

KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY
COLLEGE OF AGRICULTURE AND RENEWABLE NATURAL RESOURCES
DEPARTMENT OF AGRICULTURAL ECONOMICS



**LIVELIHOOD STRATEGIES AND THE
DETERMINANTS OF SUBJECTIVE WELLBEING: A
case study of subsistence farmers in the Northern region of
Ghana.**

by

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**LIVELIHOOD STRATEGIES AND THE DETERMINANTS OF
SUBJECTIVE WELLBEING; A case study of subsistence farmers in
the Northern region of Ghana**

By

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DECLARATION

I, Yakubu Abukari do hereby declare that this submission is my own work towards the MPhil (Agricultural Economics) degree and that, it contains no material previously published by another person nor material which has been accepted for the award of any other degree of this University and any other institution, except where due acknowledgement has been made in the text.

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DEDICATION

This work is dedicated to the memory of my daughter Musharafa and all people of goodwill.

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ABSTRACT

The study analyzed livelihood strategies and the determinants of subjective wellbeing among subsistence farmers in the Northern region of Ghana. Cross-sectional data was collected from a sample of 346 subsistence farmers drawn from four districts (Tamale metropolis, West Mamprusi, Central Gonja and Kpandai) using a multi-stage sampling technique. Data was collected from households heads through personal interview using structured questionnaire. The livelihoods of subsistence farmers in the Northern Region of Ghana was characterized by income poverty and deprivation from many needs like food, health and low levels of formal education. Using cluster analyses four livelihood strategies were identified among subsistence farmers. The strategies comprised of the adoption of; *Agriculture only* strategy, *Agriculture and Off-farm* strategy, *Agriculture and Nonfarm* strategy and *Agriculture, Off-farm and Nonfarm* strategy (The Mixed strategy). The Hirschman-Herfindahl index which measured income diversification found incomes of subsistence farmers to be 71% diverse. The asset pentagonal analysis showed that subsistence farmers had less social and financial capital compared to other capital assets. Results from the study reveals that 29% of subsistence farmers were completely unsatisfied with their life situations while 32% of them felt their livelihoods left them completely satisfied. Using an ordered logit procedure, food insecurity and the adoption of *Agriculture and Off-farm* livelihood strategy reduced the subjective wellbeing of subsistence farmers while social capital, human capital, annual income per capita, residence in the Tamale Metropolis and adopting the *Agriculture and Nonfarm* livelihood strategy improved the subjective well-being of subsistence farmers. Encouraging nonfarm activities and social capital formation is recommended for growth in income and the improvement in the subjective well-being of subsistence farmers.

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LIST OF ABBREVIATIONS

AgSIP- Agricultural Sector Investment Project

DFID- Department for International Development

FASDEP- Food And Agricultural Sector Development Policy

GLSS- Ghana Living Standards Survey

IFAD- International Fund for Agricultural Development

LEAP- Livelihood Empowerment Against Poverty

MOFA-Ministry Of Food and Agriculture

NORRIP- Northern Region Rural Integrated Project

PAMSCAD- Programme of Action to Mitigate the Social Cost of Adjustment

UN- United Nations

USAID- United States Aid for International Development

PRA- Participation Rural Appraisal



CHAPTER ONE

1.0 INTRODUCTION

Globally livelihood studies and/or appraisal have been linked to poverty. According to the World Bank (2008), three- quarters of the world's poor people live in rural areas with majority of them having their livelihoods propped by subsistence agriculture. In Ghana the story is not different; agriculture contributes 22.70% of the nation's Gross Domestic Product (GDP), with ninety percent (90%) of the nation's agriculture being subsistence (Ghana Statistical Service, 2013). Subsistence agriculture is usually synonymous with traditional, smallholder, subsidiary, peasant, low input farming (Kostov and Lingard, 2002).

Northern Ghana accounts for nearly 50% of arable crops harvested in the country but accounts for less than 26% of total value crop sales compared with coastal Ghana which produces 6% and accounts for 31% of arable crops market. This re-echoes the fact that subsistence agriculture is more pronounced in northern Ghana, where incidentally poverty levels are high with nearly eight out of every ten people in the region living under one dollar a day (Ghana Statistical Service, 2008). For its peculiar vegetation, Northern Ghana also has 75% of the nation's cattle and 50% of the nation's small ruminants (MOFA/DFID, 2002; Mollers, 2007). Subsistence farmers in this part of the country earn income from diverse allocations of their natural, physical, and human capital assets. Among various income generating activities in this part of the country include; farming, where cattle and other smaller livestock are kept alongside growing a cocktail of annual crops and other off-farm and or nonfarm activities.

In order to achieve higher livelihoods options, subsistence farmers often make one of four decisions or a combination of decisions including agriculture intensification, or

extensification, livelihood diversification and should things still not work out explore migration be it temporal or permanent. Intensification and extensification of agriculture could be motivated by the availability of labour, capital and or enabling government policy. Agriculture intensification is a strategy of gaining more from agriculture by investing more capital or labour per unit area while agriculture extensification embodies dedicating more land to agriculture (Scoones, 2009). Diversification which is another livelihood strategy adopted by subsistence farmers, minimizes the effects of the exposure of their livelihoods to extreme effects like variations in the weather, diseases, price fluctuation of agriculture commodities and lack of information precipitating market failures which greatly affects the livelihood strategies of subsistence farmers (Ross et al, 2010).

Literature offers many reasons why such diversification and or integration occurs. Among these might be diminishing returns from increasing investment in certain activities. Similarly, subsistence farmers may wish to minimize risk *ex ante* by participating in activities that generate imperfectly correlated returns (Ellis, 2000; Barret et al, 2001). The presumption throughout literature is that subsistence farmers choose such patterns of diversification so as to achieve the best possible standard of living. The chosen combination of assets and activities which are often influenced by the vulnerability context is often referred to as a livelihood strategy. A livelihood strategy encompasses not only activities that generate income and improved food security but many other kinds of choices, including cultural and social choices that come together to make up the primary occupation of a household (Ellis, 2000).

Livelihood strategies are usually constructed towards achieving specific ends or outcomes. To the subsistence farmer, the most likely outcome to any livelihood strategy include but not exclusively; food security, reduced vulnerability, increased

work days/opportunities and finally improved wellbeing (DFID, 2000). Wellbeing comes under three main dimensions (3D's) including what people have (objective), what people can do (relational) and what people feel about what they have and can do (subjective). Objective and relational wellbeing which forms core wellbeing, captures household income and other things like knowledge, life expectancy, assets and food security (Cahyat et al, 2007).

Subjective wellbeing an end in life which evaluates peoples satiation with their life situations, is emerging as a complement to the more traditional and material ways of measuring poverty and deprivation. It stands at the heart of the argument for a more human-centred approach to development and helps us to rethink indicators and policies for pro-poor policy. According to Easterlin (2002) and Frey and Stutzer (2004) subjective well-being is economic in as much it provides leads to understanding the drivers of human welfare. Thus the positive relationship between subjective well-being with the achievement of ends in life, makes it synonymous with human utility. As a result in nations like Bhutan, national progress is now measured using gross national happiness rather than gross national product (Ibid).

This study analyzes livelihood strategies common among subsistence farmers in the Northern region of Ghana and relates these strategies with the determinants of subjective wellbeing.

1.2 PROBLEM STATEMENT

Eradicating extreme poverty represents one of the largest challenges of the world and as a result the UN has made poverty reduction one of its core goals (halving the world poverty by the year 2015). In Ghana between 1991 and 2005 extreme poverty in the country reduced from 52% to 28%. Significant reduction in extreme poverty

was among export crop growers with poverty among subsistence farmers in the country remaining high at 59% (Ghana Statistical Service, 2007).

Northern region which accounts for 22% of the nation's population has 45% of the nation's headcount poor people. This translates to eight out of every ten people in the region living under one dollar a day, especially among subsistence food crop growers (Ghana Statistical Service, 2007). Cropping system in the region is entirely dependent on erratic rainfall pattern which lasts for only five months of the year. This entrenches subsistence households in poverty by reducing the number of working days subsistence farmers need for sustainable livelihood from a minimum of 200 days to 120 days (Scoones, 2009).

With nearly 72% of subsistence farmers in the Northern region not having formal education (MOFA/DFID, 2002), coupled with the fact that they have limited asset endowment, households in the region are very vulnerable in the wake of disasters. Their vulnerable situation compromises their ability to assimilate new technological breakthroughs in agriculture resulting in perennial marginal harvest year in year out (Ghana Statistical Service, 2008). Low level of formal education in subsistence households also limits their ability to exploit nonfarm activities to complement their household income (Ghana Statistical Service, 2008).

Education of their wards which could have been a sustainable pathway out of poverty appears to be besieged with the proverbial “chicken and egg problem”. Subsistence farmers are often saddled between having to educate their wards at the expense of using them to solve their overarching agricultural labour needs. This compels subsistence farmers use their children as farm labour allowing them to attend school when their labour needs on the farms reduce, precipitating school drop outs among their wards (Ellis and Ade Freeman, 2004). Multiple marriages, resulting in large

unplanned households, excessive expenditure on festivals and bidding for traditional titles by subsistence farmers compound the already sorry situation which leaves subsistence farmers trapped in the vicious cycle of poverty (Kostov and Lingard, 2002).

The food security situation in northern Ghana is dire. Majority of subsistence households face four months food insecurity in nearly all staples every year; especially around June when all crops would have been planted (Quaye, 2008). Ironically the time in the year where subsistence households undergo a lot of drudgery in land preparation and weeding on their farms coincides with the time they have less to eat, making them vulnerable to diseases which compromises their ability to labour and its attendant effects on low yields and incomes. The resultant effects of ill-health, low incomes and food insecurity have a three dimensional effect on the livelihoods of subsistence farmers which entrenches them in poverty.

In the face of these numerous challenges subsistence farmers adopt several livelihood strategies to ensure their survival and improved standard of living. What are those strategies? How does the strategies differ from each other in terms of resource endowment and household income? Do these strategies have a bearing on subsistence farmers feeling of satisfaction with life? To date, empirical information on the several livelihood strategies adopted by subsistence farmers in the Northern Region of Ghana and their contributions to household income, food security and subjective wellbeing remain scanty.

The purpose of this study was, therefore, to provide empirical information to bridge this knowledge gap.

1.3 RESEARCH QUESTIONS

The following research questions were addressed by the study;

1. What are the characteristics of subsistence farmers?
2. What are the household income patterns of subsistence farmers?
3. How diverse are the incomes of subsistence farmers?
4. What are the livelihood strategies adopted by subsistence farmers?
5. What are the assets (resources) owned with different livelihood strategies ?
6. What are the determinants of subjective wellbeing among subsistence farmers?

1.4 OBJECTIVES OF THE STUDY

The main objective of this study was to examine livelihood strategies and the determinants of subjective wellbeing among subsistence farmers in the Northern region of Ghana.

To achieve the main objective , the following specific objectives were addressed by the study:

1. To assess the characteristics of subsistence farmers in the study area.
2. To determine household income patterns of subsistence farmers .
3. To estimate income diversification of subsistence farmers.
4. To provide a typology of livelihood strategies adopted by subsistence farmers.
5. To determine the assets (resources) of farmers who have adopted different livelihood strategies.
6. To evaluate the determinants of subjective wellbeing among subsistence farmers

1.5 HYPOTHESES

The following hypotheses were tested in the study

- ❖ Demographic characteristics vary across subsistence farm households.
- ❖ Income patterns do exist in subsistence farm households.
- ❖ Income sources in subsistence farm households are diverse.
- ❖ Livelihood strategies vary across subsistence farm households.
- ❖ Assets endowment of subsistence farmers vary with the choice of a livelihood strategy.
- ❖ The choice of a livelihood strategy influences the subjective wellbeing of subsistence farmers.

1.6 JUSTIFICATION

Poverty reduction has always been at the fore front of government development agenda, as such over the years a series of programmes and initiatives have been promulgated aimed at reducing poverty in Northern Ghana and Ghana at large. Some of them; include the Ghana Poverty Reduction Strategy (GPRS I & II), the Millennium Challenge Account (MCA), LEAP, PAMSCAD, Sasakawa Global 2000, IFAD, NORRIP, AgSIP, USAID and the most recent Savannah Accelerated Development Authority (SADA). Also majority of other non-governmental organizations in the country are based in the Northern region with the aim of complementing government efforts at reducing poverty among food crop growers in the region. But to date however, the fact that poverty still stalks subsistence farmers in the region re- echoes the need for more to be done.

In doing more it is only imperative that the livelihood strategies employed by subsistence farmers in order to develop or help them escape poverty in the region are

looked at closely. It is also necessary to investigate the outcomes peculiar to the adoption of each livelihood strategy.

Notable also for research is to find out how fulfilled or satisfied subsistence farmers feel about life and whether the livelihood strategies they adopt contribute to their feeling of satisfaction. With most livelihood strategies structured to achieve satisfaction, implying that subjective wellbeing status can become an important yard stick by government and its development partners in their poverty targeting and reduction policies. For instance, how willing would a subsistence farmer who is already satisfied with the ends of his livelihood adopt any policies aimed at his development? With sustainable human development being at the helm of government and its partner's development agenda over the years, the study provides of policy alternatives focusing mainly on what is already working and what will work in the future.

This study provides a convenient lounge pad for future studies on poverty reduction and wellbeing analyses in Ghana and other parts of sub-Saharan Africa. The study is similar to works done by Adugna (2009), Barret et al (2008), and Ellis et al (2004) in Ethiopia, Kenya and Tanzania respectively. However, a distinguishing feature of this study is its focus on subsistence farmers and the introduction of subjective wellbeing and how it relates to the adoption of specific livelihood strategies.

1.7 ORGANIZATION OF THE STUDY

The study is organised into five chapters. Chapter One provides the introduction, problem statement, objectives and justification of the study. Chapter Two gives an overview of literature relevant to the study. Chapter Three outlines the methodology employed to achieve the objectives of the study. In particular, it describes the study

area, discusses the conceptual framework and the sampling techniques adopted for the data collection. In Chapter Four, the descriptive and empirical results are provided with conclusions and policy recommendations from the study in Chapter Five.

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CHAPTER TWO

2.0 REVIEW OF LITERATURE

2.1 INTRODUCTION

This chapter reviews literature as it relates livelihood strategies alongside subjective wellbeing and its determinants. The review of literature considers among other things the sustainable livelihood framework and the determinants of subjective wellbeing.

2.2 THE SUSTAINABLE LIVELIHOOD FRAMEWORK

The framework which is adopted for the study was postulated by DFID (2000), for the analysis of livelihood strategies aimed at benchmarking poverty reduction policies in developing countries. The livelihood framework by DFID served as a cadre for international development, with poor households as the nucleus around which poverty mitigation strategies were built. Since then however several sustainable livelihood approaches have been developed using the DFID framework as the base by organizations and researchers including, Oxfam, FAO, CARE, Khanya and the Multidisciplinary approach (De Haan, 2012).

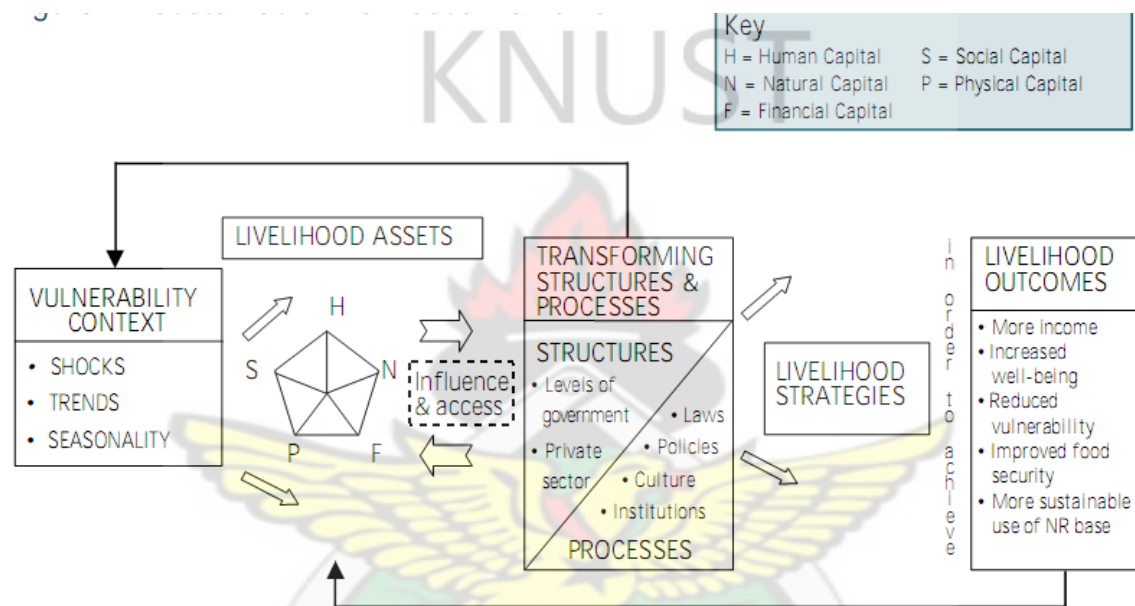
The framework from Oxfam had basic human rights and equitable distribution of resources at the core of its adopted framework to address poverty and deprivation. The FAO tailored the DFID (2000) framework towards achieving only food security. The CARE international's framework though very similar to the DFID framework in many ways, excluded livelihood strategies in its framework to address poverty. The Khanya framework which traces its roots to South Africa placed good governance at the core of its framework to counteract poverty and deprivation. The Multidisciplinary

approach developed by Karim Husein drew inspirations from the other livelihood frameworks with its locus being alleviating poverty through creating business opportunities for the poor and vulnerable. (De Haan, 2012).

Over the years however, these other sustainable livelihood framework approaches had significantly or marginally shifted the emphasis from building their fight against poverty around the vulnerable poor. The other frameworks had their emphasis on human rights, good governance and direct budgetary support as new approaches to fighting hunger and poverty. To date, however, the DFID 2000 framework is still very relevant in fighting poverty sustainably looking at the strengths of the vulnerable as in their assets and capabilities (De Haan, 2012; Clark and Carney, 2008). Further the DFID (2000) framework distinguishes itself from the other livelihood frameworks as it includes wellbeing as one of the ends of livelihood strategies. With this study's focus being on the livelihood strategies and the determinants of subjective wellbeing of a vulnerable group like the subsistence farm households in the Northern Region of Ghana, the DFID (2000), framework becomes the most appropriate. This is because, the study is carved around addressing poverty and deprivation starting from the assets and capabilities of the vulnerable subsistence farm household themselves. This makes the approach of study in tandem with the DFID (2000) framework relative to the other frameworks which seeks to shift the fight against poverty from directly involving the poor and vulnerable group. In so doing the study takes a bottom up approach rather than the top down approach or the combination of the two in its attempt to find initiatives to mitigate poverty and deprivation among subsistence farmers in the Northern Region of Ghana.

Figure 1 provides the key components of the sustainable livelihood framework by DFID (2000). A review of literature is made here on the key components of the livelihood framework including; livelihood vulnerability, livelihood assets and the institutional context. The rest being; livelihood strategies and livelihood outcomes.

Figure 1. Sustainable livelihoods framework



Source DFID, (2000)

2.2.1 Vulnerability Context

Vulnerability are occurrences which are generally beyond the control of people. According to Collier et al (2008), declining rainfalls and global warming, rising population, floods and drought episodes remain the major limiting factors to agriculture growth in developing countries. Despite worldwide coverage of climate change impact, there is intra-sectoral and inter-sectoral variations in the vulnerability depending on location, adoptive capacity and other socio-economic and environmental factors (Senbetta, 2009).

In Europe for example, the agricultural sector has benefited from global warming, while on the other hand agriculture in Africa has been affected negatively. This is attributable to the fact that global warming has resulted in reducing average rainfalls in Africa while average rainfalls in Europe have marginally increased over the years (Collier et al, 2008; McCharthy et al 2001). The effects of climate change have already contributed a lot in making the livelihood of subsistence farmers more vulnerable in sub-Saharan countries as seen in the recent increases in floods, droughts and shifts in marginal agriculture systems (Collier et al, 2008).

The livelihood framework by DFID (2000) puts livelihood vulnerability into groups of three: trends, shocks and seasonality. *Trends* as explained by the livelihood framework relates to predictable occurrences in nature like population growth and the social and economic consequences that go with it. Governance in relation to party politics and technology advancements both in diverse ways contribute to making the livelihood of the not so endowed less or more vulnerable. *Shocks* on the other hand are explained to mean the unexpected happenings in life which often destroy assets directly. The shocks here include conflicts, both human and livestock diseases, floods, bush fires and death of bread winners. The 1994 inter-ethnic conflict (guinea fowl war) in the Northern region destroyed 441 villages and 178000 livelihoods, while over 2000 lives were lost (Jonsson, 2007). Inter-ethnic conflicts in the region over the years have been precipitated by the demand for paramountcy from minority groups. With intra-ethnic conflicts emanating from non-royals wanting to ascend to thrones (Ibid). Coping with such shocks often compels people to abandon their home areas and prematurely dispose of their assets. By the DFID (2000) livelihood framework, *seasonality* also forms one of the three contributions to vulnerable livelihoods.

Fluctuations in food prices, crop yields, and employment opportunities are seasonal occurrences which tend to compromise the livelihoods of rural folks and urban poor people who spend large proportions of their income on food stuffs (Collier et al, 2008). Vulnerability by the livelihood framework affects people and industries differently. Floods could have adverse effects on rural economy but not on urban employment. Likewise changes in international commodity prices could affect mainly urban employment. As a result in sustaining livelihoods it is imperative that an inside out comprehension of the nature of the vulnerability be considered (DFID, 2000).

2.2.2 Livelihood Capital Assets

The DFID (2000) livelihood framework postulates livelihood to be supported by five livelihood assets also known as the asset pentagon. These assets include physical, social, natural, financial and human capital. The vulnerability context in the framework shapes the asset endowments; but it does not however imply that all livelihoods structuring starts from a vulnerable background (Scoones, 2009).

The approach is founded on a belief that people require a range of assets to achieve positive livelihood outcomes; no single category of assets on its own is sufficient to yield all the many and varied livelihood outcomes that people seek. This is particularly true for poor people whose access to any given category of assets tends to be very limited. As a result they have to seek ways of nurturing and combining what assets they do have in innovative ways to ensure survival (DFID, 2000).

2.2.2.1 Physical Asset

Physical assets in the livelihood framework comprises basic infrastructure and producer goods needed to support livelihoods (IFS, 2009). These physical assets include affordable transport (e.g. bicycle); secure shelter and building; adequate water supply and sanitation; clean and affordable energy; access to information (e.g. radio or mobile phones); and access to agricultural implements (IFS, 2009). Physical assets are necessary in the sense that lack or inadequacy of them can preclude people from having access to education, health facility and income. For instance, poor road network adversely affects the effective distribution of agricultural inputs and outputs which influences their prices on the market (DFID, 2000). In a study on livelihood assets in East Africa by Mkenda et al (2003), fishing gear (nets and boats) which were regularly damaged by whales and ships and accessible roads to transport fish to the market constituted the major physical assets in the livelihoods of the inhabitants of Zanzibar who were mainly fishermen. In a related work done by Lopez (2008), when he studied livelihood strategies in Bolivar and Ecuador, the regression output revealed that households owning small livestock and cattle which were both classified under physical assets were significant in their contribution to household income at 1% whiles productive assets like hoes, irrigation equipment and backpack sprayer were also significant at 1% and 5% respectively. However vehicles, chainsaws and machetes were insignificant assets owned by farmers.

2.2.2.2 Social capital

Gustavo et al (2001), grouped social capital into three classes; bonding, bridging and linking social capital. Bonding social capital entails the strong ties connecting family members, neighbours' and business associates. This group is largely homogenous sharing similar economic and social standing but different backgrounds. Bridging

social capital represents weak ties connecting between individuals from similar economic and social backgrounds. Linking social capital consists of ties between distinct social and economic classes such as between poorer households and those with influence in formal organization. Households seeking to explore social capital to improve their livelihoods depend on the number and types of relationships that households have and the quality of those relationships (Ibid). Social capital is identified to be helpful in; enhancing the efficacies of government, solving problems using the common pool approach, enhancing the diffusion of innovation, lowering transaction cost and serving as a form of informal insurance to smallholder farmers (Narayan and Pritchett, 1999).

Social capital in the DFID (2000) livelihood framework measures the social resources upon which people structure their livelihoods. It includes network and vertical or horizontal connectedness; membership of more formalized group; and relationship, which is captured in kinship and reciprocity of trust. When social capital is vertical citizen capacity for collective action is limited and influence over state markets becomes weaker. But horizontal social capital ensures higher levels of participation in social organization and other networks (Bebbington, 1999). Social capital is said to be the most important asset in terms of transforming structures and processes which directly impacts on the other livelihood assets. Social capital here influences incomes as communities with higher levels of social capital are often wealthier. Social capital also solves the “free rider problem” associated with public goods, by craving the indulgence of people to be more responsible. The development and sharing of useful knowledge is enhanced by social capital (Scoones, 2009). Sangina et al (2007), in a research on the roles of social capital, reiterated that people

with high social capital had enhanced skills to solve problems and bargain with middlemen. They also stated that social capital empowered women to participate in decision making and that significant difference did exist between social capital and the willingness of farmers to indulge in collective farming. Dickinson et al (2011), in a study in Madagascar drew a link between social capital and migration. The study emphasized that families with a member having ever migrated were more likely to migrate compared with households with no migration experience.

Studies by Sangina et al (2007) and Soini (2005) in Uganda and Kenya respectively both concurred that there was no relationship between social capital and household income, contradicting the assertion portrayed in the (DFID, 2000) livelihood framework. However, according to Lopez (2008), the amount of social capital farmers have significantly improves their accessibility to loans to invest in agriculture.

2.2.2.3 Natural capital

Natural capital in the livelihood framework consists of land, forest, water, biodiversity, air quality, waste assimilation and wild resources (Scoones, 2009). Within the livelihood framework, natural capital has the closest link with vulnerability in the sense that most of the shocks which destroys livelihoods are caused by changes in natural capital (DFID, 2000). The interdependence between man and the environment makes life generally impossible without assistance from natural capital (Scoones, 2009). According to Lopez (2008) and Boli (2005), in Bolivar and Kenya respectively, there is a positive correlation between livelihood outcomes and the size of land holding, with those having more access to land being generally better off. However, in a study on livelihood strategies in the Taita hills in Kenya by Soini (2005), natural assets were said to have positive, but insignificant contribution towards household income.

2.2.2.4 Financial capital

Financial capital comprises of the financial resources people use in structuring their livelihoods including: bank deposits or liquid assets like livestock, jewellery and loans from financial institutions (Scoones, 2009). Indicators of financial capital include; percentage of population with access to loans, livestock holding, cereal stock/ cereal production, wage rates and employment opportunities (IFS, 2009). Other income sources from crop sales, off- farm labour, pensions and remittances from relations also constitute financial capital (Ibid). Household financial capital in sub Saharan Africa is dominated by livestock (Guenther et al, 2009). In northern Ghana, however, maize and groundnut constitute the most important sources of cash to smallholder farmers (Ghana Statistical Service, 2008). Financial capital is described by the livelihood framework to be the most versatile of the pentagon of assets owing to the fact that with financial capital one could increase his holding in any of the other livelihood assets (DFID, 2000). Financial capital is the asset most poor people lack which makes the other livelihood assets mean much to them (Ibid).

Inadequate financial capital in subsistence livelihoods limits their seasonal liquidity needs to invest in agriculture which is an important barrier to agricultural development (Kydd and Dorward 2001; Prischke et al, 1983). The World Bank development report on agriculture argues that the cost of financial constraints for subsistence farmers is so huge in terms of both forgone opportunities and exposure to risk (World Bank, 2007). The demise of single channel marketing boards as a result of the structural adjustment policies has left a gap in the provision of agricultural finance (Winter- Nelson and Temu, 2005). Producers who lack credit are only able to purchase a fraction of inputs compared to their unconstrained counterparts. This

translates to lower net incomes and lower returns to labour and capital (World Bank, 2007). According to GLSS-5 (2008), twenty seven percent (27%) of farm households in Ghana owe money or goods to other persons with the level of indebtedness being more pronounced in rural Ghana (29.8%) than urban Ghana (24.1%). The fungibility of funds in subsistence livelihood and inadequate collateral makes subsistence farmers unattractive for commercial loans; this compels subsistence farmers to rely on their relatives, friends and traders more than half of the time for loans (Ghana Statistical Service, 2008; Ellis, 1993). Quaye (2008), reports that only 14% of farmers in the Northern region of Ghana have access to credit.

Subsistence farmers' investment of their financial capital is not uniform across their asset endowment, eighty nine (89%) of their investment is often spent on crops with the remaining eleven (11%) spent on livestock and fish (Ghana Statistical Service, 2008). In a study on livelihood capitals and outcomes in Kenya, financial capital was seen to be significant at 5% in its contribution to household income of smallholder farmers (Soini, 2005). Nearness to landmarks like towns, cities, paved roads and major water bodies were all significant in influencing the amount of financial capital each household had (Lopez, 2008).

2.2.2.5 Human capital

Human capital represents knowledge and skills, ability to labour, ability to adopt new technology, nutrition, household size and education (DFID, 2000; Bebbington, 1999). The DFID framework considers human capital as a generic livelihood asset that serves as the building block for the achievement of livelihood outcomes (DFID, 2000). Of the five asset pentagon human capital is the asset which lacks transferability which limits the chances of perpetuating certain livelihood strategies (Lopez, 2008). According to Boli (2005), there exist a strong link between level of education and

investment in agriculture. Lopez (2008), in a study on livelihood strategies in Bolivar and Ecuador identified; age, dependency ratio, primary education, secondary education and level of training received to be highly significant at 1% in determining household physical asset base. Level of the spouse education and average female education were significant at 5% in their contribution to physical asset base while average male education was positive but not significant (Ibid). Human capital, however, is said to have no relationship with household income of smallholder farmers in the Taita hills of Kenya (Soini, 2005). Human capital of subsistence farmers in northern Ghana is weak with over 72% of farmers being illiterate (Ghana Statistical Service, 2008). This affects the ability of subsistence farmers to adopt innovations while diseases like malaria, tuberculosis and guinea worm limit their ability to work by an average of forty eight days in a season. The unimodal rainfall regime in the region further compromises their resolve to construct sustainable livelihoods by increasing their work days (Scoones, 2009; GLSS-5, 2008; Asenso-Okyere et al, 2011). Labour scarcity is a major constraint to agriculture in northern Ghana, about forty- three percent (43%) of smallholder farmers' expenditure is spent hiring labour every season. This makes the number of people in each household an economic decision if complementary assets are needed in production. More successful households here will implicitly be those with more wives, children and dependents (Ghana Statistical Service, 2008; White and Leavy, 2001).

2.2.3 Institutional Context

The institutional context comprises; legislations, policies and initiatives by governments, international or local organizations and institutions which shapes the livelihood framework (DFID, 2000). The institutional context affects all the

components of the livelihood framework. Fiscal policy, economic trends, health and agricultural policies positively and negatively influence the *vulnerability context*, *livelihood strategies*, *livelihood assets* and *livelihood outcomes* (Ibid). Non-governmental organizations, government departments, training institutes and universities or donor agencies, have been slow in comprehending the importance of the words "participation", "ownership" and "empowerment" by and for the poor. Participation by the poor and vulnerable will not be sustainable or strong unless government and development partners too are participatory. The initiatives must be owned by those it is designed for not those who designed it. Policy initiatives should culminate in empowering the poor and vulnerable thereby disempowering the rich and prosperous not the other way round (Chambers, 1995).

According to Barrett et al (2001), investment by either the government and the private sector which is key for pro poor infrastructure development (eg markets, roads, high yielding varieties or breeds), asset accumulation and improved livelihood options is weak in Northern Ghana.

Asmah (2011), found that in Ghana the role of institutions in the transfer of information and knowledge to small farm households working in diverse settings, remote locations and some of whom are illiterate is very weak. Though there has not been any significant effect of access to extension service and non-farm livelihood diversification. This may not be too surprising considering the fact that agriculture extension departments in Ghana lack the resources and state-of-the-art technologies to deliver the required services to farming communities (Ibid).

2.2.3 Livelihood Strategies

Livelihood strategy is the combination of assets and activities that are required for a living (Ellis, 1998). A livelihood strategy is often times used interchangeably with coping strategy. However the latter is a mechanism adopted during crisis while the former represents the strategies people usually adopt in living (DFID, 2000). Scoones (2009), postulates three main livelihood strategies adopted by the poor, including; agriculture intensification/extensification, livelihood diversification and migration. The study by Scoones (2009), intimated the following check questions in analyzing livelihood strategies. First whether there is a sequence which supposes that a successful livelihood strategy usually should have a starting point, and whether one capital asset can be substituted for the other. The second has to do with whether a cluster of assets one had was related to a particular livelihood strategy. And finally, whether there were tradeoffs faced by people pursuing different livelihood strategies (Scoones, 2009; DFID, 2000).

Murithi et al (2006), in their study on the livelihood strategies in rural Kenya highlands, identified five distinct strategies using the asset cluster approach. Cluster 1 included: the part-time subsistence smallholder unskilled workers, who had the lowest mean income and skilled employment to supplement their earnings from crop cultivation. Cluster 2 consisted of mixed smallholders, who farmed more lands than cluster one and also earned more mean income though together with cluster 1 their earnings were far below one dollar a day. Clusters 1 and 2 were however similar in their livestock holding. Cluster 3 named staples producers, constituted the largest of the five clusters. The main distinguishing feature about this cluster was that they had more land and livestock compared to the other two clusters. Cluster 4 named off-farm skilled employment; had majority of their income coming from off-farm skilled

labour. They kept smaller but improved breeds of livestock than the other clusters already described. The last and the only cluster that yielded a mean income greater than one dollar a day were named the diversified commercial group. They dedicated most of their land to the cultivation of perennial crops, keeping improved livestock species alongside.

Studies on livelihood strategies by Ellis (1998), Barrett et al (2001), Babatunde et al (2008) and Adugna (2009) and Alemu (2012) grouped livelihood strategies along the permutations of main income sources including; *agriculture*, *off-farm* and *nonfarm*. Alemu (2012), however, included *non labour* which was conceptualized to represent income from transfers or remittance as a livelihood option

Ellis et al (2003), in their studies in Uganda, Kenya, Malawi and Tanzania employed livelihood differences comprising ; extensive versus intensive agriculture, small versus large scale farming, livestock keeping variations, proximity and remoteness from public infrastructure and services and finally variations in nonfarm activities to determine the building blocks to the construction of various livelihood strategies. The study identified five to six wealth rankings using PRA which revealed that among wealth ranking from the four countries studied, farmers in the highest wealth rank farmed on average more than two hectares, had four or more cattle, five or more smaller livestock, employed nonfamily labour seasonally, educated their children through to secondary school, owned bicycle and nonfarm service sector business or salaried jobs. The asset levels reduced significantly as one went down the wealth pyramid with the lowest category having no access to land, no livestock, sell their labour to others and they were usually unable to meet the cost of educating their wards .

According to Dorward et al (2005), livelihood strategies can be categorized into three, relating to the purpose for which it is being adopted. The categorization consist of the following. The *'Hanging In'* strategy, where livelihood activities are engaged in to maintain livelihood levels, often in the face of adverse socio-economic circumstances. *'Stepping Up'* strategy, where current activities are engaged in, with investments to expand these activities, in order to increase production and income to improve livelihoods – the accumulation of productive livestock for example. *'Stepping Out'* strategy is where existing activities are engaged in to accumulate assets which in time can then provide a base or 'launch pad' for moving into different activities that have initial investment requirements leading to higher and/or more stable returns – for example accumulation of livestock as savings which can then be sold to finance children's education (investing in the next generation), the purchase of vehicles or buildings (for transport or retail activities), migration, or social or political contacts and advancement.

2.2.3.1 Off-farm/Nonfarm activities as a livelihood strategy.

Literature has been inconsistent with what really constitutes off-farm and nonfarm, using the two terms interchangeably. However according to Reardon et al (2001), agricultural activity consists of production and gathering of unprocessed crops or livestock or forest or fish from natural resources. They noted that all other activities or sources of income from processing, transport of unprocessed agricultural, forest and fish products then become nonfarm activities or income sources irrespective of where the activity takes place and at what scale and with what technology. Gordon and Craig (2001), also concurred with this definition when they defined nonfarm or nonagricultural activities as all activities that are not primary agriculture including trading and processing of agricultural products. The above definitions of nonfarm

activities consider largely the sector in which the activity is taking place. Off-farm is defined with respect to location rather than sector as it is considered as wage employment especially agriculture outside ones farm (Reardon et al, 2001; Ellis, 1998). Bezemer et al (2004), however considers off-farm to encompass all other activities outside ones farm with nonfarm standing for those activities outside one's farm that are not primarily agriculture in nature.

Literature has identified several factors which motivate farmers to choose off-farm and nonfarm occupations. Reardon et al (1998) argues that the decision by farmers to partake in nonfarm activities is influenced by the incentives (credit access or remittance) they may be receiving and their capacity to involve in nonfarm activities. The regression output from a study by Babatunde et al (2010), revealed that gender, level of education, amount of assets owned and access to public water were all significant at 1% in determining one's participation in off-farm activities. Access to electricity and market were significant at 5% while household size was significant at 10%. Access to credit, nearness to tarred road and age of household head however had positive but insignificant effect on smallholder farmers' involvement in off-farm activities in the Kwara state in Nigeria.

Off-farm and nonfarm activities are responsible for half of household income in Sub-Saharan Africa (Reardon et al, 1998; Ibekwe et al, 2010). In Ghana 46% of household income comes from off-farm activities with women contributing 82% of it (GLSS-5, 2008; Owusu et al, 2009). Empirical studies by Ellis et al (1998), Reardon et al (1998), Babatunde et al (2010), Upton (1997), Douwe (1997) and Gordon and Craig (2001) have reported a positive correlation between agricultural output and off-farm and nonfarm activities. However, Ikekwe et al (2010) argued that farm output was

rather negatively correlated with off-farm and nonfarm income/activities noting that declining output in agriculture always pushes farmers in choosing alternatives outside agriculture. Aside their role in household income, off-farm and nonfarm activities help; absorb surplus labour in rural areas, spread risk, provide alternative source of income during the dry season and it can serve as a reliable livelihood prop should agriculture fail (Gordon and Craig, 2001).

2.2.3.2 Migration as a livelihood strategy.

Migration is a “geographic or spatial mobility involving a change of usual residence between clearly defined geographic units.” Ghana is a very mobile country with 59% of its population aged seven and above being temporal or permanent migrants (Ghana Statistical Service, 2008).

Literature is unanimous in asserting that migration in poor and vulnerable households is an effective poverty redistribution and reduction strategy (Waddington, 2003; Geest, 2011; Kanbur et al, 2005; Douwe, 1997). It has been reported that the most effective way to facilitate deconcentration of economic activities and to help the poor benefit from the global economy is to remove all barriers to migration (Kanbur et al, 2005). However, though migration is a human well-being enhancement strategy, the decision to migrate is contingent on asset base and social networks available. The economics behind migration as a livelihood strategy limits the extremely poor households from exploiting it as poverty ameliorating strategy (Waddington, 2003). Remittances from migrated former household members form a crucial source of income for investing in farm and nonfarm activities, for house construction and social security against unknown outcomes (Douwe, 1997; Scoones, 2009; Waddington, 2003). Households with members working away in urban centers or abroad are often

referred to as “split families”, and their livelihood strategies are described as “straddling” (Ellis, 1998).

Migration in Ghana is usually motivated by marriage, employment, conflict, nonfarm opportunities, witchcraft and the desire to be free (Ghana Statistical Service, 2008). In a study on north-south migration in Ghana by Geest (2011), it was found out that the amount of rainfall and crop yields were negatively correlated with migration at significance levels of 1% and 5% respectively, while population density was positively related to north-south migration in Ghana.

2.2.3.3 Diversification as a livelihood strategy.

Livelihood diversification or pluriactivity is defined by Ellis (1998) as “the process by which rural families construct a diverse portfolio of activities and social support capabilities in order to survive and to improve their standards of living”. Scoones (1998) considers livelihood diversification as a choice to invest in order to accumulate assets or activities aimed at coping with temporal or permanent livelihood adversity. Ross et al (2010), considers diversification as the spreading of investment across assets which protect livelihoods from extreme exposures. Literature offers many reasons why such diversification and or integration occurs; among these might be diminishing returns on increasing investment in certain activities. Similarly, subsistence farmers may wish to minimize risk *ex ante* by participating in activities that generate imperfectly correlated returns (Ellis, 1998; Barret et al, 2001).

Ellis (1998) argues that income diversification is not synonymous with livelihood diversification though the former is the most effective measure of diversification. Income diversification comprises of what constitutes household income at a particular

point in time while livelihood diversification encompasses other factors like kinships and social networks that are intricate in the survival strategies of the rural poor.

Livelihood diversification is broadly determined by *necessity* culminating from issues surrounding; access to land, land fragmentation, declining soil fertility, ill health and natural disasters and *choice* which is represented by proactive initiative to educate household members to position them better for nonfarm job opportunities or to save money to invest in nonfarm business. Livelihood diversification motivated by choice is considered as a luxury that removes such bracket of people from the poor and vulnerable people of the world. Diversification influenced by necessity is often determined by seasonality and its effect on income variability, labour and consumption smoothing problems; risk spreading or coping strategies; credit market failures and; asset endowment strategies (Ellis, 1998).

Livelihood diversification among smallholder farmers is often seen in three main faculties or portfolios including; on farm diversification comprising of mixed cropping and mixed farming; off-farm and nonfarm activities and a cocktail of activities (Asmah, 2011). In a study on livelihood diversification in rural households in the Oyo state of Nigeria, human capital was seen to be significant at 1% in influencing household's degree of diversification while natural capital, social capital, physical capital and financial capital were all significant at 5% in determining diversification. In a related study in Tanzania, Dimora and Sen (2010) concluded that non agriculture-salaried strategy was less diverse compared with agriculture- biased livelihood strategy which was highly diverse.

Literature postulates that livelihood diversification is more pronounced among the poor in transition economies whereas in Sub-Saharan Africa diversification is rather the other way round where it is common among well endowed (Kanbur et al, 2005).

2.2.3.4 Subsistence agriculture as a livelihood strategy in Ghana

Subsistence agriculture, though a common livelihood strategy employed by people on the margins of life, is seldom defined. There are several definitions of subsistence agriculture in literature, the feature of non-integration with the market, predominant use of family labour, low technology use, poor perennial yields, are common in most definitions. Mollers et al (2007), argue that subsistence agriculture can be defined using any one of three parameters including; economic size, physical measure and market integration. Ellis (1993) defines subsistence agriculture as “ farm households, with access to their means of livelihood in land, utilizing mainly family labour in farm production, always located in larger economic system, but fundamentally characterized by partial engagement in markets which tend to function with a high degree of imperfection”. Subsistence agriculture is a way of life in which knowledge of farming systems is transmitted from generation to generation through apprenticeship Douwe (1997), Goran (1986), Mills (1975) and Schultz (1964).

Subsistence agriculture is a labour intensive livelihood strategy. Saddled with this challenge of farm labour inadequacy, subsistence farmers invariably choose to use their wards as farm helps and only allowing them to attend schools when their farm labour needs reduce, thus constraining their children of having full access to formal education (Mollers, 2007). The over intensive use of labour makes marginal product of additional labour input for this type of livelihood to almost zero (Ellis, 1998).

Farming principally to feed the household makes subsistence agriculture deemed to contribute insignificantly to agricultural growth and development (Kostov and Lingard, 2002).

As a survival strategy for people at the margins of life, farmers diversify their farming system growing a mix of crops on fragmented farms scattered across the neighborhood and beyond to reduce the impact of failure on their lives (Kwarteng et al, 1994). They are skeptical about innovation leading to inefficient resource use making their marginal value product less than input prices, thereby increasing their risk (Ellis, 2007). Subsistence agriculture in northern Ghana is largely rain fed with erratic rains for four to five months, translating to about 120 working days in a year. With the minimum working days required for a sustainable livelihood being 200 days (Scoones, 2009), it can be implied that subsistence farmers in the Northern region are not able to work enough to sustain their livelihoods.

Subsistence agriculture as livelihood strategy is largely considered by modern society as a problem and anti-agriculture development (Sarris et al, 1999). Perennial poor harvest compels subsistence farmers to be net buyers of food. In other words, they are unable to live on the food they grow. They are often caught at the extreme ends of market failures selling their farm produce below the shadow price and buying farm produce above the shadow price. Under such circumstance both sales and purchase are not desired (Kostov and Lingard, 2002).

Subsistence farmers tend to spend most of their meager incomes on uneconomic things like funerals, festivals and the payment of dowry. In the end they are unable to save for investment, thereby entrenching themselves in the vicious cycle of poverty and deprivation (Upton, 1996). To this end Ellis (1998), asserts that most of the

problems confronting subsistence farmers have cultural and attitudinal undertones making it overly impossible for them to circumvent.

The livestock subsistence farmers keep constitute an important supplement to their livelihood. However, livestock keeping also has its own myriad of challenges including rustling, inadequate grazing lands, diseases, cost of veterinary drugs among others (Ashley et al, 2003; Fialor, 2010). Most of these problems enumerated have stalked subsistence farmers for centuries and to date subsistence farmers still live just like their grandfathers indicating no progress. Subsistence farmers are rarely prosperous; they are often among the poorest on the margins of society, who may often cultivate small though they have user rights to larger areas which they leave fallow or allow livestock to graze. Capital in subsistence livelihoods is often tied up in permanent crops, livestock, tools and equipment (Ellis, 2007). Other capital items include buildings, fertilizer, stored seeds, animal feeds and agro-chemicals. Though family labour forms the crust of subsistence household's labour needs, forty-three (43%) percent of their annual expenditure goes into hiring labour during peak periods in the season on ad hoc bases. Being both producers and net consumers of agricultural commodities and inputs, subsistence farmers are often at the receiving end of market failures (Upton, 1997; Ghana Statistical Service , 2008).

Diversification, which is another livelihood strategy adopted by subsistence farmers, minimizes the effects of the exposure of their livelihoods to extreme effects like variations in the weather, diseases, price fluctuation of agricultural commodities and lack of information precipitating market failures which greatly affect the livelihood strategies of subsistence farmers (Ross et al, 2010).

The ability of subsistence farmers to diversify their livelihoods is contingent on their resource endowments. Resource endowments like; knowledge, skills, health, capital

and time are essential in the exploration of off- farm and non- farm activities. Migration which could be voluntary or compulsory is another livelihood option subsistence farmers can adopt to leave agriculture temporally in order to earn more capital to reinvest in agriculture or other livelihood options or to leave agriculture entirely for good (Scoones, 2009).

The adoption of a successful livelihood strategy or a multiple of strategies among subsistence farmers is seldom achieved, since each livelihood option is dependent on a number of complex matrices. For instance, when adult males choose to migrate, labour needs of the households is left in the hands of women who are often handicapped when it comes to labour-intensive task like land clearing. However where remitted income from migrated relatives equals or exceeds the cost of hiring labour, then the decision to migrate becomes beneficial (Ibid).

2.2.4 Livelihood Outcome

Livelihood strategies are usually constructed to achieve specific ends in life known as livelihood outcomes. Livelihood activities like agriculture, off- farm, nonfarm and a mixture of activities achieves among other things; improved income, increased wellbeing, reduced vulnerability, improved food security and a more sustainable use of the natural resource base (Scoones, 2009; DFID, 2000). The literature on livelihood outcome is however limited to, household income, household food security and subjective wellbeing in accordance with the scope of the study.

2.2.4.1 Income as a livelihood outcome

Household income is a measure of the combined incomes of all people sharing a particular household or place of residence. It includes every form of income such as

salaries and wages, retirement income, transfers (which can take the form of either cash or household supplies) be it from government or from other relatives and investment gains (Ghana Statistical Service, 2008).

About sixty eight per cent (68%) of household income in the Northern region of Ghana comes from agriculture (maize and groundnut sales constituting 46%), while off-farm wage employment, nonfarm activities and remittances constitute 10.4%, 13.8% and 5.4% respectively of household income (Ghana Statistical Service, 2008). However, Upton, (1996) and Reardon et al, (2002) reported that 30% to 50% of household income from subsistence households comes from off-farm and nonfarm sources.

The per capita daily income for the Northern Region is 0.64 GH cedis while daily per capita expenditure is 0.83 GH cedis which is below the national average of two Ghana cedis a day. More than half of household income (65.2%) in the Northern region is spent on food (Ghana Statistical Service, 2008). About 86% of Ghana's rural population live below the extreme poverty line of one US dollar a day (Asenso-Okyere, 2012).

The Share the World's Resources Organization (STWR) of the UN has broken this level of poverty down into three groups: subadjacent poor: those living on between \$0.75 and \$1 a day; medial poor: those living on between \$0.50 and \$0.75 a day; and ultra- poor: those living on less than \$0.50 a day . Approximately 162 million people live in ultra- poverty on less than 50 cents a day. To put this number in perspective, if all of the ultra- poor were concentrated in a single nation, it would be the world's seventh most populous country (UN, 2008). Studies have found that those living in ultra- poverty are mainly concentrated in Sub-Saharan Africa. Sub-Saharan Africa is home to more than three-quarters of the world's ultra- poor. Sub-Saharan Africa is

also the only region in the world in which there are more ultra- poor than medial or subjacent poor.

2.2.4.2 Food security as a livelihood outcome

Food security which is another measure of livelihood outcome is defined as “having access to good quality nutritious food, hygienically packaged, attractively presented, available all year round and located at the right place at affordable prices” (FASDEP, 2007). For too long the face of sub-Saharan Africa has been one of dehumanizing hunger. More than one in four Africans is undernourished, and food insecurity—the inability to consistently acquire enough calories and nutrients for a healthy and productive life—is pervasive. Nyanteng and Asuming-Brempong (2003), in their work on the role of agriculture and food security, reported that twenty-four percent (24%) of Ghanaians were food insecure. However, according to Quaye (2008) who studied food security situation in the three Northern regions of Ghana, ninety seven percent (97%) of the respondents experienced food insecurity at least once in a year. With the most vulnerable period in the year being from April to July. With agricultural products being normal goods and having elasticity of demand less than one, meaning irrespective of the price of food in the market, the poorest of the poor still spend most of their incomes on food. This implies that income growth through sales of products and transfers would overly be used by the poor to address their food insecurity problems (Boussard et al, 2006).

2.2.4.3 The theory of subjective wellbeing (SWB) as a livelihood outcome

Wellbeing, which is the most explicit measure of livelihood outcome, can be core or subjective. Core wellbeing encapsulates basic material and non-material needs such as material wealth, knowledge and nutrition while subjective wellbeing (SWB) covers

one's feeling of being happy or satisfied. With one of the ultimate ends of any human endeavour being to achieve satisfaction/happiness, implying that, what people do for a living would implicitly or explicitly have a bearing on their feeling of satisfaction. Thus the achievement of satisfaction/happiness becomes a livelihood end in itself (Cahyat et al, 2007). Subjective wellbeing or satisfaction with life is motivated by several theories in literature. The *liking, needing and wanting* theory propounded by Inglehart (1990) and supported by Paterson (2005) relays that subjective well-being is influenced overly by liking what you get or getting what you like. The *multiple discrepancy* or the *social comparison* or *keeping up with the Joneses* theory supported by Easterlin (1995) and Michalos (1985) argue that peoples SWB is motivated by a comparison to a particular standard in life, with the most satisfied individuals being those who feel their life situations puts them above the standard. Veenhoven (1999) and Veenhoven (2004) Clark and Oswald (1994), Easterlin (2001), Frey and Stutzer (2002), Dolan et al (2011) support a theory described as the *top down and bottom up* approach. The theory seeks refuge in the concept that SWB is influenced by macro social factors like wealth, freedom and equality. The *mental health continuum* theory propounded by Keyes (2002) argues that the most satisfied individuals are those with complete or sound mental state of health (Durayappah, 2010), propounds that subjective wellbeing is influenced by the 3P's theory being; individuals *past* experience with life, their *present* life situation and the *prospects* have about the future.

2.3 DETERMINANTS OF SUBJECTIVE WELL- BEING

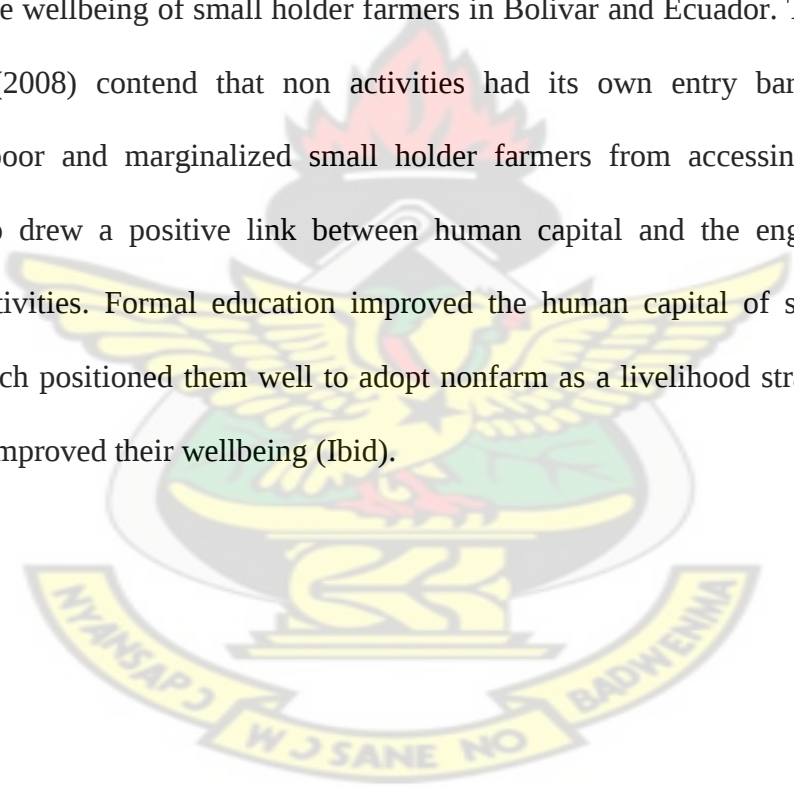
Income of a reference group or a cohort is known from literature to be as important as household income in determining subjective wellbeing (SWB), as individuals tend to

be happier if their incomes are wider than the incomes of their cohort group. That is the perception of one's incomes being enough among his peers also determines SWB (Ferrer-i-Carbonell, 2005). Evidence from Easterlin, (1995) supported by Clark and Oswald, (1994) relates that SWB varies directly with individuals income and inversely with the income of others. McBride (2001) and Argyle (1999) both found a negative co-efficient between SWB and the income of others (reference group). Diener et al (1999) report that the substitution effect of income with basic needs like food, shelter, clean water and health is the reason why it relates positively with SWB. Thus poverty should affect subjective well-being if it indeed affects basic needs. Ferrer-i-Carbonell (2005), relays that aside household income, demographic characteristics like household size, gender, age, whether the individual works or not and number of children also influences SWB. On age Veenhoven (2006) relays that age has a concave relationship with subjective wellbeing. People then to be happier in their early life's (twenties) and latter life's (after fifty years) and less happier in the mid years when they are involved in work. This view on age and subjective well-being is contradicted by Michalos (1985) who opine that SWB increases or at least does not reduce with age.

Religion, according to Pollner (1989) and Ellison (1991), correlates positively with subjective well-being. They argue that religion gives psychological and social meaning to life, especially to people who have lost all forms of social support. Veenhoven (1999) found that job satisfaction positively influenced satisfaction with life. According to Veenhoven (2006), intrinsic motivation, person-fit organizations and social benefits are important precursors to life satisfaction while job complexity, compulsory extra hours and work home conflict negatively influenced SWB. Though literature has not found any significant difference in SWB as it relays to gender, men

according to Pollner (1989) are slightly more satisfied with life than women. Diener et al (1993) found that education had a marginal but significant effect on SWB with the effect being more pronounced in low income countries. Nguyen (2008) opines that livelihood strategy adopted contributes to farmers satisfaction with life in as much it contributes to farmers relative income.

In a study on livelihood strategies in Bolivar and Ecuador by Lopez (2008), dependence on agricultural wage work as a livelihood strategy reduced the wellbeing of small holder farmers, while livelihood strategies propped by nonfarm activities improved the wellbeing of small holder farmers in Bolivar and Ecuador. The findings by Lopez (2008) contend that non activities had its own entry barriers which prevented poor and marginalized small holder farmers from accessing it. Lopez (2008), also drew a positive link between human capital and the engagement in nonfarm activities. Formal education improved the human capital of small holder farmers which positioned them well to adopt nonfarm as a livelihood strategy which eventually improved their wellbeing (Ibid).



CHAPTER THREE

3.0 RESEARCH METHODOLOGY

3.1 CONCEPTUAL FRAMEWORK

Livelihood denotes the assets, capabilities and activities required for a living and it is said to be sustainable when it can recover from shocks and stresses without undermining the natural resource base (Chambers and Conway, 1995). For this study however, livelihood would epitomize what subsistence farmers do for a living.

Subsistence farmers are considered here as a traditional farmers who draw their motivation to produce based on the demands of their households and with some marginal level of market integration. Subsistence farmers here combine their resources and activities in several ways possible in their livelihood endeavors. Such combinations are considered as their *livelihood strategies*. Livelihood strategies which are usually constructed to survive or develop, influence and are being influenced by the problems which usually shapes or determines the form the livelihood strategies would take. Such problems like illness, natural disasters, death of bread winners, wars and market failures are described here as livelihood *shocks/vulnerability*. Whereas there are many things which make livelihoods vulnerable, this study, owing to the inadequacies of time and resources, limits itself to using ill-health as a proxy to livelihood vulnerability. Livelihoods strategies are usually means to an end. Ends in livelihoods strategies are described as *livelihood outcome*. Livelihood outcomes comprise of: reduced vulnerability, improved income, improved wellbeing, food security and sustainable use of natural resource base (DFID, 2000). For resource inadequacy owing to the time required to measure sustainability in the use of natural resources, this study is limited to the use of

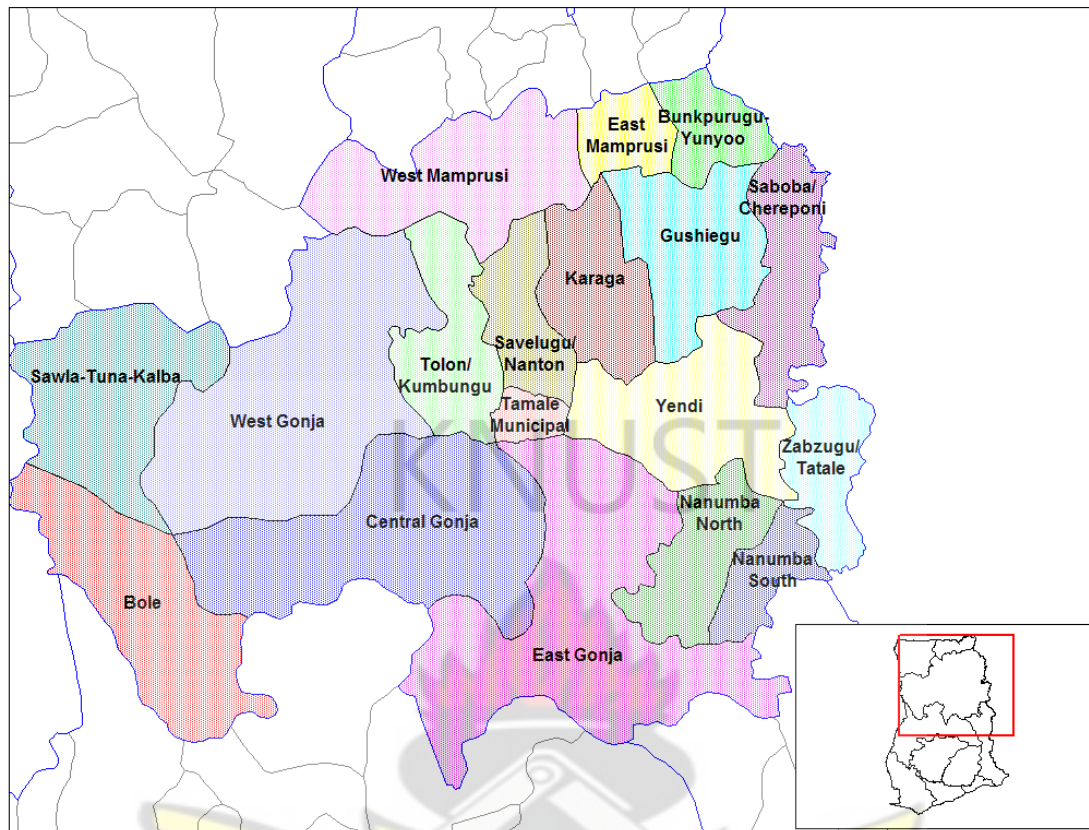
household income as a proxy for livelihood outcome. Livelihood outcomes might be numerous, but the ultimate aim of any livelihood strategy would be to achieve satiation/satisfaction with life (Easterlin,1995). The satiation/satisfaction/happiness with the ends of subsistence farm households livelihood endeavors is described here as **subjective wellbeing** (SWB). The crux of this study is therefore to identify the livelihood strategies subsistence farmers adopt and extrapolate the role these strategies may have on their feeling of satisfaction with life.

The study of livelihood strategies and the relationship these strategies may have on subjective wellbeing was conducted using farm households as **unit of analysis**. A household here was considered as a group of people who share the same dwelling, feeding arrangement and come under one person who is responsible for major decisions that affect them (Ghana Statistical Service, 2008). The concept of sustainable livelihood approach by DFID (2000) was the guiding framework used in the study to assess livelihood strategies and the determinants of subjective wellbeing of subsistence farmers.

3.2 THE STUDY AREA

The study on livelihood strategies and the determinants of subjective well-being was carried out in the Northern Region of Ghana (Fig 2). The study area was reviewed looking at the location of the region, the climate of the region, the ethnic groups in the region and the economic locus of the region.

Fig 2 Map of Northern region of Ghana showing all administrative districts.



www.ghanadistricts/northern

3.2.1 Location Of The Region

The Northern region occupies 70383 square kilometers and it is the largest region in Ghana in terms of land and the most sparsely populated. The population of the region as at 2010 was 2,468,557 made up of 1,210,702 males and 1,257,855 women (Ghana Statistical Service, 2011). It is surrounded by the Upper East and the Upper West regions to the north and the Brong Ahafo and the Volta region, to the south, while sharing the east and the west with Togo and Cote d' Voire respectively (www.ghanadistricts/northern).

3.2.2 The Climatic of the Region

The climate of the region is relatively dry, with a single rainy season that begins in May and ends in October. The amount of rainfall recorded annually varies between 750 mm and 1050 mm. The dry season starts in November and ends in (March/April) with maximum temperatures occurring towards the end of the dry season March-April (www.ghanadistricts/northern). Soils in the region with the exception of limited alluvial ones are not productive. The soils are dominated by shallow easily waterlogged laterites overlying iron pan formation and by savannah chrosols. The sparse vegetation results in low humus in the soils (Gyasi, 2010).

3.2.3 Ethnic Groups in the Region

The region is divided into twenty (20) districts. Less than a tenth (7.0%) of the economically active people in the region are unemployed. The region has seventeen (17) ethnic groups. The major ethnic groups being the Mole Dagbon, (53.2%) the Gurma, (26.8%) the remaining being and the Guan ethnic group. Among the Mole-Dagbon, the largest subgroup are the Dagomba and the Mamprusi, while the Komkomba are the largest of the Gurma, the Chokosi of the Akan and the Gonja of the Guan. The Dagomba constitute about a third of the population of the region (www.ghanadistricts/northern).

3.2.4 Economic Locus of the Region

The Northern region is the third poorest region in Ghana after the Upper East and Upper West regions. The per capita daily income for the Northern region is 0.64 GH cedis while daily per capita expenditure is 0.83 GH cedis below the national average of two Ghana cedis a day More than half of household income (65.2%) in the Northern region is spent on food (Ghana Statistical Service, 2008).

Agriculture, hunting, and forestry are the main economic activities in the region. Together, subsistence farmers account for 92 per cent of the economically active population, aged 15 years and older. Nonfarm opportunities in the region are few; they normally come in the form of butchering, tailoring, barbering (wanzam), trading, blacksmithing, traditional healing, fortune telling and other skilled or unskilled labour (www.ghanadistricts/northern).

Natural assets in the Northern Region include large stretches of vast agricultural land. It is the region with the least number of persons per square kilometer. The region on average has 35 persons per square kilometer (Ghana Statistical Service, 2012). Sheanut (*Butyrospermum parkii*) trees which alongside that from Burkina Faso, produces the best shea fruits in the world. Other natural assets include, dawadawa (*Parkia biglobosa*) trees, baobab (*Adansonia digitata*) trees and nim (*Azachdira indica*) trees. The major water resource in the region is the Volta lake which off recent has created a lot of simmering tensions between Ghana and Burkina Faso over its use and management (www.ghanadistricts/northern).

3.3 SAMPLING PROCEDURE AND SAMPLE SIZE

In order to ensure that the sample was as representative as possible, a multistage sampling procedure was employed by the study. With the fact that livelihood strategies and subjective wellbeing could be influenced by some cultural undertones (Ellis, 1998; Inglehart, 1999), four districts were purposively selected to give the study a fair representation of the three major ethnic groups in the region. With over

50% of inhabitants in the region being Mole Dagomba (www.ghanadistricts.com), two of the four districts were randomly selected from eight (8) predominantly Mole Dagomba speaking districts in the region.

These are the Tamale Metropolis and the West Mamprusi district. The Central Gonja district was sampled from four (4) Guan speaking districts while the Kpandai district was randomly selected from three (3) Gurma predominant districts (Recently carved out of the East Gonja district).

For the uniform distribution of subsistence farmers across all districts in the region, ten communities were then selected from each district in the second stage using systematic random sampling technique where the Kth (where k is the sampling interval or the skip) element was randomized for each sampled district. With Kth element being the number of communities in each sampled district divided by ten (10).

Table 1. Districts, Communities and Households sampled for the study

Districts			Communities		Households
Purposive sampling	Tamale Metro	Systematic sampling	10	Simple random sampling	93
	West Mamprusi		10		94
	Central Gonja		10		66
	Kpandai		10		93
Total	4	Total	40	Total	346

The list of communities used for the study is in appendix VI

In the final stage, subsistence farm households were sampled without replacement from the villages and communities. The number of subsistence farm households sampled from each community was relative to the representative share of the three major ethnic groups in the region. Approximately nine subsistence farmers were sampled from each community in the Tamale metropolis, West Mamprusi and Kpandai districts while seven subsistence farmers were sampled from the Central

Gonja district. In all, from the two Mole Dagomba districts one hundred and eighty seven (187) subsistence farmers were sampled representing fifty four percent (54%) of the total sample. Ninety three (93) subsistence farmers sampled from Tamale metropolis and ninety four (94) from West Mamprusi. Ninety three (93) constituting twenty seven percent (27%) sampled from Kpandai district which represented the Gurma speaking inhabitants of the region. Central Gonja which was sampled from Guan predominant districts , sixty six (66) subsistence farmers representing nineteen percent (19%) were sampled. Put together a total of 346 subsistence farm households were sampled for the study.

3.4 DATA COLLECTION

This section of the study takes an overview on the types and sources of data, questionnaire design and pre-testing and the conduct of the survey.

3.4.1 Types And Sources of Data

Primary data on household socio-economic characteristics was collected from sampled households heads through informal and formal survey using structured and semi structured interview questionnaires. Secondary data for the study was drawn from the Ministry of Food And Agriculture (MOFA), Ghana Statistical service, District assemblies and Academic journals/Publications.

3.4.2 Questionnaire Design And Pre-testing

The questionnaire was in six sections labelled A to F. Section A consisted primarily of questions covering the demographic statistics of each respondent. Section B covered the various livelihood activities of respondents and the income they earned

undertaking each livelihood option during the production year. Section C of the questionnaire covered the food security and the subjective well-being of respondents. Household expenditure and household assets were in sections D and E respectively, while the constraints respondents faced in constructing their livelihoods was in the last section labelled F. Enumerators were given a week's intensive training on the questionnaire after which they pretested the questionnaire in Dohinaayili a suburb of Tamale. After the pretesting two questions in section B of the questionnaire were removed because they appeared ambiguous. Also in order to validate responses of the respondents a series of check questions were introduced at each section of the questionnaire.

3.4.3 The Conduct of The Survey

Gaining the farmers' confidence and obtaining accurate information was a key objective during the fieldwork. To achieve these objectives, respondents (household heads) were assured of privacy, interviews were held in places of their choice and they were assured that the researchers are not related to any government tax agency and information gathered would be used for academic purposes. Most of the interviews were held at the farm or in the farmer's house. The interviews were also conducted in the local language of the respondents to ensure that the information elicited from the farmers was not compromised in the shortcomings of translations.

3.5 DATA ANALYSIS

Data was analyzed using a number of statistical tools including; Cross tabulations, averages, percentages, cluster analysis and pentagonal radar diagrams. The rest included Hirschman-Herfindahl Index, an Ordered logit model and a logit model. These were facilitated by SPSS 16 and STATA 10 software packages.

3.5.1 Identifying Livelihoods Strategies Among Subsistence Farmers

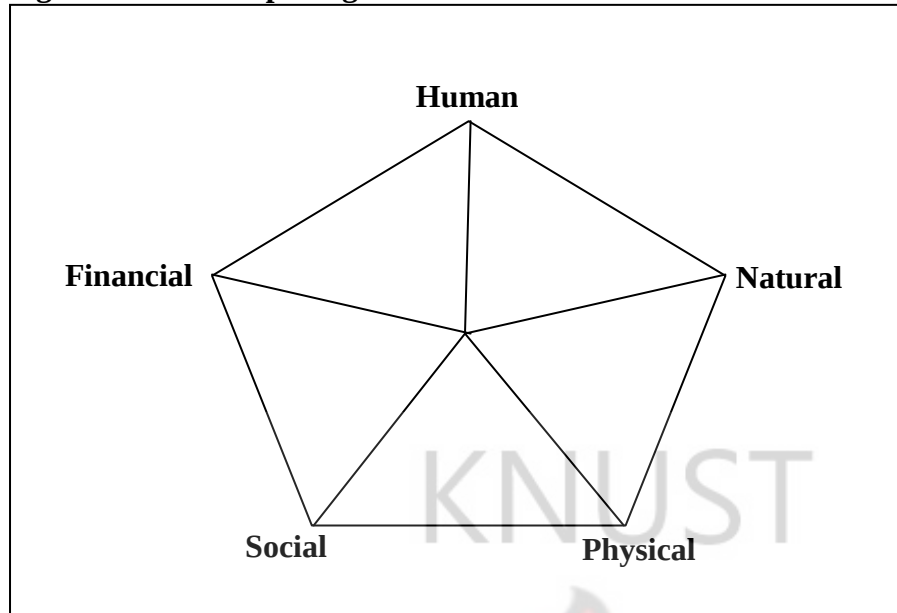
Cluster analysis is a statistical tool which identifies similarities and dis-similarities between groups of variables (Sambamoorthi, 2003). It was used to identify the livelihood strategies adopted by subsistence farmers in the Northern region of Ghana. Here subsistence farm households with similar sources of income were grouped into identical clusters. These identical qualitative clusters of similar sources of income were used to identify the various livelihood strategies employed by subsistence farmers in the Northern region of Ghana.

3.5.2 Measuring The Assets of Subsistence Farmers

The asset pentagon in Figure 3 was used in the study to estimate the resource (assets) endowments of subsistence farmers. The pentagonal radar is drawn using estimated asset indices from the five livelihood assets. The radar can be drawn using Excel and other spread sheet soft wares.

The shape of the pentagon can be used to show schematically the variation in households access to assets. The idea is that the centre point of the pentagon, where the lines meet, represents zero access to assets while the outer perimeter represents maximum access to assets. On this basis different shaped pentagons can be drawn for different livelihood strategies (DFID, 2000).

Figure 3 The asset pentagon



Source; DFID (2000)

From the study, asset indices were developed for the pantheon of assets for each adopted livelihood strategy. Thus each livelihood strategy had a common asset index for the five capital assets (Human, Natural, Financial, Physical and Social). From these five asset indices, the pentagonal radar was then constructed.

3.5.3 Measuring Income Diversification Among Subsistence Farmers

The Hirschman-Herfindahl index (HI) was used in the study to measure income spread of subsistence households. The (HI) index is normally used to measure the concentration of industries by summing the squares of their market shares. The removal of one from the Hirschman- Herfindahl index (1-HI) then denotes diversification (DI). A higher index (DI), denotes a higher level of diversification (Barrett and Reardon, 2000).

The inverse of the Herfindahl index (1/HI) gives another measure of diversification which represents the number of income sources (NIS) which contributed 10% or more to total household income. The relation used to measure diversification is given as;

$$DI = 1 - HI$$

$$HI = \sum_{i=1}^n \left[\frac{\alpha}{x} \right]^2$$

where

DI – Diversification index

HI – Hirschman – Herfindahl index

α – Total income from each income source

x – Total income from all income sources

The diversification index (DI) and the number of income sources (NIS) was used to measure income diversification within each income household similar to what Babatunde et al (2010) used when they measured income diversification among smallholder farmers in the Kwara state in Nigeria. Dimora et al (2010) in their study of diversification as a means of survival in Tanzania and Heyden et al (2006) in their work on diversification and the performance of German banks also used this index.

3.5.4 Evaluating The Determinants Of Subjective Wellbeing

Subjective wellbeing (SWB) has been measured in literature using a cross section of statistical tools including simple averages, linear regression models, logit and ordered probit models employing data sources varying from time series, panel, cross-section macro empirical and cross-section micro empirical data (Ferrer-i-Carobonell, 2005). The use of time series is weakened by the fact that comparisons cannot be objectively made from findings since the determinants of SWB vary with time and also over

disparity in incomes. The use of cross-sectional macro empirical data which consist of comparing SWB of respondents from different countries is constrained by the effects of major cultural differences. The caveat of the above data sources informs the use of cross-sectional micro data which examines SWB within a country or a particular section of a country in a bid to reduce the effects of variations in culture on SWB.

This study measured subjective wellbeing (SWB) using a scale of 0 to 10, with zero representing those who are totally unhappy and ten representing those who are totally happy with life. This scale was further put into three categories: i) those with low subjective well-being or unsatisfied/unhappy with the ends of their livelihoods (0-4), ii) those with neutral subjective well-being or happy with their livelihoods (5-6), and iii) those with high subjective well-being or satisfied/happy with the ends of their livelihoods (7 and above) . The study then tested the importance of income, residential dummy, capital assets, food insecurity, sex, number of income sources (NIS) and the livelihood strategy adopted on subjective wellbeing using the three categories of SWB as the dependent variable. Since SWB has an inherent ordering that limits the use of multinomial logit procedure, an ordered logit procedure was adopted for the study(McBride,2001), the relation of the empirical model estimated was expressed as;

$$y_i = \beta_0 + \sum_{i=1}^{16} \beta_i \chi_i + \varepsilon_i$$

Where y_i = Subjective wellbeing indice ($i = 1, 2 \text{ or } 3$).

B_0 = Constant

B_i = Coefficients

ε_i = Error term

The explanatory variables χ_i and their expected signs have been provided in Table 2.

Table 2 Independent variables determining subjective well being

<i>Variable</i>	<i>Description of variables</i>	<i>Expected</i>	<i>Sign</i>
ResTamale	Residential dummy living in Tamale Metro (1=yes, 0= no)		+
AINcome	Annual household income per capita		+
NIS	Number of income sources		+/-
AgricOnly	Agriculture Only livelihood strategy (1= yes, 0= no)		-
AgricOfam	Agriculture and Off-farm strategy (1= yes, 0= no)		-
AgricNfam	Agriculture and Nonfarm strategy (1= yes, 0= no)		+
Mixed	Mixed strategy (1= yes, 0= no)		+/-
NatCapital	Natural capital		-/+
PhyCapital	Physical capital		+
SoCapital	Social capital		+
HuCapital	Human capital		+
Sex	Sex of respondents (1=male, 0= female)		+/-
FoodInsec	Experienced food insecurity (1=yes, 0=no)		-

3.6 MEASUREMENT OF VARIABLES

Residence In Tamale Metro (ResTamale) is residential dummy which measures the effect of residing in Tamale as against not residing in Tamale. For the hedonic pleasures that comes residing in an urban area like Tamale, the ResTamale variable is expected to Have a positive impact in determining subjective well-being (Inglehart,1999).

Number Of Income Sources (Nis) is measured considering the number of income sources available in each subsistence household. The NIS variable is expected to have a mixed effect on subjective wellbeing and the determinants of the most successful

strategy. Where diversification is motivated by the well-to-do, the NIS variable would positively influence subjective wellbeing alongside the most successful strategy while on the contrary if diversification is motivated by the vulnerable, the NIS variable might as well negatively influence subjective wellbeing and the determinants of the most appropriate strategy by subsistence farmers.

Annual Household Income Per Capita (AIncome) is measured dividing the annual household income (income from all members of the household) by the number of people within each household. Income is expected to have a positive influence on subjective wellbeing. Income affects the ownership of all livelihood resources. As such income growth has a positive relationship with asset ownership and reduction in poverty which influences subjective wellbeing (Easterlin, 1995). Income is also expected to positively influence the adoption of the most successful livelihood strategy (Ellis, 1998).

Agriculture Only (AgricOnly) is measured using households which draw their income mainly from their crops and or livestock farming activities. For drudgery connected to agriculture coupled with the corresponding low income often realized, the Agriculture Only livelihood strategy is expected to have a negative influence on subjective wellbeing of subsistence farmers (Veenhoven, 2006).

Agriculture And Off-Farm (AgricOfam) is measured using subsistence farm households who draw their income from primary agriculture (crops and livestock) and the sale of agricultural labour on other people's farms. Owing to the fact that agricultural labour market in Sub Saharan Africa is not well developed which makes returns on the sale of agricultural labour to be low, the *Agriculture and Off-farm*

strategy is expected to have a negative influence on subjective wellbeing as a result of the drudgery and the low income associated with it (Veenhoven, 2006).

Agriculture And Nonfarm (AgricNfam) is measured using subsistence farm households who draw their income from agriculture and any other activities not related with primary agriculture. For additional income the nonfarm activity brings coupled to that fact the drudgery is relatively lower, the ***AgricNfam*** variable is expected to have a positive effect on subjective wellbeing owing to the satisfaction the nonfarm activity may bring to their livelihoods (Veenhoven, 2006).

Mixed (agriculture, off-farm and nonfarm) is measured using subsistence farm households who draw their income from the combination of agriculture, off-farm and nonfarm activities. It is expected to have a mixed effect on subjective wellbeing. Whereas their nonfarm activity would engender positive subjective wellbeing, their involvement in off-farm has the potential of lowering their subjective wellbeing.

Natural Capital Index (NaturalCap) is measured by the hectares agricultural land accessible to each subsistence farm household. Owing to the fact that agricultural land in the Northern region of Ghana is communally owned and is seldom individually owned, the ***NaturalCap*** variable is expected to have a mixed effect on both subjective wellbeing.

Physical Capital Index (PhysicalCap) is measured making an index of the type of physical assets that is common among subsistence farmers. The physical assets comprised of their access to drinking water, access to household lighting, access to means of transport and their most common access to information. With the comfort which comes with having more physical assets, The ***PhysicalCap*** variable is expected to positively influence subjective wellbeing (Diener et al, 1999) .

Social Capital Index (SocialCap) is measured indexing the number of associations adult members of each households belong to and how many of those who belonged to associations from each household were in leadership positions. Having a high social capital has the tendency of making people appreciate their livelihoods ends which improves their subjective wellbeing (Inglehart, 1999).

Human Capital Index (HumanCap) is measured indexing the age of household head, household size and the ability of each household adult to provide labour. Human capital index is expected to positively influence subjective wellbeing (Ferrer-i-Carbonell, 2005).

Sex: With an overwhelming majority of subsistence farmers in the Northern Region being male, the sex variable would most likely behave like an extraneous variable. Literature however concur with the fact that men are slightly more happier with the ends of their livelihoods than women (Pollner, 1989).

Experienced food insecurity (FoodInsec) is measured by asking subsistence farm household the no number of days they encountered difficulties feeding their households during the production year 2012. Any household which consistently faced difficulty in food relation to its availability, accessibility and the knowledge and safety or a permutation of these for a week or more was said to be food insecure.

The ***FoodInsec*** variable is expected to negatively influence subjective wellbeing (Easterlin, 1995).

CHAPTER FOUR

4.0 RESULTS AND DISCUSSIONS

4.1 INTRODUCTION

This chapter discusses results from the study under the following thematic headings: characteristics of subsistence farmers under the study, household income pattern in subsistence households, income diversification in subsistence livelihoods, strategies adopted by subsistence farmers and the livelihood resources (assets) peculiar to each adopted livelihood strategy. The rest being, the determinants of subjective wellbeing and the determinants of the most successful livelihood strategy of subsistence farmers.

4.2 CHARACTERISTICS OF SUBSISTENCE FARMERS

Characteristics of subsistence farmers is discussed here under the following heading: demographic characteristics, their food security situation and how vulnerable their livelihoods are to ill-health.

4.2.1 The Demographic Characteristics of Subsistence Farmers

Demographic characteristics are important in assessing subsistence farmers livelihoods. Results from Table 3a show that, 63% of respondents were Muslim and largely drawn from Tamale Metro and West Mamprusi districts. As much as 21% of respondents who were idol worshippers were predominantly domiciled in the Kpandai district. The results also shows that 93.10% of respondent subsistence farmers were men with only 6.90% of respondents being women. On education, majority of the respondents (74%) have never been to school while only 10% of respondents were educated beyond basic education.

Table 3a Characteristics of respondents

<i>Variables</i>	<i>Categories</i>	<i>Frequency</i>	<i>Percentage</i>
Religious Affiliation	Islam	217	62.70
	Christianity	55	15.9
	Traditional	74	21.40
	Total	346	100
Gender	Male	322	93.10
	Female	24	6.90
	Total	346	100
Ethnicity	Mole Dagomba	194	56.10
	Gurma	88	25.4
	Guan	52	15
	Others	12	3.50
	Total	346	100
Level of formal education	None	256	74
	Primary	54	15.6
	Secondary	31	9.0
	Tertiary	5	1.40
	Total	346	100

Field data, 2012

The results in Table 3b show that the mean age of respondents was 42 years. On household size, the results show that respondents had a mean household size of 11 which is higher than the Northern regional average of 7.4 persons per household

Table 3b. A Summary of Descriptive statistics of respondents

<i>Variable</i>	<i>Standard</i>			
	<i>Minimum</i>	<i>Maximum</i>	<i>Mean</i>	<i>Deviation</i>
Age of household head in years	18	102	41.43	12.23
Household size	3	35	10.99	5.16
Years of formal education of household head	0.00	16	2.7	4.68
Household annual income per capita	44.87	3460	483.74	390
Number of income sources	1	6	3.33	1.06
Land owned in acres	0	10.8	15.26	9.40
Land cultivated in acres	0.4	8	10.40	6.57
Hectares of staple crops cultivated	0.4	8	4.94	3.68
Hectares of cash crops cultivated	0.4	6.8	6.51	5.01
Number of labour days per year	360	1800	1121	340
Total remittance income (GH ¢) per year	1	9600	1207	1894.49
Total agriculture income (GH ¢) per year	80	11174	2625.4	1934.83
Total off-farm income (GH ¢) per year	3	640	128	120
Total nonfarm income (GH ¢) per year	60	22000	3220	3477.81
Number of cattle owned	1	100	15.06	17.18
Number of smaller livestock owned	2	55	16.11	12.13
Number of poultry owned	2	190	30.52	24.53
Distance (Km) from home to a dense town	0.00	66	24.79	16.39
Number of crops grown	1	6	2.62	0.96
Number of livestock species kept	0	7	3.08	1.34
Distance (Km) from home to market	0.10	26	3.86	3.97
Distance (Km) from home to a road	0.01	11	1.27	1.48

Field Data 2012

1 US dollars= GH ¢ 1.90

Subsistence farmers in order to protect their livelihoods from the effects of the vagaries of the weather cultivated three crops and kept three livestock species. The most commonly kept livestock species was poultry followed by smaller livestock species (sheep and goats) and cattle. The average land size owned by subsistence household in the study was 6 hectares of which they cultivated 4 hectares. On the

average, subsistence farmers dedicated 2.4 hectares of their land to the cultivation of cash and 1.6 hectares to the cultivation of staple crops.

The annual income per capita of subsistence farmers from the study was four hundred and eighty four Ghana cedis (GH ¢ 484), of this amount, nonfarm activities raked in more income to subsistence households. This was followed by income from primary agricultural activities as the second major contributor to household income in subsistence livelihoods. Off-farm activities contributed the least to subsistence farmers household income albeit its larger than life prominence in subsistence livelihoods. An engineered/motorable road was the most accessible public good to subsistence farmers followed by accessibility to daily or weekly market. Nearness however, to a dense town was the least most accessible public good in subsistence livelihoods in the Northern region of Ghana.

4.2.2 Food Security Levels In Subsistence Livelihoods

Results in Table 4 reveals the food security situation of respondents from the study.

Table 4 Subsistence farmers food security situation

<i>Experienced food insecurity</i>	<i>Frequency</i>	<i>Percentage</i>
Yes	229	66.2
No	117	33.8
Total	346	100

Field data 2012

From Table 4, sixty-six per cent (66%) of respondents experienced food insecurity.

The statistic implies that over six out every ten subsistence farmers in the Northern

region of Ghana are unable to feed themselves with the crops they grow. This concurs with Quaye (2008), who asserts that the incidences of food insecurity and poverty are particularly devastating in the developing countries like Ghana and as such a lot of resources are being channelled towards programmes aimed at reducing the effects of food insecurity and poverty in the country. Apart from compromising government objective of achieving independence with food production, food insecurity predisposes subsistence households to ill health which compromises their livelihood strategies.

4.2.2.1 Duration of their own harvest

From Table 5, maize stocks lasted more than twice (7.80 months) the stocks of other crop, groundnuts stocks lasted 3.60 months, yam stocks lasted 2.70 months while cowpea and rice stocks lasted 2.90 and 3.20 months respectively. This is explained by the fact that, to subsistence farmers, maize is treated strictly as their main staple crop, as such it is not grown for the market. As a farmer in Arigu (West Mamprusi) retorted in response to a question whether he has sold some maize *‘Ahh to sell maize only to go back and buy it, a rational farmer never sells maize, our maize is for the household consumption so if not under very pressing circumstances it is not sold.’* In other words food insecurity as long as subsistence farmers in the Northern region are concerned, only starts when their maize stocks run-out.

Table 5 Stocking periods for crops grown.

<i>Field Crop</i>	<i>Mean Number of months of stocks depletion after harvest</i>	<i>Main reason for depletion of stocks after harvest</i>
Maize	7.8	Shortage out of consumption
Groundnut	3.6	Sold all
Yam	2.7	Sold part consumed the rest
Cowpea	2.9	Sold part the rest spoilt
Rice	3.2	Sold all

Field data 2012

With maize stocks lasting for 7.80 months in the year implying that subsistence farmers face insecurity of maize in the 4.20 months prior to the next farming season this affirms the view held by Quaye (2008) that farmers in northern Ghana face four months of food insecurity each year commencing in April through to the difficult month as regard food that is July. The other crops (groundnut, cowpea, yam and rice) had an average stocking period of 3.10 months owing to the fact that subsistence farmers treat them as cash crops as such they normally grow them for the market.

4.2.2.2 Coping strategies during periods of hunger

Subsistence farmers adopt several strategies to mitigate the effects of their food insecurity predicament. The results in Table 6 of the study revealed that the most popular survival strategies during difficult times include reducing the quantity of food consumed per meal (28.7%), borrowing or buying food on credit (25.6%), selling livestock (20.7%) and reducing the frequency of meals (19.4%).

Table 6 Coping strategies during times of difficulty with food

<i>Coping strategy during periods of hunger</i>	Frequency	Percentage
Sold farm animals	100	20.7
Took wild fruits/twigs	6	1.2
Reduce the quantity of meals	139	28.7
Slept without food	21	4.3
Borrow/ Buy food on credit	124	25.6
Reduce the frequency of meals	94	19.4
Total	484	100

Field data 2012

4.2.2.3 Food security situation across districts in the Northern region of Ghana

From Table 7, the χ^2 results which looks at the relationship between the variables, is significant at 1% affirms a strong relationship between food security and location in the Northern region of Ghana. The study's findings as shown in Table 7, indicate that in the West Mamprusi district recorded 79% of their subsistence farmers experienced food insecurity. Sixty seven per cent (67%) of subsistence farmers in the Tamale metropolis were food insecure. Kpandai and Central Gonja had 66% and 48% respectively of their subsistence farmers being food insecure.

Table 7 Food security situation across four districts in the Northern region

<i>District</i>	<i>Experienced food insecurity within the year</i>				
	YES			NO	
	Sample size	Frequency	%	Frequency	%
Tamale Metro	93	62	67	31	33
West Mamprusi	94	74	79	20	21
Central Gonja	66	32	48	34	52
Kpandai	93	61	66	32	34
Total sample	346	229	66	117	34
Chi- Square	15.87				
Degree of freedom	3				
Significance	0.00				

Field Data 2012

Though the district food security situation did not show any regular patterns, invariably however, the most urban districts (Tamale Metropolis and West Mamprusi) in relative terms were more food insecure than the rural districts. For instance, Central Gonja which is 15% urban had 48% of its respondent farmer population being food insecure. Tamale metropolis which is 67% urban had 67% of its respondent farmer population being food insecure. Also the Kpandai district is 10% urban with 66% of its farmer population being food insecure. Further, West Mamprusi which is 30% urban had 79% of its farmer population being insecure in food (www.ghanadistricts/northern).

Urban areas usually have more net food buyers. The imbalance between buyers and producers pushes food prices up beyond the reach of urban poor which precipitates food insecurity (Matuschke, 2009).

4.2.3 Subsistence Livelihoods And Ill-Health

The effect of ill-health on their livelihoods was so dire. Results from the study shown in Table 8 reveals that 75.6% of respondents in the study experienced ill-health within their household during the 2012 cropping season, which prevented affected farmers from tilling their lands for several days.

Table 8. The effect of ill-health in subsistence livelihoods

<i>Experience ill health in the season</i>	<i>Frequency</i>	<i>Percentage</i>
Yes	258	75.6
No	88	25.4
Total	346	100

Field Data, 2012

On average 60 labour days were lost per household to ill-health (Appendix I). This figure is higher by 12 labour days than the average 48 labour days lost per season to ill-health estimated by Asenso-Okyere et al (2011) for Ghana. Considering the number of labour days lost by household members who may have to stay back and cater for the sick, then the implicit effect of ill health on households becomes even more devastating. Poor nutrition, hazardous working conditions and inability to afford adequate treatment for illness precipitates poor health. Ill-health has a vicious connection with poverty. It serves as a catalyst for poverty spiralling while poverty perpetuates conditions which predisposes people to ill health (Grant, 2005). Poor health also reduces human capital potential to labour which will result in a loss of days culminating eventually in reducing output. The above mentioned sentiments about the effects of lost labour days weakens the wherewithal of subsistence farmers

in constructing sustainable livelihoods, thereby entrenching their households in chronic poverty.

According to Grant (2005), prolonged ill health affects all household assets. Human capital is affected as prolonged ill health results in school drop- out, loss of jobs and food insecurity. Physical capital is compromised as prolonged ill health constraints household members to properly maintain their houses. Other physical assets dwindle as affected households trade off their assets to mobilize resources to treat the sick. Food insecurity issues are exacerbated as the households are usually unable to duly make up for the labour days lost due ill health which culminates in low outputs entrenching food insecurity. Social capital is affected when the prolonged care for the sick results in suspicions and bad relations which splits households. Financial capital is compromised as prolonged ill health precipitates wage losses, increased cost of drugs for treatment and endless debts. All these propel subsistence farm households into irrecoverable palpable poverty.

4.3 HOUSEHOLD INCOME PATTERNS

This household income is discussed under the following headings: income levels in subsistence livelihoods, income and location in the Northern region of Ghana, income and livestock ownership and income and food security.

4.3.1 Income Levels In Subsistence Livelihoods

From the results as presented in Table 9, eighty- six percent (86%) of subsistence farmers earn less than two Ghana cedis a day which is consistent with the view held by Asenso- Okyere (2012) on his recent study in Ghana.

Table 9. Income distribution among subsistence farmers

<i>Daily income grouping (GH¢)</i>	<i>Frequency</i>	<i>Percentage</i>
0.10 to 0.49	49	14.2
0.50 to 0.99	109	31.5
1.00 to 1.49	85	24.6
1.50 to 1.99	55	15.9
2.0 and Above	48	13.9
Total	346	100

Field data 2012.

\$ 1 = GH ¢ 1.90

The United Nations defines extreme poverty as those who earn less than one US dollar a day while those who live on less than fifty US cents are described as ultra - poor. With two Ghana cedis the approximate equivalent of one US dollar this implies that eight out of every ten subsistence farmers in the Northern region are extremely poor while 46% of the respondents are ultra- poor. This concurs with the assertion held by the Ghana Statistical Service (2007) and Alhassan and Poulton (2009) who purport that though poverty levels in the country have fallen over the years, it still remains as high as 88% especially among small holder crop growers in the Northern regions of Ghana. The mean daily income for the study was one Ghana cedis twenty-eight pesewas (GH ¢ 1.28). The Ghana Living Standards Survey (GLSS-5) reported sixty-four Ghana pesewas (GH ¢ 0.64) as the average daily per capita income in rural northern Ghana in 2008. This figure when compounded over three years at an average prime rate of 15.33% gives one Ghana cedis thirteen pesewas (GH 1.13). With subsistence agriculture being the main stay of rural dwellers in the Northern Region implies that incomes of subsistence farmers over three year period have risen by roughly thirteen percent (13%) albeit the figure still falls far below the UN minimum threshold for extreme poverty.

4.3.2 Income and Location in The Northern Region

At a significance of 1%, the χ^2 analysis in Table 10 shows a strong relations between household income and location in the Northern region paving the way for the results to be discussed. From Table 10, the results show that subsistence farmers domiciled in Tamale metropolis and its environs were more visible in the income grouping of subsistence farmers earning between fifty Ghana pesewas (50 GH p) to one Ghana cedi fifty pesewas (GH ¢1.50) group.

Table 10. Income distribution across districts in the Northern region

Location	Income Grouping					Total
	0.10-0.49	0.50-0.99	1.00-1.49	1.50-1.99	2.0+	
Tamale Metro	5	41	28	11	8	93
West Mamprusi	16	18	20	19	21	94
Kpandai	17	33	23	15	5	93
Central Gonja	11	17	14	10	14	66
Total	49	109	85	55	48	346
Chi square	35.504					
Degree of freedom	12					
Significance	0.000					

Field Data, 2012

However, West Mamprusi district and Central Gonja had the highest proportions of inhabitant farmers earning more than two Ghana cedis and above. Kpandai district was the most vulnerable district in terms of income. It recorded both the least number of farmers earning two Ghana cedis and the highest number of farmers earning less than fifty Ghana pesewas.

4.3.3 Income And The Ownership of Livestock

The significance of the χ^2 analysis at 10% as in Table 11 showed that the relationship established by the study between livestock ownership and household income was not by coincidence and can be discussed. Livestock ownership for its livelihood support reasons was the reason why eighty percent (80%) of subsistence from the study as displayed in Table 11, kept livestock. The substitution effect between household income and livestock makes the latter important in the livelihoods of subsistence farmers. This assertion is upheld by the study since as much as fifty-nine per cent (59%) of farmers who did not keep livestock were ultra- poor earning less than fifty US cent (i.e less than One Ghana cedis) a day while those who did keep livestock were relatively less worse off with forty-two per cent (42%) of them being ultra- poor.

Table 11. Relationship between income and livestock ownership

Own Livestock	Income Grouping					Total
	0.10-0.49	0.50-0.99	1.0-1.49	1.50-1.99	2 and above	
Yes	34	83	69	46	44	276
No	15	26	16	9	4	70
Total	49	109	85	55	48	346
Chi Square 8.98						
Degree of freedom 4						
Significance 0.062						

Field data, 2012.

Also sixteen per cent (16%) of those who kept livestock earned two Ghana cedis and above a day while only six per cent (6%) of those who did not keep livestock earned up to two Ghana cedis and above per day. This concurs with the opinions of Ashley and Annor-Frempong (2003), Apori et al (2009) and Fialor (2010) that livestock keeping plays both supplementing and complementing roles in the livelihoods of subsistence farmers.

4.3.4 Income And Food Security of Subsistence Farmers.

From Table 12, the incidence of food insecurity reduced from 75% in the first income quartile group to 60% in the second to 57% in the third and 50% in the fourth quartile.

Table 12. Income quartile and food security

		Quartile income								
<i>Food security</i>		I	II	III	IV	Total				
		%		%		%		%		
Yes	Frequency	118	75	85	60	16	57	10	50	229
No	Frequency	39	25	56	40	12	43	10	50	117
Total		157	100	141	100	28	100	20	100	346

Field data 2012

This re echoes the fact that growth in income enhances peoples accessibility to food thereby reducing their food insecurity situation. Also, food being a normal good, an increase in household income, be it from earned or unearned sources, will result in an increase in demand for food which reduces their food insecurity situation. However in communities with less developed markets, an increase in income could be inflationary which may compromise farmers access to food (Boussard et al, 2006).

4.4 INCOME DIVERSIFICATION IN SUBSISTENCE LIVELIHOODS

Subsistence farmers diversify their livelihoods either through: their assets, their activities or their incomes. These three areas of diversification are motivated towards the achievement of a particular end in life and as such they are interdependent and not mutually exclusive of each other.

4.4.1 Subsistence Farmers Income Portfolios.

Results from Table 13 show that subsistence income portfolios did vary across their income quartiles. Notwithstanding the agrarian nature of their livelihood, their nonfarm activities contributed more to their annual income than agriculture. The study revealed that on the average, nonfarm income contributed 42% of household income with agriculture lagging behind with a contribution of 36%. This statistic is however consistent with literature which asserts that nonfarm income usually contributes more to household income than agriculture in sub-Saharan Africa (Ellis et al, 2004; Barrett et al, 2001; Reardon, 1997; Babatunde et al, 2009).

Agriculture and off-farm income shares of total household income reduced consistently across the income quartile, that is from 47% in first income quartile to 27% in the fourth income quartile for agriculture with that of off-farm reducing from 2.62% in the first income quartile to 1.08% in the fourth income quartile. Conversely nonfarm share of household income increased across the income quartile from 30.51% in the first quartile to 46.93% in the fourth quartile. This inverse relationship between agriculture and off-farm incomes to increasing household income and the positive correlation between nonfarm income and increasing household income as was also observed by Ellis et al (2004) in their work on diversification in rural Uganda.

Livelihoods propped wholly by the hiring out of labour and the agriculture according to the study, are symptomatic of deprivation. Such livelihood strategies are usually adopted by subsistence farmers during hard times when they run out of options. The conundrum here is that if farming and hiring out labour which are core activities in subsistence livelihoods are associated with deprivation, then does the solution to reducing poverty lie in abandoning farming and off- farm activities all together?

Table 13 Income portfolios across income quartiles

Source of Income (α)	Household Income Quartile				
	I	II	III	IV	All
	n=157	n=141	n=28	n=20	Households N=346
Crops	28.59%(1074)	30.01%(2331)	17.52%(1955)	13.91%(2078)	22.50%
Livestock	18.01%(642)	13.54%(1051)	8.51%(949)	13.12%(1960)	13.30%
<i>Agriculture</i>	<i>46.6</i>	<i>43.55</i>	<i>26.03</i>	<i>27.03</i>	<i>35.80</i>
Off-farm	2.62%(98.40)	1.91%(148)	1.72%(192)	1.08%(162)	1.63%
Nonfarm	30.51%(1146)	41.30%(3207)	49.92%(5570)	46.93%(7012)	42.17%
Remittance	16.08%(604)	9.04%(702)	19%(2120)	22.56%(3370)	16.64%
Other	5.11%(192)	4.20%(326)	3.33%(372)	2.40%(358)	3.76%
Total (χ)	100 (3756)	100 (7765)	100 (11158)	100(14940)	100
Measuring Diversification Using Income Shares					
$HI = \sum \left[\frac{\alpha}{\chi} \right]^2$	0.24	0.29	0.32	0.31	0.29
NIS=(1/HI)	4.17	3.45	3.08	3.24	3
DI=(1-HI)	0.76	0.71	0.68	0.69	0.71

Field data, 2012. The figures in the brackets are the absolute mean income from each income source in Ghana cedis

The relationship between agriculture and off-farm activities with deprivation in subsistence livelihoods, has motivated the opinion in literature that being more dependent on nonfarm income and less dependent on agriculture is the surest escape

root out of poverty (Ellis et al, 2004). This view could be a facile attempt at addressing endemic income poverty. This is so because moving away from agriculture creates the nagging problem of national food deficit that might result if farmers prefer nonfarm opportunities to agriculture. Also nonfarm activities have their own entry barriers which would naturally keep most subsistence farmers away from assessing them.

Results from Table 13, also shows that remittance income, contributed more (16.67%) to household income than livestock (13.30%). Remittance a product of migrated household members in search of greener pastures from without their hometowns, is an important facet in the fight against poverty in the country. A view overly shared by Adams (2006) on his work on remittance and poverty in Ghana.

In a country with uneven distribution of resources and opportunities, it is through migration that income inequalities created from the unequal allocation of resources and opportunities can be bridged. In so doing internal migration should be encouraged by reducing barriers to it rather than discouraged as alluded by the following authorities (Waddington, 2003; Geest, 2011; Kanbur et al, 2005; Douwe, 1997).

4.4.2 Measuring Of Diversification In Subsistence Livelihoods Using Income Shares

Results from Table 13 also show that the incomes of subsistence farmers were 71% diverse. Most of them drew their incomes from three main portfolios. Income diversification (DI) and number of income sources (NIS) both varied by reducing across the income quartile. Thus signifying that, income poor households had more diverse income sources than their relatively income rich counterparts which is line with the opinions of Dimora and Sen (2010), Ellis (1998) and Upton (1996) whiles

contradicting the opinions of Abdulai and CroleRees (2001) in Mali and Babatunde et al (2009) in Nigeria.

The nature of the diversification however varied. Those in the upper income quartiles had their incomes concentrated on a few high earning income sources compared to those in the lower income quartile who lack the luxury to choose where to concentrate their investment. As such they spread their tentacles wide in order to mitigate the risk of losing out completely should one or two investments fail in a season.

4.5 ADOPTED LIVELIHOOD STRATEGIES BY SUBSISTENCE FARMERS.

Using only sources of earned incomes, four livelihood strategies were identified in the study. The livelihood strategies included; those whose source of income was from only agriculture, those who drew their income from agriculture activities alongside off-farm activities, those whose livelihood was supported by agriculture and nonfarm activities and those whose livelihood were constructed by a cocktail of all the livelihood options being Agriculture, Off-farm and Nonfarm described here as the *Mixed Strategy*.

The results in Table 14 shows that all the four livelihood strategies identified in the study were fairly popular among subsistence farmers, however the most popular livelihood option observed from the study was the *Agriculture and Off-farm* strategy (29.20%) whiles *Agriculture Only* livelihood option was the least practiced livelihood strategy (20.50%).

Table 14 Adopted livelihood strategies

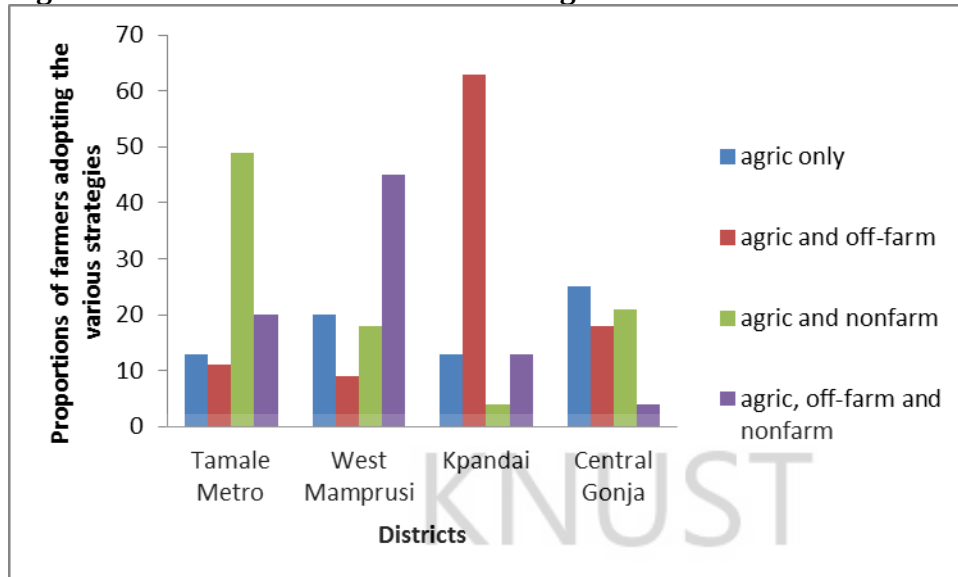
<i>Livelihood strategy</i>	<i>Frequency</i>	<i>Percent</i>
Agriculture Only	71	20.50
Agriculture and Off-farm	101	29.20
Agriculture and Nonfarm	92	26.60
The Mixed Strategy(agriculture, nonfarm and off-farm)	82	23.70
Total	346	100

Field data 2012

Though with different distributions, these livelihood strategies concur with that of several other studies across sub Saharan Africa including Barrett et al (2005) in Cote d' Voire and Uganda, Babatunde et al (2009) in Nigeria and Adugna et al (2008) in Ethiopia. Figure 4 shows that the distribution of the various livelihood strategies is not even across the region. Tamale, which is the regional capital had majority of its subsistence farmers adopting the *Agriculture and Nonfarm* livelihood strategy which could be motivated by the presence of nonfarm wage employment opportunities and a big market for nonfarm self-employed artisans.

Conversely Kpandai had majority of its subsistence farmers adopting *Agriculture and Off-farm* strategy. Being the least urban district in the study, the opportunities to work on people's farms far out- weigh that of nonfarm activities in the district.

Figure 4 Distribution of livelihood strategies across four districts



The West Mamprusi district had the highest proportion of respondents with the mixed livelihood strategy. Central Gonja had high proportions of farmers adopting the *Agriculture Only* strategy owing to the presence of vast fertile soils in the district.

4.5.1 Livelihood Strategy And Income

From Table 15, it can be noticed that the mean daily per capita incomes of all the adopted strategies were overly below Two Ghana cedis. However, small subsistence farmers daily mean income per capita did vary from one strategy to another, implying that some strategies yielded more than others. The results of the One way Anova test of differences in means in Table 15, shows that significant differences did exist between the mean income of subsistence farmers adopting the *Agriculture and Nonfarm* strategy with that of those adopting *Agriculture and Off-farm* and the *Agriculture Only* strategies. There was however no significant difference between the mean incomes of those adopting *Agriculture and Nonfarm* with that of the *Mixed* strategy.

Table 15. Livelihood strategy and daily household income per capita

<i>Livelihood strategy</i>	<i>Daily income per capita</i>					
	Number of respondents	Minimum	Maximum	Sum	Mean	Std dev
Agriculture Only	71	0.21	4.29	71.60	1.00	0.75
Agriculture and Off-farm	101	0.12	3.16	93.03	0.92	0.60
Agriculture and Nonfarm	92	0.32	5.66	151.97	1.65	1.07
Agriculture, Off-farm and Nonfarm	82	0.24	5.40	126.40	1.54	0.88

Field data, 2012**Table 16. One way Anova which compares the mean income of Agriculture and Nonfarm with that of the other strategies**

<i>Source</i>	<i>Partial SS</i>	<i>df</i>	<i>F</i>	<i>Prob> F</i>
Model	36.57	3	17.24	0.000
Mixed Strategy	0.53	1	0.75	0.39
Agriculture and Off-farm	25.71	1	36.35	0.000
Agriculture Only	16.59	1	23.46	0.000

Field data 2012

These findings of low income by farmers adopting the *Agriculture Only* and *Agriculture and Off-farm* strategies overly corroborate the opinions of Barrett et al (2005), Ellis et al (2008) and Babatunde et al (2009) that livelihood strategies that are supported mainly by agriculture and the sale of labour are often times harbingers of vulnerable livelihood strategies while those combining agriculture with nonfarm activities are the most successful and the least vulnerable.

4.6 CAPITAL ASSETS OF SUBSISTENCE FARMERS

The five forms of capital assets are natural, social, physical, financial and human which constitute the asset pantheon in the construction of livelihood strategies. The asset profile affects the adoption of a livelihood strategy and it is affected by the outcome of the livelihood strategy. Discussions in this section considers the assets of subsistence farmers under various adopted strategies using results in Table 17.

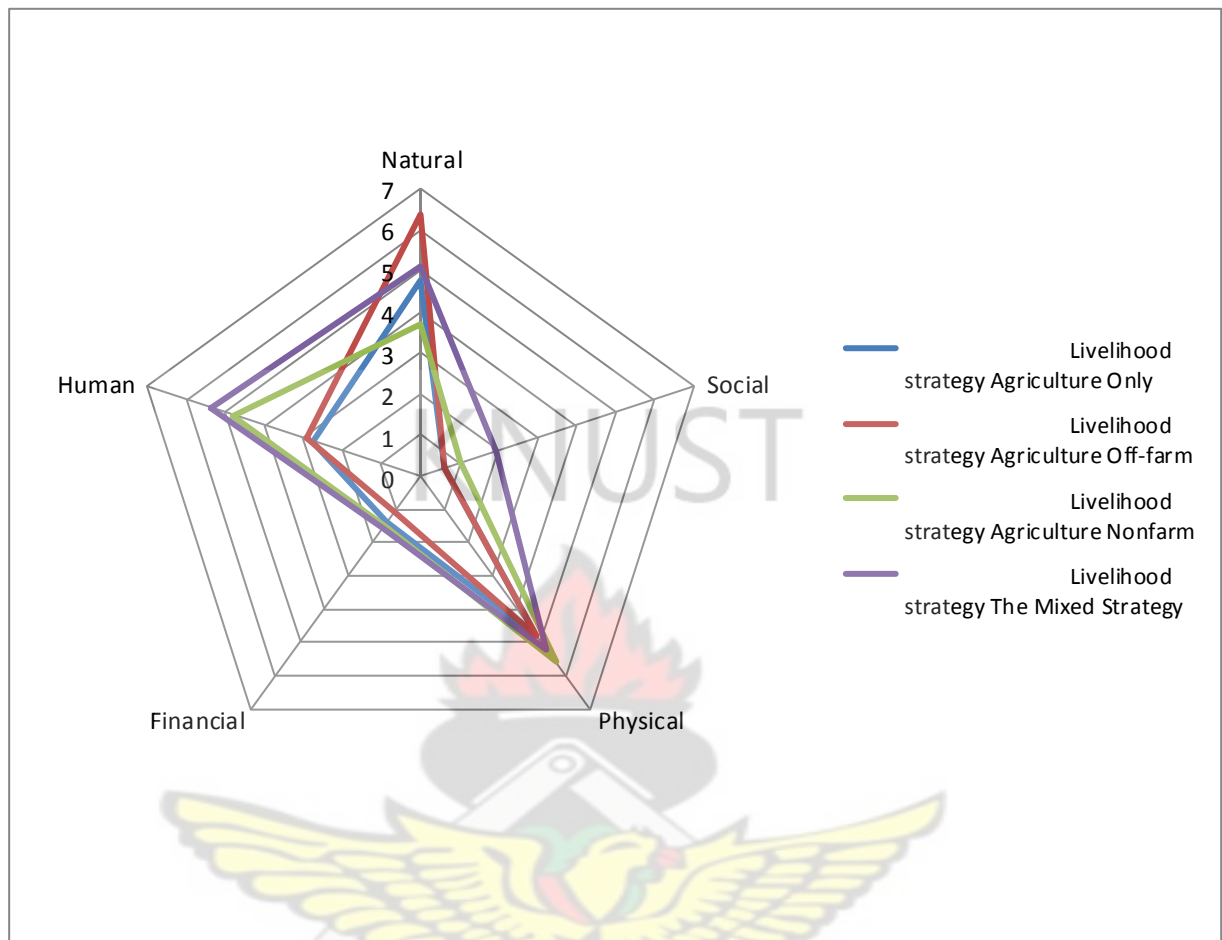
Table 17 Asset index of adopted livelihood strategies

Livelihood Asset	Livelihood strategy				
	Agriculture Only	Agriculture Off-farm	Agriculture Nonfarm	The Strategy	Mixed
Index					
Natural	4.75	6.39	3.68	5.1	
Social	0.59	0.61	1.03	1.96	
Physical	4.78	4.81	5.60	5.24	
Financial	1.37	1.06	1.51	1.55	
Human	2.74	2.92	4.78	5.38	

Field data, 2012. *Guide to the estimation of indices is in Appendix III and IV*

The livelihoods approach is concerned first and foremost with people. It seeks to gain an accurate and realistic understanding of people's strengths (assets or capital endowments) and how they endeavour to convert these into positive livelihood outcomes. From Table 17 it can be noticed that the resources subsistence farmers in the Northern region of Ghana lacked most are social followed by financial capitals.

Figure 5. Asset pentagons of the four adopted livelihood strategies from Table 17



Source; Field Data, 2012

From Figure 5 it can be noticed that the superimposed asset pentagons of all the adopted strategies shows that financial and social capital are close to the centre which represents zero access to assets. However physical capital, natural capital and human capital were relatively the most owned assets, considering their positioning away from the centre of the pentagonal radar. The asset profile of each adopted livelihood strategy did vary, the study discusses these variations subsequent text.

4.6.1 Natural capital of subsistence farmers

From Table 17 and Figure 5 farmers adopting the *Agriculture and Off-farm* strategy had relatively more access to land. However, they lacked behind the other strategies in the other four capital assets. On the contrary farmers adopting the *Agriculture and*

Nonfarm strategy had the least access to land but fared relatively well in the other livelihood assets. These findings however contradicts the view held by Lopez (2008) and Boli (2005) that access to land correlates positively with the other capital assets. With the rationalization being that agricultural land in Northern Ghana is overly communally owned and it is seldom owned by individuals. Thus agricultural land in a community in the Northern region of Ghana has no exchange value to members of that community. It is a resource that is considered as 'given' to members of that community. The study's findings however corroborates those by DFID (2000), which asserts that, owing to the unpredictable nature of a natural resource, livelihoods wholly dependent on the natural resource base tend to be the most vulnerable owing to the effect of natural exigencies like drought, floods, diseases, crop failure and bush fires on livelihoods.

4.6.2 Social capital of subsistence farmers

Social capital which measures respondents benefits from their social connections was one of the least owned assets among all the adopted strategies. Results from Table 17 and figure 5 show that apart from the *Mixed strategy* (agriculture, off-farm and nonfarm), social capital was the least owned asset. The details in Appendix II shows that on the average about 69% of subsistence farmers in the Northern Region did not belong to any association. Such low levels of social capital promotes antipathy towards each other within the community which breeds suspicion. This suspicion and lack of fraternal concern for each other predisposes people to conflicts which destroys livelihoods. An up close look at the asset index Table 17 however, shows that livelihood strategies which recorded social capital indices of one and above also performed relatively better in physical, human and financial capital. The findings allude to the opinions held by DFID (2000), White and Lindon (2002), Collier et al

(1998), Flores et al (2004) and Oyen (2002) that social capital relates positively with the ownership of other capital assets.

4.6.3 Human capital of subsistence farmers

Household size, ability to work, level of education of household head and age of household head were the variables used in arriving at an index for human capital. From Table 17, farmers adopting the *Agriculture only* livelihood strategy were the least resourced in terms of human capital while those adopting the *Mixed strategy* were the most resourced in human capital. They had on the average, the least number of people per household and the least in the level of education of household head. However, the *Agriculture only* strategy fared better than the *Agriculture and Off-farm* strategy and the *Mixed strategy* in relation to the effect of sickness on their households which affects their households ability to labour. Results in Appendix II shows that whereas 62% of farmers adopting the *Agriculture alone* were affected by ill-health as much as over 80% of those adopting the *Agriculture and Off-farm* and the *Mixed strategy* (*Agriculture, Off-farm and Nonfarm*) suffered ill-health in their households within the season. It is apparently not out of chance that subsistence farmers who chose to sell their labour to other farmers suffered the most in terms of ill-health. This could be explained by the fact that the sale of farm labour could predispose subsistence farmers to ambient diseases owing to the fatigue and stress which comes with agricultural labour. On the contrary, the hiring out of labour (*Off-farm*) could be adopted as an *ex post* survival strategy to lessen the effect of time lost in the season due to the effect of ill-health on their households.

This explains why literature postulates that livelihoods supported by the returns of agricultural wage labour is often a coping strategy rather than a development strategy (Ellis,1998; Barrett et al, 2005).

4.6.4 Financial Capital Of Subsistence Farmers

Financial capital consisted of liquid assets like bank deposits, loans and wages and salaries. The rest being income from livestock sales and livestock holding's, crop sales and stocks harvested crops. From Table 17 and Figure 5 it can be noticed that financial capital was the least owned asset after social capital among subsistence farmers in the Northern region of Ghana. This confirms the opinion of DFID (2000), that financial capital is the most versatile and the least owned asset in subsistence livelihoods which puts more premium on the other livelihood assets of subsistence farmers. The *Agriculture only* strategy and the *Agriculture and Off-farm* strategy which performed relatively poorly in financial capital had 90% of their income coming from primary agriculture while *Agriculture and Nonfarm* strategy and the *Mixed strategy* (Agriculture, Off-farm and Nonfarm) which performed relatively better in financial capital owned the difference to nonfarm which contributed more than 50% of their income. This concurs with the assertion held by Ikekwe et al (2000) that nonfarm income negatively correlates to agricultural income in subsistence livelihoods.

4.6.5 Physical Capital Of Subsistence Farmers

The components of physical capital include; type of house and accompanying amenities like source of water and electricity, means of transport and communication and work tools. Results from Table 17 and Figure 5 of the study confirm that with subsistence farmers adopting the *Agriculture only* and the *Agriculture and Off-farm* lagging behind their colleagues who adopted the other two strategies, subsistence farmers performed overly better in physical capital relative to the other capital assets. According DFID (2000) physical capital serves as an important launch pad for the attainment of other assets. Over 80% of subsistence farmers, had access to

mobile phones and radio sets which formed their core source of information. Mobile phones according to Said et al (2000), provide rural households with fast and easy modes of communication, thereby increasing their ability to access livelihood assets, undertake diverse livelihoods strategies, and overcome their vulnerabilities. On access to radio sets, the study's findings revealed that over 80% of farmers adopting *Agriculture and Nonfarm* and the *Mixed strategies* had access to radio sets while less than 60% of those who adopted the *Agriculture only* and *Agriculture and Off-farm* livelihood strategies had access to radio sets. Only 25% and 35% of farmers who adopted *Agriculture and Off-farm* strategy and the *Mixed* strategy respectively had access to electricity while over 54% of farmers who adopted the *Agriculture and Nonfarm* strategy had access to electricity. Thus confirming findings of Olivia and Gibson (2009) that nonfarm enterprises are more predominant in communities with access to electricity.

4.7 SUBJECTIVE WELLBEING AND ITS DETERMINANTS

This section presents the results of subjective wellbeing patterns and its determinants. Here discussions on subjective well-being centers on the frequency distribution of subjective well-being indices, and the determinants of subjective well-being.

4.7.1 Subjective Well-being Indices of Subsistence Farmers

For a better understanding of the trade- offs between different outcomes the subjective wellbeing of subsistence farmers was measured. Findings in Table 18, shows the distribution of subjective well-being indices among 346 respondents.

Table 18 Subjective wellbeing indices of subsistence farmers

<i>Subsistence farmers satisfaction with life (SWB)</i>	<i>Level of SWB</i>	<i>Frequency</i>	<i>Percentage</i>
	(0-4)- Not satisfied/Unhappy	100	29
	(5-6)- Satisfied/Happy	135	39
	(7 and Above)-Very satisfied/Very happy	111	32
	Total	346	100

Source; Field Data, 2012.

Subjective well-being has been measured in the past using individuals satisfaction with various domains of life like health, marriage, work and leisure. Then there is the emotional measure of subjective well-being which looks at respondent's joy and contentment now or yesterday. Another measure of subjective well-being relates to respondents satisfaction with life as a whole. Implicit in the life as a whole methodology is the fact that respondent's satisfaction or otherwise with any faculty of life would invariably affect their subjective well-being (Helliwell et al., 2013; Ferrer-i-Carbonell, 2005).

From the study as presented in Table 18, of the study 29% subsistence farmers recorded low (0-4) subjective wellbeing indices or were unhappy with their lives as a

whole. As much as, 32% of subsistence farmers felt their livelihoods left them very happy (SWB index of 7 and above). Similarly 39% of respondents of the study were happy (SWB index of 5-6) with their livelihood as a whole. Paradoxically, notwithstanding the high levels of income poverty and deprivation among subsistence farmers in the Northern Region of Ghana, majority of them (71%) were at least happy (SWB of 5 and above) with the ends of their livelihoods as whole. Thus suggesting strongly that other factors influence subjective wellbeing aside the hedonic pleasures of the world. The average subjective wellbeing index of study (5.40) was however lower relative to most European or Scandinavian countries which average subjective wellbeing indices are usually above seven. This is however in tandem with literature with stipulates that on the average prosperous people then to record higher subjective well-being indices relative to poorer people (Helliwell et al, 2013).

4.7.2 The Determinants Of Subjective Wellbeing Among Subsistence Farmers

From Table 19 the Brant test of parallel regression assumption is insignificant implying that results of the ordered logit model is fit to be discussed. Also the log likelihood ratio of -260.195 of the ordered logit model is significant at the level of 1% indicating that the coefficients in the model are different from the null (zero), demonstrates the model's goodness. Significant variables which determine the subjective wellbeing of subsistence farmers include; food insecurity, residing in Tamale metropolis, social capital, human capital. The rest being adopting the *Agriculture and Nonfarm* strategy and adopting the *Agriculture and Off-farm* strategy. Experiencing food insecurity had a negative coefficient and significant at 1%. This implied that a unit increase in the food insecurity situation of subsistence farmers the probability of them having a high subjective wellbeing is reduced by 0.19 times holding all other independent variables constant. In other words food insecurity

increases the probability of subsistence farmers having low subjective wellbeing. Inability to achieve food security as one of the ends in life, negatively affect the mood of households who are unable to accomplish this primary end of life. This unpleasant predicament leaves subsistence farmers overly unsatisfied with their life situations which lowers their subjective wellbeing. If the food insecurity situation persists inveterately, a reminiscence of the food insecurity situation of the past and the prospect of a bleak future for food has the tendency of keeping subsistence farmers in a vicious cycle of low subjective wellbeing as opined by Durayappah (2010).

Table 19 Determinants of subjective wellbeing

Variable	Coefficient	Odds	P>/Z/
Resides in Tamale Metro	0.616*	1.850	0.076
Sex	-0.003	0.997	0.995
Number of income sources	-0.206	0.814	0.200
Annual income per capita	0.001**	1.001	0.001
Experienced food insecurity	-1.659***	0.190	0.000
Natural capital	-0.203	0.980	0.682
Human capital	0.206**	1.223	0.012
Physical capital	0.033	1.033	0.654
Social capital	0.122*	1.119	0.097
Agriculture and Nonfarm	2.14***	8.485	0.000
Agriculture and Off-farm	-0.734**	0.480	0.046
The Mixed Strategy	0.203	0.816	0.682
Cut 1	-2.236		
Cut 2	0.614		
Log likelihood	=-260.195	LR	Prob> Chi2=0.000 Pseudo
Chi2(12)=191.4		R2=0.269	
Brant test		16.62	
Degree of freedom		12	
Significance		0.164	

***, ** and * represent significance levels 1%, 5% and 10% respectively

Residing in Tamale (Urban area) positively influenced the subjective wellbeing of subsistence farmers at a significance level of 10%. Holding all other variables constant, residing Tamale (Urban area) increases the probability of subsistence farmers of having a high subjective wellbeing by 1.85 times. The level of modernization in the Tamale Metropolis and the hedonic pleasures it comes with gives other meaning to life apart from the drudgery of tilling the land. This explains why residing in Tamale Metropolis or towns with similar levels of hedonic pleasure tend to improve the feeling of satisfaction with life.

Annual income per capita positively influenced subjective wellbeing at a significance level of 5%. Holding all other variables constant a unit increase in the annual income of subsistence farmers the odds of having a high subjective wellbeing is 1.001 times higher relative to them having a medium to low subjective wellbeing. This concur with the generally held view in literature that income positively relates with subjective wellbeing (Clark and Oswald, 1994; Easterlin, 2001; Frey and Stutzer, 2002; Ferrer-i-Carbonell, 2005).

Social capital, which measures connectedness, had a positive coefficient with a *p* value of 10%. This means that holding other variables constant, a unit increase in the social capital of subsistence farmers the probability of them being very happy with the ends of their livelihoods is increased by 1.119 times. That is subsistence farmers association to groups of any form increases the possibility of them feeling satisfied with the ends of their life. The group creates the platform for members to share their challenges experiences. In doing so members then to fathom that they are not alone in their predicament which reduces their desperation and anxiety thereby increasing their satisfaction with what they have. The globally accepted axiom propounded by Inglehart (1999), stipulates that high subjective wellbeing is achieved 'if people get

what they get like or like what they get'. A social interaction with people tend to draw people towards liking what they get which improves their subjective wellbeing.

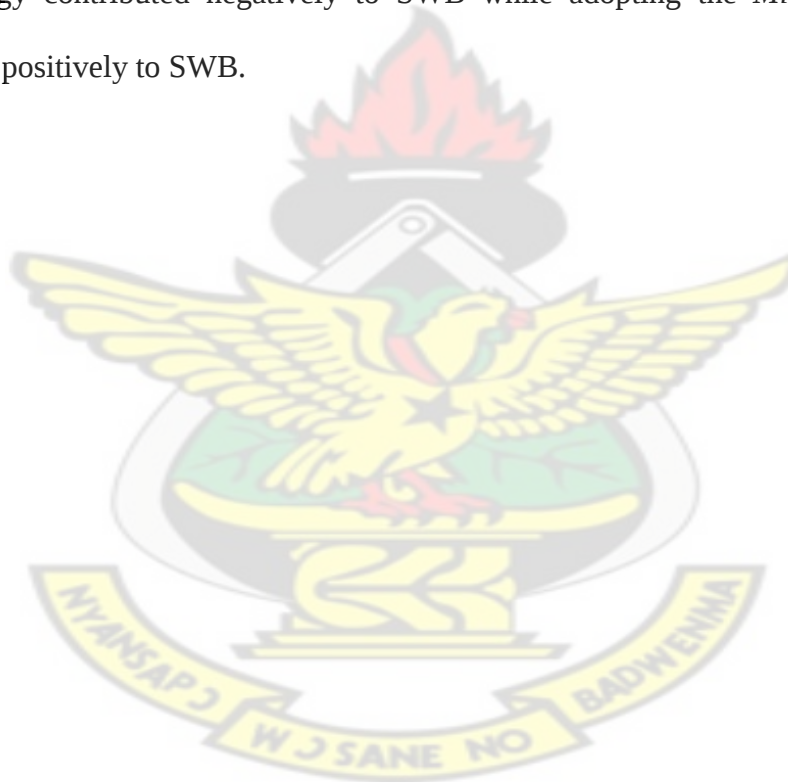
Human capital, which comprises of household size, ability of adult household members to labour, level of education and age of the household head positively influenced subjective wellbeing at a significance of 5%. Holding other variables constant, a unit increase in the human capital of subsistence farmers, the probability of them having a high subjective wellbeing is increased by 1.223 times. This concurs with the opinions held by Diener et al (1993) that human capital positively correlates with subjective wellbeing.

Agriculture and Nonfarm livelihood strategy, had a positive coefficient and significant at 1% in its contribution to subjective wellbeing. Invariably holding other variables constant a unit increase in the number of subsistence farmers adopting the *Agriculture and Nonfarm* strategy the odds of them having a high subjective wellbeing is 8.49 times greater relative to them having a medium to low subjective wellbeing. Aside the contribution of nonfarm activities to household income in subsistence livelihoods, job satisfaction which subsistence farmers may derive from participating in nonfarm activities also positively influences their subjective wellbeing (Pollner, 1989).

The *Agriculture and Off-farm* livelihood strategy had a negative coefficient at a p value of 5% in its contribution to subjective wellbeing. Implying that holding other variables constant a unit increase in the number of farmers adopting *Agriculture and Off-farm* strategy the odds of subsistence farmers having a high subjective wellbeing is 0.48 times lower relative to them having a medium to low subjective wellbeing. In effect the *Agriculture and Off-farm* livelihood strategy contributes negatively to

subsistence farmers satisfaction with life. The negative relationship between *Agriculture and Off-farm* livelihood strategy and subjective wellbeing suggests strongly that subsistence farmers did adopt *Agriculture and Off-farm* strategy not out of will and might be pushed by circumstance into adopting the strategy. Since the end of every livelihood among other things is to achieve happiness, it would be irrational adopting any strategy willingly when it leaves you unhappy with life.

Agriculture Only and the *Mixed Strategy* strategies were insignificant but had negative and positive coefficients respectively implying that adopting *Agriculture Only* strategy contributed negatively to SWB while adopting the *Mixed Strategy* contributed positively to SWB.



CHAPTER FIVE

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 CONCLUSION

Subsistence farm households in the Northern region of Ghana were characterized by higher than regional average levels of illiteracy, relatively bigger household sizes and the overarching problem of ill-health which are symptomatic of poverty. They cultivated fewer acres of their land though they had user rights to cultivating more acres. Their livelihoods were anchored in agriculture with a household growing on the average three crops and keeping three livestock species. The incomes of subsistence farm households were overly low. Over 86% of subsistence farmers earned less than two Ghana cedis (GH ¢ 2.0) daily income per capita. Also about seven out of every ten subsistence farmers were food insecure.

Four livelihood strategies were identified among subsistence farmers in the region. The strategies which varied along subsistence households comprised of: those whose livelihoods were supported mainly by agriculture; those whose livelihood support came from agriculture and off-farm activities (the sale of labour on others farm); those whose livelihoods were propped by their exploits in agriculture and nonfarm and finally those whose livelihoods support came from a cocktail of activities (agriculture, off-farm and nonfarm) described as the *Mixed Strategy*.

As regards income as a livelihood outcome, subsistence farm households adopting the *Agriculture and Nonfarm* strategy were the most endowed earning one Ghana cedis sixty-five pesewas daily per capita income whiles those adopting the *Agriculture and Off-farm* strategy were the least endowed earning on an average ninety-two Ghana pesewas daily per capita income. Income portfolio diversification did vary along

income quartiles. The share of agriculture and that of off-farm did reduce as income grew while nonfarm share of household income rather increased as income increased. Remittance share of household income was as much as 16.40%. Hirschman-Herfindahl diversification index revealed that incomes of subsistence farmers were 71% diverse. Income diversification was high among subsistence farmers in the lower income quartile. Income diversification was also found to reduce as income grows. The study also found growth in household income to positively correlate with household food security and the ownership of livestock.

Of the five asset pentagon, social and financial capital were the least owned asset among subsistence farmers in the Northern region of Ghana. Among the four popularly adopted livelihood strategies, The *Mixed Strategy* was the most endowed in terms of assets, followed closely by the *Agriculture and Nonfarm* strategy. The weakest livelihood strategy as regards asset endowment was the *Agriculture Only* livelihood strategy.

On subjective wellbeing, the study's findings showed that subsistence farmers were fairly happy with the ends of their livelihoods. Majority of them had subjective wellbeing score of at least five on the eleven point scale. Experiencing food insecurity and adopting *Agriculture and Off-farm* livelihood strategy reduced the subjective wellbeing of subsistence farmers while the possession of social capital and human capital, residing in the Tamale Metropolis, annual income per capita and adopting the *Agriculture and Nonfarm* livelihood strategy improved the subjective wellbeing of subsistence farmers.

5.2 POLICY RECOMMENDATION

One of the means of reducing deprivation among subsistence farmers can be achieved through growth in incomes. Income growth can be achieved through nonfarm, off-farm, agricultural activities and unearned income sources like remittance. It is recommended therefore that subsistence farmers adopt nonfarm activities such as marketing of their farm produce and value addition like agro processing as a sustainable means of growing incomes.

Also the growth in incomes can be achieved through connecting communities to densely populated towns through enhanced road network, this would create the enabling market for both on farm and nonfarm products. Further, building the human capital potential of subsistence farmers through formal and non-formal education would help in reducing some of the entry barriers to nonfarm activities and in a longer way help subsistence farmers to find other jobs out of primary agriculture.

Food insecurity had a strong effect in lowering the subjective wellbeing of subsistence farmers whiles and the adoption of *Agriculture and Nonfarm* had equally the most strongest effect improving the subjective wellbeing of subsistence farmers. Addressing issues which affect the availability and accessibility of food and instituting policies that would engender the adoption of *Agriculture and Nonfarm* as a livelihood strategy are the surest means of making subsistence farmers happy with their livelihoods as a whole.

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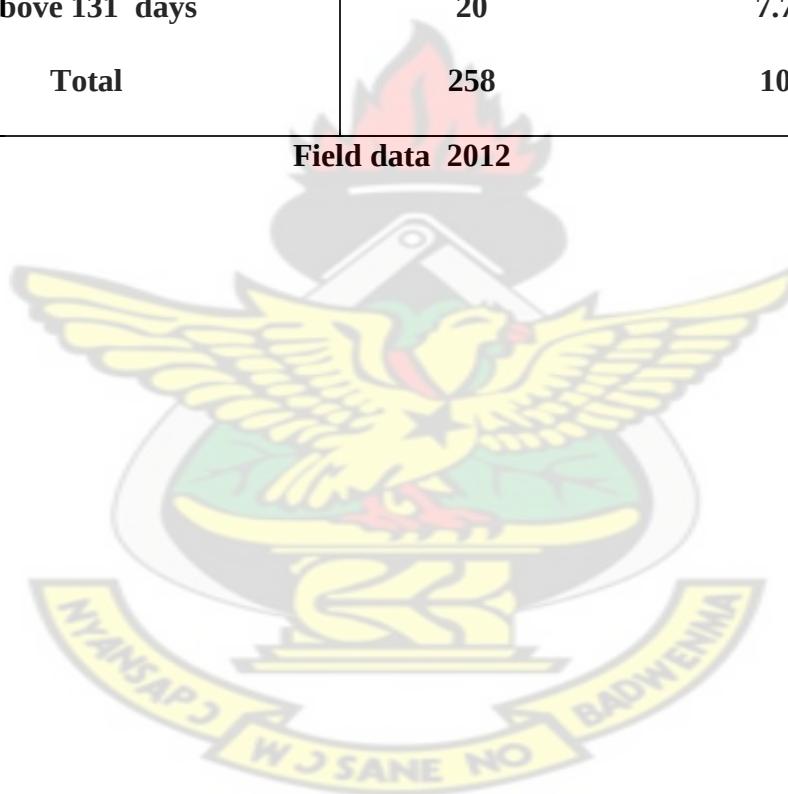
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Appendix I

Number of days household members were unable to work due to ill-health		
<i>Days unable to work due to illness</i>	<i>Frequency</i>	<i>Percentage</i>
7 to 37 days	98	38
38 to 68 days	62	24
69 to 99 days	43	16.70
100 to 130 days	35	13.60
Above 131 days	20	7.70
Total	258	100

Field data 2012



Appendix II

Asset summary of subsistence farmers in the study

Capital Assets	Capital Attributes	Livelihood strategies			
		Agric Only	Agric Off-farm	Agric, Nonfarm	The Mixed
NATURAL	Land owned	14 acres	19 acres	11 acres	15 acres
	Land cultivated	12 acres	11 acres	9 acres	10 acres
SOCIAL	% belonging groups	20%	26%	37%	40%
	% in leadership	28%	26%	47%	67%
FINANCIAL	Annual income GH ¢	GH ¢ 3606	GH ¢ 3248	GH ¢ 5910	GH ¢ 5778
	Number of poultry	21	25	21	23
	Number of ruminants	16	15	12	14
PHYSICAL	% Access to pipe borne	27%	43%	50%	36.6%
	%Access to well	37%	13%	23%	30.5%
	% Access to river/dam	24%	34%	21%	23.2%
	%Access to electricity	48%	25%	54%	35%
	%Access to mobile	88%	81%	98%	90%
	%Access to radio	74%	61%	89%	83%
HUMAN	Household size	9.5	10	10	10
	Years in school	2	3	2	4
	% Affected by ill-health	62%	83%	67%	87%

Appendix III

Estimating Indices For The Five Capital Assets

- 1) Social Capital index = $1.66 \times \text{Number of social capital assets owned by household.}$

Where social capital assets comprise of number of household adults belonging to any association and the number of them in leadership positions of the associations.

- 2) Natural capital = $\frac{\text{Actual score of household} \times 10}{\text{Maximum possible score}}$

Actual score comprised of the number of acres each household had access to. The maximum possible score however, is the largest possible access to land in the study which was 27 acres.

- 3) Financial capital index = $\frac{\text{Actual score by household} \times 10}{\text{Maximum possible score}}$

Actual score for financial capital comprised of the annual monetary value of all assets owned by the household. The maximum possible score constitutes the annual financial asset worth of the most wealthiest household in the study which was GH ¢ 49511 Ghana cedis

Appendix IV

Estimating Indices For The Five Capital Assets

- 4) Human capital index for the study comprised of household size, level of education of household head and the ability of the household to labour.

$$\text{Human capital index} = \frac{\text{Actual household size} \times 3.33}{\text{Maximum household size}} + \frac{\text{Actual no of labour days} \times 3.33}{\text{Maximum available labour days}} + \frac{\text{Level of education of household head} \times 3.33}{\text{Maximum attainable level}}$$

- 5) Physical capital index = $\frac{\text{Actual score} \times 10}{\text{Maximum score}}$

Actual score for human comprised of the households rating over their dwelling place, means of transport, means of communication, lighting source and source of water. Each of the various categories gave each household a maximum score of 3. The five attributes of physical capital together gave a maximum possible score of 15 for highest possible score in physical capital for study.

Appendix V

The study's Questionnaire

KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY (KNUST) CANR-

Faculty Of Agriculture- Department Of Agricultural Economics

Household Survey Questionnaire

Dear Respondent,

This household survey questionnaire is designed to collect data to analyse *livelihood strategies and their determinants amongst subsistence farmers in the northern region of Ghana*. The ultimate goal here is to explore the alternatives of reducing poverty among subsistence food crop growers taking an up close look at their livelihoods. That is the strategies which are already working and those which need re-tooling.

Thus, your genuine response is of paramount importance for the success of the study, and the researcher kindly request your cooperation in so doing. Please be assured that any information you provide will be kept confidential and used purely for the purpose of the study.

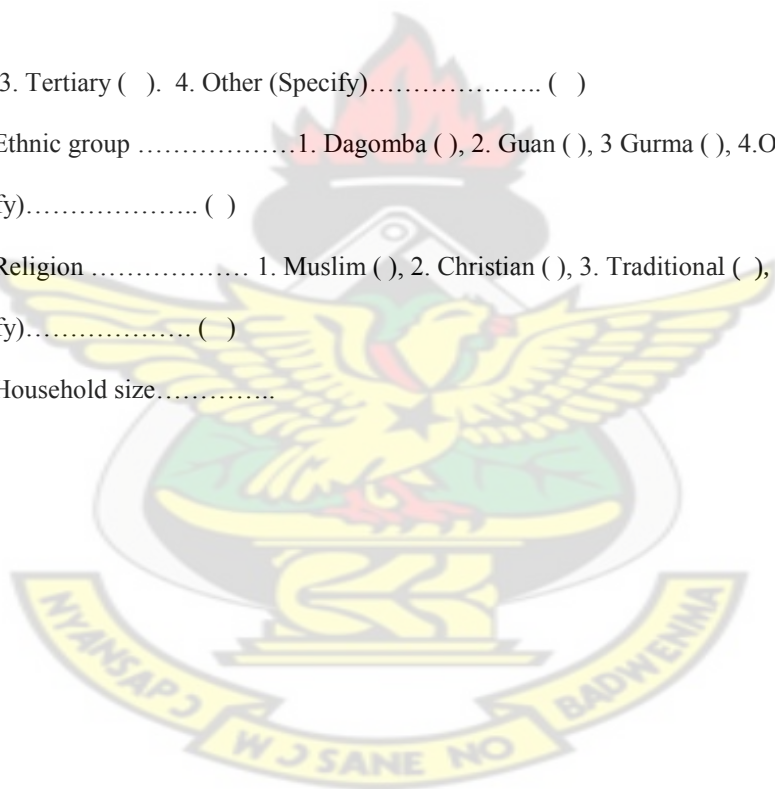
The study however important is not sponsored and the enumerator in the person of has not been given any money to be given to you after the interview.

Thank you.

A. BACKGROUND INFORMATION

Place of interview please tick

1. *District []
2. **Community []
3. Name of community.....
4. Name of respondent.....
5. Sex of respondent (1) male () (2) female ()
6. Age of respondent.....(yrs)
7. Educational level of respondent..... 1. Primary (), 2. Secondary/vocational (),
8. 3. Tertiary (). 4. Other (Specify)..... ()
9. Ethnic group 1. Dagomba (), 2. Guan (), 3. Gurma (), 4. Other (Specify)..... ()
10. Religion 1. Muslim (), 2. Christian (), 3. Traditional (), 4. Other (Specify)..... ()
11. Household size.....



B. SOURCES OF LIVELIHOOD/OCCUPATION

Provide information on your sources of livelihood last year (2011)

Livelihood source	Rank	Annual income (GH)
1.Agriculture		
2.Off-farm		
3.Nonfarm		
4.Remittance		
5.Other(Specify)		
6.Other(Specify)		

**Districts and **Community codes are in the appendix page 14*

MEMBERSHIP TO ASSOCIATIONS/ORGANIZATIONS

Does any member of your household belong to any organization? Yes (1) No (2)

If yes complete table below

Which household member (Household head=1, Spouse=2, Male household member=3, Female household member=4)	Does this person hold any position in the organization (Yes=1, No=2)

B. AGRICULTURE

a) What is the total land area owned by your household?

b) Provide the following information on 2012 production season.

Crop	Acres	Distance from farm to market(Km)	Total output in bags or baskets	Quantity sold in bags/baskets	Unit price	Total value of produce
1.Maize						
2.Rice						
3.Cowpea						
4.Groundnut						
5.Other (specify)						
6.Other (specify)						
7.Other (specify)						

c) What is the distance from home to the nearest farm.....(km) and the farthest farm.....(km)

?

d) What is the most common means of transport to the nearest farm.....(km) and the farthest farm
(km) ? (1=walking 2=bicycle 3=motorcycle 4=car 5=others)

e) What is the average time taken to reach the nearest farm.....(min) and the farthest farm.....(min)
 ?

f) What is the lorry fare to the nearest farm..... (Gh) and the farthest farm..... (Gh) ?

g) Indicate the labour input (man days) used for production per acre last year (2012)

Activity/ Operation	MAIZE		RICE		Other(specify)	
	Mandays	Rate per unit	Mandays	Rate per unit	Mandays	Rate per unit
Clearing of land						
Ploughing						
Planting						
Weeding						
Fertilizer application						
Harvesting						
Cleaning /sorting						
Spraying						
Other 1						
Other 2						

h) Provide other input cost per acre of land cultivated for the 2012 cropping season

Input/Activity	Maize		Rice		Other(specify)	
	No/Quantity	Unit price(acre)	No	Unit price(acre)	No	Unit price(acre)
Ploughing/tractor service						
Seeds/Planting material						
Fertilizer						
Pesticides						
Dehusking						
Threshing/shelling						
Transporting						
Other 1						
Other 2						
Other 3						

i) Do you or any member of your household own any livestock? Yes (1), No (2)

j) If yes complete table below for the year 2012

Livestock type	Number	No consumed/gifts	No sold/bartered	Unit price Per a livestock	Total revenue from livestock sales	Cost of feeding (cash/ in kind)	Cost of veterinary services	Other cost
Fowls								
Guinea fowls								
Ducks								
Pigeons								
Goat								
Sheep								
Cattle								
Other								

B.2. OFF-FARM ACTIVITIES

a) Did your household earn any income (cash/ in kind) working on other peoples farms last season (2011)? 1.Yes (), 2. No ()

b) If yes complete table below for 2011

Household member involved *	Task**	Number of days worked	Rate per a day	Amount received (cash/kind)

*Household head=1, Spouse=2, Son=3, Daughter=4, other relative=5

**Land clearing=1, Ploughing=2, Weeding=3, Harvesting=4, Threshing/winnowing=5, Transporting=6, other (specify) =7

B.3. REMITTANCE

a) Did your household receive any remittance (cash/kind) from friends and relations last season (2011)? 1.Yes (), 2. No ()

b) If yes complete table below for 2012

Source of remittance: From(1=male child, 2=female child, 3=Spouse, other relations=4)	Location of remitter (1= Abroad, 2= other region in Ghana, 3= within the Northern region of Ghana)	Frequency of remittance (1=monthly,2=Quarterly 3=Semi-quarterly, 4=Annually)	Amount received in cash and in kind	Purpose of the money/ remittance 1=consumption, 2=sch fees, 3=farm inputs 4=health care 5=other(specify)

B. 4. NONFARM

a) Was your household involved in any nonfarm activities last season (2012)?

1. Yes ()... 2.No ()

b). If yes complete the table below for 2012 Nonfarm activities

Activity*	No of household members involved	Monthly expenses involved	Revenue received per month	Number of months in a year when the activity is most active.

*Blacksmith=1, Butcher=2, Tailor/Seamstress=3, Faith based=4, Herbalist=5 Trader=6, Welder=7, Electrician=8, Mason=9, Plumber=10, watchman=11, Teacher=12, Barber=13 Drummer/Musician =14, Labourer (casual) =15, other public sector job=16, Others (specify) = 17

B.5. ASSISTANCE

a) Did your household receive any assistance (cash/kind) last season (2011)?..... 1.Yes (), 2.No ()

b) If yes complete table below on assistance received in 2012

Type of assistance Cash credit=1, Inputs credit=2, Training=3, Other=4	Source*	Purpose Agric=1, Food/consumption=2 Trade=3, other=4	Amount/ value of assistance received	Interest/ cost of capital paid Per annum

*Family and friends=1, Susu=2, NGO/Government=3, Financial Institutions=4, others=5

A. HOUSEHOLD FOOD SECURITY AND CONSUMPTION

a) Complete the table below on your household food security situation for 2012 season

Staple	Frequency of consumption per week	No of months household depended on the market or sources other than own farm produce for consumption	Main reason why you had to rely on other sources for consumption
Maize			
Cassava			
Yam			
Millet			
Guinea corn			
Cowpea			
Pigeon pea			
Rice			
Groundnut			
Other 1			
Other 2			

b) Did your household experience any difficult times with food in 2012?

1.Yes() 2.No()

c) If yes what coping strategies did you adopt?

- 1 Bought food on credit
- 2 Slept without food
- 3 Reduce the quantity of meals
- 4 Reduce the frequency of meals
- 5 Took wild fruits/leaves as meals
- 6 Sold farm animals
- 7 Other (specify)

H a) On a scale of zero to ten how happy are you or what is your general satisfaction with life? Where

0 implies totally unhappy, with 10 implying totally happy. [.....]

B. HOUSEHOLD EXPENDITURE

a) Complete the table below on your household expenditure for 2012

Food/Commodity/Service	Quantity consumed per week	Unit price	Total amount spent per month
Maize			
Cowpea			
Pigeon pea			
Rice			
Yam			
Cassava			
Vegetables			
Oil			
Sugar			
Bread			
Salt			
Transport			
Fish			
Meat			
Eggs			
Soap			
Alcohol			
Cooking fuel			
Water			
Milling			
Milk			
Dry cells			
Health care			
Education			
Clothing			
Equipment and tools			
Construction and house repair			
Debt repayment			
Funerals			
Marriage ceremonies			
Remittance/Gifts			
Bidding for tiles			
Naming ceremonies			
Apprenticeship			
Rent			
Other 1 (Specify)			
Other 2 (Specify)			
Other 3 (Specify)			
Other 4 (Specify)			
Other 5 (Specify)			

C. HOUSEHOLD ASSETS, HOUSING AND HOUSEHOLD AMENITIES

a) Indicate the major material used for the roof, floor and walls of the household's dwelling.

a) Roof (Thatch=1, Iron sheets=2, Tiles=3, Plastic=4, Other=5)

b) Floor..... (Mud/sand=1, Wood=2, Concrete=3, Asbestos=4, Other=5)

c) Walls..... (Concrete=1, Mud brick=2, Wattle=3, Other=4)

2) What is your main source of drinking water? (Piped dwelling=1, Public pipe=2, Well=3,

Pond/lake/river=4, Tanker=5, Borehole=6, Rainwater=7, other=8

3) What type of lighting fuel does your household use? (Kerosene=1, Generator=2,

Torch/lantern=3, Electrical network=4)

b) How many of each of the following assets does your household own (assets must be in working condition)

Asset	Available(1=yes, 2=No	No/Quantity	Current Market Value per unit
Bed			
TV			
Radio			
Axe			
Machete			
Knapsack sprayer			
Hoe			
Tractor			
Generator			
Bicycle			
Harrow			
Plough			
Sewing machine			
Groundnut thresher			
Maize Sheller			
Vehicle			
Motor cycle			
Mobile phones			
Stove (electric/gas)			
Fridge			
Computer			
Other 1			
Other 2			
Other 3			

D. CONSTRAINTS

a) Production constraints

PROBLEM	RANK
Lack of improved seeds	
Inadequate capital	
Cost of labour	
Poor soils	
Inadequate rains	
Access to land	
Ill health	
Inadequate grassland	
Inadequate waterings facilities	
Diseases of crops/livestock	
Rustling	
High cost of drugs	
Peace/Conflict	
Other	

b) Marketing constraints

Problem	Rank
Low prices	
Poor road network	
Quality of farm products	
Lack of information	
Distance to market	
Other 1	
Other 2	

G. HEALTH STATUS OF FARMERS DURING CROPPING SEASON

a) Did any of your household members fall sick which prevented him/her from working during the cropping season? (1) Yes () (2) No ()

b) If “Yes” how many members were sick?

c) How long were they unable to work?

- | | |
|---------------------------------|----------------------------------|
| a) Less than one week (1)..... | e) More than four weeks (5)..... |
| b) One to two weeks (2)..... | |
| c) Two to three weeks (3)..... | |
| d) Three to four weeks (4)..... | |

d) How did your sickness affect your farm?

- (1) Had lower output (3) Produce got spoilt (4) Increased cost of production
(2) Weeds affected my farm (5) Other (Specify)

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Appendix VI

*District codes *TAMALE MERTOPOLITAN* = 1, *WEST MAMPRUSI* = 2, *KPANDAI* = 3,

CENTRAL GONJA = 4.

**Community codes

1)	Kakpayili	21) Wiae
2)	Shishegu	22) Bankamba
3)	Zujung	23) Chakoli
4)	Zagyuli	24) Tinglinto
5)	Zakaliyili	25) Bombare
6)	Datoyili	26) Nagbigyido
7)	Maleshegu	27) Kodwobone
8)	Yilonayili	28) Kucharti
9)	Katariga	29) Ekumdi
10)	Tugu	30) Binandim
11)	Janga	31) Kusawgu
12)	Wulugu	32) Fufulso
13)	Kparigu	33) Yapei
14)	Loagri No 1	34) Mpaha
15)	Nasia	35) Tuluwe
16)	Yagaba	36) Sheki
17)	Guabulga	37) Sankpala
18)	Kpasenkpe	38) Buipe
19)	Yama	39) Ntreaso
20)	Arigu	40) Adubiliyili