the rainy season and cultivation of crop fields in the north, generally and therefore it poses a great challenge for food supply (UNDP, 2010: 91)

> Some of the major reasons given for difficulties in satisfying household food needs in the past 12 months include poor harvest as a result of climate conditions, drought and pest and disease and high food prices as households sold most of their products right after harvest, thus exposing themselves to food shortages later (UNDP, 2010: 91).

Further, the Municipal NADMO reports have also indicated that, indeed extreme weather events are becoming more severe in recent times with deleterious effects on life and

property. Thus, environmental and climate change management issues (such as public education on climate change and its effects, supporting dry season farming, improved planting material and soil activities) are to receive greater attention (KNEDA, 2012: 25)

With respect to the issue of land, its availability for farming purposes appears to be a serious concern for the Upper East Region, as it has been noted thus: *"For the region as a whole, 12.3 per cent have less land compared to only 2.0 percent that have more land now, than a year before"* (GSS, 2003: 4). Yaro (2004: 180) stresses that the land system in the Kassena-Nankana society is undergoing some changes. As Yaro (2004: 108) puts it: *Land tenure arrangements have been commercialized by the conversion of token ritual gifts into cash or higher value gifts.* Such developments are often due to land use changes and competing demands—putting pressure on arable land with consequences for food security.

While food insecurity has become an issue of increasing concern in the study area as noted above, few studies have closely assessed the current trends and underlying determinants of this situation, to the inclusion of: Yaro (2004); DAEA Household Survey, 2008 (as cited in UNDP, 2010: 30). Consequently, much still remains to be understood concerning the linkages between emerging threats to rural households food systems and food security and their ability to effectively respond.

On grounds of the foregoing assertions, purpose of this paper is to explore the food security situation in the Kassena-Nankana Municipality, as it takes a broader and comprehensive look at some of these emerging issues: their extent and influence and how they have been responded to within the rural context. In doing so, the study adopts a multi-perspective approach (triangulation) — drawing from secondary sources to be complemented by farm households self reporting as expatiated in the methodology section. It is hoped that, findings and recommendations would contribute to literature and help inform the overall research efforts, policy planning and decision making aimed at promoting food security in the study area.

1.3 Objectives of the study

The general objective of the study is to examine the emerging threats confronting rural households' food security in the Kassena-Nankana Municipality.

The specific objectives of the study are to:

1. Describe the scale and nature of emerging threats (demographic change, climate variability, access to land and food price volatility) in the study area,
2. Explore the interconnections/linkages between the emerging threats and household food security,
3. Assess the effectiveness of available options put in place to manage these threats.
4. Make recommendations for policy response and further research on the threats to food security in rural communities.

1.4 Research questions

The study sought to answer the following pertinent questions:

1. What are the nature and scale of these emerging threats in the study area?
2. How do these threats affect food systems and food security among rural households?
3. How capable and effective are rural households in their responses to the food insecurity situation?
4. What is the way forward?

1.5 Scope of the study

In order to keep focus and maintain clarity of structure, the study has been delimited along three dimensions namely; geographical, content and time scopes. Geographically, the study would cover the Kassena-Nankana Municipality—looking at households within the six Urban/area councils (Navrongo, Manyoro, Pungu, Doba, Kolgo and Naga). Contextually, emphasis would be on addressing issues bordering on the generality of food and agricultural enterprise and more specifically placing the spotlight on the

identified emerging threats and challenges to household food security (variables of concern). Time wise, the study would put in perspective issues from the turn of the century to present — (2000-2013). But where there may be the need to put issues in their right perspective by drawing beyond the stated time period, due consideration would be given.

1.6 Justification of the study

Food security is a much talked about subject in the development discourse of especially developing countries, with particular reference to poor rural agricultural producing communities. Food systems and food security seem to be further threatened by certain influencing elements (such as, demographic change, environmental pressures and climate change, growing insecurity of access to land and increasing volatile food prices) which are becoming more pronounced and less predictable with varying effects on differentiated communities.

Literature has shown that, the Kassena-Nankana Municipality has been exposed to some of these major threats to food security and the challenge is becoming more acute (UNDP, 2010). There is therefore the imperative need to look into this. What are the extents of these threats and how do they play out on rural households' food security in the context of the Kassena-Nankana Municipality? It is hoped that a rigorous and insightful study in this direction would help establish the facts, reawaken society to the realities, and enhance and refresh our understanding of the current issues at stake, thereby adding significantly to literature and contributing to addressing the food needs of rural communities.

1.7 Organisation of the study

The work is organised into five main chapters which reflect on the structural requirements of the course and central themes of the study. It is considered valuable here to give an introduction to the chapters as well as a summary of the issues they cover. Chapter one which is the introductory chapter sets the scene and provides an overview of the key issues to be addressed in the study. Thus the background, problem statement,

objectives, research questions and scope of the study are captured. Chapter two is devoted to the review of conceptual and theoretical issues underpinning the study. The Chapter also looks at relevant empirical works germane to the study. Presented in Chapter three are the relevant features of the study area, the research design and methodological techniques and procedures used for the data collection and analysis. Information on the analysis and discussion of the data gathered are presented in Chapter four. Presented in Chapter five which is the last is the summary of major findings, recommendations and conclusion.

CHAPTER TWO

THEORETICAL CONCEPTS AND EMPIRICAL ISSUES ON THE THREATS TO FOOD SYSTEMS AND FOOD SECURITY

1.1 Introduction

Following the setting out of the issues for investigation and determination in Chapter one, the objective of Chapter two is to review relevant literature on food security/insecurity. Thus this Chapter first defines key concepts, elaborates on some theoretical approaches and goes on to provide a conceptual framework on food security (or insecurity). The Chapter then proceeds to explore empirical studies on the linkages between the identified emerging threats to food security and the responses adapted to meet these challenges.

1.2 Definition of key concepts

Before proceeding, there is the imperative need to define and highlight the relationships of some key concepts utilised throughout the study. These concepts include: emerging threats: under which demographic change, climate variability, land insecurity, and food price volatility are considered. Also defined are the concepts of food systems, household, and food security and insecurity. The clear definition of the key concepts to be employed in this study provided the grounding upon which some relevant theories have also been reviewed and a conceptual framework developed that guides the study.

1.2.1 Emerging threats

This is an open concept which has not been categorically defined, but as implied in literature and for the purposes of this study context, it has been conceptualized and operationally defined as: *the observance and description of a phenomenon which was previously little or even well known but whose intensity, dimensions or extremes are becoming more pronounced and less predictable usually with potential devastating consequences on its area of influence*. Guided by this broad definition, issues considered as emerging in this study context include the following:

Changing demographic profile

This would be used in this study to mean, shifts in the characteristic of a population (rural household population), which include the age of household head, family size, and related socio-demographic indicators such as number of income earners that could influence food security outcome.

Climate variability

> The term is often used to denote deviations of climate statistics over a given period (such as during a specific month, season or year) from the long-term climate statistics relating to the corresponding calendar period. (In this sense, climate variability is measured by those deviations, which are usually termed anomalies) WMO, 1992 (as cited in FAO, 2008: 85).

Climate change

> The term is often used in a more restricted sense to denote a significant change (i.e., a change with important economic, environmental and social effects) in the mean values of a meteorological element (particularly temperature or amount of precipitation) in the course of a certain period, where the means are taken over periods of a decade or longer (WMO, 1992, as cited in FAO, 2008: 85-86).

From the above definitions, climate variability as is well known has to do with short term changes or variations in weather parameters/elements while climate change is seen rather as the long term accumulated effect of climate variability. Based on these assessments, the study would take a closer look at trends of some critical climatic elements (such as rainfall and temperature trends) in the study area, as proxies for the climate variability and change pattern that could have discernible influence on food systems and food security in the area.

Land tenure, insecurity and inaccessibility

"Land tenure may be defined as the terms and conditions on which land is held, used and transacted" (Adams, Sibanda, & Turner, 1999: 2). Based on this definition of land tenure, land inaccessibility and insecurity in the context of this study, would be assessed by looking at changes in the availability of households cultivable land over the last couple of years.

Food price volatility

> Price volatility is the dispersion of a price series from the mean. It is usually measured in terms of the standard deviations of the price change….Realized volatility can be decomposed into high-frequency volatility and low-frequency volatility (Peterson and Tombek 2005). High-frequency volatility refers to weather- and disease-related shocks that last for a season or less. Low-frequency volatility loosely refers to variability that persists for more than one season (Braun, & Tedesse, 2012: 3).

Flowing from the above definition of food price volatility, the study would consider the annual and seasonal variations in food prices, to be verified by trends in prices of selected key commodities pertaining to the study area.

In all of the above, it bears emphasizing that these underlying threats to food security have been considered "emerging", not because they have been previously unfamiliar or unknown but because they are exhibiting signs of becoming increasingly complex and pronounced in intensity and effect, with rural communities mostly being at the receiving end. Trends in these as shown by literature could result in adverse consequences on food systems and by extension food security.

1.2.2 Food system

Basically like all systems, the food system comprises multi interdependent components which functions and influences outcomes that bother on food security

> *Food Systems* encompass (i) activities related to the production, processing, distribution, preparation and consumption of food; and (ii) the outcomes of these activities contributing to food security (food availability, with elements related to production, distribution and exchange; food access, with elements related to affordability, allocation and preference; and food use, with elements related to nutritional value, social value and food safety). The outcomes also contribute to environmental and other securities (e.g. income). Interactions between and within biogeophysical and human environments influence both the activities and the outcomes (GECAFS Online).

This comprehensive and illustrative definition and explanations of what food systems are, brings to the fore certain critical elements which include; the activities and processes, outcomes and impacts. It should also be stressed in the light of conceptual relationships

that, the concepts of food security and food systems are inextricably linked as has been further noted thus:

> *Food security*_ is underpinned by food systems. Food security is the state achieved when food systems operate such that 'all people, at all times, have physical and economic access to sufficient, safe, and nutritious food to meet their dietary needs and food preferences for an active and healthy life' (FAO, 1996). Food security is diminished when food systems are stressed (GECAFS Online)
>
> Dynamic interactions between and within the biogeophysical and human environments lead to the production, processing, preparation and consumption of food, resulting in food systems that underpin food security. (Gregory, Ingram & Brklacich, 2005 as cited in FAO, 2008: 4).

1.2.3 Household

> A household is defined as a person or a group of persons, who lived together in the same house or compound and share the same house-keeping arrangements. In general, a household consisted of a man, his wife, children and some other relatives or a household help who may be living with them. However, it is important to remember that members of a household are not necessarily related (by blood or marriage) because non-relatives (e.g. house helps) may be part of a household (GSS, 2012: x).

1.2.4 Food security and insecurity

Food security:

> A situation that exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life (FAO, 2012: 359).
>
> The viability of the household as a productive and reproductive unit (not) threatened by food shortage (Frankenberger and Goldstein, 1991).

Food insecurity:

> A situation that exists when people lack secure access to sufficient amount of safe and nutritious food for normal growth and development and an active and healthy life. It may be caused by the unavailability of food, insufficient purchasing power, inappropriate distribution, or inadequate use of food at the household level. Food insecurity, poor conditions of health and sanitation, and inappropriate care and feeding practices are the major causes of poor nutritional status. Food insecurity may be chronic, seasonal or transitory (FAO, 2012: 359).

The study thus, based on the definitions of food insecurity (or security) above, would assess the situation in the study area by paying attention to how the specified emerging threats are serving to constrain and constrict the food system and food security (affordability, availability and utilisation) currently, as compared to past situations and to the general national picture. With this, the link between the threats and food security in the area would be made more apparent.

1.3 Theoretical framework for food security (or insecurity)

This section elaborates on relevant theoretical perspectives and concepts, scholarly debates and discussions as well as measurement dimensions and issues (indicators) of food security, that underpin the study. These assessments also formed the basis upon which a conceptual framework was built to help guide the discussions and analysis.

It has been emphasized that the concept of food insecurity appears too complicated and complex to be meaningfully and effectively explained by a single factor or a single academic discipline (Sarracino, 2010: 3). As a result, broad and various theoretical perspectives have been propounded and refined overtime in the attempt to bring us closer to understand the rudiments and direction of food insecurity. Thus it is worthy of note that theorizing and conceptualising food security and famine have evolved and proceeded along a historical linear trajectory—reflecting major time epochs and socio-economic conditions. This study would proceed to review the theoretical approaches of food insecurity, which have been grouped into four distinct categories as captured by Sarracino (2010: 8). These approaches are:

1) Demographic theories (Malthusian and neo-Malthusians);
2) Climatic theories (Food Availability Decline—FAD);
3) Food Policy Failures (Food Intervention Decline—FID); and
4) Sen's Entitlement Approach (Entitlement Failure Approach).

1.3.1 Demographic theories (Malthusian and neo-Malthusians)

This approach has its roots in the postulations of Reverend Thomas Malthus (1766-1834). The main thrust of the theory is to establish a relationship between population growth and life-sustaining resources (Todaro & Smith, 2012: 281). The main assumptions of this approach are essentially that: While human population grows at geometric rate, land and food supplies increase at arithmetic rate. Consequently, because food cannot match population expansion food insecurity conditions [famine] sets in. It is further assumed that the increase demand for food as a result of the population increase can be addressed in two main ways:

a) More lands to be put under cultivation, however new lands have lower marginal productivity.
b) The exploitative intensity of cultivated lands to be increased, which results in a marginal and average productivity decline.

Given this, the average productivity of work would fall below the subsistence wage—the wage which guarantees a household survival (Sarracino, 2010: 9). As further explained in Figure 2.1, the y-axis represents food supply/demand (as indicated by the red and blue lines respectively), whereas the x-axis represents the population growth:

i. Thus, when population growth stays between points O and P, households operate above the subsistence wage and food supply is greater than demand resulting in a surplus.
ii. At point P, households still operate above the subsistence wage but at equilibrium (food supply equals demand) as indicated by point E.
iii. However, any further growth of population beyond "P" would result in average productivity of work dropping which may eventually fall below household subsistence wage as demand would phenomenally outstrip supply leading to a catastrophic situation.

At this critical point as Sarracino, (2010: 9) noted:

> …the equilibrium will be restored by famines, epidemic disease, mass migration and reduction in marriages and in fertility. All these processes will restore the

original structure of families and the cycle will start again. In Malthusian view, famine acts as a natural check on population growth, equilibrating the demand for food with food supplies.

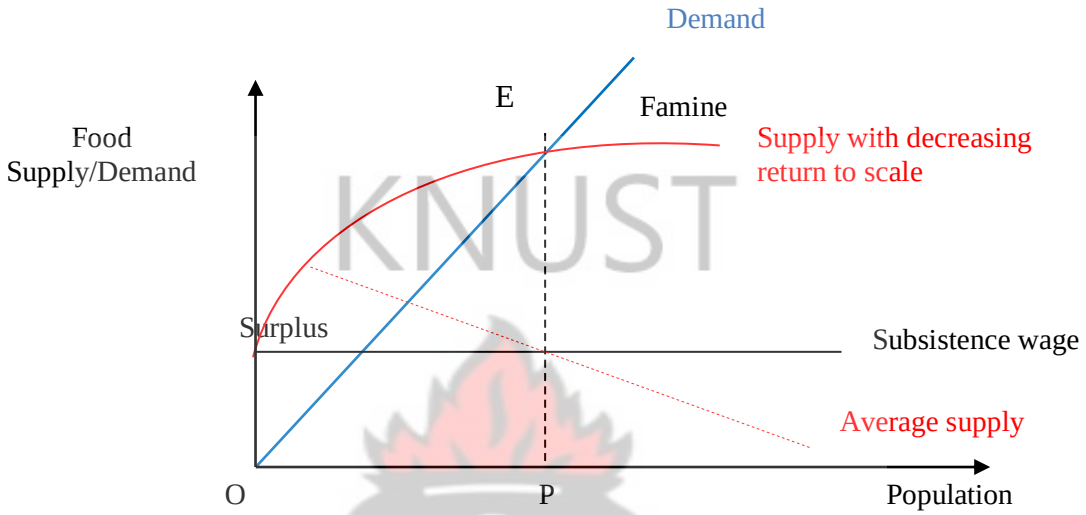


Figure 2.1: The Malthusian approach

Source: Cornia, G.A., Appunti delle lezioni, marzo, 2006 (as cited in Sarracino, 2010: 9).

Also, neo-malthusians are basically advocating for environmental protection and sustainable use of its resources since necessary resources such as water availability, energy supply and raw materials could be overstretched.

However, as incisive as this approach is, it is not sacrosanct as it runs into a host of criticisms. First, the theory did not give enough forecast to the possibility of mass and swift human movement (migration). It is also argued that, geographically, marginal land is not a straightforward case of an infertile or less fertile land. Moreover, Malthusian and neo-malthusian theories do not take adequate account of the role and impact of technological progress. Besides, Malthus strongly advocates non intervention since this would only come with a temporal relief to a food insecurity condition. This seems untenable since governments and other interventions exist to attend to the pressing needs of people if the need arises.

In any case, this approach still holds some relevance in contemporary times and to this study as it offers the basis that brings us to understand and better appreciate not only the growth but also other evolving socio-demographic dynamics such as the age, sex, household size and education, and their relationship with the phenomenon of food insecurity. In fact, some of its assumptions and even limitations would contribute towards a thorough analysis and discussion of the issues under consideration.

1.3.2 Climatic theories (Food Availability Decline—FAD)

The Food Availability Decline (FAD) view assumes that food insecurity is caused by a sudden reduction of food supply. The major drivers being especially natural disasters and such other factors that have the capacity to constrict food supply. In the event of this, the prices of food increase thereby straining the capacity of people especially the vulnerable to meet their food needs. *"The FAD approach claims that whatever has caused an acute decline in the supply of food is a necessary condition for famine to emerge"* Fine, 1997 (as cited in Yaro, 2004: 20).

Figure 2.2 gives a graphical illustration of the FAD food insecurity approach. Thus, indicated on the y-axis are the prices of food and the x-axis indicates quantity of food produced. The supply and demand curves are supposedly linear and are at equilibrium at P and Q. When there is a decline in the quantity of food supply (food availability decline) as shown thus, from Q to Q^1 (S to S^1), there is a corresponding increase in prices (P to P^1), creating shortages and hardship. As a result, as noted by Sarracino (2010: 11), the vulnerable are left with no choice than to start reducing the quantity of food consumed. At this point, it may be necessary and prudent to institute measures to mitigate and possibly forestall the factors that played out to occasion this situation.

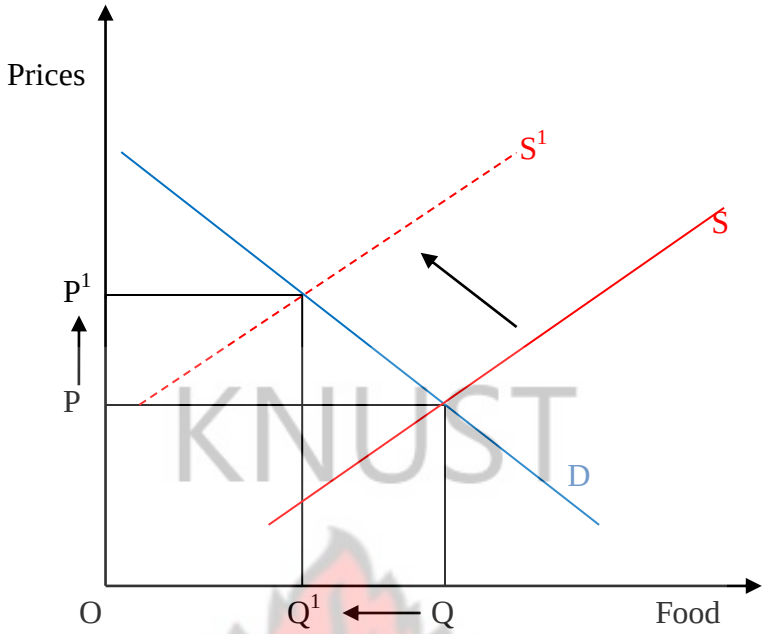


Figure: 2.2: Food availability decline

Source: Cornia, G.A., Appunti delle lezioni, marzo as cited in Sarracino, (2010: 11).

According to the FAD approach, all that is needed to avert food security crises is the increasing supply of food relative to population growth. In other words, the approach equates adequate food supply with adequate food security and nutrition for all (Sarracino, 2010: 11). This thinking led to the development of green revolution technologies especially in Asia and Latin America, with international actions and calls for national self sufficiency in agricultural productivity (Yaro, 2004: 20).

Incontrovertibly, food insecurity can arise as a result of food availability decline. However, this approach is still not without major limitations. Thus, the main inherent limitation is that it fails to recognize the important fact that food insecurity causes may be many and varied. For instance, equally important determinants are income inequalities and distributional constraints (Sen, 1981 as cited in Sarracino, 2010: 11).

The review of this theory highlights the dramatic factors such as natural (climate) disasters that could cause sudden and marked decline in the availability of food aside population growth which represents a relatively subtle driver of food insecurity. This

would allow for a more comprehensive understanding of how the climate situation affects food security in the study area.

1.3.3 Food Policy Failures (Food Intervention Decline—FID)

The Food Policy Failures (Food Intervention Decline- FID) emerged apparently as a result of deficiencies associated with earlier approaches especially the FAD. The FID approach contends basically that food insecurity is as a result of misguided and poor policies and services. Hence, all actors charged with policy formulation, research, monitoring and evaluation must live up to their responsibilities to effectively deal with the food insecurity situation at specified levels. One other explicit assumption of this approach is lacking faith in market forces as being able to play out to and resolve the issues surrounding food insecurity.

Essentially, thus the approach recognizes the crucial needs for the adoption of a well coordinated and focus interventional posture to dealing effectively with the global food security situation. Consequently, food security issues and policies have become a central plank of political institutions and a top issue on the agenda of non-governmental organisations and global institutions (Sarracino, 2010: 12). This approach can really be found to be behind the shift in focus and heightening interest in food policies at the turn of the century. Apt and useful example was the institution of the MDGs (capturing broad issues of food security concerns) which has served as a guiding post towards the formulation of regional and national food security policies.

The FID approach has also been debated and criticized on several fronts. One major limitation is that, governments especially in developing countries are less accountable due to weak institutions to formulate and effectively deliver on policy. Besides, interventions by foreign institutions and associations have always been found not to effectively deal with local needs due to poor assessment, insufficient consultation and inactive local participation (Sarracino, 2010: 15).

Summing up, the review of this approach allows for a close assessment of the effectiveness of food security policy interventions in our development efforts, especially in respect of the emerging threats that have been identified and discussed. This is

important as the principle of direct and effective intervention in the food sector is critical in addressing the issues of food insecurity.

1.3.4 Sen's Entitlement Approach (Entitlement Failure Approach)

This view was born out of the fact that although aggregate food supplies may have been increasing, as shifts in statistics may suggest, available evidence equally indicate that millions of people are food insecure. Thus, it became more apparent that the increase in and availability of food cannot alone in any way guarantee access to all. Equally important are factors such as the distribution and individual and groups ability to access the available food. Hence the individual and his/her entitlements matter. Sen (1984: 497) defines entitlements as *"the set of alternatives commodity bundles that a person can command in a society using the totality of the rights and opportunities that he or she faces"*. As noted by Devereux (2001: 246):

> In the context of poverty and famine, the entitlement approach aims comprehensively to describe all legal sources of food, which Sen (1981: 2) reduces to four categories: "production-based entitlement" (growing food), "trade-base entitlement" (buying food), "own-labour entitlement" (working for food) and "inheritance and transfer entitlement" (being given food by others). Individuals face starvation if their full entitlement set does not provide with adequate food for subsistence.

Thus in a given context, the amount or quantity of food available, from which an individual or a household can access would be contingent upon self production, income and purchasing power, labour potency, and communal assistance. Consequently, if for whatever reason any one or more of these commodity bundles become deficient, and depending on the degree of deficiency and also depending on the significance it holds to a particular household then food accessibility and by extension food security could to that extent be compromised. It is further elaborated (Yaro, 2004: 24-25):

> The ***entitlement set*** constitutes all possible combinations of goods and services that a person can legally obtain by using the resources of his endowment set. The entitlement set chosen by a person is said to be the optimum combination or outcome based on her assessment of the many scenarios made possible by the endowment set.
>
> The ***entitlement mapping*** is the relationship between the endowment set on the one hand and the entitlement set on the other. Hence the input-output ratios in

farm production for farmers, and the ratio between money wage and the price of food, that is the real wage rate for labourers, exemplify entitlement mapping whereby resources or the endowment set can be converted into goods and services (Osmani, 1993). The set of all the alternative bundles of commodities that a person can acquire in exchange for what he owns may be called the 'exchange entitlement'. The concept of ***entitlement failure*** is derived from the above three concepts. A person suffers a failure in entitlement when the entitlement set does not contain enough food to avoid starvation in the absence of non-entitlement transfers.

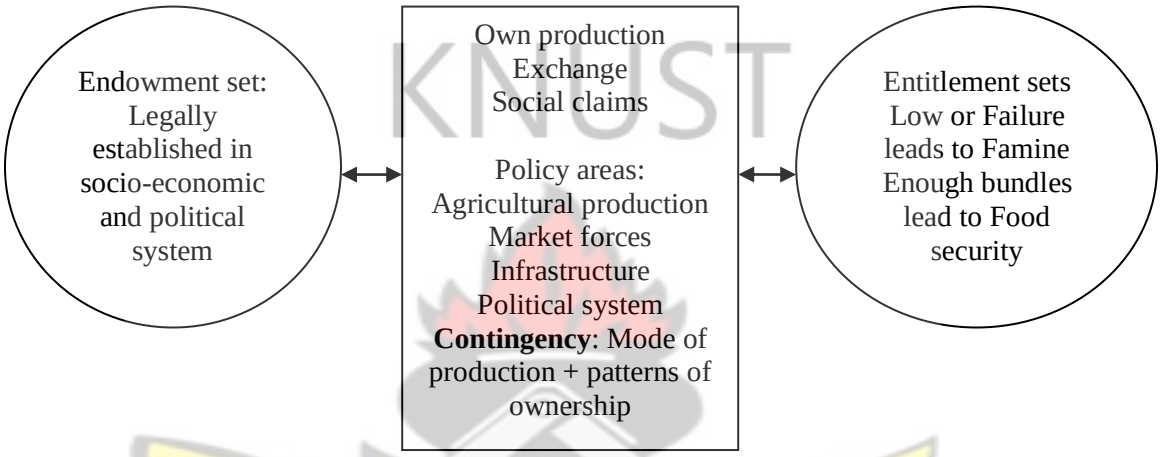


Figure 2.3: Schemata of Entitlement Failure view

Source: Yaro (2004: 24).

This Entitlement failure view represents a multi-perspective and coherent approach to assessing and better appreciating the phenomenon of food insecurity at the micro-level (individual and households) in different contexts. However, it did not represent the magic wand as food security issues are still glaringly pronounced. Thus, upon scholarly scrutiny several inherent limitations have been advanced. Even, Sen himself identifies four limitations to his approach. Thus, possible ambiguity of the specifications of entitlements, characteristic problems and violations dogging the concept of rightful transfers (such as looting and brigandage), choosing to starve and to starve others (partly explained by inter-household power relations, ignorance, fixed food habits, or apathy) and "finally the approach focusing of starvation, which has to be distinguished from farm mortality, since many of the famine deaths—in some cases *most* of them—are caused by epidemics" (Devereux, 2001: 248; Sarracino, 2010: 22-23).

Further, Devereux (2001: 246) sees Sen's approach *"as a descriptive rather than a normative concept; entitlements derive from legal right rather than morality or human rights"*. It is also noted that Sen's approach did not excel at taking into account aggregate food supply but focuses exclusively on distribution thereby ignoring aggregate shortage. Further, it is argued that Sen readily embraces the traditional definition of famines as characterized by widespread starvation and high mortality. By this contention, Sen only pays attention to the very end of such a process completely ignoring the entire process leading to this end (Sarracino, 2010: 24).

From the foregoing, the critical review of the various major theoretical approaches and alternative explanations to food insecurity [famine] — Malthusian and neo-malthusian, Food Availability Decline (FAD), Food Intervention Decline (FID) and the Entitlement Failure Approach (EFA)—describing their foundations and evolutions, basic assumptions, applications, implications and limitations is important as it gives a broader and balanced theoretical perspective as it teases out the core guiding principles and variables of concern (demographic dynamics, climate extremes, price volatility, and land accessibility) that provide the basis for proper conceptual and empirical assessment, as well as a rigorous analysis and discussions of results of the survey data for an informed judgment (summary of findings, recommendations and conclusions).

1.4 Households response strategies to food insecurity conditions (food shortages)

This section explores the range of strategies that farm households employ to meet the challenges of food insecurity in the face of these threats. Thus, attention is given to the legal sources and activities that would contribute to households' food security —Watts's (as cited in Frankenberger and Goldetein, 1991: 95) conceptualization— somehow along the propositions of the entitlements approach (Figure 2.4).

Figure 2.4 illustrates three main issues and their interconnectedness in the face of the threats to households' food systems and food security namely: household strategies, household vulnerability and government and donor responses. The first component which is formed by a horizontal axis (labeled Time) and vertical axis (labeled as

Reversibility—*upward pointing arrow;* and Commitment of domestic resources—*downward pointing arrow*) connected by an arc (showing a range of household response option) gives an indication of the type of household domestic resources that would be committed overtime and the possibility of reversibility "to normalcy" or a more secured livelihood base.

The time line (horizontal axis) shows that the range of household responses in terms of the commitment of household domestic resources would (vertical axis) vary (from crop and livestock adjustment down through to farmland sale and outmigration). As further illustrated, the wide range of household responses is put into two categories— adaptation and divestiture. The commitment of domestic resources up to small animal sales could be considered adaptation while responses beyond this point could be termed as divestment. It is also to be noted that, when the commitment of domestic resources become so high overtime then reversibility becomes correspondingly low.

Further, the household vulnerability component shows that household vulnerability could be put into three categories namely, moderate, high and extreme. Thus with low commitment of domestic resources such as diet change, borrowing seasonal labour migration could mean that household vulnerability is moderate. Household vulnerability could however be said to be high when there is a transition from adaptation to divestment. Then, with the commitment of resources beyond this could result in extreme household vulnerability situation.

The last component and bottom part of the framework shows that, when the commitment of household domestic resources is high and household strategies are mainly adaptation, with vulnerability being essentially moderate then government/donor response is to target systematic long-term sustainable development. However, when household strategies are largely divestment with vulnerability ranging from high to extreme the focus of government/donor would be on mitigative and relief measures.

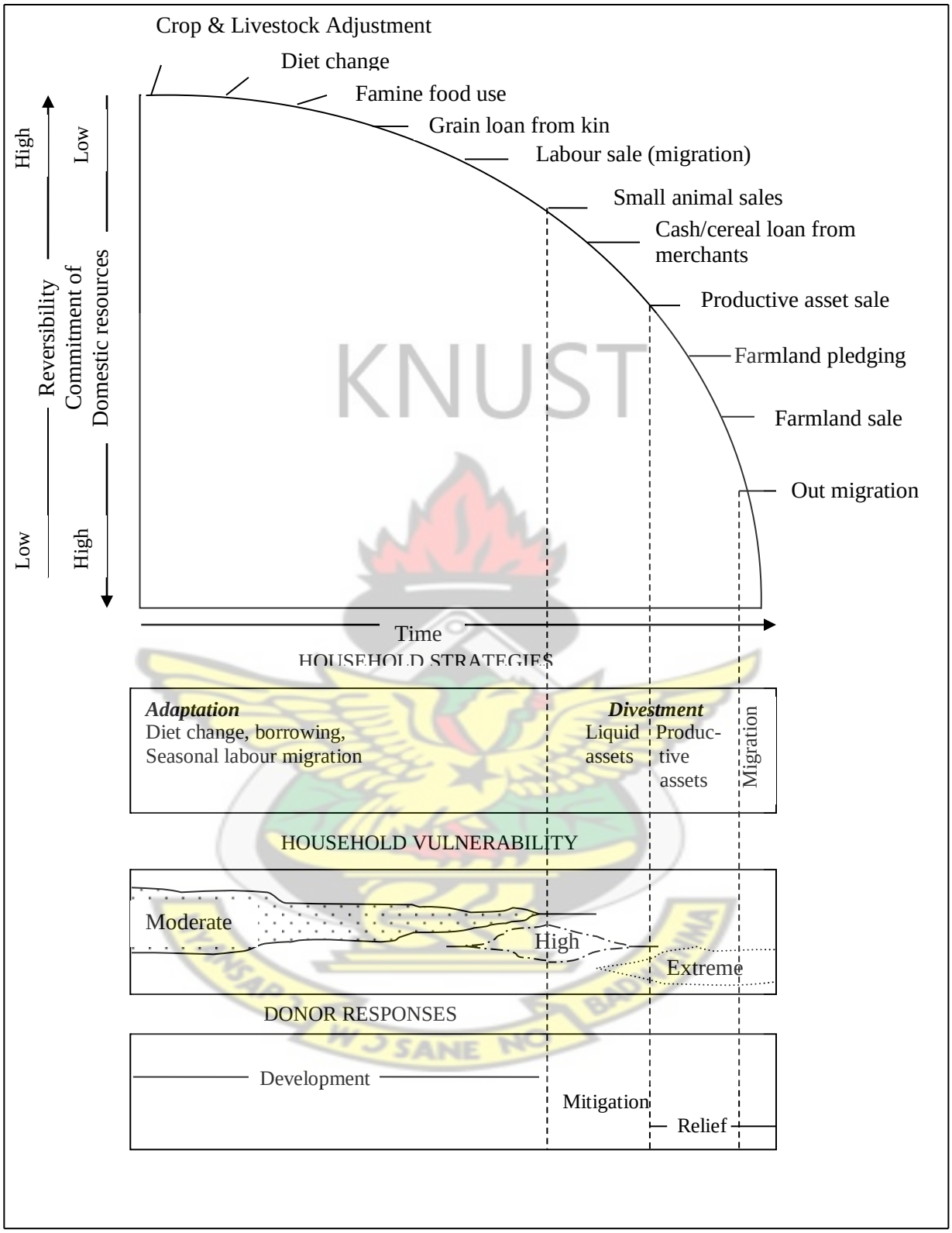


Figure 2.4: Responses to household food shortages

Source: (after Watts, 1983 as cited in Frankenberger and Goldstein, 1991: 95).

1.5 Emerging threats to food security framework

The following diagram (Figure 2.5) is constructed based on the review of the theoretical and conceptual frameworks. It provides a 'road map' to summarize the direction of the study. Thus, the conceptual framework clearly identifies and links up the key components of the study structure. The framework essentially covers the emerging threats to food systems, their measurement indicators and outcomes. As can be seen, the first component of the framework shows the emerging threats (climate change, access to land, food price, changing demographics and volatility of food prices) to food security. Further linkages are shown on the influences of these threats to the specific food system activities (producing, processing distribution and consumption) and the outcomes of these interactions—food security outcomes (availability, access and utilisation).

The last component (response options and strategies) then indicates the kind of measures taken by households to respond to these food insecurity outcomes. The feedback arrow to the food security (or insecurity) component suggests that whatever strategies adopted by households would result in a food security or insecurity situation, a situation which may require further (refined) response strategies. This was done in order that the context would be provided for the guidance of the analysis and discussion part of the study.

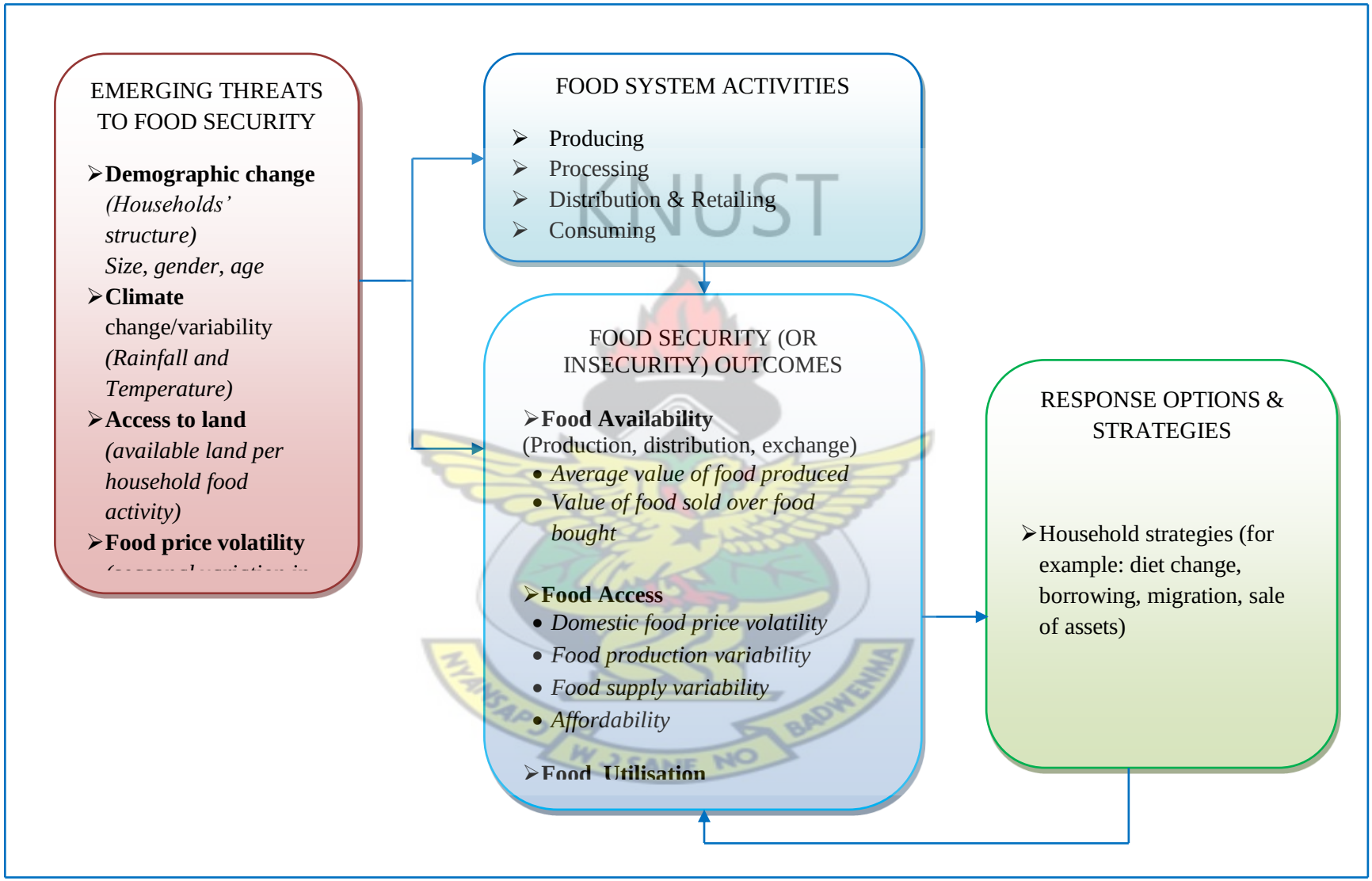


Figure 2.5: Emerging Threats to Food Security Framework

Source: Adapted from: FAO, IFAD & WFP. (2013: 16); GECAFS Online.

1.6 The role of agriculture and the scale and impact of food insecurity in Ghana

In Ghana, like most parts of the developing world (especially, sub–Saharan Africa), even though agriculture constitutes a significant basis upon which livelihoods are sustained, achieving food security to alleviate poverty represents a critical and persistent challenge. In consequence, as the nature and importance of agriculture activity is being stressed, the depth and spatial disproportionateness of the encumbrances of food insecurity and poverty in Ghana has also been highlighted.

Being a largely rural enterprise, agricultural activity is practiced predominantly on smallholder, family-operated farms employing rudimentary technology to produce a whopping chunk (80%) of the entire agricultural output of the nation. It has been further estimated that about 2.74 million households operate a farm or keep livestock (MoFA, 2007: 4). As further reported by the GSS (2008: 72), farming and livestock keeping are predominantly rural, involving 85 percent of rural households but only 28 percent urban households as against a national figure of 60.5 percent. Among the rural areas, rural savannah tops with the highest estimated total number of 872,096 households (92%) in agricultural activities.

Agricultural activity has been shown to represent the major source of household income in Ghana, accounting for a third (34.8%) of the total annual income. Other sources of income are indicated to be: wages (28.6%), non-farm self-employment (self-employment outside main agricultural activity such as trading and artisanship) (24.5%), rent (2.0%), remittances (8.9 %), others (1.2%). In respect of these, the Upper East Region records for household agricultural income (56.9%), non-farm self-employment income (26.1%), wage income from employment (11.0%), rental income (3.1%) and other income (0.1%) (GSS, 2008: 109).

It is to be noted that food was found to be the major component of households' expenditure in Ghana, accounting for 40.0% of the estimated total annual expenditure. Going further by locality, the Upper East Region and rural savannah registered higher figures of 64.5 percent and 73.8 percent respectively (GSS, 2008: 96-97). It is also to be further noted on the mean annual income (GH Cedis) by region that, the Upper East Region recorded the second lowest (616), coming only after the Upper West Region (606) as against Greater Accra Region which records the highest (1,529) with

a national figure of 1,217. It is again to be noted that, only a small fraction of the population of Upper East Region (5.9%) fall within the highest quintile with a higher figure of 54.8 percent found in the lower quintile as against national records of 32 percent and 12.6 percent for the upper and lower quintiles respectively (GSS, 2008: 107). The indication is therefore that poverty is relatively higher in the Upper East region, with rural farm households most probably being the worst affected.

1.7 Linkages between the underlying emerging threats and food insecurity

This section evaluates empirical studies bordering on food security/insecurity issues by examining selected central concerns (which could significantly determine, influence and establish food insecurity outcomes as shown by literature) and their linkages and interconnections to especially the rural households' security/insecurity conditions. These are: changing demographic patterns; climate variability (extreme weather events); land inaccessibility and insecurity; and food price volatility.

1.7.1 Demographic change and the food insecurity nexus

"Human population growth is perhaps the most significant cause of the complex problems the world faces; climate change, poverty and resource scarcity complete the list" Foresight, 2009 (as cited in Collodi, & M'Cormack, 2009: 1). It has also been stressed that, a country's population growth rate, family size, and age-sex composition may have wide ranging implications for socio-economic indicators including poverty and food security (NDPC, 2010:18; GSS, 2013: 50). This view highlights the significant relationships between population and other critical factors (threats) such as climate change, land availability and the increasing influence they have on humankind.

As noted by the MoFA (2007: 12) access to land has been declining due to population pressures. The implication is that, access to land for agricultural activity and food production could therefore be seriously hampered as put forward by the Malthusian approach. More critical and worthy of note concerning households' food security, is going beyond sheer population size at the macro level to take a closer look at the ever evolving socio-demographic characteristics at the household level, such as age, level of education, household size, number of income earners and the general disposition and orientation in terms of the acquisition and allocation of household food.

The age of a household head is expected to have a bearing on the food security status of that household by way of his/her labour efforts in productivity (Babatunde et al. as cited in Kuwornu et al., 2013: 34). As it is noted, younger and energetic household heads have the ability and would usually put more farmland (that is if this is available) under cultivation as well as seek and obtain non-farm or off-farm jobs than older and weaker ones. However, it is found by Arena and Anyaei (as cited in Kuwornu et al., 2013: 34) that older heads of households are more secure than the younger ones. Viewed differently in a sense, the increasingly young population in developing countries will influence agriculture (in terms of they being attracted to agricultural activity or not) (Collodi, & M'Cormack, 2009: 1). From these findings, it may therefore be put that the expected age of household heads could either positively or negatively influence the chances of food security among households.

Aside age, the level of education is another important socio-demographic factor that could have a bearing on household food security (or insecurity) status. Educated households have been shown as noted by Shaikh (as cited in Kuwornu, et al., 2013: 35) generally to be better positioned to manage farm related issues such as the processing and application of information passed on to them than the less educated ones.

Also, extensive studies have been done on the impact of household size on food security. Generally, the trend shows that larger household sizes are more likely to be food insecure than smaller ones. According to Sindhu et al. (as cited in Bashir, Schilizzi & Pandit 2012: 5), in India an increase in one household member increases that family's chances of insecurity by 49%. In a similar vein, Bashir, et al. (2012: 4) found out among small farmers in Pakistan that an increase by one member in a family size decreases the chances of food security by 26%.

One other critical population dynamic that may influence households' food security is the number of income earners in the household. The assumption is always that, households with larger income earners would definitely stand greater chances of being food secured than those with less. In this regard, Bashir et al. (2012: 5) found that the chances of a household food security are enhanced by 132% with an increase in one income earner.

The above discussion on the influence of population dynamics focuses on increasing household sizes and income status on food security. However, as noted by Sen's entitlement approach, other sources such as working for food and food assistance may also determine a household food security status.

The socio-economic disposition of household units in terms of the ways of acquisition of food for the unit as well as the allocation or distribution of the unit's farm produce, as supported by Sen's entitlement approach could also determine the food security situations of households. Evidence available from Nepal indicates that, own farm production and purchase from market constitute significant sources of food for households, with other identified sources being barter and food loans (Maharjan & Khatri-Chhetri, 2006: 10).

1.7.2 Linkages between extremes weather events and food insecurity

The point cannot be emphasized enough that, the global food system is under threat by climate variability and extremes. A growing body of evidence indicates the sad realities of the interconnections between food insecurity and the climate change phenomenon. For instance, it has been noted that the links between climate change and food security are complex, uncertain and varied (FAO: 2012: 16). Thus, risks such as droughts, floods, pests and animal diseases, stresses on natural resources (particularly water) may result from weather variability and biodiversity threaten productivity in various regions of the world. According to Rockstrom et al., 2009 (as cited in Beddington, 2012: 6) food insecurity and climate change are presenting an ever-heightening challenge that greatly affects human well-being and socio-economic advancement of communities the world over. It has been further and specifically stressed that:

> Extreme weather events such as droughts and floods are predicted to become more frequent, adding to the global burden of hunger caused by poverty, weak governance, conflict and poor market access (Beddington et al., 2012; IPCC 2007 as cited in Beddington, 2012: 3).

Edame, Ekpenyong, Fonta, and Duru, (2011) found out that climate change in sub Sahara Africa come with huge deleterious cost to agriculture productivity as the study examined the basic components of food security: availability, accessibility, affordability, preference, utilization and nutritional value and food systems stability. The study revealed that Africa is one of the continents where agricultural productivity

would reduce by as much as 20 percent due to increasing weather variability. It is further revealed that, with population growth and changing food consumption patterns, agricultural productivity needs to be boosted by not less than 70 percent it food demands are to be met by 2050.

Mariola (2012: 712) in the study of the threats to food security in the context of the European Union reemphasized that the issue is becoming a prominently raised one. The study notes thus, when agriculture alone utilizes 70% of global fresh water resources, then extreme changes commonly in the form of droughts and floods pose serious problems to the production of the needed quantity and quality of food to meet basic consumption needs.

It bears stating that, these climatic threats do not affect localities, communities and groups proportionately. Besides the capacities of different entities under these surging climate threats would correspondingly vary. It can therefore be validly asserted that rural farm households in the developing world would not have the same capacities as different communities elsewhere to meet sustainably the increasing challenge of the climate change threat. Thus, the intersection of the rural farm household, their bio-physical environment and their food security situation can be said to be one of the critical complexes that can enhance understanding and point the way forward in addressing rural household food needs.

1.7.3 Interconnections between land accessibility and food security (or insecurity)

Competition for the earth resources are fast becoming a contentious issue in most parts of the world and more particularly in developing countries. Thus, competitions are getting keener and tensions are mounting over ownership and access to sensitive resources such as land. As observed by Devereux (2001: 253):

> Throughout rural Africa, natural resources are owned *(de jure)* or controlled *(de facto)* by private individuals, households, extended families or lineage groups, communities, ethnic groups or "tribes", and the state. These "resource decision units" (Bromley, 1989) overlap, since all individuals are simultaneously members of most institutional groupings as well. Conflicts and "ambiguities" can occur at or between any of these levels, because institutional ownership or control of a resource such as land does not necessarily imply equal or equitable access to that resource by each individual member of that institution.

Considering the multilayered and complex ownership relations by the different stakeholders as pointed out by (Devereux, 2001: 253) potential land insecurity issues could emerge due to certain actions and decisions (such as household decisions, communal orientations, land use planning and management, and the exercise of government's right of expropriation/power of eminent domain) by the actors at different levels that could either positively or negatively affect households with corresponding impact on food security since land is a necessary requirement for agricultural activity and food production.

Access to land or land ownership which is usually either through inheritance or outright purchase and farm size, which is the availability and total area of land (measured in acres) put under cultivation by a household, are critical factors in determining income and food security status of the households. Regarding access to land, available findings by Kyaw (as cited in Kuwornu et al., 2013: 35) suggests that the incidence of food insecurity and low incomes tends to be more pronounced in landless rural poor. Similarly, available evidence shows a positive relationship between farm size and enhancement of households food security status and income (Deininger; Jayne et al; a as cited in (Kuwornu et al., 2013: 35). Thus, all things being equal, a household with a larger farm size tends to be more food secure and vice versa.

1.7.4 Food price volatility as a threat to households food security

Food price fluctuations and unpredictability is another critical factor that greatly determines food security outcomes. The MoFA (2007: 24) gives the definition of food security *as "good quality nutritious food, hygienically packaged and attractively presented, available in sufficient quantities all year round and located at the appropriate places at **[affordable prices]**"*. Critical factors that contribute to volatile food prices include: increasing consumer demands in rapidly growing economies, increasing populations, increasingly scarce natural resources (including access to land for food production), as well as increasing frequency of extreme weather events (shocks) (FAO, IFAD & WHO, 2011 : 11). Clearly established here is a link between price volatility and the other threats (population changes, access to land and weather shocks) in determining food security.

Astonishing increases in especially food commodity prices have generated renewed interest and widespread concern in development discussions about their impacts on poor households (Aksoy & Hoekman, 2010: 1). In 2011, the G20 noted with worrying concern food price volatility and the need for complete information and transparent markets to stem it (Blas, 2011: online). Because of globalisation, as noted by Braun and Tadesse (2012: 6):

> "…the livelihoods of many poor people directly or indirectly depend on global markets to which their local markets are connected. The change in international food pieces reaches poor people in poor countries through the global price transmission system.

It has been further observed that, the effects are essentially a reduction in real income and increased income instability. This depends very much on a number of factors, notably: the share of income generated from the food sector and the share of food budget expenditure. Consequently, if the share of the agricultural sector income is high, then a rise in food prices leads to a rise in real income. On the other hand, if food expenditure share is high, then a rise in food prices decreases real income. As a result, because most rural households are net buyers of food (buying more than they sell), they tend to experience low real incomes (Braun & Tadesse, 2012: 7) thereby worsening their food security and poverty situation as the agricultural sector represents a major income source.

1.8 Concluding comments

'Emerging threat(s)' as a concept has not been defined categorically but has been implied extensively in literature to indicate especially current threats to global food security trends. For this study, the concept has been defined as: the observance and description of a phenomenon which was previously little or even well known but whose intensity, dimensions or extremes are becoming more pronounced and less predictable usually with potential devastating consequences on its area of influence. The common and overarching ones gleaned from literature—and looked at in this study—are to the inclusion of the following: Changing demographic profile, climate variability, land insecurity (inaccessibility) and food price volatility. Thus, such unfolding developments come with the demonstrated capacity to fragment and erode

any gains as well as frustrate efforts made on the food security front especially with respect to vulnerable rural communities in developing countries.

The concept of food security (or insecurity) has also been looked at from different perspectives. This study depended largely on Frankenberger and Goldstein (1991) definition: The viability of the household as a productive unit (not threatened by food shortage). But generally, the binding elements of all the definitions are basically the uninterrupted availability, affordability and utilization of food. This may seem ideal but the data analyses would help show the extent in rural communities in the Kassena-Nankana Municipality.

The theories that underpinned the study included the following: Demographic theory (Malthusian and neo-Malthusian); Climatic theories (Food Availability Decline—FAD); Food Policy Failures (Food Intervention Decline—FID); and Sen's Entitlement Approach (Entitlement Failure Approach). Within the broader demographic theoretical framework and for the purposes of this current study, variables such as sex, age, and household size have been utilised. In respect of the Climatic theories (Food Availability Decline—FAD) it came out quite clearly that climatic factors —such as marked rainfall and temperature vagaries—could have serious implications for food security.

With respect to the Food Failures (Food Intervention Decline—FID) theoretical perspective, weaknesses with regard to food security policy interventions have been shown to be a major source of food insecurity. Finally, Sen's Entitlement Approach (Entitlement Failure Approach) offers a multi-perspective dimension to understating food security (or insecurity) situation among a population. Thus, Sen's approach emphasizes that food availability alone cannot guarantee food security but the legal avenues (in terms of effective strategies and options) available to the individual to access the food also counts. Still in the area of response to food security, Watts's comprehensive approaches highlight such critical response options as crop and livestock adjustment, diet changes, farmland change among others.

The review of empirical studies bothering on the threats to food security indicates that these emerging threats have been shown to impact communities variously in different settings across the developing world. On the basis of the above theoretical and

empirical perspectives, the 'Emerging threats to food security framework was developed to guide the discussions and analysis with respect to the study objective and research questions. This having been done, the next chapter focuses on the profile of the study area and the research methodology—for gathering the required data for the analysis and discussion in Chapter four.

CHAPTER THREE

PROFILLE OF THE STUDY AREA AND RESEARCH METHODOLOGY

3.1 Introduction

Having devoted Chapter two to the review of relevant literature, first presented in Chapter three is the profile of the study area germane to the study focus. Next, the Chapter presents information on the research methodological approach—how data for the study were collected and analysed.

3.2 Profile of the Kassena-Nankana Municipality

The study was conducted in the Kassena-Nankana Municipality of the Upper East Region of Ghana. This section takes a look at the essential issues of location, the people and their activities. More specifically, the critical issues that the researcher considers relevant to the research focus which have been highlighted are: location and size; relief and drainage; climate and vegetation; demographic characteristics and economic activities.

3.2.1 Location and size

Kassena-Nankana Municipal is one of the thirteen (13) Municipalities and Districts in the Upper East Region. It was created out of the Kassena-Nankana District by Legislative instrument (L.I) 1855 of 2008 with its administrative capital at Navrongo. The Kassena-Nankana municipal lies within the Guinea Savannah woodlands. The district falls approximately between latitude 11°10' and 10°3' north and longitude 10°1' west. The Municipal shares boundaries with Bongo District and Bolgatanga Municipal to the east, West Mamprusi of the Northern Region to the south, to the west with Builsa South District, Kassena-Nankana West District and Builsa District respectively, and finally the Municipality shares boundaries with Burkina Faso to the north. The district is subdivided into six Urban/area Councils namely; Navrongo Urban council and Manyoro, Kologo, Naga, Pungu and Doba Area Councils (KNEDA, 2012: 9; Ghana districts.com)—these local government level entities shall form the basis for the sampling procedure for the households' respondents as elaborated under the data collection procedure section.

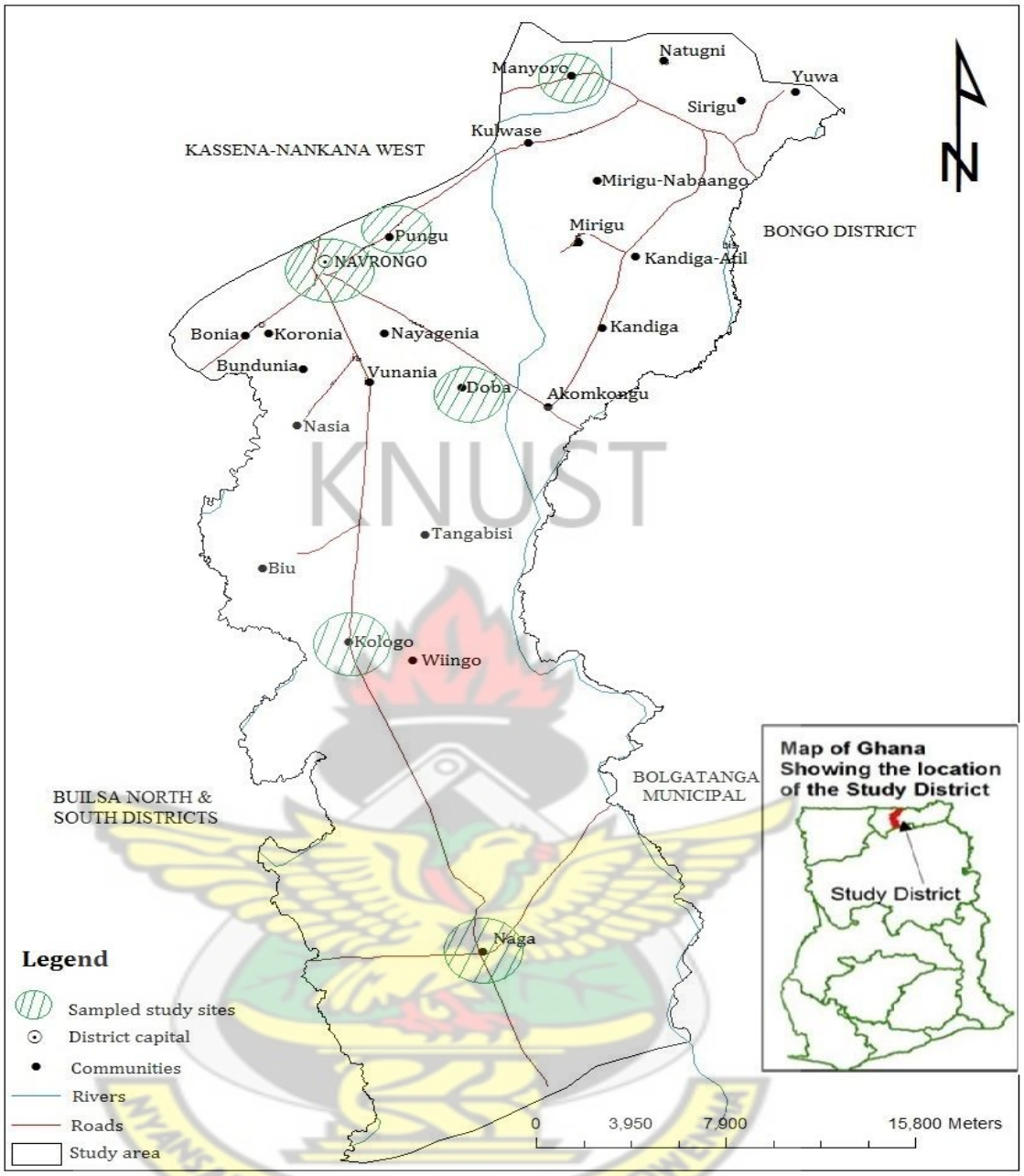


Figure 3.1: Map of the Kassena-Nankana Municipality showing the study sites

Source: Department of Geography and Rural Development, KNUST, 2014.

3.2.2 Relief and drainage

The drainage system of the Kassena-Nankana Municipality is constituted mainly around the tributaries of the Sissili River – Asibelika, Afumbeli, Bukpegi and Beeyi. A tributary of the Asibelika River (Tono River) has been dammed to provide irrigation facilities, which is of great economic importance to the entire District. However, during floods most of the areas along rivers become seriously affected.

There are also some few dugouts and ponds, which are used for livestock, crop farming and domestic purposes.

3.2.3 Climate and vegetation

The climate conditions of the district are characterized by the dry and wet seasons, which are influenced mainly by two (2) air masses – the North-East Trade winds and the South-Westerlies (Tropical Maritime). The area falls within the Tropical Continental climatic zone as classified by Dickson and Benneh (as cited in Yaro, 2004). The Harmattan air mass (North-East Trade Winds) is usually dry and dusty as it originates from the Sahara Desert. During such periods, rainfall is virtually absent due to low relative humidity, which rarely exceeds 20 per cent and low vapour pressure less than 10mb. Day temperatures are high recording 42° Celsius (especially February and March) and night temperatures are as low as 18° Celsius. The District experiences the tropical maritime air mass between May and October. This brings rainfall averaging 950mm per annum. There is a Meteorological Services Department at Navrongo, which records the weather situation in the area. The vegetation of the Municipality is classified under the Sahel and Sudan types. This comprises mainly open savannah with fire-swept grassland and deciduous trees. Human activity and natural climatic trends are having a significant toll on the environment.

3.2.4 Demographic characteristics

According to the *2010 Housing and Population Census of Ghana*, the Kassena-Nankana East District (now Kassena-Nankana Municipality) had a population of 109,944 representing 10.5 percent of the Upper East Region (1,046,545) and 0.4 percent of total national population (24,658,823). Also, the rural population has been put at 79,951 representing 73 percent of the total population of the district (Ghana Statistical Service, 2012). The average household size was given as 7 persons which was greater than the national average of 5 persons. On the structural complexity, the settlement patterns are mostly dispersed—with the location of housing structures. Functionally, the structures are less complex as they are usually interspersed with

farmlands and other units and livelihood enhancing facilities (such as schools, and other governmental and organisational agencies/institutions) (UNDP, 2010: 12).

3.2.5 Socio-economic characteristics

The family structure is basically the same as in other parts of northern Ghana—being patrilineal. However, authority and welfare concerns in the household rest usually with the presiding elder who could either be a male or a female. The municipality basically subsists on the primary sector being led and dominated by agricultural activities. About four out of every five of the population (78.9%) aged 15+ can be said to be located in the agricultural sector in 2008 with unemployment and underemployment being relatively high (UNDP, 2010: 22). Major food crops include maize, groundnuts, sorghum, millet and rice. Dry season gardening in crops such as pepper, tomato, onion, garden eggs and other leafy vegetables (Kenef, lettuce and cabbage) are a significant source of income to households (UNDP, 2010: 24). Besides, livestock and poultry keeping are common household practices—being kept for economic and socio-cultural reasons.

While this section looked at the profile characteristics of the study area germane to the contextual issue of the study, the ensuing section looks at the methodological procedures and processes for gathering and analysing the required data for the study.

3.3 Research methodology

3.3.1 Research design

According to Henrichsen, Smith, and Baker (1997), research is an organised and systematic way of finding answers to questions. A research design is a roadmap or a blue print showing the details of how a research study would be carried out from the beginning through to completion. A research design serves critical research needs. Thus it among other things provides a guide that offers order and clarity in the process of study (Sarantakos, 2005; Kumekpor, 2006).

In the quest of finding suitable answers to research questions, conventionally social scientists put methodological approaches or strategies into two main categories—quantitative and qualitative. However, it is valuable to point out that the

debate on the commensurability of these two approaches is an open issue. While some see these approaches as dichotomous entities others regard them as complementary—the use of one does not therefore preclude the use of the other (Landy & Banville, 1992). Thus, making a third approach—the mixed method useful in social science research.

The mixed methods approach has been respectively and variously described by different authors as the "the third methodological movement", "the third research paradigm" and "a new star in the social science" Tashakkori and Teddlie; Johnson and Onwuebuzie; Mayring (as cited in Creswell & Plano, 2011: 1). A very broad and comprehensive definition of the mixed method approach is further given by Johnson et al. (as cited in Creswell & Plano 2011: 4).

> Mixed methods research is the type of research in which a researcher or a team of researchers combine elements of qualitative and quantitative research approaches (e.g. use of qualitative and quantitative viewpoints, data collection, analysis, inference techniques) for the purposes of breadth and depth of understanding and corroboration.

As could be deduced from the above definition, the mixed method essentially encompasses philosophical viewpoints, as well as methodological and data gathering, organisation and analysis procedures, with the ultimate aim of ensuring a more holistic research exercise. One other advantage of this approach is that, it excels as it *"provides strength that offset the weaknesses of both quantitative and qualitative research"* as noted by Creswell and Plano (2011: 12). It is illustrative to however note that as potent as this approach is, it is not without weaknesses as it has its own limitations in the eyes of some writers. For instance Creswell (2009: 205) notes that:

> The challenges this form of research poses for the inquirer… include the need for extensive data collection, the time intensive nature of analyzing both text and numeric data, and the requirement for the researcher to be familiar with quantitative and qualitative form of research.

It is therefore an essential requirement that in employing this approach great care needs to be taken to keep both structure and focus. This would ensure that the benefits and advantages that come with this approach are fully reaped.

The mixed method approach was adopted for this study because of the overall orientation of the study in looking at both quantitative and qualitative perspectives of the study. Besides, there is the need to carry out a more rigorous and insightful work

that would provide an enhanced understanding of the issues under study and contribute to literature. It was hoped that this approach would help serve this need and purpose.

Specifically, this study employed the exploratory descriptive survey design. This was considered suitable because the study sought to explore and describe the nature of some of the emerging threats to households' food security.

3.3.2 Key variables and unit of analysis

According to Ghosh and Haque (2004: 1), a quantity that can assume more than one value is a variable. In the view of Hall (2008: 60), variables are concepts that can take two or more values. On the part of Sahu (2013: 35), an entity which varies over different situations is known as a variable. Basically, variables are classified into two types—dependent and independent variables. As Hall (2008: 60) explains further: *Independent variables* are those regarded as causing or influencing the outcome of other variables (dependent) in a research project. *Dependent variables* are those regarded as being influenced by other variables (independent) in a research project. Thus put differently, variation in the dependent variable is presumed to depend on variation in the independent variable.

In this study, the main variables of concern include: The socio-demographic structure of rural farm household; climatic data trends; cultivable lands (available to rural households) trends, prices of key staple commodities (independent variables); and the viability of rural farm households threatened (or not threatened) by food shortages (availability and utilization amongst others) being the dependent variables.

According to Kumekpor (2002: 54), the unit of analysis of a research is the empirical units, objects and occurrences which must be observed or measured in order to study a particular phenomenon. The basic units of analysis in this research were rural farm household heads. The household is the nucleus of community setting and structure. The household is a key socio-economic unit and provides valuable insights into living conditions in Ghana (GSS, 2008: iv). The head of household was therefore considered because he/she as it has been noted: *"is generally the person who has economic and*

social responsibility for the household. All relationships are defined with reference to the head" (GSS, 2012: x).

3.3.3 Sources and methods of data collection

Both primary and secondary sources were relied upon for this study. The secondary information included both published and unpublished sources. The published sources covered journals, books and so on. The unpublished sources included records and reports germane to the core issues of the study.

The primary data sources were basically from farming household heads. The research instrument was a structured questionnaire for the household survey which was administered by direct interview with the respondents. The questionnaire sought to elicit information on the following areas: the socio-demographic characteristics of households; the nature of climate extremes and changing trends, land accessibility and food price volatility and how these influence food systems and food security. Household strategies in response to the food insecurity (shortages) concerns were also covered.

Data collected could further be categorized into quantitative and qualitative. The quantitative data included household structure (such as sex, age, size and number of income earners), climatic data (in the form of annual rainfall and temperatures trends were also gathered from the synoptic weather station at Navrongo), and seasonal prices of key commodities (sorghum, millet, groundnuts). The qualitative data were basically household narratives on the emerging threats to food security. Thus, both the primary and secondary data (both qualitative and quantitative) complemented each other in addressing the research questions. Table 3.1 illustrates the data sources and collection techniques.

Table: 3.1 Data sources and collection techniques

Objectives of the study	Research questions	Variables (required data)	Data source	Collection method
1.To describe the scale and nature of emerging threats (demographic change, climate variability, access to land and food price volatility)	1. What are the nature and scale of these emerging threats in the study area?	• Changes in households demographic trends • Changing climatic pattern (Rains and temperatures) • Availability of cultivable land • Annual and seasonal variations in food prices	• Household heads • Navrongo Meteorological Station records • household heads • Official records	• Document review • Semi-structured questionnaire
2. To explore the interconnections/linkages between the emerging threats and household food security,	2. How do these threats affect food systems and food security among rural households?	• Household demographic dynamics (age sex, occupation etc) and food security (or insecurity linkages) • Linkages between changing climatic trends and households food insecurity • Interconnection between availability of cultivable land and households food security (insecurity) • Linkages between rising food prices and households food security (or insecurity)	• Household heads • Published and unpublished data	• Document review • Semi structured questionnaire
3. To assess the effectiveness of available options put in place to manage these threats.	3. How capable and effective are rural households in their responses to the food insecurity situation?	• Household strategies in the face of these emerging threats	• Household heads • Published and unpublished material	• Document review • Semi structured questionnaire
4.Make recommendations for policy response and further research on the threats to food security in rural communities	4. What is the way forward?	• Assuaging/mitigating and sustainability measures	• Household heads • Published and unpublished material	• Document review • Semi structured questionnaire

Source: Author's construct.

3.3.4 Sampling design and size determination

In order to select the household heads for the interview, a combination of methods were used. First, six (6) communities (Balobia, Telania, Wanjagnia, Kansa, Diggogo and Chaaba) were purposively sampled from the six (6) area councils (Navrongo, Pungu, Manyoro, Doba, Kolgo and Naga) respectively. This selection was expected to meet the principle of fair representation and variability as the micro-ecological conditions and socio-cultural character of the municipality could be said to be duly catered for. The total number of households for the six communities was 769. As noted by Yang and Miller (2008: 229), smaller sample sizes are acceptable for relatively homogenous societies (population) because there is less random sampling error in such populations as compared to more heterogeneous ones. Rural communities in the study area can be said to be relatively homogenous due to common or similar socio-cultural organisations and economic round of activities—being predominantly agrarian. On the basis of this, a confidence level of 90% was chosen to calculate for the sample size using the following formula:

$$n = \frac{N}{1+N(\alpha)^2}$$

Where: **n** = sample size

N = sample frame

α = margin of error

This gave a sample size of ninety (90) which was then proportionately distributed among the communities (Table 3.2).

Table 3.2: Selected communities and sampled household respondents

No	Area Council	Communities	No of households	Sampled Household heads
1	Navrongo	Balobia	147	17
2	Pungu	Telania	140	16
3	Manyoro	Wanjagnia	110	13
4	Doba	Kansa	120	14
5	Kolgo	Diggogo	128	15
6	Naga	Chaaba	124	15
Total		**6**	**769**	**90**

Source: Authors' construct.

Having identified the required number of sampled household heads, further efforts were made to identify 50 percent each of male and female respondents from each of the selected communities since aspects of the study borders on socio-demographic dynamics. In this respect, contacts were made with the Agricultural Extension Officers and Assemblymen whose mandate covers the target communities to help purposively select such farming household heads. Separate numbered lists were then created for both male and female household heads for each community. The numbers corresponding to the names of these household heads were then written out on pieces of paper and randomly picked till the required respondents were gotten. These respondents or their representatives were then selected for the interviews.

Attention was also paid to the measurement issues of validity and reliability. In order to help attain this, a number of measures were undertaken, namely: the research instruments were designed in relation to key refined and standardized conceptual and measurement dimensions bordering on food security; the pre-testing of the questionnaire (with the necessary modifications made); and the training and use of three (3) field assistants (proficient in the local languages—Kasem and Nankani).

3.3.5 Method of data analysis

Considered here are the techniques and procedures used for the organisation, processing, analysis and the interpretation of the data that were gathered for the study. The data sources which were both primary and secondary included quantitative and qualitative data. The quantitative data gathered on the household respondents (sex, age, household size, number of regular income earners and the such) were first edited and coded and analysed with the Statistical Product and Services Solutions (SPSS version 17). Quantitative data on climate (rainfall and temperature trends) and seasonal food prices trends were analysed using simple descriptive statistics. Thus basically, the quantitative data were presented using a combination of tabulated description (that is tables), graphical description (that is graphs and charts) and statistical commentary (that is discussion of the results).

The qualitative data (which covered essentially the perceptions of household heads on the emerging threats to food security) as captured by the semi-structured

questionnaire were analysed using narrative reporting with contextual descriptions and direct quotations from the respondents. This aimed as much as possible to represent the voices of the household respondents to compliment the quantitative data.

3.4 Concluding comments

The profile has offered compelling grounds and context for the conduct of the study in several respects—physically, demographically and socio-economically. The area, falling within the savannah woodlands vegetation zone and the tropical continental climatic zone is underlined by certain conditions that are not generally very suitable for agricultural activity. Thus, very harsh weather conditions such as: the unusual dry and dusty winds originating from the Sahara Desert, a single and highly intermittent rainfall regime, and highly extreme temperature trends (ranging from as high as 42^{o}C for day to as low as 18^{o}C for night) are definitely not the best of conditions for especially subsistence-based and rain-dependent agriculture.

Besides, the drainage system has been shown not to have been tapped into that much to support rural agricultural activity in the sense that aside the Tono Irrigation Project which is basically dominated by commercial rice and tomato farming there are few dugouts and ponds which can be used to enhance and transform rural agricultural enterprise. Thus, the physical (environmental) milieu has already been shown not to be too suitable for agricultural enterprise and any further imbalances could result in dire consequences for food security in the area.

In terms of demographics, the area has been shown to be predominantly rural—with 73 percent of the total population living in rural areas. The average household size of 7 is also greater than the national average of 5. This could have implications for food security in the sense that rural households in the area would have relatively more mouths to feed.

On the socio-economic front, the area can be said to be relatively homogenous in terms of social structure and cultural organisation. A significant proportion of the inhabitants have been shown to be either unemployed or eking out a living in the agricultural sector. This suggests that developments such as imbalances in the ecosystem (climate variability), unfavourable demographic trends, rising food prices

and limited availability of cultivable land could result in food insecurity situation with far-reaching implications for majority of the inhabitants.

Generally, the physical, demographic and socio-economic characteristics appear to portend a murky picture of food security in the study area. But, the extent to which this profile actually influences food security (or insecurity) among rural farming communities in the area would be found out in the next chapter which basically deals with analysis and discussion of the field data.

CHAPTER FOUR

ANALYSIS AND DISCUSSION

4.1 Introduction

Chapter three dealt with the profile of the study area and research methodology, this chapter presents the analysis and discussion of the data obtained. The study results are presented under the following sections: nature and scale of the emerging threats to food security; linkages between the emerging threats and food security; and household copying strategies. This is done to reflect the issues of concern—derived on the basis of the research questions—that are critical in addressing the study objectives.

4.2 Nature and scale of the emerging threats to food security

This section looks at the emerging threats in their individual manifestations and dimensions. The information is presented in four sub-sections, thus: socio-demographic characteristics of respondents; climate variability trends, diminishing trends in cultivable lands; and food price volatility. This only gives the context as the subsequent section would help establish the linkages to food security situation in the area.

4.2.1 Socio-demographic characteristics of respondents

The information gathered under this sub-section are the socio-demographic characteristics (sex, age, level of education, household size and number of regular income earners) of the survey respondents (household heads) which have been shown by literature to have potential influencing impact on especially rural farm households' food security outcomes. The purpose of this information is to create the context for the analysis of household views or perceptions on the effects of these socio-demographic variables on their food security outcomes to be addressed under the linkages between the emerging threats and food security section.

Table 4.1: Socio-demographic characteristics of respondents

Variables		Respondents		
		Male	**Female**	**Total**
		Freq.(%)	***Freq.(%)***	***Freq.(%)***
Sex		45 (50)	45 (50)	**90 (100)**
Age:	18-25	2 (4)	- (-)	2 (2)
	26-35	5 (11)	3 (7)	8 (9)
	36-45	7 (16)	5 (11)	12 (13)
	46-55	8 (18)	6 (13)	14 (16)
	55-65	13 (29)	14 (31)	27 (30)
	66+	10 (22)	17 (38)	27 (30)
Total		***45 (100)***	***45 (100)***	***90 (100)***
Level of education:	No formal education	27 (60)	26 (58)	53 (59)
	Basic education	13 (29)	18 (40)	31 (34)
	Secondary/Tech./Voc.	5 (11)	1 (2)	6 (7)
	Tertiary	- (-)	- (-)	- (-)
Total		***45 (100)***	***45(100)***	***90 (100)***
Household size:	1	- (-)	- (-)	- (-)
	2	- (-)	(-)	- (-)
	3	5 (11)	3 (7)	8 (9)
	4	5 (11)	4 (9)	9 (10)
	5	6 (13)	8 (18)	14 (16)
	6	13 (29)	16 (36)	29 (32)
	7+	16 (36)	14 (31)	30 (33)
Total		***45 (100)***	***45 (100)***	***90 (100)***
No. of income earners:	0	20 (44)	18 (40)	38 (42)
	1	19 (42)	17 (38)	36 (40)
	2	4 (9)	9 (20)	13 (14)
	3	2 (4)	1 (2)	3 (3)
	4+	- (-)	- (-)	- (-)
Total		***45 (100)***	***45 (100)***	***90 (100)***

Source: Author's Field Survey, June 2014.

4.2.2 Climate variability trends in the Kassena–Nankana Municipality

This section examines the climatic variability situation in the study area by looking at the critical elements of rainfall and temperature trends. The data were obtained from the synoptic weather station records at Navrongo for the period 2000-2013. The purpose of this is to show the nature and trends of climate in the area.

Thus, in order to assess changing weather patterns, annual rainfall trends for the municipality were first of all looked at as illustrated in Figure 4.1. As can be seen, the annual rainfall distribution shows a highly irregular trend for the period under study. With figures as high as 1230mm, 1204mm and 1147mm for the years of 2000, 2007 and 2010 respectively on one hand as against very low figures like 896mm, 750mm, and 877mm for the years 2002, 2005 and 2006 respectively. Thus the difference between the highest year (2000) and the lowest year (2005) is a whopping figure of 480mm. Such striking inter annual differences can affect farmers predictability for agricultural activity. In the sense that farmers may find it difficult to have a fair idea on how the ensuing year's rains would be like and the kind of agricultural activity to carry out in order to maximise output.

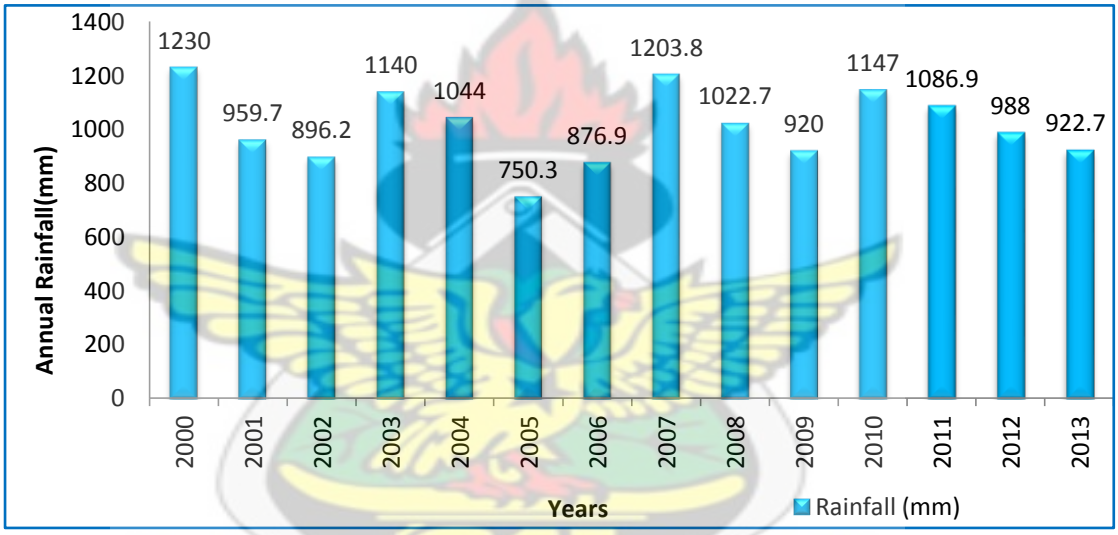


Figure 4.1: Annual rainfall (mm) figures for the study area from 2000-2012

Source: Generated based on data from Meteorological Station, Navrongo, June 2014.

Information was further sought on the degree or extent of divergence of rainfall from the mean for the period under study (200-20013) which is very critical for agricultural activity and food production. As can be seen from Figure 4.2, the degree of divergence from the mean (1013.4mm) —index of 0 is staggering for the various years. Aside these marked variations the trend line shows a slight decline—implying that rainfall amounts for the period (2000-2013) have been reducing gradually. Such extreme divergences and decreasing amounts could have wide-ranging negative effects on agricultural activity. Aside the fact that the striking divergence may affect

farmers' sense of predictability with respect to their planting culture, the decreasing amounts may also negatively affect farm activity in the sense that the area has a single rainfall regime with the issue of droughts being a serious concern.

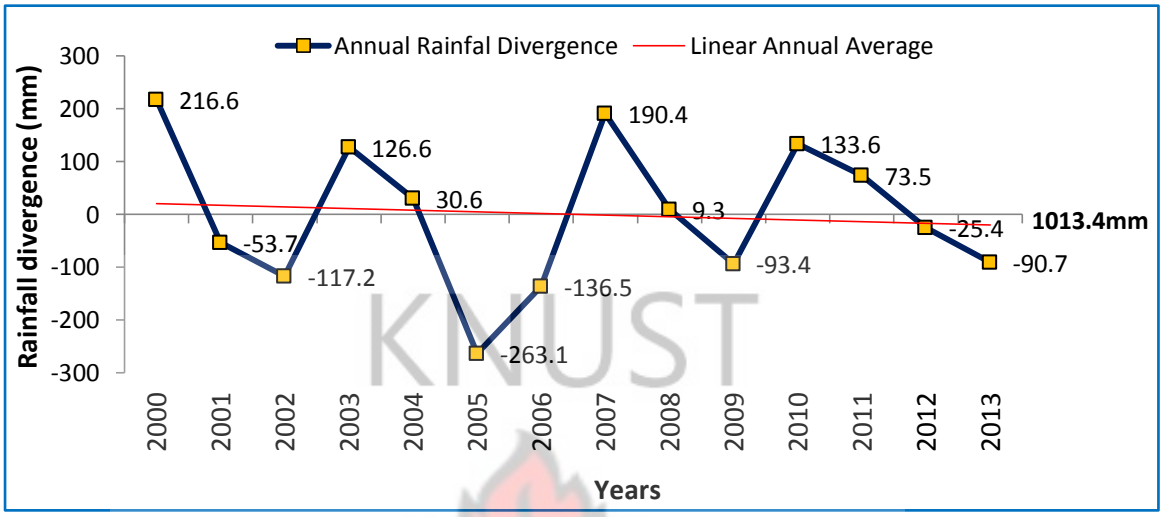
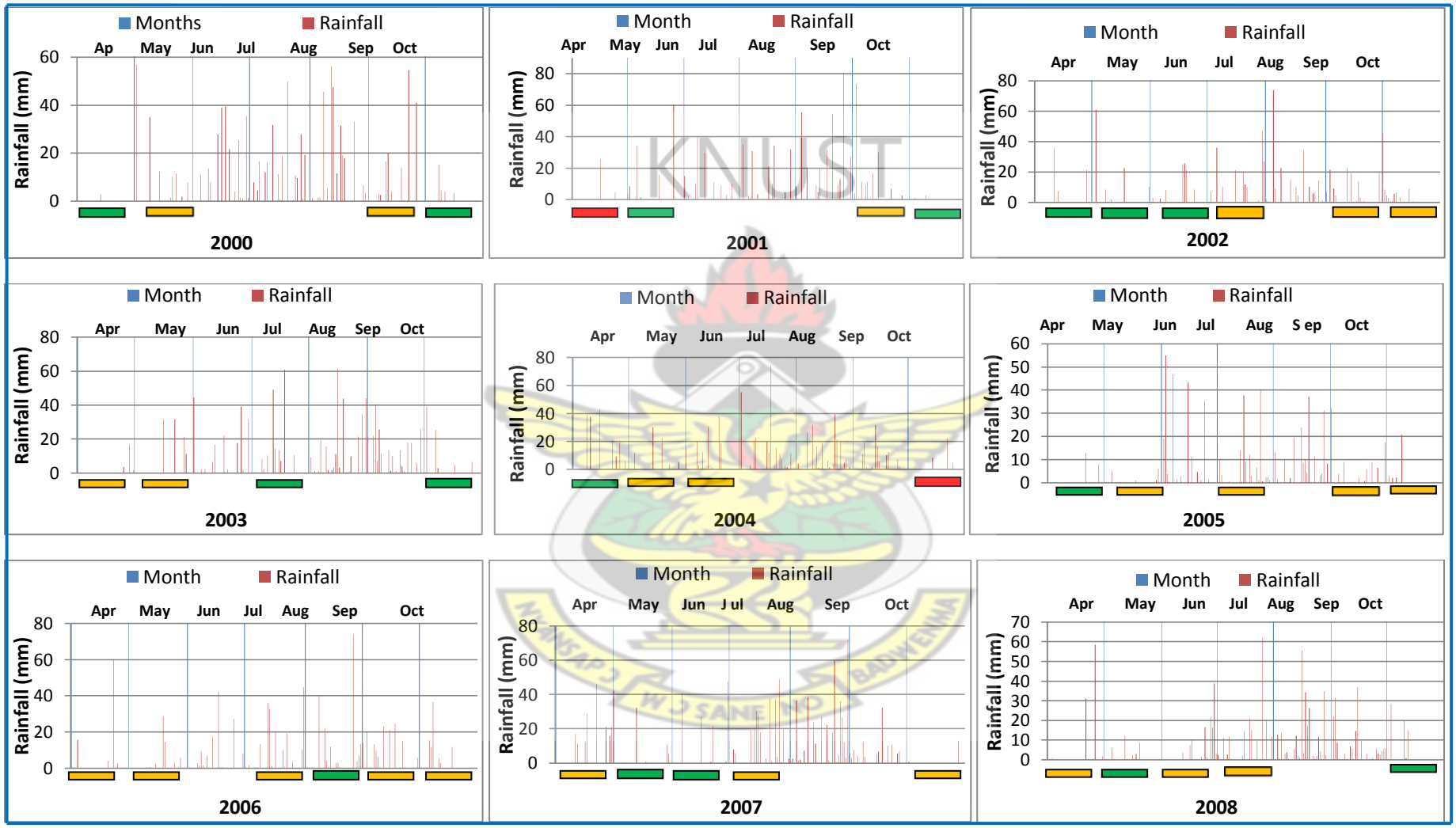


Figure 4.2: Intra-annual divergence of rainfall for the Kassena-Nankana Municipality (2000-2013)

Source: Generated based on data from Meteorological Station, Navrongo, June 2014.

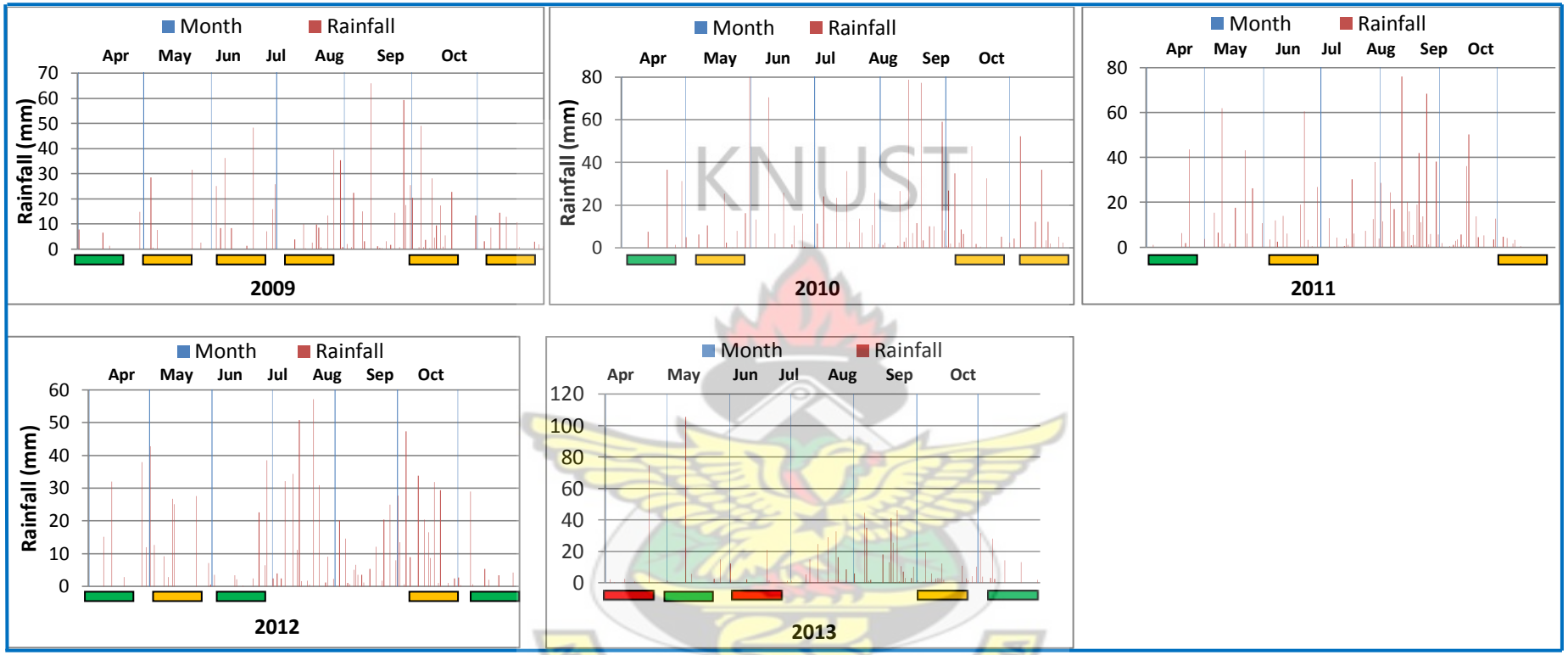
Efforts were also made to further assess the extent of weather extremes by paying particular attention to the issue of drought (dry spells) which is a critical manifestation of the phenomenon of climate change in so far as food systems and food security are concerned. In making this drought analysis, one would notice as illustrated in Figure 4.3 that the period under study 2000-2013 reveals 98 dry spells —with an average of 8 dry spells per year (planting season). A dry spell is defined as a period of 6 consecutive days where no rainfall is recorded (daily rainfall = 0mm, with a threshold of 1mm for a rainy day) (Lax, 2009: 91).



Key: 1 Dry spell in a month 2 Dry Spells in a month 3 Dry spells in a month

Figure 4.3: Number of dry spells in a month for the rainy/planting season (April - October) for 2000-20013 for the study area

Figure 4.3 continued.



Key: 1 Dry spell in a month 2 Dry spells in a month 3 Dry spells in a month

Figure 4.3: (continued): Number of dry spells in a month for the rainy/planting season (April - October) for 2000-20013 for the study area

Source: Calculations based on data records from the Meteorological Station, Navrongo. June 2014.

Figure 4.4 further throws more light on the dry spell situation of the study area. The trend line indicates a steady increase of the number of dry spell. Aside this, it can also be noted that 2013 recorded the highest number of dry spell for the entire period under consideration. This information perhaps is an indication that climatic conditions in the area are changing for bad.

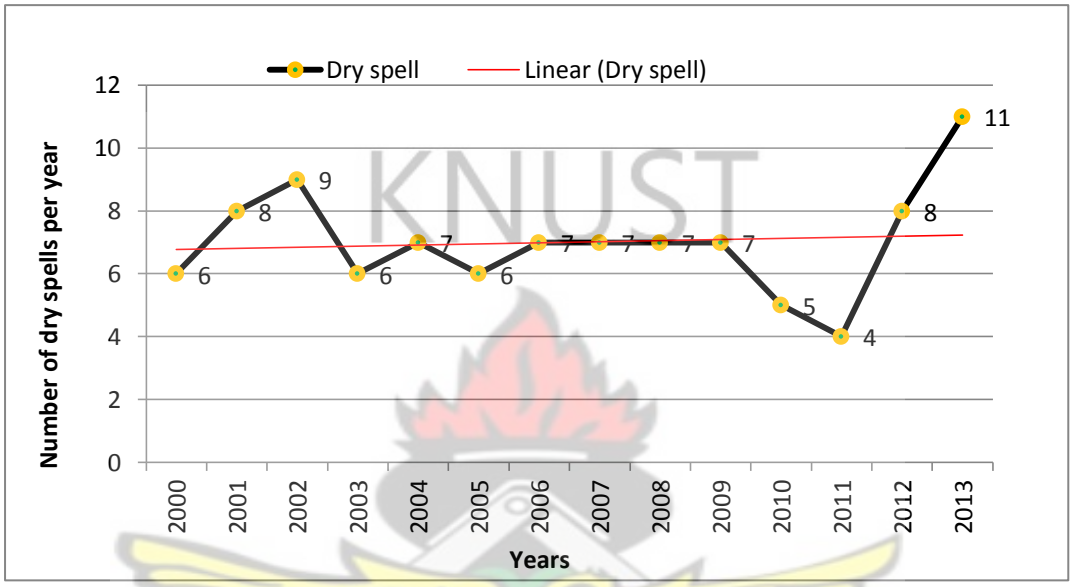


Figure 4.4: Number of dry spells in a year for the period 2000-2013

Source: Calculations based on data from the Meteorological Station, Navrongo, June 2014.

The finding on the dry spell phenomenon is particularly noteworthy as literature shows that dry spells are critical for agricultural activity. It is reported that those that last for two weeks or more (prolong dry spells) are particularly disastrous for plants, as they dry up the soil and prevent germination especially shortly after sowing (Sultan and Janicot, 2003, as cited in Laux, 2009: 97). The findings further fall in line with assertions by Beddington (2012: 3) that extreme weather events such as droughts are predicted to become more frequent adding to the burden of food insecurity. This implies that food systems and food security outcomes can be considered to be under threat given the numerous dry spells that have been shown in the data against the backdrop that agriculture in the area is basically rain-fed.

The climatic pattern of the area can further be illustrated by looking at the temperature trends. The temperature pattern has been looked at in two dimensions—the individual

annual trends and the annual mean divergence. Figure 4.5 shows the annual temperature trends for the period under study (2003-2013). It can be seen from the data that there are marginal variations in between the individual years.

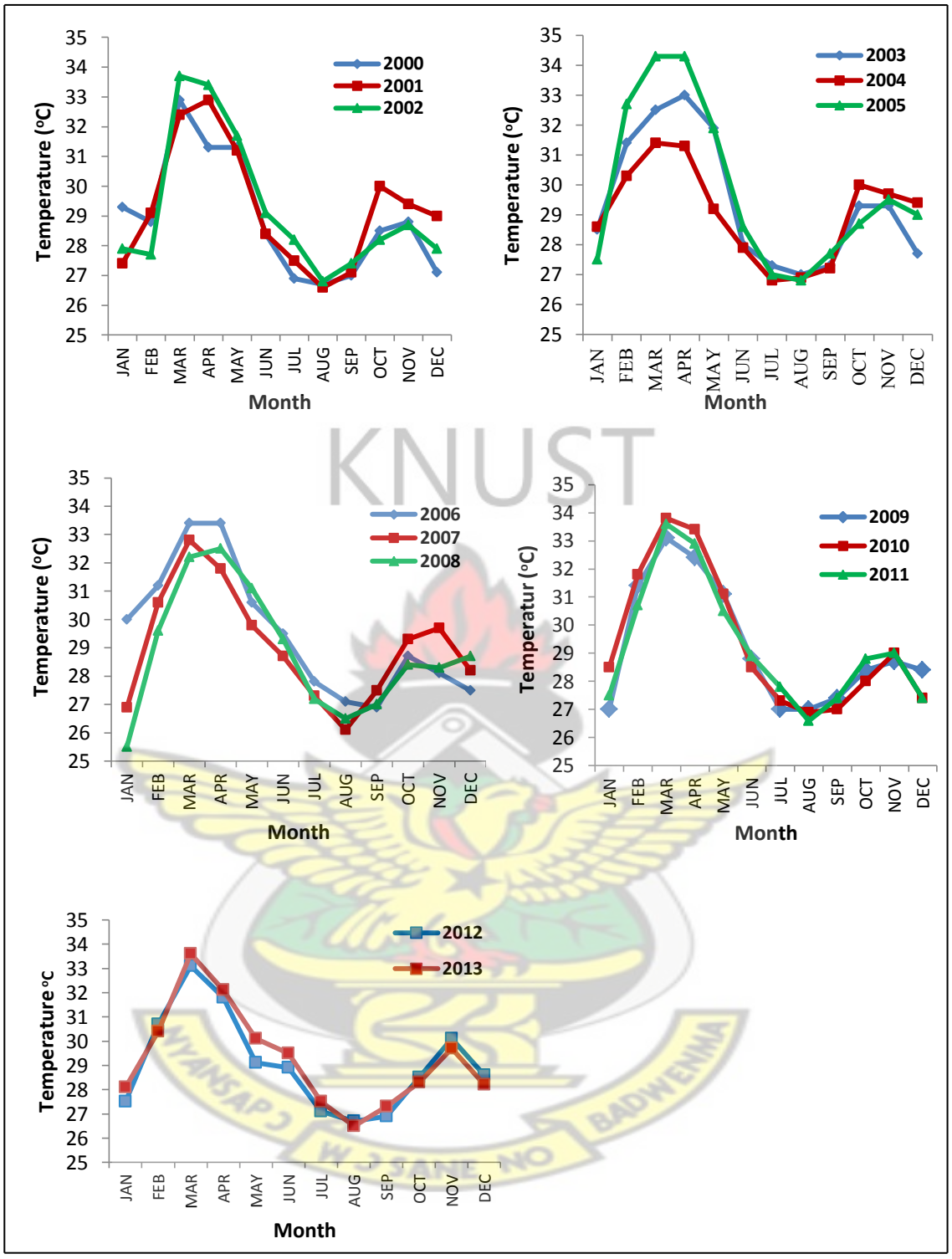


Figure: 4.5: Annual temperature trends for the Kassena-Nankana Municipality 2000-2013

Source: Calculations based on data obtained from records of the synoptic weather station at Navrongo, June 2014.

Figure 4.6 shows the monthly mean divergence of temperature for the period 2000-2013. The information is based on data gathered from the weather station at Navrongo.

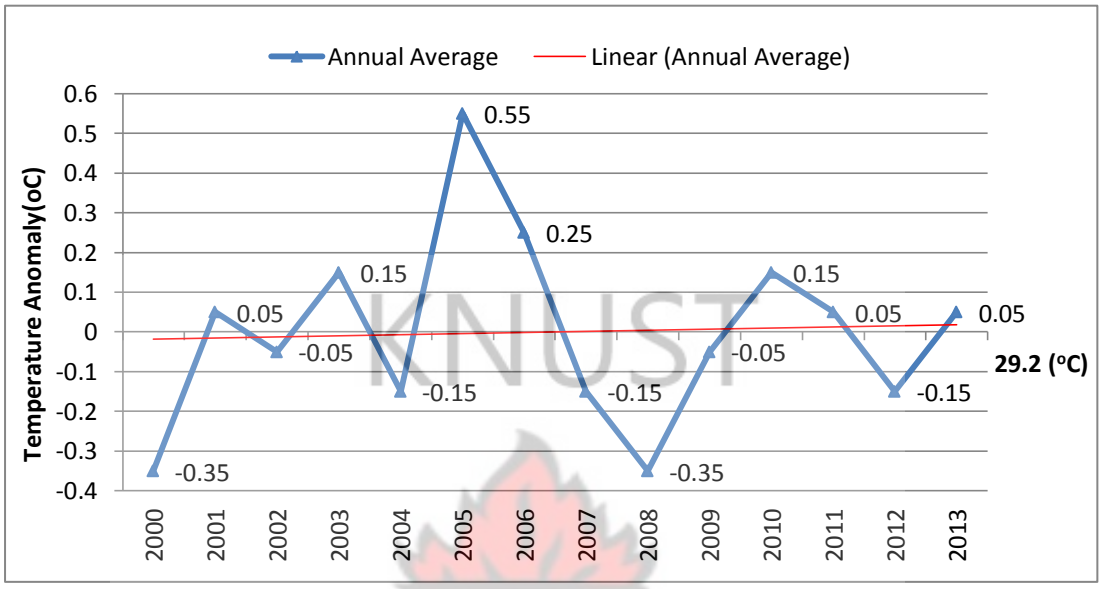


Figure 4.6: Mean surface temperature difference (divergence) for the study area 2000-2013

Source: Meteorological Station, Navrongo, June 2014.

It is clear that the temperature trends show considerable variations throughout the various years. A significant highest positive deviation is observed for the year 2005 with a reading of 0.55^{O}C with the lowest deviation being -0.35^{O}C for the years of 2000 and 2008. Besides these notable deviations, the trend line shows a slight increase over the period. To find out the extent to which such variations in the climate of the area (showed in this study by rainfall and temperature trends) affect agricultural productivity and food security, the views of farm household respondents were then sought—as presented under the linkages of the emerging threats to food security section.

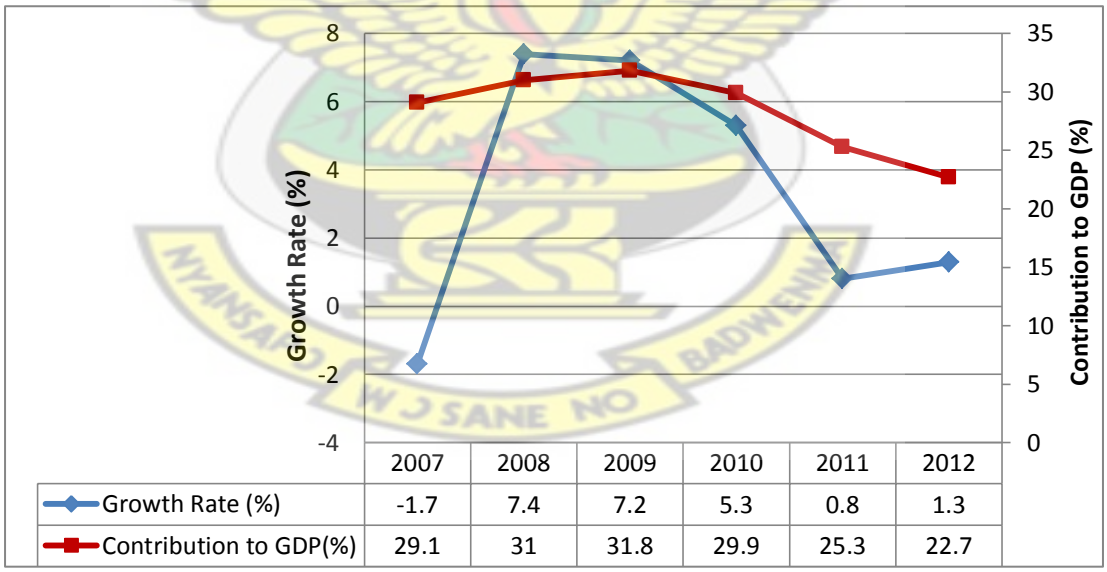
4.2.3 Diminishing trends of cultivable land

Quantitative data on the changing patterns of the availability of arable or cultivable land for rural farming activity are pretty scanty. But as noted by GSS (2003) and Yaro (2004), for the Upper East Region in general and the study area in particular, the issue

of availability of land for the purposes of farming appears to represent a serious concern with time. The underlying causes have been noted basically to be changes in the land tenure acquisition arrangement due to such factors as land use changes and competing demands. As noted by Yaro (2004): "*Land tenure arrangements have been commercialized by the conversion of token ritual gifts into cash or higher value gifts*". In the face of such development cultivable land could fall to other land use needs. This could have serious implications for food security for rural poor farming households in the long run due to their disproportionate or over-reliance on the environment for their livelihood.

4.2.4 Food price volatility

Under this section, the prices of key commodities in Ghana predominant in the study area have been presented against the background of the general performance of the agricultural sector (in terms of growth rate and contribution to GDP) —to help create the context for the price analysis. This information is presented in Figure 4.7. It can be seen that generally the agricultural sector has not been faring very well in recent times.



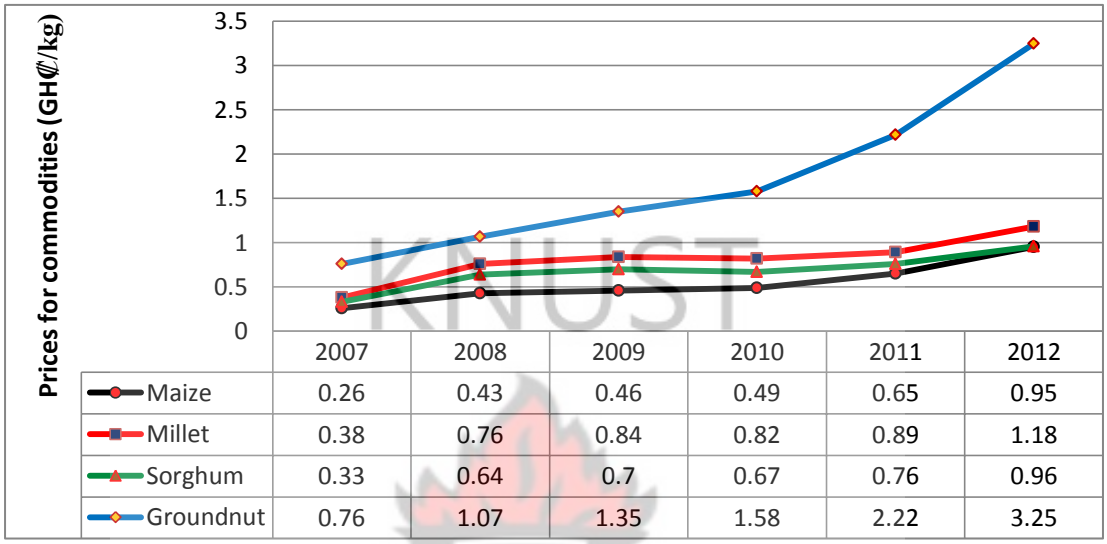
	2007	2008	2009	2010	2011	2012
Growth Rate (%)	-1.7	7.4	7.2	5.3	0.8	1.3
Contribution to GDP(%)	29.1	31	31.8	29.9	25.3	22.7

Figure 4.7: Agricultural sector performance, 2007-2012

Source: ISSER, 2012: 97; 99.

Having taken a look at the overall performance of the agricultural sector as presented in Figure 4.7, Figure 4.8 then presents information on the national average prices for

selected commodities (maize, millet, sorghum and groundnut). The selection was based on the fact that these are the principal staples (that is in terms of both production and consumption) especially in the northern part of the country and for that matter the study area.



	2007	2008	2009	2010	2011	2012
Maize	0.26	0.43	0.46	0.49	0.65	0.95
Millet	0.38	0.76	0.84	0.82	0.89	1.18
Sorghum	0.33	0.64	0.7	0.67	0.76	0.96
Groundnut	0.76	1.07	1.35	1.58	2.22	3.25

Figure 4.8: Nominal wholesale prices for selected food commodities 2007-2012

Source: Ministry of Food and Agriculture, as cited in ISSER, 2012: 116.

The data show a steady rise in the prices of these food commodities—against the backdrop that agriculture has not been faring very well in recent times (as indicated by the agricultural sector's growth rate and contribution to GDP in Figure 4.7). The implication of this information is that rural farm households could be negatively affected given that their livelihoods are basically agriculture-dependent. Thus considering that the small-holder rural famer is both a producer and consumer of these food commodities he/she either stands to gain or lose from these rising prices. As explained by Braun and Tadesse (2012:7) what would happen to the farmer depends on two critical factors—the share of income generated from the food sector and the share of food budget expenditure. Thus, if the share of the agricultural sector income is high, then a rise in food prices leads to a rise in real income. On the other hand, if food expenditure share is high, then a rise in food prices decreases real income.

As noted by GSS (2008: 96, 97 & 109) agricultural activity is the main source of household income in Ghana—accounting for a third (34.8%) of the total annual income. In this regard, the Upper East Region records 56.9 percent for households'

agriculture income. With respect to expenditure, it is also reported that food is the major component of households' expenditure in Ghana—accounting for 40 percent of estimated total annual expenditure. In respect of these, the Upper East and rural savannah recorded relatively higher figures of 64.5 percent and 73.8 percent respectively (GSS, 2008: 97). This clearly shows that most rural farm households would most probably spend more income on food than they generate from their farms. Hence the inability to find the additional income for this 'food gap' may result in food security situations since they appear to be net buyers of food items than sellers.

While this section looked at the nature and scale of the emerging threats, the next section would then focus on their linkages to the food security situation of rural communities. This would thus help establish the extent to which each one of the emerging threats affect the food security needs of farm households.

4.3 Linkages between the emerging trends and food security (or insecurity)

4.3.1 Socio-demographic dynamics and food security nexus

The views of household heads were sought on the extent to which they agree or disagree on the influence of socio-demographic dynamics on food security. The data are presented at Table 4.2.

Table 4.2: Perceptions on demographic dynamics of food insecurity

Selected socio-demographic variables	**Response options**							
	Agree		***Not sure***		***Disagree***		**Total**	
	Freq.	(%)	Freq.	(%)	Freq.	(%)	***Freq.***	***(%)***
Sex	50	(55.6)	14	(15.6)	26	(28.9)	***90***	***(100)***
Age	90	100)	-	( )	-	( )	***90***	***(100)***
Level of education	49	(54.4)	16	(17.8)	25	(27.8)	***90***	***(100)***
Household size	44	(48.9)	4	(4.4)	42	(46.7)	***90***	***(100)***
No. of income earners	81	(90)	2	(2.2)	7	(7.8)	***90***	***(100)***

Source: Field Survey, June 2014.

In the case of sex, the information presented (Table 4.2) shows that whereas most of the respondents (56%) said that one's sex could have an influence on rural households food security outcomes, 16 percent were not sure and 29 percent disagreed. This assessment was made against the consideration of the views of both male and female small holder farmers (who are also household heads). In this regard, a female respondent expresses her sentiments in this manner:

> When you are a woman in this part of the world it is very uneasy for you to own your own land and access farm related support services such as credit facilities. This makes it very difficult for us to meet our food needs.

With respect to age, the data from the Table (4.2) indicates that all the respondents (90) were of the view that this (age) greatly influences farmers' activities which could have either negative or positive consequences on households' food security. According to one respondent:

> The age of the farming household head definitely has an influence on food security outcomes. While it is true that younger household heads are expected to work harder and probably put more land under cultivation, this is at times not the case due to general disinterest with agricultural activity in the area. On the other hand, older household heads seem to rather have accepted farming activities as the way forward. However, as they get older, naturally their productivity goes down and this negatively affects food productivity. But overall, the general indication is that food insecurity is a real problem for rural farming households.

Whereas this finding is in line with earlier findings (Babatunde et al. as cited in Kuwornu et al., 2013: 34) that younger and energetic household heads would usually put under cultivation more farmland and also seek and obtain non-farm jobs than older and weaker ones, it also corroborates the views by Arena and Anyaei (as cited in Kuwornu et al., 2013: 34) that rather, older heads of households are more secured than younger ones.

Considering that (see Table 4.1) the age of survey respondents range from as young as 18 to over 66 years, it can be concluded that this could have various implications for food security as both young and old household heads have been shown to have some influence on food insecurity. The underlying concern here is that it has been generally indicated that rural households are facing acute food security concerns with age of farming households being a critical factor.

With respect to the level of education, it can be seen clearly that majority of the respondents (54%) have indicated that the level of education of the rural household farmer could impact on food security outcomes, whereas 17.8 percent were not sure, with 27.8 percent disagreeing (Table 4.2). The views of the majority who agreed that the level of education influences food insecurity outcomes have been captured vividly by what one of them remarked:

> If one is educated you are better positioned to adapt and apply new farming methods and techniques than someone with no or very little formal education who may have to rely on others for direction.

The above assertions agree with Shaikh (as cited in Kuwornu, 2013: 35) who opines that educated households have been shown to be in a relatively better position to effectively manage farm related activities than less educated ones. Given that (Table 4.1) a significant number of the survey respondents (59%) have no formal education, the implication is that their farm activity could be adversely affected leading to food insecurity conditions as they may have difficulties appreciating and implementing new and innovative ways of optimizing farm output.

One other way that the study sought to assess the implications of population dynamics on rural households food security was by looking at the household size. It is noteworthy from the Table (4.2) that 49 percent of the respondents agreed that the size of the farm household could have influence on food security, four percent were not sure and 47 percent disagreed. These divergent views can be summarised by what was remarked by one of them, thus:

> The question with respect to the size of the household as having any influence on food insecurity can be looked at from two perspectives. First and almost out of fashion is the view that bigger household sizes could enhance farm productivity by way of more hands (labour). In contrast, it is now becoming apparent to many that smaller household sizes are rather better to manage in terms of providing for their food needs.

Generally, the figures and narration above confirm findings (Sindhu et al. as cited in Bashir et al., 2012: 5) in India that larger household sizes are more likely to be food insecure than smaller ones. Similarly, the assertion also falls in line with Bashir et al. (2012:4) findings in Pakistan among small farmers that an increase by one member in a family size decreases the chances of food security by 26 percent.

It is noted from Table 4.1 that most of the respondents (65%) have household sizes above five (5). It has been earlier indicated that the area has an average household size of 7 which is above the national average of 5. What this means is that food insecurity among these households could be of particular concern (having more mouths to feed) considering related issues such as; adverse weather impacts on food productivity and diminishing amounts of cultivable lands available to rural households.

Last on the socio-demographic front was an assessment of the number of regular income earners in a farm household. As per Table 4.2, majority (90%) of the respondents agreed that households with higher number of income earners could be more food insecure than those with a lesser number. It was reported by a respondent that:

> I am getting older and weaker and cannot effectively work on my farm. The only way that the household food security needs are being met has been two of my sons who are formally employed. The story is different from other households who are less fortunate to have this kind of support.

These findings entrench the assertion by Bashir (2012: 5) that the chances of a household food security are enhanced by 135 percent with an increase in one income earner. When one takes a look at Table 4.1, it is clearly seen that 42 percent of households do not have any members receiving any form of regular income, 40 percent have at least a member taking some form of regular income, 13 percent has 2, 3 percent has 3 with no household having 4 or more regular income earners. This implies that in respect of the relationship between the number of regular income earners and food security, rural farming households are to a significant extent constrained and relatively vulnerable as the data suggest a high dependency ratio among these households.

4.3.2 The extent of climate variability and extreme events and their effects on food security

Having analysed and presented the information on the occurrence and extent of weather extremes per the rainfall and temperature data (sub-section 4.2.2), the focus then shifts to households perceptions on the extent of these climatic variations and their effects on food systems and food security. In other words, the question was put to the survey respondents with regard to whether climatic changes in the past decade

or so have had threatening implications for food security. The information is captured in Figure 4.9.

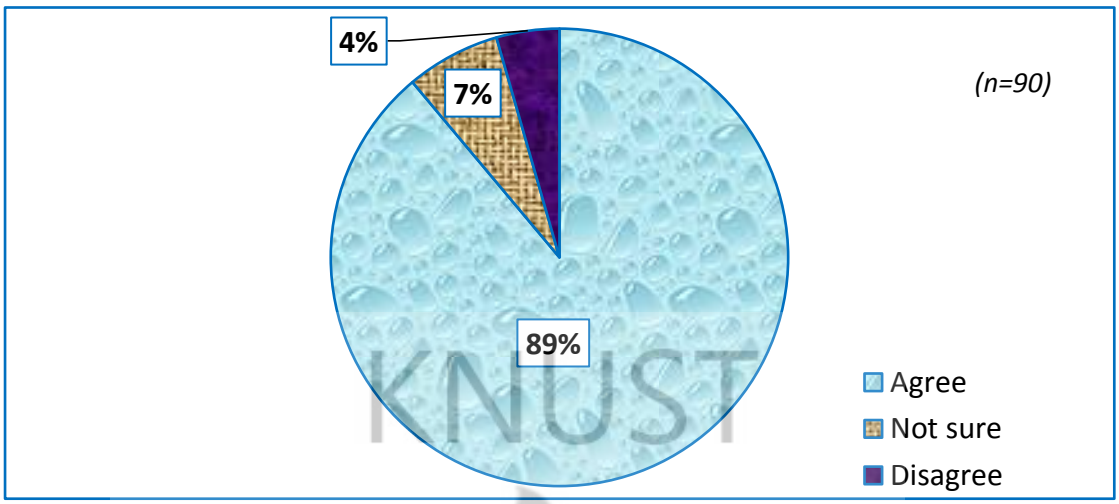


Figure 4.9: Households perceptions on the threats of climate variability to food security
Source: Field Survey, June 2014.

The information from Figure 4.9 indicates that a significant majority of the respondents (89%) reported that changing climatic conditions are having a threatening impact on food systems and food security, six of them (7%) said they were not sure and four (4%) disagreed. The views of the majority who agreed can be summarised by what one of them reported:

> There have been significant changes in the climatic conditions in the area. Rains are setting in late and amounts are generally reducing. Temperatures too are becoming relatively high and variable as compared to the past. At times you get serious drought and at times floods. These changing conditions are greatly affecting agricultural activity and food security in the area.

The above claims not only reflect the trends in the climatic data analysed for the study area but also confirm findings by Mariola (2012:712) and Edame et al. (2011) that extremes commonly in the form of drought, floods and temperatures pose serious challenges to food systems and food security. What this means is that subsistence-based rain-dependent rural communities would be disproportionately affected given that they are less capable to effectively cope and adapt. In order words, given their relatively higher poverty levels, rural households may be severely limited in their

ability and efforts to adopt appropriate and innovative approaches (such as water conservation methods) in response to new challenges posed by climate extremes.

4.3.3 Growing insecurity of cultivable land as a threat to food security

This section presents information on land insecurity related challenges as possible threats to food security in the Kassena-Nankana Municipality. The section does so by basically examining the viewpoints of rural farm households. Thus, the question was put to respondents whether land available for cultivation has been increasing, decreasing or remained same and whether such changes are affecting food security. The information sought is illustrated in Figure 4.10.

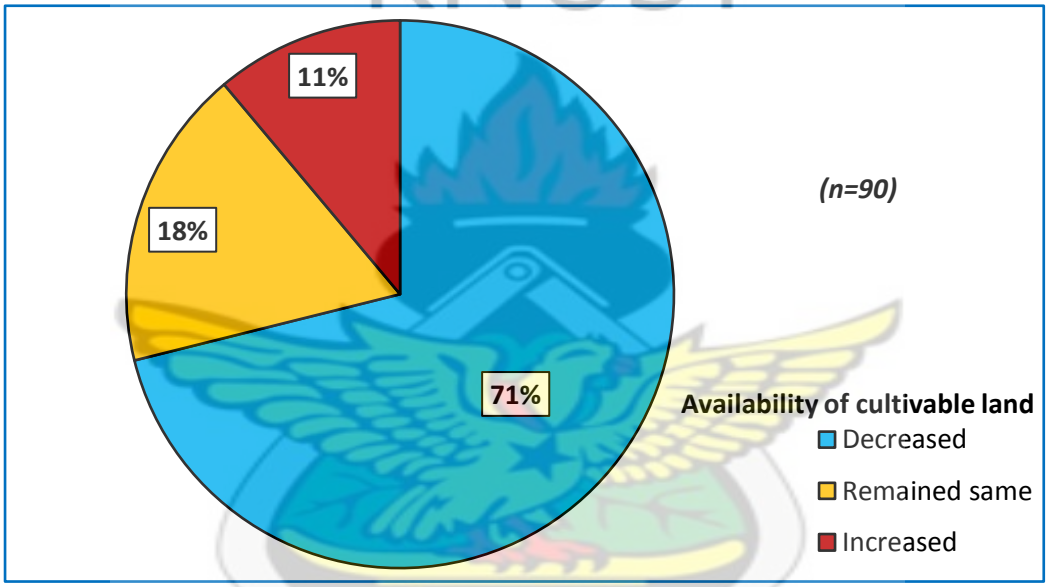


Figure 4.10: Households position on the availability of (access to) cultivable land

Source: Field Survey, June 2014.

The data indicate that as many as 64 of the respondents (71%) reported that land available to them has been reducing, 16 of them (18%) reported that it remained same and 10 (11%) said the land available to them for cultivation has increased. The views of the majority who reported that land available to them has been decreasing can be summarised by what was said by one of them:

> Land for cultivation is owned by the whole family. As family sizes increase land is put under different uses aside farming and even the available land for farming is seriously constrained. Looking for cultivable land elsewhere goes with high cost in terms of what one may have to spend to get it and the

distance factor. This has been an emerging concern that threatens food security and incomes.

This data point to the phenomenon where there seems to be a growing sense of land insecurity amongst rural people: with adverse effects on food security and incomes. These claims confirm findings by Kyaw (as cited in Kuwornu et al., 2013: 35) which suggest that the incidence of food insecurity and low incomes tends to be more pronounced in landless rural poor. Similarly, the findings also corroborate assertions (Deininger; Jayne et al.; a as cited in (Kuwornu et al., 2013: 35) that points to a positive relationship between farm size and enhancement of rural households food security and incomes. Considering that agricultural activity in the area is predominantly rural and subsistence-based, and that land is a sine qua non for agricultural activity and food production, these constraints (limited cultivable land) could worsen the plight of rural households in the sense that they same household size or even more would now depend on a decreasing available land for its sustenance.

4.3.4 Volatility in food prices as a challenge to food security

Having done some quantitative analysis of the prices of key commodities earlier, attention is now turned to households' position and views on the effects of rising food prices on livelihood and food security status. In other words the question was put to the respondents whether food prices are rising and how these affect their food security status. The information is presented at Figure 4.11.

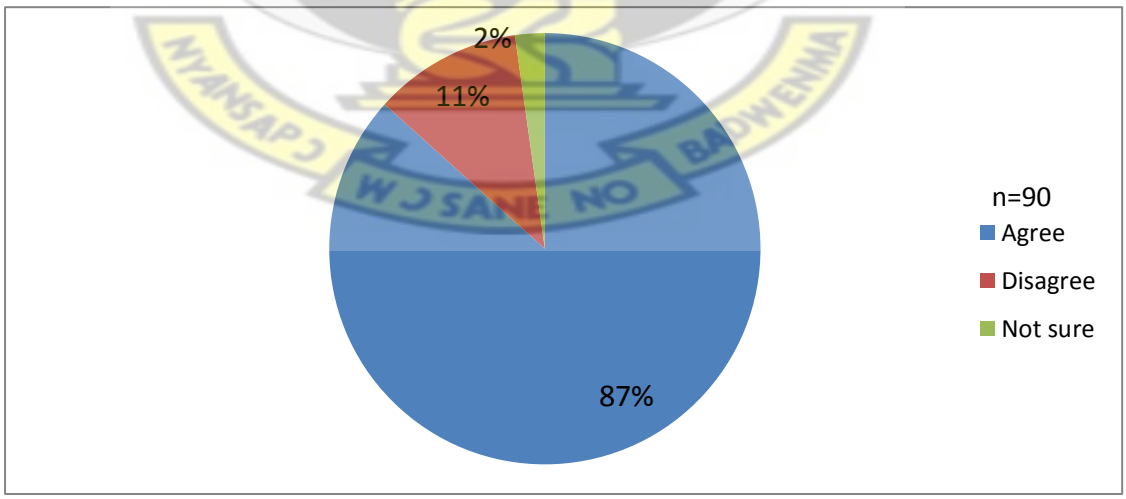


Figure 4.11: Households' perception on food price volatility on food security

Source: Field Survey, June 2014.

The data thus indicate that a significant number of the respondents (87%) agreed that indeed prices of food commodities are going up, a trend which has a corresponding negative effects on their food security situation. Eleven percent of the respondents disagreed while 2 of them (2%) said there were not sure.

The majority who admitted that rising food prices are a critical concern point to the threatening impact this has on rural households' food security. One of the respondents noted thus:

> The income we get from our farms is what we use to supplement what we produce from our farms. But the problem is that agricultural yields are coming down and prices are rising leaving us with no or little surplus to sell but with more food requirement to meet [by way of buying]. This makes us very vulnerable.

These claims support the position of Aksoy and Hoekman (2010) and Braun and Tadesse (2012) that rising costs of food is having a devastating toll on especially poor rural households. Given that already farming households in the area are facing real challenges regarding issues such as climate-induced stresses this could only serve to worsen their plight. In other words, rising cost of food against the backdrop of poor farm output from rural households implies that since they do not produce all that they consume, they might not be able to get the needed cash surplus from their produce to purchase their consumption needs, thereby rendering them vulnerable to food insecurity.

Following the assessment of the linkages between the emerging threats and food security in this section, the next section pays attention to the strategies employed by households in the face of these threats.

4.4 Rural households response strategies to the emerging threats to food security

Having assessed the effects of the various threats to rural farm households food security in the previous sections, this section takes a look at the kind of approaches and strategies generally available to households in their response to these threats. This section will serve a double purpose. Whereas it gives an insight into their response options, it also further highlights the extent of food insecurity: moderate (crop and animal adjustment to labour sale), high (small animal sale to productive asset sale) or

extreme (farmland pledging, farmland sale and out-migration) in the area. The response strategies were reached based on Watts's comprehensive (as cited in Frankenberger and Goldstein 1991: 95) framework (Figure 4.2 and Table 4.3).

Table 4.3: Households' responses to threats of food security

Households strategies on the threats to food security	Responses					
	Yes		Somehow		No	
	Freq.	(%)	Freq.	(%)	Freq.	(%)
a) Crop & Livestock Adjustment	71	(79)	13	(14)	6	(7)
b) Diet change	63	(70)	19	(21)	8	(9)
c) Grain loan from kin	10	(11)	7	(8)	73	(81)
d) Labour sale (migration)	57	(63)	16	(18)	17	(19)
e) Small animal sales	49	(55)	22	(24)	19	(21)
f) Cash/cereal loan from merchants	90	(100)	-	(-)	-	(-)
g) Productive asset sale	36	(40)	28	(31)	26	(29)
h) Farmland pledging	17	(19)	13	(14)	60	(67)
i) Farmland sale	39	(43)	14	(16)	37	(41)
j) Out migration	65	(72)	15	(17)	10	(11)

Source: Field Survey, June 2014.

From Table 4.3, it is clear that the data suggest a wide range of household response strategies. The various response strategies represent a certain degree of household's vulnerability. For strategies such as diet change, and crop and livestock adjustment, the indication is moderate households' vulnerability. For instance, 70 percent of respondents said diet change was a household strategy and 79 percent reported that crop and livestock adjustment represented another strategy.

Strategies such as small animal sales indicate high households' vulnerability. In the case of small animal sales under this categorization, 55 percent reported that this was a strategy, meaning they are highly vulnerable. Finally, response strategies covering such areas as productive asset sales, farmland sale and out migration are an indication of extreme household vulnerability. In respect of out-migration under this categorization, 72 percent of the respondents indicated that this was an option.

From the data one would notice that virtually all the households are involved in the different ranges of response strategies. However, it could further be noticed that according to Watts's categorization, some are moderately vulnerable whereas others

are highly and extremely vulnerable. This is a clear manifestation of the food insecurity situation that rural farm households are confronted with in the sense that they (the rural households) are resorting to almost all the activities/strategies identified by Watt (as cited in Frankenberger and Goldstein, 1991: 95) as proxies for food insecurity.

4.5 Concluding comments

The study results suggest that generally the emerging threats (changing household demographic structure, climate variability, availability of cultivable land, and rising food prices) are quite extensive and remarkable in their individual nature and scale as they are related to the Kassena-Nankana Municipality. These emerging threats have been shown in their varied dimensions to be adversely affecting rural farm households food security. Household strategies resorted to in the face of these threats are wide and varied but have not proven to be very effective in halting and reversing the trends. It must be noted that these unfolding trends could worsen the rural poverty situation in the area given that already high poverty levels are recorded in the area relative to other regions of the country. Effective measures are therefore required to deal with the situation. In view of this, the next chapter pays attention to the summary of key findings with the aim of making recommendations that could help improve the food security situation in the study area.

CHAPTER FIVE

SUMMARY OF FINDINGS, RECOMMENDATIONS AND CONCLUSION

5.1 Introduction

This chapter concludes the study, as it presents in summary form, the major findings of the analysis and discussion of the survey data in Chapter four. The findings take cognizance of the study objectives and have been categorized thus: extent and scale of the emerging threats, effects of the threats to food security and nature and effectiveness of households response strategies. On the basis of this, recommendations are made for future action to enhance efforts at meeting the food insecurity challenges amongst rural households in the study area and then the conclusion is given.

5.2 Summary of findings

5.2.1 Extent and scale of the emerging threats to food security

The extent and scale of the emerging threats relevant to the study area were considered in respect of the following: Socio-demographic structures of household, climate variability, diminishing access to cultivable (arable land) and volatile food prices.

In the area of socio-demographic structure of rural farm households, it became clear on the basis of the data gathered that for instance rural household sizes are relatively large. Thus, 65% of the households have sizes above the national average of five. Fifty nine percent of them had no formal education, 42% have no regular income earning member with 40 % having at least one regular income earner.

With respect to climate variability the analysis of the rainfall data not only show evidence of considerable variations and decreasing amounts over the study period (2000-2013), but also reveals 98 dry spells (thus an average of 8 dry spells in a planting season). The rainfall data analysis also reveals a steady rise in the number of dry spells with the latest year (2013) recording 11 dry spells within the planting

season—the highest within the entire period under study. As regards temperature, trends have also shown noticeable variations and a rising trend over the study period. These trends are expected to have negative impact on agricultural productivity and thereby adversely affecting food security.

In respect of the issue of diminishing availability of arable (cultivable) land, available literature indicates that the Upper East Region in general and the Kassena-Nankana Municipality in particular are experiencing worrying incidences of such developments due primarily to changing land use patterns and population growth. It has further been noted that such trends have been shown to have negative implications for poor rural farm households in the long run.

Concerning rising food prices, it was portrayed that seasonal prices of key commodities (such as maize, millet, sorghum and groundnut) that are critical to the livelihoods of rural communities are rising steadily. Rural farm households stand disadvantaged in the face of these rising key commodity prices in the sense that even though they produce such commodities they are net consumers as a large chunk of their farm income is spent on food. This has been shown to be particularly noteworthy of rural and savannah north of Ghana.

5.2.2 Effects (linkages) of the threats to food security

The key findings relating to the effects of the emerging threats to food security would be presented in their individual respects. Thus, socio-demographic dynamics and food insecurity nexus, climate variability and its effects on food security, growing insecurity of cultivable land as a threat to food security and volatility in food prices as a challenge to food security.

The study reveals in respect of the socio-demographic dynamics, households headed by females were noted to be more food insecure than their male counterparts as this was admitted by 56% of the respondents. The reason basically has to do with the patrilineal system of the area, which means that women are disadvantaged when it comes to access to productive resources even though as heads of households they bear the same responsibility for its up-keep as their male counterparts.

Concerning the educational level of household heads, it was revealed that this was very low as 53% had no formal education with 31% having at least basic education. This was shown to have adverse implications for food security as 54% of the respondents admitted to this. The reason being that, they are challenged when it comes to the adoption and application of refined farming methods. Still on the socio-economic and demographic structure of households it was discovered that 42 % had no regular income earning member with 40% having one. Concerning this, 90% of the respondents rightly admitted that such developments obviously have negative implications for food security for such households.

With regard to climate variability, it was found out that majority of the respondents (89%) agreed that climatic changes within the past decade or so have had threatening implications for food security. It was thus reported that rains are setting in late with marked intermittence—creating worrying dry spell phenomena which have been confirmed by the climatic data from the synoptic weather station. This can be well appreciated given the already fragile physical milieu of the study area.

On the issue of diminishing availability of cultivable lands, the study has shown that this is assuming alarming rates as 71% of the respondents confirmed that the cultivable land available to them has been decreasing with corresponding negative implications for food security. The underlying factors being population pressures and changing land uses.

In relation to rising prices of key commodities (such as maize, millet sorghum, and groundnut) households have been shown to be net consumers as a larger share of their farm income is spent on food. It was thus shown that a significant number of the respondents (87%) agreed that rising food prices were affecting their food security status against the back drop of poor harvests. This has been considered worrying given the relatively poor performance of the agricultural sector and the fact that majority of rural people are eking out a living in the agricultural sector.

5.2.3 Nature and effectiveness of households response strategies

Given the unfolding influences by these emerging threats on rural food systems and food security status a number of age-old strategies have been resorted to by

households some of which have been shown to be less effective and sustainable as per Watts's conceptualization such as productive assets and farmland sales and out-migration.

5.3 Recommendations

Based on the major findings of the study, the following recommendations were reached to help improve the food security situation in rural communities of the Kassena-Nankana Municipality:

5.3.1 Maintaining manageable and productive household socio-demographic structures

The size, composition and structure of households are critical as they can influence food security outcomes of individual households. Households are microcosms (basic units) of the bigger society (districts and the nation at large) — the latter are mainly aggregations of the former. There is therefore the need for attention to be given to the complexity and development of households. Measures should include the following:

- Government should through its relevant agencies encourage the need to keep manageable family sizes, by especially targeting rural male and female adolescent cohorts through the provision of affordable and accessible family planning and related services. This is necessary as findings of the study have shown that household sizes in the area are relatively larger than the national average of 5 and have been further shown to have adverse effects on food. Avenues such as radio broadcast could be of help.

- It is also important for rural education to be taken more seriously and given the necessary attention. It is useful for government to vigorously pursue and promote educational policy and programmes such as functional literacy that could help improve illiterate household heads to be more functional and help maintain strong and productive household structures. This is required since the study has shown that most of the household heads have no formal education which further was shown to have negative implications for food security.

5.3.2 Ensure effective coping and adaptation strategies to climate variability and change stresses

In the face of the changing climatic trends which have been shown to have adverse effects on food systems and food security, it is valuable for more education and sensitization to be mounted on the challenges posed by these climate-induced stresses in the municipality. This is considered necessary to keep rural people constantly awake to the impacts of this evolving phenomenon. This could be done through an effective collaboration between lead agencies such as The Municipal Meteorological office, Municipal Agricultural Directorate, Traditional Authorities, Faith-Based Organizations and Compound Heads. This could be coordinated by the Municipal Assembly. Community durbars, local radio broadcasts and religious sermons could be periodically used as avenues for this purpose. Pictures and videos from climate related changes and impacts from different areas of the municipality and elsewhere could be used to enhance their appreciation of the real issues on the ground.

Aside this information sharing approach which might not be enough, it is also valuable for more practical and frontal measures such as; the introduction of appropriate quick-maturing, drought and disease resistant, and high yielding crop varieties and animal breeds, so as to help improve agricultural productivity and food security. Soil management and water conservation techniques (for instance the provision of small scale irrigation facilities—small earth dams and dugouts) should also be developed and enhanced to help sustain and transform agriculture in rural communities to help improve the food security situation in such areas. This could be ensued through effective implementation and advancement into rural communities of government's policies on agriculture such as irrigation development.

There is also the need for local-based research to be encouraged, supported and sustained to monitor and document unfolding climate-induced events and their impact on various livelihoods support systems, with implications especially for food security so as to enhance evidence-based planning to meet local specific current and future challenges. This could be encouraged by the Municipal Assembly, NGOs and educational institutions such as the University for Development Studies which has its Science Faculty in the Municipality.

5.3.3 Promoting sustainable land use planning

Given current developments of diminishing trends of cultivable lands (due basically to population pressures and land use changes,) which have been shown to have strong linkages to food insecurity, it would be very useful for proper zoning and strict land enforcement regulations by the municipal assembly through its agencies such as the survey and town and country planning departments in accordance with the national spatial development policy framework. This would help ensure that lands suitable for agricultural purposes do not fall to other land uses with implications for food security. There is also the need for intensive and improved farming methods and the exploration of marginal lands to compensate for the loss of cultivable lands. This could be championed by the Municipal Agricultural Directorate.

5.3.4 Building strong resilience toward food price volatility

Rising food costs can have adverse effects on vulnerable households with negative impact on food security. Since rural households have been shown to be net consumers, efforts by government, NGOs and other relevant bodies with interest in improving rural livelihoods should help institute measures such as identifying communities with comparative advantage on key commodities and offering the necessary support (like: technical, manpower and financial assistance). This will improve rural agricultural productivity and thereby improving their real income which would help stimulate investment, thereby making them more resilient to rising food prices.

5.4 Conclusion

The results of the study showed that the emerging threats (socio-demographic dynamics of rural households, climate variability, diminishing availability of cultivable land and food price volatility) are playing out in their varying manifestations, dimensions and extent in the Kassena-Nankana Municipality. Such developments have been further shown to have considerable debilitating effects on rural household food systems and food security in the study area. Some of the strategies used by rural households include diet change, productive asset sale,

farmland sale and migration. Such strategies have largely remained the same and less refined over a long time as they have been shown to be less sustainable. It is, therefore, expected that this study would not only help throw more light on this critical issue of concern to all but would also offer the avenue for constructive engagement by all relevant stakeholders with the primary aim of meeting the challenges raised and discussed in order to ensure an improved picture of the food security situation among especially rural poor farming communities.

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APPENDICES

Appendix 1: Questionnaire for farming households heads

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Research Topic: Emerging Threats to Food Security among Rural Households in the Kassena-Nankana East Municipality.

- **Urban/area council……..Settlement…….....**

A: Socio-demographic information

1. Age: ……..
2. Sex: I. Male [ ] II. Female [ ]
3. Level of Education
   I. No formal education [ ]
   II. Basic education [ ]
   III. Secondary/Technical/Vocational [ ]
   IV. Tertiary [ ]
4. Household size…….
5. Number of income earners within the household……

B: Climate variability and its effects on food systems and food security

6. Have climatic changes (in respect of especially rainfall and temperature pattern) in the past decade or so had any threatening implications for food security in the area?
   I. Agree [ ]
   II. Not sure [ ]
   III. Disagree [ ]

   Explain……..

C: Land inaccessibility (or insecurity) as a threat to food security

7. How would you describe the area under cultivation by your household over the last couple of years?

   I. Decreased [ ]
   II. Remained the same [ ]
   III. Increased [ ]

8. Would you say that the availability and accessibility of land for food productivity presents any challenges to your household food security situation?

   I. Yes [ ]
   II. No [ ]

Explain.....

D: Volatility in food prices as a threat to households' food security

9. Do you consider volatility in food prices as posing any challenges in meeting your household food security needs?

   I. Agree [ ]
   II. No sure [ ]
   III. Disagree [ ]

   Explain.....

F: Responses to households food shortages (insecurity)

10 Do you consider any of the strategies below as your household response option to food shortages (insecurity)? *Mark [√] under* ***Yes*** *or* ***No*** *for each of the corresponding strategy.*

Households strategies		Responses		
		Yes	Not sure	No
a.	Crop & Livestock Adjustment			
b.	Diet change			
c.	Grain loan from kin			
d.	Labour sale (migration)			
e.	Small animal sales			
f.	Cash/cereal loan from merchants			
g.	Productive asset sale			
h.	Farmland pledging			
i.	Farmland sale			
j.	Out migration			
k.	Support from Gov't, donor NGO's etc.			

Further comments…….

Thank you for your cooperation!!!

Appendix 2: Global and regional distribution of undernourishment

	2000-2002	2005-07	2008-10	2011-13*
WORLD	**957.3 (15.5%)**	**906.6 (13.8%)**	**878.2 (12.9%)**	**845.3 (12.0%)**
DEVELOPED REGIONS	**18.4 (<5%)**	**13.6 (<5%)**	**15.2 (<5%)**	**15.7 (<5%)**
DEVELOPING REGIONS	**938.9 (18.8%)**	**892.9 (16.7%)**	**863.0 (15.5%)**	**826.6 (14.3%)**
Africa	**214.3 (25.9%)**	**217.6 (23.4%)**	**226.0 (22.7%)**	**226.4 (21.2%)**
Northern Africa	4.9 (<5%)	4.8 (<5%)	4.4 (<5%)	3.7 (<5%)
Sub-Saharan Africa	209.5 (30.6%)	212.8 (27.5%)	221.6 (26.6%)	222.7 (24.8%)
Asia	**662.3 (18.3%)**	**619.6 (16.1%)**	**585.5 (14.7%)**	**552.0 (13.5%)**
Caucasus and Central Asia	11.6 (16.2%)	7.3 (9.8%)	7.0 (9.2%)	5.5 (7.0%)
Eastern Asia	193.5 (14.0%)	184.8 (13.0%)	169.1 (11.7%)	166.6 (11.4%)
South-Eastern Asia	113.6 (21.5%)	94.2 (16.8%)	80.5 (13.8%)	64.5 (10.7%)
Southern Asia	330.2 (22.2%)	316.6 (19.7%)	309.9 (18.5%)	294.7 (16.8%)
Western Asia	135 (8.3%)	16.8 (9.2%)	19.1 (9.7%)	20.6 (9.8%)
Latin America and the Caribbean	**61.0 (11.7%)**	**54.6 (9.8%)**	**50.3 (8.7%)**	**47.0 (7.9%)**
Caribbean	7.2 (21.3%)	7.5 (21.0%)	6.8 (18.8)	7.2 (19.3%)
Latin America	53.8 ()11.0%	47.2 (9.0%)	43.5 (8.0%)	39.8 (7.1%)
Oceania	**1.2 (16.0%)**	**1.1 (12.8%)**	**1.1 (11.8%)**	**1.2 (12.1%)**

Number of undernourished (*million)* and prevalence *(%)* of undernourished (Global 2000-2002—2011-13).

Source: (FAO, IFAD & WFP 2013: 8).