

UNIVERSITY FOR DEVELOPMENT STUDIES

**YAM PRODUCTION AND ITS CONTRIBUTION TO HOUSEHOLD INCOME
AND FOOD SECURITY IN ZABZUGU**

BY

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**DISSERTATION SUBMITTED TO THE DEPARTMENT OF COMMUNITY
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AND RURAL DEVELOPMENT**

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DECLARATION

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I hereby declare that this dissertation is a product of my own initiative and research work. I further declare that this work has not been presented anywhere else in the world for a similar purpose. Due recognition has been given where references are made.

Candidate's signature.....

Date 22/11/11.....

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SUPERVISOR'S DECLARATION

I hereby declare that the preparation and presentation of this project work was supervised in accordance with the guidelines on supervision of project work laid down by the University for Development Studies.

Supervisor's Signature.....

Date 22/11/11.....

Dr Elias N.K. Sowley



ABSTRACT

The study was conducted to examine yam production and its contribution to household income and food security in Zabzugu. The techniques of data collection employed were Questionnaire administration, focus group discussion, in-depth interviews and observation. Simple random sampling was used to select fifty (50) households for the study. Employing primary and secondary data, the study demonstrated that yam contributes significantly to households' livelihood in the study area. The study revealed that households derive their income from three prominent sources namely, income from animal rearing (8.2%), crops production (77.7%) and non-farming activities (14.2%). Yam production contributes 66.2% to household income and 40% to household food security. Other crops used by households as food sources include maize (30%), groundnuts (6%), beans (4%), cassava, (16%) and rice (4%). On the average, households earn about GH¢ 2098.1 a year (GH¢ 174.8 a month). Yam contribution to food security is affected by increased commercialisation (60%), poor economisation (24%) social factors (6%) and pests and diseases (10%). It was also realized that the problem of inadequate capital, pests and diseases, marketing and transportation constraints, high cost of production and a host of others tend to hamper the growth of the yam industry. In this regard, addressing these challenges through extension of loans to farmers, improvement of the road network and increased access to extension services could help in finding a remedy to the myriad of challenges facing the industry.



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DEDICATION

This work is humbly dedicated to my late father, Mohammed Alhassan and to my beloved mother, Alhassan Fati as well as my darling wife, Zainab.





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LIST OF ABBREVIATIONS AND ACRONYMS

AGDP	Agricultural Gross Domestic Product
CBOs	Community Based Organisations
DRC	Democratic Republic of Congo
ERS	Economic Research Institute
FAO	Food and Agriculture Organisation
FAO STAT	Food and Agricultural Organisation Statistics
FDG	Focus Group Discussion
GDP	Gross Domestic Product
GH¢	Ghana Cedi
GPRS	Ghana Poverty Reduction Strategy
GTZ	German Technical Corporation
Ha	Hectares
HDI	Human Development Index
HDR	Human Development Report
HIV	Human Immune Virus
IDS	Institute of Development Studies
IFAD	International Fund for Agricultural Development
IIED	International Institute on Environment and Development
IITA	International Institute of Tropical Agriculture
ILO	International Labour Organisation
Kg	Kilogram
LSRO	Life Services Research Office
MDGs	Millennium Development Goals
MOFA	Ministry of Food and Agriculture
Mt	Metric Tonnes
NGOs	Non-Governmental Organisations
PHC	Population and Housing Census
PSI	Presidential Special Initiative
SHS	Senior High School
SPP	Species
UN	United Nations
USAID	United States Action on International Development
USDA	United States Development Agency

WCA	West and Central Africa
WCED	World Commission on Environment and Development
WTO	World Trade Organization



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CHAPTER ONE

1.0 INTRODUCTION

1.1 Background

With a projected human population growth of 50% by the year 2050, the world food demand is expected to be more than doubled (Green et al., 2005). This indicates that the demand for agriculture areas will increase enormously over the coming years (Tilman, 2002). Agriculture is very central to the survival of mankind. The majority of the world's poor live in rural areas and depends on agriculture, either directly or indirectly for their incomes and food security (Pinstrup-Anderson and Pandya-Lorch, 1995). Food is a necessity as it gives man the might to work. Inadequate food with its resultant malnutrition in both children and adults hinders both the development of human resource capacity and the optimization of production (Mensah, 1997).

In developing countries, the issue of food insecurity has been centred on minimising instability in aggregate food supply (Badu and Quin, 1994; Pretty et al., 1996). At the household levels, food insecurity is directly influenced by agricultural performance (Cleaver and Schreiber, 1994). About 18%, that is, 791 million of the people in the developing world lack food. In Sub-Saharan Africa, one out of every three people does not have adequate food (Wiebe et al., 2001). Sub-Saharan African's share of the world food insecure population is projected to quadruple, rising from 9% in 1969/71 to 39% in 2010 (FAO, 1969).

According to the Food and Agriculture Organization (2006) projections, 680 million people, representing 12% of the developing world's population could be food insecure by 2010. Similarly, USDAs Economic Research Service projects that 694 million people in 67 low-income countries will fail to meet their nutritional requirement by 2010 (ERS, 2000).

The World Food Conference (1974) optimistically declared that "no child should go to bed hungry". Nearly three decades after this declaration was made, millions of people still go to bed hungry with some dying of starvation (Onimode and Synge, 1995). In Sub-Saharan Africa, despite considerable increases in the availability of food, some 240 million people are under-nourished (HDR, 1994).





In Ghana, agriculture is seen to be the single most important production sector that has the capacity and impetus to propel economic growth and structural transformation in order to maximize the benefits of economic growth (GPRS II, 2006-2009).

Agriculture is the highest contributor to Gross Domestic Product (GDP) and provides employment for over 60% of the population. Consequently, the economy cannot make overall progress unless the mass of small-scale food producers can achieve significant improvement in their productivity through increased investment and changes in technological innovation (GPRS II, 2006-2009).

Ghana's agriculture is dominated by crop production (PPED, 1991). The contribution of livestock to the Agricultural Gross Domestic Product (AGDP) in 1987 was 5% (PPED, 1991), evidence that crop production constitutes the bulk of agricultural activities in Ghana.

Yam production contributes significantly to the export sector of the country, as evidenced by Ghana's ranking as the largest yam producer in West Africa (FAOSTAT, 2006). Among the exported horticultural and root crops in Ghana, yam ranks second to pineapple and contributes about 16% of the Agricultural Gross Domestic product (FAOSTAT, 2006). Yam production has increased from 614,000 tonnes during 1979-81 to 3,892,000 tonnes in 2005; a 533.8% increase as a result of an increase in area under cultivation (FAOSTAT, 2006). The importance of yam to the Ghanaian economy cannot be over-emphasized.

Yam and cassava are among the major food consumed in Ghana and together contributed 36% of the total dietary energy supply, with maize contributing 12% (FAOSTAT, 2006). However, yam has seen very little improvement in its husbandry practices over time. All phases of cultivation are labour intensive, causing the youth to shy away from its cultivation, and limiting the scale of production (Coursey, 1967). For instance, land preparation including burning and clearing for yam cultivation have been estimated to consume 49% of the labour outlay for producing one hectare of ware yams, especially in the rain forest agro-ecology of Nigeria. In Ghana, yam is planted at random on manually constructed mounds, 1-2m apart (Coursey, 1967). Mounding is a very tedious and expensive operation that limits the scale of root crop production (Ezumah, 1986).



On the regional dimension, the Northern region contributes significantly to yam production of the country (CRI, 2006). Based on the production statistics of yams in Ghana (1997 - 1998), the productive regions were categorized as high when production per annum was over a 300,000Mt and these were Brong Ahafo, Eastern and Northern Regions (CRI, 2006). Most households in the Northern Region rely on the crop for their incomes and food security and its contribution to the livelihood of the people cannot be underestimated. Zabzugu which is in the Eastern corridor of the Northern Region has a vast potential for yam production which could be harnessed for development considering the fact that the region is predominantly rural and agricultural based (GSS, 2002). The socio-economic impact of the crop to poverty alleviation and social transformation are worth examining, hence, this study.

1.2 Problem Statement

The role of food in the growth and development of individuals and nations cannot be down-played. Ghana, as an emerging economy, over a long period, has experienced food deficits. In spite of the attempts made by various governments since independence to arrest the situation, the country still suffers severe food crisis (FAO, 2006). It is estimated that, per capita food production has been on the decline of about 0.9 % per anum. Cereal production per capita for instance, declined from 79 kg per anum to about 58 kg per anum in 1990 (FAO, 1993). After cereals, root and tuber crops are the second most important group of food crops. This particularly applies to Sub-Saharan Africa where, of the total foodstuffs produced, roots and tubers make up 31% and cereals 53% (Paulino and Yeung, 1981). In West African countries, more than 50 % of the supply of calories is derived from the cultivation of roots and tubers (Okigbo, 1987). A steady decline in the production of yams amounting to an annual average of over 1% has been observed for Africa over a decade (Okigbo, 1987). The reasons for the decline in yam production in Africa include inadequate capital, incidence of pest and diseases, marketing and transportation difficulties, high cost of production, erratic rainfall pattern, inadequate extension services, inadequate labour and declining soil fertility.

The high water content in roots and tubers is one of the reasons for the low price per unit. This also makes fresh roots and tubers unsuitable for transport due to loses resulting from decay (Hahn, 1989). The high water content makes storage difficult which leads to high losses, and therefore constitutes an impediment to increase production of root and



tubers. In rural areas where there is a high migration rate, the low labour productivity seriously restricts production (Knoth, 1993).

In the Northern Region, in particular, majority of the people are into agriculture and yet poverty levels among these people are high. The farmers, since time immemorial, have been engaged in the production of various crops such as yam, groundnuts, maize, rice, millet, cassava, vegetables and rearing of animals as their source of livelihood. In spite of all these, their standard of living has not seen much improvement. It is generally believed that the indigenous crops cultivated by the people, though adaptable to local conditions, are low yielding and market prices for them are very low. Various Non –Governmental Organizations(NGOs) such as Community Initiative on Food Security (CIFS) and Opportunities Industries Centre (OIC) in the study area through building on local initiatives on food security, and successive governments through various policy interventions such as subsidization of farm inputs, have tried to improve the yam industry in particular and agricultural production in general. These efforts have not yielded the desired results. The questions that quickly come to mind are: do farmers gain from yam production? If they do, how much is it contributing towards household income and food security? This study seeks to examine these concerns.

1.3 Research Questions

1.3.1 Main Question

The main question of the study is: What contribution does yam production make to household income and food security in Zabzugu?

1.3.2 Specific Questions

The specific questions to help address the main research question include the following:

- What are the income levels of households in Zabzugu?
- What are the sources of household income in Zabzugu?
- What is the contribution of yam production to household income in Zabzugu?
- What is the contribution of yam production to food security in Zabzugu?
- What are the factors that hinder the attainment of improved income and food security through the production of yam?



1.4 Objectives of the Study

1.4.1 Main Objective

The main objective of the study is to assess the contribution of yam production to household income and food security in Zabzugu.

1.4.2 Specific Objectives

The specific objectives of the Study include the following:

- To estimate household income and its sources in Zabzugu.
- To determine the contribution of yam production to household income in Zabzugu.
- To determine the contribution of yam production to food security in Zabzugu.
- To establish the factors that hinder the attainment of improved income and food security through the production of yam

1.5 Relevance of the Study

Roots and tubers (yam, cassava, potato and sweet potato) play a significant role in the global food system. They contribute to the energy and nutrition requirements of more than 2 billion people in developing countries especially in West Africa, the major yam producing zone in the world. Unfortunately, very little published information exists in the study area on yam production and how the crop can contribute to household income, food security and poverty alleviation. The findings of this study will help identify how yam production contributes to household's livelihood and the challenges associated with its production in the study area.

Government and Non- governmental Organisations (NGOs) will be able to integrate into their programmes policies that will promote and encourage yam production at the rural household level in their quest to improve the living conditions of the people.

Findings from this study will also serve as the basis for other scientific research in the near future and hence contribute to the development of more responsive social policies and development strategies.



Information generated through this study will also contribute to the debate on how to improve the performance of the yam sector, based on which appropriate strategies and policies would be formulated to ensure the full potential of yam as a staple crop is realized for the benefit of the entire country. The potential beneficiaries of this study are yam farmers, project planners, district assemblies, NGOs, government and consumers of yam produce. The appropriate recommendations that will emanate from the study will help in ensuring food security in the area.

1.6 Limitations of the Study

A number of problems constrained the data collection and analysis;

It was difficult collecting the data because many of the respondents did not understand the rationale of the study and thought they were going to be exposed. Though the researcher did his best to explain the rationale of the study some were not convinced.

The study was limited in its representativeness and generalisability due to the small sample and rudimentary analytical procedures. The number of questionnaires to be administered to households had to be reduced due to financial constraints.

The timing of the research posed a major problem. The study was expected to be conducted at a time when most respondents were serious with their farming activities. Besides, combining work and the research did not accord the researcher much time to collect and analyze quality data, and this affected the validity of the research work.

1.7 Definition of Terms

1.7.1 A Household

Brydon and Chant (1989:47) define the household as:

"The household, whether defined as a unit of residence or domestic consumption is a crucial feature of social organization whatever form it takes. A further reason for the central role of the household is its multiplicity of function: it is the site of biological and social reproduction, of socialization, of nurturing and of fundamental decision-making."

One of the defining characteristics of rural agricultural households is the strength of family ties. The key elements usually included in the family system are residential arrangements, succession, property, inheritance, types of marriage and power structures within the family.



There are many variations within the kinship system which serve as crucial factors for the organisation of the social relationships of production and reproduction (Bryndon and Chant, 1989, Ardayfio-Schandorf, 1994). Generally, in a rural setting in Ghana, a number of family units may be found residing within the same residential compound, thereby constituting one household. The household may share either sleeping room or have a single room to a family, but share the same kitchen, verandah and courtyards. For the purpose of this study, a household consists of several family units who may be related and residing on the same compound and sharing the same kitchen.

1.7.2 Income

Income, in broad terms, refers to regular receipts such as wages and salaries, income from self -employment, interest and dividends from invested funds, pensions and other benefits from social insurance and other current transfers receivable (Canberra Group, 2001). Large and irregular receipts from inheritances and the like are considered to be capital transfers because it is unlikely that they will be spent immediately on receipts and one-off in nature. Thus, Income is operationally defined as the amount of money earned by members of a household through salary and any other sources at a given period of time.

1.7.3 Food Security

Food security includes adequate availability of food to members of a community, assured access in terms of affordability and finally, utilization of food to provide a balanced diet (FAO, 1998). What is not captured in this definition is how to ensure the availability and affordability of food in the community especially in the developing world where farming activities that form the main source of food are dependent on the generosity of nature.

1.7.4 Livelihood

Livelihood is defined as a means of earning or providing enough food and cash to sustain lives of individuals, households and groups of households (Wilde, 2001). It involves the activities people undertake to meet their basic needs and also to generate income.

1.8 Organization of the Study

This study is organized into five (5) chapters. The details are as follows:

Chapter one which constitute the introductory chapter has several components that include the background of the study, the problem statement, objectives, research questions, relevance of the study, limitations of the study, definition of terms and organization of the study.

Chapter two looks at review of related literature (sub-headings according to the classification of variables) and theoretical/conceptual framework.

Chapter three focuses on methodology of the research. It specifically examines the background of the study area, research design, respondents of the study, sampling procedure, research instruments, procedure for data collection, procedure for data analysis and scope of the study.

Chapter four is centered on results and discussion of data. Summary, conclusion and recommendation come under chapter five (5)



CHAPTER TWO

2.0 LITERATURE REVIEW

Introduction

This chapter presents a review of related literature on work done in the past in relation to yam production and how it contributes to household income and food security needs of households.

2.1 A Short History of Agricultural Development

In the middle of the 19th century, the era of modern agriculture began, characterized by the development of synthetic fertilizers, the use of machinery powered by fossil fuels and large scale production of monocrops (McNeely and Scherr, 2003). This development continued in the 20th century, when technology further advanced, and inorganic pesticides, livestock vaccines and improved transportation and storage systems became available. Since the 1900s, these Science-based production systems have dominated the developed world and are spreading amongst the high value export crop systems in developing countries (McNeely and Scherr, 2003).

In the late 1960s, due to international efforts, the 'Green Revolution' was started, an attempt to extend the benefits of these modern agricultural technologies to staple food production in developing countries (McNeely and Scherr, 2003). The Green Revolution was a great success as irrigation contributed significantly to production. However, in the 1960s and 1970s, the environmental side effects of these new production technologies came to light, revealing a decrease in wild biodiversity and a high concentration of pollutants in soils. Critics started to condemn the modern agricultural techniques as having little regard for long-term sustainability and resource conservation (McNeely and Scherr, 2003).

In addition to all the environmental accusations, modern agriculture also proved to have little benefits for poor farmers in developing countries (Altieri 2002; McNeely and Scherr, 2003). These farmers were unable to adopt modern agricultural methods, since they either could not afford to use them or the methods were not appropriate in their specific situation. Farmers in developing countries continued to use low-input agricultural systems, since they were excluded from access to credit, information and technical support, and remote from infrastructure or markets, that would have





contributed to a transfer to modern agriculture (Pingali et al., 1997; pretty, 1999; Altieri, 2002).

However, population growth kept on spurring the modernization and intensification of agricultural systems, as global food demand increased, resulting in excessive forest clearance, soil erosion and other undesirable practices which impact negatively on soil fertility resulting in low crops yields (McNeely and Scherr, 2003). All these developments were the inspiration for some commercial farmers to adopt the principles of organic agriculture to produce food more sustainably (McNeely and Scherr, 2003). The quest to ensure food security cannot be underestimated.

Per capita food production has been on a decline of about 0.9% per annum (FAO, 1993). Cereal production per capita for instance declined from 79kg per annum to 58kg per annum in 1990 (FAO, 1993). It is when one looks at the problem at the individual level and in relation to the worker's purchasing power that one grasps the full significance of the crisis in Ghana. The production of root and tuber crops especially yam when given the necessary attention can help in abating food crisis in Ghana and enhance poverty alleviation among peasant farmers.

2.2 World Yam Production and Trade

Yam (*Dioscorea spp*), a multi-species, polynoid, and vegetative propagated tuber, is cultivated widely in the Tropics and Sub-tropics. Over 95% of the world's yam production occurs in West and Central Africa (Otoo et al., 2009). Yams are important for food, income and socio-cultural activities especially in West and Central Africa and account for about 93% of the world annual production of 38 million tonnes (IITA, 2000). The most important zone for cultivation and use of yams stretches from Cote D'Ivoire through Ghana, Togo, Benin, Nigeria, Cameroun, Gabon, Central African Republic and the Western part of the Democratic Republic of Congo (FAO, 2000). Nigeria produces about 70% of the world total. In a recent urban food demand study in three cities in northern Nigeria (i.e. Kano, Kaduna, and Abuja), 62% in Kano, 88% in Kaduna and 97% in Abuja purchased yams weekly (IITA, 2000).



Africa continues to play a domineering role in world yam production with Nigeria alone accounting for nearly 75% of the total world production (Opera, 1999). World annual production was estimated to be 25 million metric tonnes in 1992. During the past five years, total world production has increased from 32.7 million metric tonnes in 1995 to 37.5 million metric tonnes in 2000 (Opera, 1995). Also, during this period, export quantity declined slightly while export income remained fairly steady. During the period 1975-90, total cultivated area increased by 38.8%. However, the importance of yam in the economy of the main production areas appears to be declining due partly to competition with other crops like cassava in Nigeria and taro in the South Pacific (Opera, 1999). The major producing areas have also continued to experience high population growth rates. During the last production decades, the annual growth rates of per capita production in the major yam zones in Africa have declined (Dorosh, 1985). Tables 1-3 show records of world yam production and trade.

Table 2.1: World Production of Yam

	Area (10 ³ ha)	% of world area	Production (10 ³ Mt)	% of world production	Yield (Mt ha ⁻¹)	% of world Yield
World	2,110	100	20,198	100	9.6	100
Africa	2049	97.1	19,539	96.7	9.4	97.9
North/central America	22	1.0	243	1.2	11.1	115.6
South America	10	0.5	48	0.2	4.7	0.5
Asia	15	0.7	168	0.8	11.4	118.8
Oceania	15	0.7	200	1.0	13.5	140.6
Leading countries						
1. Nigeria	1350	64.0	15,000	74.3	11.1	115.6
2. Cote d'Ivoire	200	9.5	1,700	8.4	8.5	88.5
3. Ghana	160	7.6	800	4.0	5.0	52.1
4. Togo	100	4.7	750	3.7	7.5	78.1
5. Benin	59	2.8	610	3.0	10.3	107.3

Source: Adapted from (FAO, 1975)

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Table2.2: World Leading Yam Producers in 1990

	Area (10 ³ ha)	% World Area	Production (10Mt)	% of world production	Yield (ka ha ⁻¹)	% of world Yield
World	2,928	100	29,447	100	10,057	100
Africa	2,789	95.3	28,249	95.6	10,127	100.7
West Indies	59	2.0	350	1.2	6,122	60.9
Oceania	18	0.6	284	1.0	15,818	157.3
Asia	15	0.5	198	0.6	12,876	128.0
Nigeria	1,900	64.9	22,000	74.7	11,579	115.1
Cote D'Ivoire	266	9.1	2,528	8.6	9,504	94.5
Benin	90	3.1	992	3.4	11,026	109.6
Ghana	200	6.8	168	2.4	3,500	34.8
Togo	40	1.4	420	1.4	10,500	104.4
Zaire	38	1.3	270	0.9	7,200	71.6

Source: Adapted from (FAO, 1991)

Table 2.3: Data on World Production and Trade in Yams

	2000	1999	1998	1997	1996	1995
Production Mt	37,532,138	37,552,383	35,753,519	34,705,657	33,587,195	32,765,435
Exports- Mt	-	23,198	21,080	28,069	27,493	26,264
Exports- 1000 US\$	-	20,077	19,212	20,873	20,810	21,108

Source: (FAO, 2000)

2.2.1 Yam Varieties

Yam, a tropical crop in the genus *Dioscorea*, has as many as 600 species among which 12 species are edible (Coursey, 1976). Within this genus, 6 are economically important Staple species. These are: *Dioscorea rotundata* (white guinea yam), *Dioscorea alata* (Yellow yam), *Dioscorea bulbifera* (aerial yam), *Dioscorea esculant* (Chinese yam) and *Dioscorea dumetorum* (trifoliate yam) . Out of these, *Dioscorea rotundata* (white yam) and *Dioscorea alata* (water yam) are the most common species in Ghana. Yams are grown in the coastal region in rain forests, wood savanna and southern savanna habitats



(Coursey, 1976). *Dioscorea alata* cover major areas in Asia, whereas *Dioscorea rotundata* and *Dioscorea cayensis* is commonly cropped in Africa (Mandal, 1994)

2.2.2 Statistics

Yams are produced on 5 million hectares in about 47 countries in tropical and sub-tropical regions of the world (IITA, 2009). Yields are about 11 tonnes per hectare in the major producing countries of West Africa. According to FAO statistics, 48.7 million tonnes of yams were produced worldwide in 2005, and 97% of this was in Sub-Saharan Africa (FAO, 2005). West and Central Africa account for 94% of world production. Nigeria is the leading producer with 34 million tonnes, followed by Cote D'Ivoire (5 million tonnes), Ghana (3.9 million tonnes) and Benin (2.1 million tonnes). Ethiopia (174,000 tonnes) and Sudan (137,000 tonnes) are the major producers in East Africa. Columbia (333,000 tonnes) leads the production in South America followed by Brazil (230,000 tonnes), while Japan (204,000 tonnes) is the leader in Asia (IITA, 2009). Yams are also important in the Caribbean (for example, Haiti with 197,000 tonnes in 2005), and the south pacific islands. Ghana exports the largest quantity of yams (about 12,000 tonnes) annually. Average yam consumption per capita per day is highest in Benin (364 kcal) followed by Cote D'Ivoire (342 kcal), Ghana (296 kcal,) and Nigeria (258 kcal) (IITA, 2009).

2.2.3 Socio-Cultural Aspects of Root and Tuber production

Yams are as unique in human society as they are in the plant world (Degras, 1986). Besides, their genesis, which is tropical and African, seems to have played a role in man's evolution. The fate of tropical man and yams are interwoven throughout the yam's entire growing system (Degras, 1986). Yams play a central role in the farming system and are important plants of traditional culture and religion (Hahn, 1984). Traditional ceremonies still accompany yam production indicating the high status given to the plant (Degras, 1986). Considerable amount of ritualism has developed around the production and utilization of yam. The most important manifestation of this ritualism is in the new yam festival celebrated at the beginning of the harvest season in most traditional areas in Nigeria (Ike and Inoni, 2006).



Yams play a significant role in the socio-cultural lives of some producing regions like the celebrated New Yam Festival in West Africa, a practice that has also extended to overseas where there is a significant population of the tribes that observe it. In some parts of Nigeria, the meals offered to gods and ancestors consist principally of mashed yam. According to Diop(1996), the ritual , ceremony and superstition often surrounding yam cultivation and utilization in West Africa is a strong indication of the antiquity of use of this crop. In Nigeria, yam is considered to be a man's property and the traditional ceremonies that still accompany yam production indicate the high status given to the plant.

Seen from the perspective of the history of mankind, the societies whose nutrition is based on the cultivation of roots and tubers are very old cultures (Knoth, 1993). The settlement areas for these societies originally comprised the whole of the tropical equatorial region. During the course of history of mankind, almost all root and tuber societies have either been infiltrated by cereal cultivation societies or destroyed by their hegemonic strives. More or less intact, root and tuber societies have only been able to survive and retain their cultural heritage until today in West Africa (yam belt) and some islands of Oceania (Coursey, 1981 cited in Knoth, 1993).

The vegetation cycle (planting, harvesting, and storing) is frequently embedded in a series of rituals serving to protect the roots and the tubers (Knoth, 1993). The harvest of roots and tubers is tabooed until certain rituals supported by religious sanctions have been carried out (Knoth, 1993). In these societies, the individual plant often has a greater significance than the crop population. For Yams, for example, ridged beds and staking systems are set up for each individual plant .It is the aim to maximize the yield for each plant (largest possible tubers) and not maximize the area output (Knoth, 1993). This concentration on the individual plant is also illustrated in harvest technology, with the greatest care, only a definite number of tubers are harvested from each plant allowing it to continue to grow.

Post-harvest technology is also in line with the desire for harmony in these societies. The purpose of this is more to avoid longer periods of storage than to develop improved storage systems (Lancaster and Coursey, 1984). The traditional store for yams (yam barn) in West Africa does not only serve to preserve the tubers but also has symbolic



character and is a sign of the economic prosperity and of the social influence of its owner (Knoth, 1993).

The overall field of post harvest activities in these societies is often seen as an extension of household activities (Lancaster and Coursey, 1984). It is therefore not surprising that the post harvest tasks are the responsibility of the women (Lancaster and Coursey, 1984). Gender specific division of labour however, shows some differences depending on the variety of crop. The women are thus involved in cultivating and storing cocoyam and cassava or even in charge of this. In contrast, the cultivation and storage of yam is exclusively a matter for men (Knoth, 1993).

2.2.4 Management Practices of Yam production

Yam is a demanding plant in every respect. Its demands on the soil fertility mean that it is mostly the first member in a crop rotation (Knoth, 1993). The preparation of the field, ridging, vegetative propagation, mulching, weed control and harvesting mean a great input of work. About 50 working days have to be calculated per hectare with a harvest yield of ten tonnes of tubers (Coursey, 1966 cited in Knoth, 1993).

According to IITA (1998), the following are the management practices associated With yam production:

2.2.4.1 Choice of Land

Yam requires fertile soil. It is usually grown as a first crop after clearing a bush fallow. The crop flourishes well in a free draining and fertile soil. The yams for such soils Conditions in Nigeria are white yam or white guinea yam (*Dioscorea rotundata*) and Water or yellow yam (*Dioscorea alata*).

2.2.4.2 Land Preparation and Method of Planting

Yams are planted on a ridge or make mounds at approximately one metre apart. Planting is done seed or cut setts from ware tubers. A day before planting the tubers has to be subjected to treatment with wood ash or fungicide (thiabendazole) to prevent damage to the soil (Coursey, 1984). The setts are planted at an interval of 15-20 centimetres (5.9-7.9in) with the cut surface facing up.



2.2.4.3 Mulching

Mulching is an essential management practice, and is mostly carried out during October-November in Nigeria usually with dry grass or plant debris weighed down with balls of mud. Dosage of fertilizer application is done after chemical analysis of the soil samples (FAO, 1990). Manual weeding is done by hoeing is done three or four times depending on the rate of weed growth. However, in some cases, chemical weed control system used.

2.2.4.4 Staking

Yam requires staking usually 2m high and trains the yam vines on them. Two stakes, each 2m (6ft-7in) height are used for staking the plant to vine over it. Use one stake for two stands of yam, or one long strong bamboo stake for 4 adjacent stands. Tie the adjacent stakes together at the top to reinforce strength (Coursey, 1966).

2.2.4.5 Pest and Disease Control

Pest and disease control is by cultural and chemical methods. The pest which affect the plant are nematodes such as root knot *meloidogyne* spp and yam nematode (*scutelloremal bradys*), and insects such as yam shoot beetle, yam tuber beetle crickets. Weeding of the field is essential and maintaining a 2-3metres (6ft7in-9ft10in) weed-free border around the field is to be ensured. (Onwueme, 1978). Chemical control through the use carbofuran granules at 3kg a/ha to the soil for the control of both nematodes and insects may also help. Other control measures include the use of resistant cultivators where available. According to Knot (1993), disease incidence in yam production can be reduced by planting uninfected yam tubers and treating setts with wood ash before planting.

2.2.4.6 Harvesting

Harvesting is done before the vines and soil become dry and hard. Generally, a yield of 10-15 tonnes per hectare for white yam and 16-25 tonnes for water yam are obtained by following prescribed management practices.

2.2.4.7 Storage

Improved storage of fresh yam tubers begins during harvesting. Injuries should be avoided as much as possible as these constitute doors for rot viruses. For this reason,



harvesting transport and storage have to be carried out with as much care as possible (Nwankiti et al., 1989). The harvested yams are stored by tying them with rope or through the use of traditional yam ban. Regular inspection of the stored product is important for the success of storage systems. Rotting tubers should be sorted out and removed. According to Nwankiti et al. (1998) improvement to the traditional yam ban can substantially reduce losses. The modern storage systems include:

- The ventilated-pit store (Ezeike, 1995)
- The thatched-roof pit (Fiagan, 1995)
- The thatched root pit store (Fiagan, 1994)

2.2.5 Importance of Yam to Household Livelihood

Yam is a tuber crop which is produced in nearly every part of the tropical region. Its greatest importance is attained in West Africa where more than 90% of the world-wide production (40 million tonnes of fresh tubers) is being produced (Lucien, 2008) According to Lucien (2008), yams play three major roles in the production areas:

- (1) It is a staple diet for millions of people thus contributing to food security. In cote D'Ivoire, yam is the first food crop on a quantity basis (three million tonnes of fresh tubers were produced in 2002) and it is consumed by two-thirds of the population.
- (2) Traditionally considered as a food crop produced for farmer's consumption, yam has achieved nowadays an economic importance. In the production area exists a well-established trade circuit which involves many actors.
- (3) A considerable amount of ritualism is developed around the production and utilization of yam, since for several decades yam has been embedded in the population habit and has socio-cultural significance.

Yam production serves as a source of income generation to peasant farmers and the labourers who work on yam farms as well as for those that engage in its sale, the itinerant traders who assemble the crop from village to village and the marketers in urban areas who retail the commodity (IITA, 2000). Peels and waste from yam are often used for feeding poultry and livestock. According to Komolafe et al. (1983), the various uses to which yam is put tends to indicate that the crop is a famine fighter. Aseidu (1989)



reported that yam plays an important role in social and religious festivals as it constitutes an integral part of the cultural heritage for many people in the yam growing areas of Nigeria.

Yams are a good source of vitamin B₆, which is needed by the body to break down a substance called *homocysteine*, which can directly damage blood vessel walls (www.whfood .Org, 2010). Individuals who suffer a heart attack despite having normal or even low cholesterol levels are often found to have high levels of homocysteine. Since high homocysteine levels are significantly associated with increased risk of heart attack and stroke, having a good supply of vitamin B₆ on hand makes a great deal of sense. High intakes of vitamin B₆ have also been shown to reduce the risk of heart disease (www.whfood, 2010).

Many consumers have found products in the market place that promote wild yam or wild yam extracts as substances that can help provide a natural alternative to hormonal replacement in women who have reached the age of menopause (www.whfood.org, 2010). Many of these products are provided in the form of creams that can be topically applied. Even though the food itself is not usually promoted by natural products companies, these yam-containing products have sparked interest in the relationship between yam and menopause. Yams do contain some unique substances called steroidal saponin, and among these substances are chemicals called diosgenin. Because of similarities between diosgenin and progesterone, questions were initially raised about the ability of our body to convert diosgenin into progesterone, but research has shown that the answer here is clearly no. Diosgenin does, however, have an impact on hormonal patterns in studies involving animals, and may be helpful in lowering risk of osteoporosis, although we don't as yet have any human studies in this area (www.whfood.org, 2010).

Wild yam also has some history of traditional use in herbal medicine, especially Chinese herbal medicine, as a botanical that can affect organ system function. While the focus here has been on kidney function, wild yam (or Chinese yam) has also been used to support the female endocrine system. For example, there has been traditional use of this root in conjunction with lactation. There has only been seen one high-quality, peer-reviewed research study in which women were actually given wild yam (in the form of a



topical cream) to determine the impact of this plant on menopausal symptoms. Although the research showed some very limited benefits from the wild yam cream and no side effects, none of the symptom changes were statistically significant. In summary, it can be said that there's no research evidence to support the claim that yam has special benefits when it comes to menopause, but that more research is needed in this area because there is a clear connection between yam, diosgenin, and endocrine function that is not yet understood (www.whfood.org, 2010).

2.2.6 Agronomic Characteristics of Yam production

Yam is grown and cultivated for its energy rich tuber. It is adaptable to fairly fertile soils and is suitable for inter-cropping with green legumes such as cowpea, Soya beans and a variety of leafy vegetables (www.food-info.net, 2010). A well-drained, rich, loamy soil is the most favourable. Yam requires a warm, humid climate; however, the crop possesses considerable drought resistance. It gives more calories per unit of land area than most crops and matures within seven months (www.food-info.net, 2010). On soil of average fertility, 20-30 tonnes per hectare of tubers can be obtained, and up to 55 tonnes per hectare on fertile soil. It has quite demanding labor and maintenance requirements, such as hilling the soil around each plant to form mounds, to ensure a pulverized soil favorable for tuber development. Storage of tubers occurs after harvest in barns or heaps covered with grass. (www.food-info.net, 2010).

2.2.7 Some Constraints on Yam Production

Yam cultivation is generally limited by high costs of planting material and of labour, decreasing soil fertility, inadequate yield potential of varieties, as well as increasing levels of field and storage pests and diseases associated with intensification of cultivation (IITA, 2009). The labour requirements in yam cultivation for mounding, staking (especially in the forest zone), weeding and harvesting exceed those for other starchy staples such as cassava. These account for about 40% of yam production cost while 50% of the expenditure goes to planting materials (IITA, 2009). The seed yams are also perishable and bulky to transport. If farmers do not buy new seeds yams, they must set aside up to 30% of their harvest for planting the next year. Increasing pressure from a range of insect pests (e.g. Leaf and tuber beetles, mealy bugs, scales), fungal (e.g. anthracnose, leaf spot, leaf blight, tuber rots), and viral diseases, as well as nematodes



contribute to sub-optimal yields and the deterioration of tuber quality in storage (IITA, 2009).

The shortage of yam setts has a major influence on yam production. Langyintuo (1996) notes that seed shortage is a major constraint to increase yam production in the Guinea Savanna zone. At first, purchasing seed appear not to be common practice, farmers tend to use their own seeds for planting and only obtain them off-farm on an ad hoc basis (Langyintuo, 1996). Their reluctance to exchange planting materials is explained, in part, by the believe that "seed yams carry along with them the fortunes or misfortunes of the farmer who grow them " (Tetteh and Saakwa, 1991). In spite of this, farmers do seek planting materials from external sources if:

- Their stocks are inadequate due to a poor harvest in the previous season.
- They wish to obtain new varieties.
- They plan to increase the area planted

Unfortunately, the quality of purchased seed yams is often poor. At the same time, it is normal for farmers to sell seed yams only once their own fields have been planted. This means that the purchasers tend to plant late which results in sub-optimal yields (Marfo et al., 1998).

2.3 Sources of Household Income and Livelihood

In the last three decades, development researchers have focused on understanding determinants of vulnerability of livelihood sources and intensification of poverty among rural people. This has produced much empirical studies of income and activity diversification; documenting various reasons why households simultaneously participate in more than one income earning activities (Reardon et al., 1992; Ellis, 2000). Ellis (1998) distinguished between pull and push factors that necessitate diversification.

Rural households earn income from diverse allocation of their natural, physical and human capital assets among various income generating activities (Ellis, 1998). Literature offers many reasons why such diversification occurs. Among these might be diminishing returns on increasing investment in certain activities synergies (economy of scope), among distinct activities, or the lack of markets, which compel self-provision of goods or



services the household desires for own consumption (Barrett et al, 2001). Similarly, households may wish to diversify as strategy for coping with an unexpected shock, or to minimize risk ex ante by participating in activities that generate other incomes. The presumption throughout the literature is that households choose such patterns of diversification so as to achieve the best possible standard of living (Barrett et al., 2001). The chosen combinations of assets and activities are often referred to as the household's livelihood strategy. A livelihood strategy encompasses not only activities that generate income, but many other kinds of choices, including cultural and social choices, that come together to make up the primary occupation of household (Ellis, 1998).

The concept of livelihood strategy has become central to development practice in recent years. Nonetheless, given the uncountable possible proportional mixes of activities undertaken by household, it is not always clear what constitute a distinct livelihood rather than just a slightly different mix of activities within the same general livelihood (de Haan 2000; IIED, 2004). An appropriate operational definition of livelihood remains elusive, as does an associated method for identifying livelihoods in quantitative data (Ahu, 2003).

2.3.1 The Sustainable Livelihood Framework.

The livelihood approach views the world from the point of view of the individuals, households and social groups who are trying to make a living in valuable conditions and with limited assets (Mabogunje, 2000). It provides a framework for understanding the opportunities and assets available to poor people and the sources of their vulnerability, as well as the effects of external organization, processes and policies in such vulnerabilities (de Haan, 2000). This approach is therefore, the most appropriate framework for the purpose of this study which is to assess how yam production contributes to the livelihood of the people of zabzugu.

According to Barrett et al. (2001), the basic elements of most livelihood frameworks are: livelihood resources, what people have, variously referred to as stocks and stores, assets and capital (both tangible and intangible); livelihood strategies: what people do (e.g. agriculture, wage, labor, and migration); livelihood income; What goals they are pursuing and the living that results from their activities.



Krantz (2001) also asserts that a key point of the sustainable livelihood approach is that it allows the consideration of various factors and processes, which either hinder or enhance poor people's ability to make a living in an economically and socially sustainable manner. Hugo et al. (2001), on the other hand, assert that the sustainable livelihood approach is an analytical framework, which seeks to improve our understanding of how people use the resources at their disposal to make a livelihood.

2.3.2 Yam Production as a Livelihood Strategy

2.3.2.1 The Concept Livelihood

The livelihood is defined as adequate stocks and flows of food and cash to meet basic needs (WCED, 1987a). A livelihood comprises people, their capabilities and their means of living including food, income and assets (IDS, 1991). A household may be enabled to gain sustainable livelihood security in many ways-through ownership of land, livestock or trees: right to grazing, fishing, hunting or gathering; through stable employment with adequate remuneration; or through varied repertoires of activities. A livelihood is socially sustainable when it can cope with and recover from stress and shock and provide for future generations.

Rural livelihoods comprise, or more often several, activities. These include cultivation, herding, hunting, gathering, and reciprocal or wage labour, trading and hawking, artisanal work such as weaving and carving, processing, providing service in transport, fetching and carrying and the like. They variously provide food, cash and other goods to satisfy a wider variety of human needs (WCED, 1987a).

2.3.2.2 Agriculture and Rural Livelihoods

Agriculture is notably the most important economic activity of rural households in most developing countries (Kabeer, 1991; Bird and Shepherd, 2003). In the past, it has often been assumed that increased farm productivity would create more non-farm income earning opportunities in the rural economy via linkage effects (Monsen, 1991). However, this assumption is no longer tenable for many poor rural families, as it is obvious that farming on its own is unable to provide a sufficient means of survival (Potts, 2000).

As a result of inadequate income from agriculture most households are compelled to embark on livelihood diversification strategies in order to vary the sources of household



income (Afshar, 2003). The tendency for rural households to engage in multiple occupations is known to policy-makers, but few attempts have been made to link this behaviour in a systematic way to rural poverty reduction policies (de Haan, 1999). In the search community, for example, women are more involved in both agriculture and petty trading as a form of livelihood diversification (Bryceson et al, 2003). Thus, in farming households, activities are not confined to agricultural but often include non-farm activities in order to diversify income and meet household needs. Migration is one common livelihood strategy in rural settings.

2.3.2.3 Yam Production and Household Livelihoods

The production of yams has been very important to the welfare of many generations of people in Ghana and other countries of West and Central Africa (FAO, 2007). Yams certainly continue to be very important for food security, income generation and several socio-cultural events. The yam culture is an integral part of over 60 million people in the sub-region, where it provides multiple opportunities for poverty reduction and better nutrition (Crusoe, 2004). Yam performs a very supportive role as far as the sustenance of human life is concerned. The following are some of them:

2.3.2.3.1 Food Uses

Fresh tubers of yam are used to prepare traditional food dishes from Cote d' Ivoire, Ghana to Nigeria. Yams are most appreciated eaten in pounded form called fufu, a dough obtained by mortar-pounding tubers that have been boiled until soft. These countries account for over 90% of *Dioscorea rotundata* production (FAOSTAT, 2003). According to Bricas (2003) most inhabitants of urban areas of West Africa eat boiled or fried yams, often as snack away from home. The use of yam flour (produced by milling dried chips) is another emerging habit. Yam flour is very well adapted to urban cooking requirements and is used to prepare a dough called Amala, a staple or occasional food for about 50% of the population of Cotonou (Benin) and towns of Southwestern Nigeria. Amala is not perceived as a substitute for fufu but rather as a food in its own right (Bricas et al., 1997)

2.3.2.3.2 Non Food Uses

Yam produces starch which is an important ingredient in food and non-food industries such as paper, adhesives, plastic, textile and pharmaceutical industries. Tuber processing



is aimed at obtaining products that are staple in terms of longevity, nutrition and palatability (Oladebeye et al., 2008a)

2.3.2.3.3 Medicinal Uses

Yam tubers are used for various traditional medicines in China, Korea and Japan, the mucilaginous tuber milk contains allantoin, a cell-proliferant that speeds the healing process when applied externally to ulcers, boils and abscesses. Its decoction is also used to stimulate appetite and to relieve bronchial irritation, cough and so on on (WWW.nutrition-and-com/yams.html).

2.3.2.3.4 Health Benefits

The following are the health benefits associated with yam as a tuber crop:

- Yam is a good source of energy; 100g provides 118 calories. It mainly composed of complex carbohydrates and soluble dietary fibre. Together, they raise blood sugar levels rather very slowly than simple sugars and therefore recommended as low glycemic index healthy food (WWW.nutrition-and-com/yams.html).
- The tuber is excellent source of B-complex group of vitamins, provides adequate daily requirements of pyridoxine (vitamin B6), thiamin (vitamin B1), riboflavin, folic acid, pantothenic acid and niacin. These vitamins perform various metabolic functions in the body (WWW.nutrition-and-com/yams.html).

2.4 Household Income and its Sources

Household income consists of all receipts whether monetary or in kind (goods and services) that are received by the household or by individual members of the household at annual or more frequent intervals, but excludes windfall gains and other such regular and typically over time receipts (Reinsford and Lorenz, 2009). Household income may be defined to cover:

- Income from employment (both paid and self-employment).
- Property income
- Income from the production of household services.
- Current transfer received.



2.4.1 Household Income and Household Composition

Household income and household composition are intricately related. On one level, there is obviously a strong connection between household composition and the adequacy of household income. On the other hand, the families who have more adults in the family have the opportunity for greater income while those with younger children might have more constraints against respondents entering the labor force (Massouri Department of Social Sciences, 2000).

2.5 The Household Economy and the Indivisible Role of Women

Rural women, with special reference to those in food production, engage in many "indivisible" activities that affect their productive lives (Murray, 1981; Oppong and Abu, 1987). According to Oppong (1987), Ghanaian women tend to be more heavily burdened than their male counterparts across most socio-economic groups. The drudgery that characterised women's daily activities are clearly seen, for example most of the pre-farm activities which include fetching water, cooking, serving meals and getting the children ready for school are performed by women.

With the exception of some areas in Northern region, where the gender division of labour require men to look for firewood, this role is largely reserved for women who spends long hours in search of firewood for cooking (Ardayfio-Schandorf, 1994). Meanwhile, they are expected to perform their farm duties after completing these off-farm activities. According to FAO (2000), women produce about two-thirds of the world food, 50-60% of the labour input. Women role in agriculture is growing at a faster pace than men and they are the most important actors in the food chain, which begins from production, and includes market and intra-household distribution of food (Mikell, 1997).

In Ghana, the backbone of the rural communities is the small-scale farmer, the majority of who are women (Ardayfio-Schandorf and Awumbila, 2000). Women play a major role in agriculture, which includes farming, fisheries, forestry and livestock production (Benneh et al., 1996). They play a lead role in post-harvest activities such as shelling of grains and marketing (Ameyibor, 1993). Women are also becoming increasingly visible in farm tasks which traditionally have been designated as male preserves thus, breaking grounds in typical male dominated areas such as land clearance and growth of cash crops



(Goldstein and Urdry, 2002). Also, they play a major role in the transportation of farm produce to the market centres through head-loading.

In spite of the central role of women in agriculture, they remain the most disadvantaged population in Ghana. Women have limited access to resources than their male counterparts (Boserup, 1970). These women are the last to benefit from, or in some cases, have been negatively affected by prevailing economic growth and development processes. Gender bias and gender blindness still persist in the agricultural sector (Swindell, 1985). Women farmers also suffer lack of recognition because their area of operation falls within the informal sector of the economy which is largely associated with unskilled and unprofessional tasks (FAO, 2000).

For yams, the bulk of cultivation and post-harvest related activities in northern Ghana are undertaken predominantly by men (Anamoh and Bacho, 1994). Peter et al (1997), notes that "in the Northern and Upper West region, farmers quite categorically say that yam farming is considered too demanding for women", with women yam farmers being restricted almost totally to the southern regions. Thus, the challenge facing government and policy makers is to establish required policy frameworks and strategies to ensure real change in the lives of women and men in rural areas, who contributes enormously to the food production base of the country.

2.6 Food Security

Extensive research in the late 1980s focused on understanding household food security, food insecurity and hunger. This work led to the development, by an expert working group of the American Institute of Nutrition, of the following conceptual definitions published in the 1990 by the Life Services Research Office (LSRO) of the Federation of American Societies for Experimental Biology (Anderson, 1990).

- Food security- Access by all people at all times to enough food for an active healthy life. Food security includes at minimum: (1) the ready availability of nutritionally adequate and safe foods, and (2) an assured ability to acquire acceptable food in socially acceptable ways (e.g. without resorting to emergency food supplies, scavenging, stealing, or other coping strategies).



- Food insecurity - Limited or uncertain availability of nutritionally adequate and safe foods or limited or uncertain ability to acquire acceptable foods in socially acceptable ways.
- Hunger -the uneasy or painful sensation caused by a lack of food. Hunger may produce malnutrition over time. Hunger is a potential, although not necessary, consequence of food insecurity.

Food insecurity and hunger, as the terms are used here, are conditions resulting from financial resource constraint (Anderson, 1990). Hunger, for example, can occur for many reasons, including dieting and being too busy to eat. The measurement procedure described here, however, is concerned only with food insecurity and hunger that occur because the household does not have enough food or money to buy food. Hunger, in this perspective, may be seen as a severe stage or level of food insecurity, rather than as a distinct or separate condition (Anderson, 1990).

Food security, according the Ministry of Food and Agriculture (1998), includes adequate availability of food to members of a community, assured access in terms of affordability and finally, utilization of food to provide a balance diet. What is conspicuously missing in this definition is how to ensure the availability and affordability of food in the community especially in the developing world, where farming activities that form the main source of food are dependant on the generosity of nature that is capable of and indeed affects productivity and hence the prices of food crops.

In another instance, food security has been viewed as development strategy by which a community or a country aims at producing as much of or all its food needs within its boundaries, thereby minimizing the extent of its dependence on food produced from other communities or geographical areas (FAO, 1981; NSDA, 1981 and World Bank, 1982). The viability of this definition is questionable in a sense that a country cannot under any circumstances produce all her food needs due mainly to certain constraints such as weather, soil quality, level of technology and other factors.

The International Fund for Agricultural Development (1994), defined food security as the capacity of a household to procure a stable and sustainable basket of adequate food.



Food security as a rural development strategy by which poor rural households get their food needs has met quite opposing views from scholars of varying persuasions. Faychamps (1991) does not regard food security as a unique or even an important strategy through which poor rural households ensure food self-sufficiency. Instead, he is of the view that there are many households for whom food self-sufficiency is an unattainable objective, either because they live in areas that are inherently unsuitable for agriculture or because they do not have sufficient productive assets to produce by themselves. Others, who share the same viewpoint, for instance Barret (1988, cited in Faychamps, 1991) indicated from his study of Madagascar that most of the rural inhabitants are deficit producers. The same trend was observed for Northern Nigeria. Whilst these observations might be true for some areas, they may not hold for others. Zabzugu is no exception.

According to Mbokoko (1996), more 300 million people in sub-Saharan Africa suffer from malnutrition and 160 million from undernourishment, because food supplies are still structurally insufficient. On calorie intake, he noted that the daily intake was 2096 calories in 1992 whilst an adult requires 2,200 to 3000 calories per day. He foresaw deterioration in the situation by the year 2000, when the number of people suffering under- nourishment will reach 300 million (Mbokoko, 1996).

Food security is defined as existing when all people at all times have access to sufficient, safe, nutritious food to maintain a healthy and active life (WFS, 1996). Commonly, the concept of food security is defined as including both physical and economic access to food that meets people's dietary needs as well as their food preferences. In many countries health problems related to dietary excess are an ever increasing threat, in fact, malnutrition and food borne diseases such as diarrhea have become double burden (WFS, 1996). Food security is built on three pillars:

- Food availability: sufficient quantities of food available on a consistent basis.
- Food access: having sufficient resources to obtain appropriate foods for a nutritious diet.
- Food use: appropriate use based on knowledge of basic nutrition and care, as well as adequate water and sanitation.



2.6.1 Food Security and Sustainable Development

Food security is a complex sustainable development issue, not only linked to health through malnutrition, but also to sustainable economic development, environment and trade (WFS, 1996). There is a great deal of debate around food security with some arguing that:

- There is enough food in the world to feed everyone adequately but the problem is distribution.
- Future food needs be met by current levels of production.
- National food security is paramount – or no longer necessary because of global trade.
- Globalization may or may not lead to the persistence of food insecurity and poverty in rural communities.

Issues such as whether households get enough food, how it is distributed within the household and whether that food fulfils the nutrition needs of all members of the households show that food security is clearly linked to health and sustainable development (WFS, 1996)

2.6.2 Agriculture and Food Security

Globally, around 852 million people are chronically hungry due to extreme poverty, while up to 2 billion people lack food security intermittently due to varying degrees of poverty (FAO, 2003). Six million children die of hunger every year: 1700 everyday (FAO, 2003). This means that the demand for agricultural areas will increase enormously over the coming years (Tilman, 2002).

Agriculture remains the largest employment sector in most developing countries and international agriculture agreement are crucial to country's food security. (WFS, 1996). Some critics argue that trade liberation may reduce a community's food security by reducing agricultural employment levels. Concern about this has led a group of World Trade Organization (WTO) member states to recommend that current negotiations on agricultural agreements should allow developing countries to re-evaluate and raise tariffs on key products to protect national food security and employment. They argue that WTO agreements, by pushing for the liberalization of crucial markets, are threatening the food security of whole communities. Related issues include:



- What is the impact of the further liberalization of food and agricultural trade, considering the widely differing situations in developing countries?
- To what extent can domestic and social policies and food, agricultural and rural development policies, offset the diverse (and possibly relative) impacts of international policies, such as those relating to international trade?
- How can the overall economic gains from trade benefit those who are more likely to be suffering from food insecurity?
- Do gains trickle down to enhance economic access to food for the poor?
- How can food and agricultural and trade be restrained from the over- exploitation of natural resources that may jeopardize domestic food security in the long term?
- How to ensure that imported food products are of acceptable quality and safe to eat.

2.6.3 Achieving Food Security

The number of people without enough food to eat on a regular basis remains very high at over 800 million, and it is not falling significantly (FAO, 2009). The proportion of people, who are hungry, however is greater in Africa (33%) than Asia (16%) (FAO, 2009). According to FAO (2009), in 22 countries, 16 of which are in Africa, the undernourishment prevalence rate is over 35%.

FAO (2003) reported that: In general, the countries that succeeded in reducing hunger were characterized by more rapid economic growth and specifically more rapid growth in their agricultural sectors. They also exhibited slower population growth, lower levels of Human Immune Virus (HIV) and higher rankings in the Human Development Index (HDI)'. According to FAO (2003), addressing agriculture and population growth is vital for achieving food security.

USAID (2010) proposed several key steps to increasing agricultural productivity which is in turn key to increasing rural income and reducing food insecurity. They include:

- Boosting agricultural science and technology. Current agricultural yields are insufficient to feed the growing populations. Eventually, the rising agricultural productivity drives economic growth.
- Securing property rights and access to finance.



- Enhancing human capital through education and improved health.
- Conflict prevention and resolution mechanisms and democracy and governance based on principle of accountability and transparency in public institutions and the rule of law are basic to reducing vulnerable members in the society.

The UN Millennium Development Goals (MDGs) are one of the initiatives aimed at achieving food security in the world.

2.6.4 Roots and Tubers Production and Food Security

Africa's staple foods, roots and tubers such as cassava, yam, cocoyam and taro face many threats. They increasingly experience attacks from pests, weeds, disease, drought, flooding and toxicity, threatening the livelihoods of more than 240 million people (IITA, 2009). Sub Saharan Africa produces 51%, 97% and 77% of the total world production of cassava, yam and cocoyam respectively (IITA, 2009). These crops are mainly produced by subsistence farmers using traditional, often labour intensive farming practices and provide opportunities for generating income and improving food security. They also enhance and diversify the rural economy, alleviate poverty and generate livelihoods for women and medium to large scale farmers in many parts of sub-Saharan Africa (IITA, 2009).

Evidence abound that root and tuber crops are efficient sources of low-cost calories because of their adaptability to wide range of ecologist. The rural poor in some African countries obtain about 65-75% of their daily food energy from root and tuber crops (Aliyu, 2000). Root and tuber crops deserve particular attention because many developing world's poorest and most food insecure households look at these crops as contributing, if not the principal source of food, nutrition and income (Alexandratos, 995; Scott et al., 2000; and Chandra, 2003). Root and tuber crops mean many things to different people. For some, it means the difference between subsistence and achieving a leg on the economic ladder, to others, they mean the difference between survival and starvation (Scott et al., 2000).

African countries contribute 23% to the world production of root and tubers crops (FAO, 2000). The main root and tuber crops produce in Africa are:



- Cassava (53% of the world production), followed by Asia (29%) and South America (17%).
- Yams (96% of the world production).
- Potatoes (4% of the world production), the main producers being Asia (37%) and the rest of the world (55%).
- Sweet Potatoes (7%), the main producers being Asia (91% of the world production).

In Africa, root and tubers are generally grown in countries located in the sub-Saharan zones, notable in Nigeria, Ghana, Cote d'Ivoire, Benin, Cameroon, Central African Republic, Democratic Republic of Congo and Rwanda. 40% of root and tuber crops are produced by Nigeria, followed by DR Congo (10%), Ghana (8%), Tanzania (4%), Mozambique (3%), Uganda (5%) and Cote d'Ivoire (3%) (FAO, 2000). The contribution of root and tuber crops to the world supply of calories is only 5% compare to 51% for cereals and 37% for other foods, while in South America, the roots and tubers contribute 5% and in Asia only 4% to the calorie supply (FAO, 2000)

Between 1983 and 1996, developing countries consumption of roots and tubers as food increased by 45million metric tonnes (or 22%) to reach 253million metric tonnes. Yam accounted for 60 million tonnes of this increase, cassava, at 93million tones, accounted for the largest share of roots and tubers consumed as food in 1996, followed by sweet potato (69million tonnes) and potato (65million tonnes). Although yam consumption increased most rapidly, it was from low levels (Scott et al., 2000).

Root and tuber crops are second in importance to cereals as global source of carbohydrates. They also provide some minerals and essential vitamins, although a proportion may be lost during processing (Diop, 1998).

Table 2.4: per Capita Daily Consumption of Food Commodities as Percent of Total Consumption (1983-1996)

Food Commodity	Equatorial Africa	Humid West Africa	Semi-Arid West Africa	East Africa
Root crops	41.4	29.6	19.1	18.6
Cereals	26.7	38.9	49.0	48.5
Pulses	4.9	1.5	3.5	3.8
Fruit and vegetables	6.2	7.7	2.0	4.4
Oil Crops	10.4	12.7	13.3	9.1
Livestock products	3.2	3.7	4.5	6.4
Other Products	7.2	5.9	7.7	9.6
Total	100	100	100	100

Source: Diop (1998)

Table 2.4 shows that tropical root crops may supply from as much as 56% of the total daily calorie (energy) intake in DR Congo to as little as 7% of the total daily calorie intake in Jamaica. In Ghana, roots and tubers constitute 43% of total calorie intake per day as compared to 19% in Nigeria. Yam contributes more than 200 dietary calories per capita daily for more than 150 million people in West Africa (ANB-BIA Supplement, 2003).

According to Scott et al. (2000), the total use of root and tubers in developing countries is projected to increase by 58% (by 232million tones-235million tonnes) between 1993 and 2020. Cassava share of the increase will be 44%, Potatoes 29%, and the remaining 27% will be the share of yam and sweet potato.

According to Gebremeskel and Oyewe (1987), yam accounted for 55.3% of total root and tuber consumption in West Africa and 4.1% in Central Africa during 1975-1984. They further show that average per capita consumption of yam was 99.4kg/year in West Africa and 10.5kg/year in Central Africa. Nweke et al. (1989) noted that in southeast Nigeria, people in major food producing rural areas consume 757calories per capita per day from yam, compared to 345calories from cassava, 298 calories from rice, 185calories from wheat and 149 calories from grain legumes. The importance of yam in the economy of the main



producing areas appears to be reducing due partly to competition from the other crops like cassava in Nigeria, taro in the south pacific (Opara, 1999). However, in the case of Ghana, the contribution of yam to the economy by way of meeting household food needs and foreign exchange earnings through export has been growing.



CHAPTER THREE

3.0 METHODOLOGY

3.1 Brief Profile of the study Area

3.1.1 Location and Size

The Zabzugu/Tatale District is situated on the eastern flank of the Northern Region. It shares boundaries with the republic of Togo to the East: Yendi District to the West: Nanumba and Nkwanta Districts to the South: and the Saboba/Chereponi District to the North. Zabzugu, the district capital, where the study was carried out is about 160 kilometres from Tamale, the Northern Regional capital. The district has land area of 2,332 km² with Zabzugu alone occupying 194.3 km² of the land area (www.ghanadistricts.gov.gh, 2006).

3.1.2 Demographic Characteristics

The population of the District is 100,662, (GDHS, 2009) comprising 49,181 (48.8%) males and 51,481 (51.2%) females with an estimated growth rate of 2.9%. The district has a population density of 40 persons per square kilometre. Households in the district are predominantly headed by males with an average household size of 7.7 people. The proportion of households headed by females is 4.2%. The smallest household comprised of one member and the largest household comprised of 30 members (PHC, 2000).

3.1.3 Economic Activities

About 97% of the inhabitants of the district derive their livelihoods from agriculture as the main economic activity. Major crops cultivated are yam, maize, millet, groundnuts, soya beans and cassava. Although fishing is also an economic activity in the district, very few people are engaged in it. Other economic activities that are found in the district are dressmaking and light industrial works such as blacksmithing. The strategic location of the district, linking the Northern Region to the Republic of Togo makes Zabzugu a vibrant commercial centre and a growth pole of the district that serves the peripheral communities. Some of the youth are also engaged in the making of the "Dagombas traditional smock.

3.2 Sampling Procedure

The selection and distribution of site, sample size and target population were carried out using simple random and purposive sampling techniques.





3.2.1 Selection of Study Site

Purposive sampling was used in selecting the research location. Purposive sampling is a criterion-based selection in which particular settings, persons, or events and area are selected deliberately in order to achieve important information for the research (Patton, 2002). Zabzugu was considered suitable for the research because the people in the area contribute reasonably to the yam basket of the country, and yam contribution to their livelihood cannot be underestimated.

The study area is made up of five (5) main parts with homogenous cultural characteristics. The sample was drawn from each of the parts using simple random sampling. According to Librero (1993), the simple random sampling technique is suitable for homogenous populations.

3.2.2 Selection of Sample Size

Simple Random Sampling Techniques, which gives everyone an equal chance of being selected was used to obtain the target population of fifty (50) households in the study community who were yam producers. The community was zoned in order to make listing of households easy. This made it possible for all households in the community to be listed and randomly selected. Household heads constituted the respondents. However, where there existed more than one household in a compound, only one household was picked randomly to answer the questionnaires. According to Librero (1993), the factors to take into consideration when selecting the sample and the size of the sample include homogeneity, size of population, cost and precision. These factors were considered in determining the sample size.

3.3 Population and Unit Analysis

The target population for the research was household heads. The unit of analysis, however, was yam producers who were household heads. The research considered these categories of people because the study was aimed at establishing how yam production in Zabzugu affects the socio-economic lives of households.



3.4 Scope of the Study

Basically, the study was limited to Zabzugu in the Northern Region of Ghana and sought to establish the contribution of yam production to household income and food security in the study area.

3.5 Source and Nature of Data

3.5.1 Primary Data

Primary data were collected from target groups using questionnaires, in-depth interviews and observation. According to Twumasi (2001) the adoption of several techniques of data collection in a single study facilitates the collection of reliable information.

3.5.2 Secondary Data

Secondary data relevant for the study were reviewed. Data from project reports, journals, news letters, books and other related materials, both published and unpublished from libraries, Ministry of Food and Agriculture (MOFA) and other research works were reviewed to enable the researcher to have an insight into the subject matter under study. The review exercise helped in assessing documented facts on the research topic which enabled the researcher to identify gaps thereby necessitating the study.

3.6 Techniques of Data Collection

3.6.1 Questionnaires Administration

Questionnaires, both open-ended and pre-coded questions, were administered to respondents. The purpose of the questionnaires was to acquire quantitative data. In designing the questionnaires, objectives associated with the study were clearly identified, thus facilitating the construction of the questionnaires items. In all, fifty (50) questionnaires were administered to household heads who were yam producers.

3.6.2 Focus Group Discussion (FGD)

The study employed focus group discussion to tap information on the views of both men and women on how yam production contributes to their livelihood and the challenges they encounter in their bid to improve yam production in the community. In order to make the interaction more effective, separate sessions were held for males and females with each group comprising five to ten members. A checklist was prepared to guide the discussion.



Focus group discussions are structured, guided discussions that have as their sole purpose the gathering of data for scientific purpose (Patton, 2002). In such settings, participants stimulate each other in an exchange of ideas that may not emerge from individual interviews or surveys. The most appropriate uses of focus group occurs when researchers desire group interacting around a topic, seek diversity of responses and value triangulation of methods as was the case in this study (that is, supplementing or complementing other methods that are looking at the same topic through a different lens).

3.6.3 In-depth Interviews

Apart from the questionnaire administration and the focus group discussions, in-depth interviews were granted to some yam farmers/producers and key informants in the community. This was to provide answers for questionnaires that would not be captured in the questionnaire.

3.6.4 Observation

This technique was employed to cross-check people's answers to questions. Observation is crucial since it enables the researcher observe the behavior rather than relying on self-reports as the basic source of data. The observational method therefore overcomes the limitations of the self-report methods of collecting data (Mugende and Mugenda, 1999). Patton (2002) defines participant observation as an inductive method of data generation. According to Maguire (1987), observation entails being present in a situation and making records of one's impression of what takes place. Patton (2002) asserts that directness is the major advantage of observation. Researchers watch what they do and listen to what they say rather than asking people about their views and feelings.

3.7 Data Analysis

Analysis of the data was done manually using quantitative and qualitative techniques. Analysis is the separation of the research into constituents parts (Twumasi, 2001). There are two types of data analysis techniques you can employ either individually or in combination with each other. Obviously, a combination of these two techniques would be much more meaningful (Librero, 1993).



3.7.1 Quantitative Techniques

For all intents and purposes, when we talk of quantitative analysis, we are referring to the use of statistical tools. In social science research, there are two types of statistical tools: descriptive statistics and inferential statistics. Descriptive statistic is the most commonly used and they describe the data in quantitative form (Librero, 1993).

The quantitative data obtained were analyzed using the statistical tools such as frequencies, percentages and means. The results of this analysis were presented in the form of pie charts, bar graphs and tables. Descriptive statistics was employed in describing the socio- demographic characteristics of respondents. Households' incomes were calculated by simple additions of income earned from various sources. The Factors that hinder yam contribution to household income and food security were identified.

3.7.2 Qualitative Techniques

This form of analysis is also called non-quantitative analysis. This is because in the process of interpreting, you do not put emphasis on quantification but rather on the quality of the information (Librero, 1993). By qualitative technique, the information generated from the study was critically analyzed and generalizations made about the population under study. This was facilitated by the data derived from the focus group discussion and observation made.

CHAPTER FOUR

4.0 RESULTS AND DISCUSSIONS

Introduction

The chapter presents the demographic characteristics of respondents (households) who participated in the research work, in terms of age, sex, household composition, economic activities as well as other relevant socio-cultural data pertinent to the study. This information is very crucial for the interpretation of results emanating from the analysis made regarding how yam production contributes to the livelihood of the people of Zabzugu. From a sample of fifty (50) households in the study community, the following were the demographic characteristics of the respondents.

4.1 Demographic Characteristics of Respondents

4.1.1 Sex Distribution of Respondents

Majority of the respondents (96%) were male heads of household. This is a reflection of the national situation where majority (70.5%) of households in Ghana is male-headed (GSS 2008). The rest (4%) were females (Table 4.1). Most of them were widows living with their children. . The male dominance (96%) observed in the study confirms the report by Nukunya (1972) that in most regions in Ghana, the traditional household structure is based on male-headed units of the extended family system, a system that has been maintained throughout history.

Table 4.1 Sex Distribution of Respondents

Sex	Frequency	Percentage
Male	48	96
Female	2	4
Total	50	100

Source: Field Survey, 2010

4.1.2 Age Distribution of Respondents

Majority (44%) of the respondents were aged 40-50 years (Table 4.2). This was followed by those aged 51 years and above (36%) with the rest (20%) constituting the youth aged 18-39 years. Considering the fact that life expectancy in Ghana is 58.65 years for males and 60.35 years for females (UNDP, 2009), it means that majority (60%) of the



respondents were still in their productive years (29-50). The age distributions of the respondents are tabulated as follows:

Table 4.2 Age Distribution of Respondents

Age Group	Frequency	Percentage
18-28	2	4
29-39	8	16
40-50	22	44
51 and above	18	36
Total	50	100

Source: Field Survey, 2010

4.1.3 Marital Status of Respondents

Marriage is socially defined to include formal unions based on traditional, legal or religious sanctions (GSS, 2005). The study shows that majority (90%) of the respondents were married (Table 4.3). The rest (10%) were single, divorced or widowed. This shows the level of importance attached to marriage in the community. In traditional societies, the amount of respect bestowed upon a person depends to a large extent on the number of wives and children one possesses, as they are used as a social insurance against old age (Nukunya, 2003). Married couples are often held in high esteem and regarded as more responsible than the unmarried ones. Probably, this explains why only 4% of the respondents were not married. Divorce is frowned upon in rural settings. It is therefore not surprising that, only 2% of the respondents were divorced. The table that follows gives the marital status of the respondents:

Table 4.3 Marital Status of Respondents

Marital Status	Frequency	Percentage
Single	2	4
Married	45	90
Widowed	2	4
Divorced	1	2
Total	50	100

Source: Field Survey, 2010



4.1.4 Religious Affiliation of Respondents

The findings of the study show that majority (94%) of the respondents were Muslims (Table 4.4). Only 6% of the respondents were traditionalist. There were no Christians in the community. It is not surprising majority of the respondents (94%) were Muslims as the study was conducted in an area dominated by Dagombas who are predominantly Muslims.

Table 4.4 Religious Affiliation of Respondents

Religious Status	Frequency	Percentage
Muslim	47	94
Christian	-	-
Traditional	3	6
Total	50	100

Source: Field Survey, 2010



4.1.5 Education

Education is important for progressive development, in that it helps individuals to make informed decisions that impact their health, livelihood and general well-being (Kabeer, 1991). The research findings shows that most of the respondents (80%) had no formal education (Fig. 4.1). 8% had basic education; 8% had completed Senior High School with 2% each having tertiary and other forms of education such as non-formal, technical and vocational education. This appears in fig 4.1 as follows:

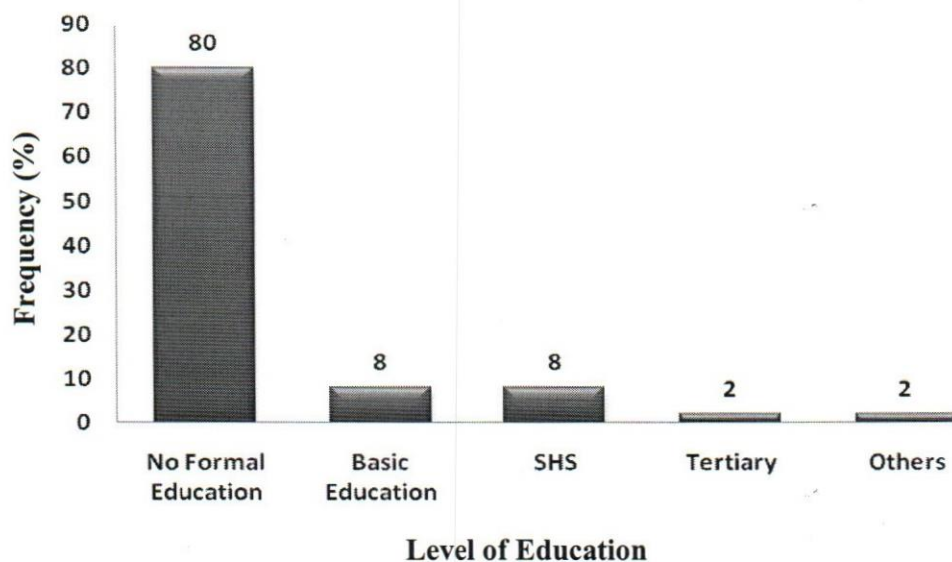


Fig. 4.I: Educational Background of Respondents

Source: Field Survey, 2010

The high illiteracy rate (80%) brings to question the effectiveness of the various attempts being made by successive governments to improve education especially in the rural communities in Ghana. Due to the low level of education, basic skills and knowledge in modern farming techniques may be lacking, thereby reinforcing the peasant status of the people. This confirms Brydon's (1987) assertion that, in rural areas, lack of formal or informal education tends to limit farm productivity and access to agricultural extension services.



4.1.6 Household Size of Respondents

The size of a household is an important demographic factor which determines among other things the social control within the family and the distribution of household resources (Nukunya, 2003). Households with 7-12 members constituted the majority (46%) of respondents (Table 4.5). The other households had either 13-18 (24%), 6 and below (20%), or 19 and above (10%) members. The large household size of respondents is not surprising of a community dominated by Muslims who primarily practice polygyny. Oladoja et al. (2008) indicated that a large family size is an indication of available family labour for the farming operations. This implies that, the greater the number of hands available, the greater the likelihood of high output. The large family size could be attributed to lack of adequate knowledge on family planning issues or the quest to get more hands to support farming activities.

Table 4.5 Household Size of Respondents

Household size	Frequency	Percentage
6 and below	10	20
7-12	23	46
13-18	12	24
19 and above	5	10
Total	50	100

Source: Field Survey, 2010



4.1.7 Occupation of Respondents

The survey revealed that farming is the primary occupation (98%) of the households (Fig. 4.2) with the rest (2%) engaged in trading. This suggests that farming significantly contributes to rural livelihood than any other economic activity in the rural settings.

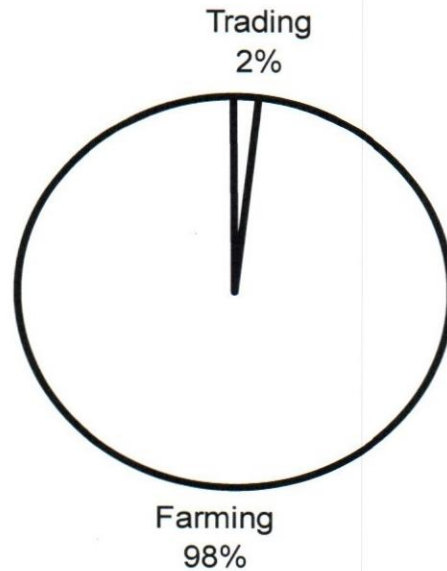


Fig. 4.2: Occupation of Households

Source: Field Survey, 2010

Fig. 4.2 indicates that Zabzugu is an agrarian society, with farming being the primary occupation of majority (98%) of the people in the community. Although land exists in abundance in zabzugu, the people are unable to farm on a large scale due to inadequate capital. Most (2%) households trade in agricultural and non-agricultural products.

4.2 Household Income and its Sources

4.2.1 Household Income

It is clear from earlier discussions that household income in Zabzugu is generally low. One objective of the research is to estimate household income and its sources. In order to estimate the level of income in the households, the researcher asks the respondents about their earnings for the year. It was difficult for the respondents to answer questions pertaining to annual income because they simply spend the small amounts of money they get from day to day. Additionally, they could not put monetary value on most of the farm

Produce. They were therefore, asked to make estimates based on the previous year's harvest and/or total sales from agriculture and secondary economic activities(non-farm income).

The finding shows that the average income in the area is rather low due to the seasonal and subsistence nature of farming, resulting in high level of poverty in the community. On average, respondents earned about GH¢2098.07 a year (GH¢174.8 a month). This is an extremely low income considering the high cost of living in recent times.

4.2.2 Sources of Household Income

The study identified three main sources of household income that is, income from animal rearing (8.2%), crop production (77.7%) and non-farming activities (14.2%). Income from non-farm activities consists of income from occupations such as weaving, buying and selling, remittances, construction, private and public sector jobs and other non-farm activities.





4.3 Yam Contribution to Household Income

Yam plays an indispensable role in the lives of the people of Zabzugu. It is a major (66.2%) contributor to household income (Fig. 4.3). Other crops (i.e., maize, groundnuts, beans, groundnuts, cassava, among others), animal rearing and non-farm activities contributed 33.9% to household income in Zabzugu.

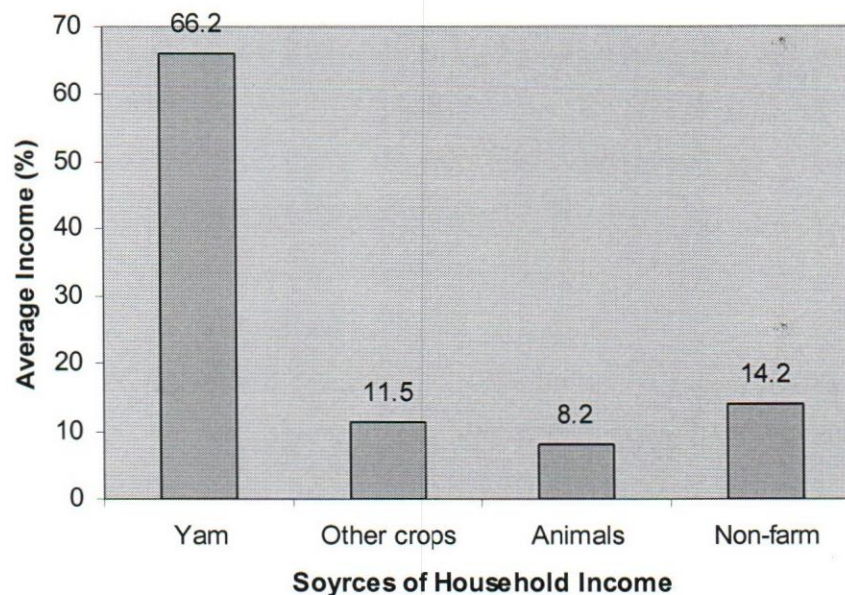


Fig 4.3: Contribution of Various Sources to Household Income

Source: Field Survey, 2010

Fig. 4.3 indicates that households get the bulk (66.2) of their income from the sale of yam. Apart from agricultural incomes derived from the sale of crops and animals, non-farm income emanating from trade and remittances also helps in the sustenance of households and supplements the gains made from agriculture. Households have learnt to diversify their income sources by cultivating other crops, rearing of animals as well as trading to cushion them in the event of poor harvest from yam.

4.3.1 Enhancing Yam Contribution to Household Income

For the purpose of maximizing gains and enhances yam contribution to household income, the following measures have been put in place by the households:

- Storing yam over a longer time period to take advantage of favorable market prices in the future.



- During the period of yam glut, bigger external market centers such as Tamale, Accra, Kumasi and others are harnessed to take advantage of the relative stable price systems in those areas. Members usually contribute to hire vehicle to transport the produce to these centres.
- The respondents also revealed that in order to reduce their dependence on yam as a major food crop, other crops such as maize, beans and cassava are cultivated to supplement the food needs of the household. This measure ensures the availability of yam always for sale to meet the financial needs of the household.
- Sale of animals, other crops and the influx of remittances enable households to acquire the necessary capital to meet the demands of the next planting season. This practice ensures that capital scarcity does hamper the growth of the yam industry and jeopardize its contribution to household livelihood.

4.4 Yam Contribution to Food Security

Most of the respondents (40%) consume yam (Table 4.6). Other crops which serve as source of food are maize (30%), cassava (16%), groundnuts (6%), beans (4%) and rice (4%).

Table 4.6: Types of Food Crops used by Households as Food Sources

Crops	Frequency	Percentage
Yam	20	40
Maize	15	30
Groundnuts	3	6
Beans	2	4
Cassava	8	16
Rice	2	4
Total	50	100

Source: Field Survey, 2010

The survey discovered that yam contributes enormously to household food consumption needs. It is a major staple for the people. Majority (84%) of the respondents intimated that they got enough harvest from yam during the 2009 cropping season for consumption all-year round while 16% of the respondents claimed that their harvest could not take



them through the year and they resorted to maize and the sale of animals to meet household food consumption needs.

4.4.1 Factors Negatively Affecting Yam Contribution to Food Security in Zabzugu

Majority (60%) of the respondents held the view that increased commercialization of yam has greatly affected its contribution to food security (Table 4.7). According to them, the high demand for the crop in other parts of the country had led to a paradigm shift from preserving more yams for consumption all year-round to unbridled desire to sell the produce to generate money to address other personal needs. In a focus group discussion with the men, it came to light that the desire of many especially the youth to make quick money has resulted in the abandonment of the cultivation of more staple food crops and adoption of the cultivation of commercial crops such as rice, groundnuts and cotton which do not form part of the food stock of the family. The production of these commercial crops has put additional pressure on the land, and yet produce from these farms is not meant for consumption but for the market.

Some respondents (24%) also indicated that poor economisation of the crop (yam) has adversely affected its contribution to household food security. The respondents revealed that yam producers do not ensure judicious use of the crop during harvest time. Most households eat four times during harvest time and consumption levels dwindle to 3 or 2 times in the lean season. This means that little effort is made to economise the crop when it is in abundance. "In an interview with an elderly man in the community, he said, he said, we cannot get enough yam for consumption in the lean season partly because of wastage".

Social functions were identified by 6% of the respondents as a factor negatively affecting yam contribution to food security. To them, social functions such as funerals, outdoorings and marriage festivities tend to impact negatively on the crop's contribution to food security in the area. A lot of foodstuffs are wasted during these festivities and this wastage affects people's ability to access yam in the lean season. An opinion leader in an interview confessed, "festivities have come to stay and so is hunger if care is not taken to manage our food resources especially yam as a staple crop".



The incidence of pest and diseases accounted for 10% of the responses. According to the respondents, the incidence of pest and diseases tend to lower yam quality and hence undermines its contribution to household food security.

Table 4.7: Factors Negatively Affecting Yam Contribution to Household Food Security.

Factors	Frequency	Percentage
Increased commercialisation of the crop	30	60
Poor economisation	12	24
Social functions	3	6
Pest and diseases	5	10
Total	50	100

Source: Field Survey, 2010

4.5 Factors that Hinder the Attainment of Improved Income and Food Security through the Production of Yam

The respondents were asked specifically if the following factors hinder the attainment of improved income and food security through the production of yam. Their responses were as follows:

Majority (20%) of the respondents stated that inadequate capital was the major setback to effective yam production (Table 4.8). They mentioned that yam production, just like any other human endeavour, needs capital to thrive and its inadequacy compels them to stay at the peasant farming level. Besides, banks and other financial institutions are not willing to give them loans with the explanation that they lack collateral. The lack of access to credit through formal channels means that farmers obtain the bulk of their credit requirements from middlemen or from their own resources. Nevertheless, in the absence of well-functioning formal credit systems, farmers manage to obtain funds from a variety of other sources, including their own agricultural and non-agricultural enterprises, traders and input suppliers (Lyon, 2000). The inadequate capital in the area had tremendous impact on yam production. It impedes yam production on which the livelihood of about 66.2% of the people depends. A focus group discussion with the men revealed that yam production is their major economic activity and the lack of adequate

capital to support its production tends to limit household incomes and food supply, which are very important for the sustenance of households.

Table 4.8 Factors that Hinder the Attainment of Improved Income and Food Security through the Production of Yam

Impediments	Frequency	Percentage
Inadequate capital	10	20
High cost of production	8	16
Marketing and transportation difficulties	7	14
Pests and diseases	6	12
Erratic rainfall pattern	3	6
Inadequate labour	4	8
Low prices offered	4	8
Declining soil fertility	2	4
Inadequate extension services	5	10
Lack of improved varieties	1	2
Total	50	100

Source: Field Survey, 2010

Some respondents (16%) who answered the questionnaires indicated that high cost of production pose a challenge to yam contribution to household income and food security. They lamented over the exorbitant cost involved in ploughing, mounding and weeding. Besides yam setts, fertilizers among other inputs as well as transportation and harvesting cost also affect the production cost of yam. According to UTA (1998), the main constraints to increased yam production are the shortage and high cost of planting materials. Seed represents the highest cost item, accounting for as much as 50% of operating expenses (Gray et al, 1997), while Osei (1993) estimates planting material make up between 35-54% of the total cost of production. Most respondents complained about the increasing cost involved in these activities, as it is too much for an average farmer to bear.

Marketing and transportation difficulties were identified by 14% of the respondents as one of the constraints to expanded yam production. The respondents indicated that





inaccessibility of vehicles to farmers coupled with the poor state of the roads tends to work against the yam production as livelihood driver in the study community. The poor feeder road network increases the costs of input supplies and limits farmer's access to them (IECT, 1999). Indeed this may be the single most important factor limiting farmer's ability to participate in the market economy. The farmers complained they are unable to obtain a ready market for their produce especially during harvest. The deplorable nature of the roads linking the community makes it inaccessible and hence increase the costs involved in transporting yam to other market centres for sale. The youth, in a focus group discussion, see the rehabilitation of the major roads leading to the urban centres as the surest way to ease the marketing and transportation problems. To them, this measure is necessary if favourable market prices are to be realized for yam produce.

Some respondents (12%) also indicated that pests and diseases are a threat to increased yam production. According to them, pests destroy the yam tuber, making it unsuitable for human consumption and sale. IITA (1998) reported that the incidence of pests and diseases is increasing due to the fact that production systems are becoming more intensive. The respondents intimated that, if an increase in yam production is to be realized, greater attention will need to be paid to reducing post-harvest losses. An interviewee revealed that pest and diseases are "slow-killers" as they reduce the food quality and the economic value of yam.

Other respondents (10%) indicated that lack of proper access to extension services is a drawback to effective yam production in the area. The respondents complained that extension officers are hardly available for consultation in their community, and when they do, there is no enough attention to individual farmers especially on their farms for advice and assistance on new and better methods of farming. Yam producers, who are predominantly illiterates, lack an in-depth understanding of improved farming practices involved in yam production, and this tends to hinder the quantity and quality of yam output.

Inadequate labour was also indentified by 8% of the respondents to retard yam production since its production entails a lot of manual work. The respondents bemoaned the high labour cost involved in yam production. They stated that accessing labour becomes a bit difficult during the peak periods in the production process when every



member of a family is seriously working on his/her farm. Both hired and family labours are employed for production in the community. Significant inputs of labour (more than 10%) are required for training yam vines along stakes; a practice which has been shown to increase yields (Dorosh, 1988). In a focus group discussion with the women group, it emerged that yam production tends to favour men than women due to its complex management process, since men easily succumb to stress than women. The tedious management processes involved in yam production tends to scare more women away from its production since they rarely have resources to hire labour.

Low prices offered also accounted for 8% of the responses. The respondents complained that the domestic market is incapable of absorbing the large quantities of yams produced resulting in a glut in the peak of the production season. The lack of proper access to external markets due to transportation constraints exposed them to exploitation by market women who travel to the community to buy their goods. According to Marfo et al (1998), the inability to keep yam tubers because of poor storage practices as well as the relatively perishable nature of the crop, together with the low prices which prevail at harvest time, act as an important constraint to increased output.

Also, 6% of the respondents attested to the fact that the erratic nature of the rainfall pattern in some cases cripples yam production in the area. The respondents stated that even though yam does not require much rain to do well, this is required during the maturing stage to facilitate its development. Yam development is inhibited by prolonged rain absence. In a period of drought, huge losses are suffered. In such cases, farmers are unable to get enough for consumption not to talk of getting excess yam for sale to address other household needs

The declining soil fertility did not take a centre stage in the list of problems mentioned by the respondents. Only 4% of them asserted that the current state of the soil affect yam output. Majority of the farmers maintained that, given the required financial and logistical support, they will be able to manage with the soil to produce satisfactory output.



A few respondents (2%) indicated that they lack improved varieties of yam and wish they could get improved varieties. Most of the respondents were satisfied with the varieties of yam cultivated in the area.

4.5.1 Suggested Solutions to the Problems

The farmers were asked to suggest possible solutions to the constraints that were identified. It was suggested that the problem of inadequate capital and high cost of production could be solved or minimized if financial institutions like the banks come to their aid by giving them loans at affordable and low interest rates. They also suggested the intervention of government in the form of making loans accessible to yam producers as well as subsidizing farm inputs to reduce the high cost of production.

Extension education is very vital to every farmer. It was suggested that more agricultural extension agents must be trained and posted to stay with them so as to realize their felt farming needs and help stimulate a change in their ways of farming especially on the modern farming systems. With the presence of agricultural extension agents in the community, improved farming practices can be brought to the door steps of the farmers easily. The farmers also suggested that in order to make the extension agents stay in the community, Ministry of Food and Agriculture (MOFA) should motivate extension agents. In a focus group discussion, it was generally agreed by the farmers that their relation with the extension agents must be cordial and also assist in providing the extension agents with facilities that are needed for the effective performance of their activities.

In order to abate the problem of low prices offered for general agricultural produce, it was suggested by the farmers that government should in a way offer realistic prices to yam producers by promoting its exportation as a non-traditional export crop. They also proposed the creation of Presidential Initiative on Yam to encourage more people to go in to large-scale yam production.

Moreover, it was also realized that the deplorable nature of the roads linking Zabzugu, especially the Yendi-Zabzugu road, needs to be rehabilitated. They indicated that the poor road network results in increased cost to farmers. This is because most drivers refuse to ply the Yendi-Zabzugu road to convey the produce to the market centres and even if they do, they usually charge exorbitant fares. It was suggested by farmers that,

the road must be rehabilitated to put them in good shape so as to ease transportation difficulties.

4.5.2 Measures to Enhance Yam Accessibility to Households

The research participants suggested the following measures to make yam accessible in the community:

- Extension of financial assistance to yam producers to expand their production levels.
The respondents bemoaned that they rely solely on their meagre savings for production and that hinders their ability to expand their farms. They called on Government and NGOs to come to their assistance.
- Subsidisation of farm inputs
Accessibility and subsidization of tractor services, chemicals and other necessary inputs were also suggested by respondents to reduce the high cost associated with yam production which tends to scare people away from that enterprise
- Improving the road network
The research participants also suggested the rehabilitation of the Yendi-Zabzugu road by Government to open up the community for investments and to ease the exorbitant cost involved in accessing bigger market centres.



CHAPTER FIVE

5.0 SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Summary of findings

The objectives of the study were to estimate household income and its sources, yam contribution to household income and food security as well as the the factors that hinder the attainment of improved and food security through the production of yam.

In pursuance of these objectives, the major findings from study are as follows:

- Households derive their income from many sources, namely, animal rearing (8.2%), crop production (77.7%), and non-farming (14.2).
- Yam contribution to household income stands at 66.2%, indicating that yam contributes most to household livelihood than any other agricultural activity in the community.
- Yam contribution to household income is enhanced by households through prolonged storage, food crop diversification, sale of animals, other crops and the influx of remittances.
- With regard to the types of crops used as food sources, yam contributed 40% with other crops such as maize, groundnuts, beans, cassava and rice contributing 60% to household food security.
- The factors that negatively affect yam contribution to food security are increased commercialisation (60%), poor economisation (24%), social functions (6%) and pest and diseases (10%).
- The problems militating against yam production include inadequate capital (20%), high cost of production (16%), marketing and transportation difficulties (14%), pest and diseases (12%), erratic rainfall pattern (6%), inadequate labour (8%), low prices offered (8%), declining soil fertility (4%) inadequate extension services (10%) and lack of improved varieties (2%). Suggestions were offered by the farmers to abate these problems that undermine their efforts in their bid to improve yam production.





5.2 Conclusion

The problem of rural poverty is still a living reality in many developing countries including Ghana. Combating poverty requires multi-faceted approaches since it is a complex phenomenon. Identifying the income sources of rural households is an essential prerequisite for determining where resources should be channelled to maximize the utilisation of agricultural resources on which majority of the livelihood of rural people depend. The revelation that yam production is the dominant agricultural activity in the study area points to the fact that pushing more resources in to its production by government and other development agents can counter rural poverty, raise household incomes and improve food security. In this regard, instituting a Presidential Special Initiative (PSI) on yam will be very appropriate since it will ensure policy redirection and rekindle people's interest in the production of the crop. However, addressing the problems of pests and diseases, inadequate capital, marketing and transportation constraints, inadequate extension services among others are instrumental if the yam industry is to gain momentum in the study area. This calls for the resourcing of the Ministry of Food and Agriculture (MOFA) and other supporting agencies to play a more proactive role in uplifting yam production in particular and agriculture in general. |

5.3 Recommendations

Ensuring food security remains an integral part of the policies of every government that is responsive to the plight of its citizens. The alarming rate at which food insecurity is escalating leaves much to be desired. The following recommendations are made to enhance yam contribution to household livelihood:

Credits facilities need to be extended to farmers who wish to produce yam on a commercial scale to enable them expand their holdings since land is not much a problem in the study area. This will address the key problem of inadequate capital due to farmer's inability to access bank loans because of the absence of collateral security. The credit repayment periods should be arranged such that farmers are not compelled to dispose off their produce immediately after harvest where prices are still low. Farmers in the community should be encouraged to form co-operatives to enable them access credit from the financial institutions with ease.



Since high cost of production was identified as a major drawback in yam production, farmers should adopt various strategies of combining their resources effectively in order to produce at a lower cost. There is also the need for extension education to teach farmers on better methods of cultivating yam and better practices to adopt to improve on the fertility level of the soil. MOFA should be responsible for this. The cultivation of yam as a means of poverty alleviation should be embraced and supported by Government and other NGOs in their poverty alleviation strategies in the district as a whole.

Government should consider instituting a presidential initiative on yam so as to encourage many farmers to go into yam production as the crop contributes substantially to the non-traditional export base of the country. There should be a guaranteed price for yams so that farmers will be assured of getting good prices to compensate for their efforts. This measure will make yam production a lucrative business if implemented.

Livestock production should be given the necessary attention by the people in the community since its contribution to household income is very limited (8.2%). In this regard, basic training with regard to the maintenance and management practices associated with livestock production is required. This could be acquired through the support of the District Assembly and other agencies in the district.

Considering the high illiteracy rate of 80%, basic education is essential in an attempt to improve yam production in particular and agriculture in general. This will help reshape the perception of the people regarding some of their traditional beliefs and practices that impact negatively on yam production in the community. In this light, both formal and non-formal education should be given priority. The non-formal education in particular should be repackaged to include social and economic issues that invoke entrepreneurial thinking within the people in the community in particular and the district as a whole. This will help to think of the possible livelihood diversification rather than total dependence on the generosity of nature.

It should be noted that the above recommendations cannot be implemented by only the government or any single stakeholder in this sector of the economy. It is therefore hoped that all stakeholders in the food sector of the economy will give this document all the attention it deserves.

References

- Altieri, M.A. (2002). Agro ecology: the science of natural resource management for poor farmers in marginal environment. Agriculture, Ecosystems and
- Adebayo, B.A (2003): Intra-household Redistribution of Income and Calorie consumption in Southwestern Nigeria; Economic Growth Center, Yale University, Centre Discussion Paper, NO. 890, July, 2004.
- ANB-BIA-SUPPLEMENT (2003): Improving Yam Production Technology in West Africa, Weekly News, Issue/Edition No. 463, 2003
- Environment.Anamoh, B. and Bacho, F. (1994). Participatory Rural Appraisal on Post-Harvest Systems of Yam and Cassava in Northern Ghana. Final Report. Ghana: Post-Harvest Project, MOFA and GTZ.
- Awumbilla, M. (1997). Gender and Structural Adjustments in Ghana. A Case Study In North East Ghana: In Awotona et al,(eds). Tradition, Location and Community. Peace-making and Development. Amesbury, USA: Alder short and Bookfield.
- Babaleye, T. (2005). Improving Livelihood Through Yam Production Systems, an IITA Publication, International Institute of Tropical Agriculture, Ibadan, Nigeria.
- Boserup, E.E. (1970). Women's Role in Economic Development. Allen and Unwin, London.
- Canberra Group (2001). Expel Group on Household Income Statistics: Final Report and Recommendation, Ottawa, Canada.
- Coursey, D.G. (1961). The Magnitude and Origins of Storage Losses in Nigeria Yams, In: Journal of Social Science, Food and Agriculture.
- 6 Coursey, D.G. (1966). Food Technology and the Yam in West Africa, in Tropical Science, Vol. 3.
- Coursey, D.G. (1981). The Interaction from Yam and Man, In: Journal d'Agriculture Traditionnelle de Bontanique Appliquee, Vol. 28.
- Coursey, D.G. (1982). Tropical Root Crop Work at the Tropical Products Institute, In: African Regional Centre for Technology (edi):Root and Tubers Production, Storage, Processing and Marketing in Africa, Dakar, Senegal.
- Coursey, D.G. (1983). Yams, In: Chan, H.T. (1983). Handbook of Tropical Foods, New York.
- Diop, A. (1998). Storage and Processing of Roots and Tubers in the Tropics, Prepared For FAO and Edited by Calverley, D.J..B, 1998.
- Dorosh, P. (1988). The Economics of Roots and Tuber Crops in Africa; RCMP Research





- Monograph No.1, Research and Crop Management Programme, International Institute For Tropical Agriculture (IITA), Ibadan, Nigeria.
- Eka, O.A. (1985). The Chemical Composition of Yam Tubers. In: Osuji, G. (Ed): Advance in Yam Research. Frontline Publishers, Enugu, Nigeria.
- Ellis, F. (1998). Household Strategies and Rural Livelihood Diversification. Journal of Development Studies.
- Food and Agriculture Organisation (1990). Patterns of Urban Food Consumption in Developing Countries. Perspective from the 1980s; Food and Nutrition Division, FAO, Rome, Italy.
- Food and Agriculture Organisation (1999). Regional Project for the Development of Community-based Technology Transfer Centres in Support of Food Production Towards Food Security in Africa (CTTC). Draft Outline of Project Document Resulting from the Project Formulation Session, Ghana 1999. Mimeo, Accra. FAO Regional Office.
- Food and Agriculture Organisation (1987). Production Year Book for 1986, Food and Agriculture Organisation of the United Nation, Rome, Italy.
- FAOSTAT (2005). Agriculture Data, Revised in February 2005, FAO, Rome, Italy.
- Food and Agricultural Organisation (1998). Cassava, Yam and Maize Sub-Sector Study: Yam Draft Working Paper No. 2. Rome: FAO.
- Food and Agriculture Organisation (2006). FAO Statistics, FAO, Rome, Italy.
- Food and Agricultural Organisation, (1981). Food Lost Prevention in Perishable Crops, FAO, Agriculture Services Bulleting, Rome.
- Food and Agricultural Organisation (1986). Role of Roots, Tubers and Plantains in Food Security in Sub-Saharan Africa. Report to The Committee on World Food Security, Rome
- Food and Agricultural Organisation (1990b). Action Programme for the Prevention of Food Losses, Improving Post Harvest Handling, Storage and Processing Root And Tuber Crops, Rome.
- Ghana Statistical Service (2005). 2000 Population and Housing Census, Northern Region. Analysis of District Data and Implications for Planning, GSS, Accra, Ghana
- Ghana Statistical Service (2005). 2000 Population Housing Census, Northern Region. Analysis of District Data and Implications for Planning, GSS Accra, Ghana.



- Ghana Statistical Service (1999). Poverty Trends in Ghana in the 1960s. paper Prepared for the 10th Consultative Group Meeting (November) Accra, Republic of Ghana.
- Ghana Statistical Service (2000). Yearly Statistics by National (sic). Euro traces Data Sheets. Accra
- Ghana Statistical Service (2000). Ghana: Consumer Price Index Numbers, December 1999. Statistical News Letter No. 2 B12/99. Accra: Statistical Service.
- Ghana Statistical Service (2002c). Ghana Statistical Service (Ghana Living Standard Survey GLSS-4, Report of the Fourth Round). October, 2000.
- Ghana of Government (2005). Growth and Poverty Reduction Strategy Two (GPRS II) (2006-2009). National Development Planning Commission, Accra, Ghana.
- Ghana of Government (2003). Ghana Poverty Reduction Strategy (2003-2005): An Agenda for Growth and Prosperity. National Development Planning Commission, Accra, Ghana.
- Ghana of Government (2000). Interim Poverty Reduction Strategy Paper (2000-2002). Ministry of Finance, Accra, Ghana.
- Ghana Statistical Service (2002). 2000 Population and Housing Census, Summary Summary Report of Final Results, GSS, Accra, Ghana.
- Hansen and Ninsin, K.A. (1989). The State, Development and Politics in Ghana. Codeseria Books Series, London.
- Hicks, J.R. (1946). Value and Capital: an enquiry into some fundamental principles of Economic theory (second edition). Clarendon Press, Oxford.
- Hahn, N.D. (1989). The African Farmer and Her Husband, In: Deutsche Stiftung Fur Internationale Entwicklung (edi). Root, Tubers and Legumes, Report of the Expert Meeting, Bonn.
- International Expert Group on Household Income Statistics, Canberra Group (1997). Papers and Final Report of the First Meeting on Household Income Statistics, Canberra, Australia. Belconner :Australian Bureau of Statistics.
- IIED (2004). Stay on the Farm, Weave in the Village, Leave the Home. Livelihood Diversification and Rural Urban Linkages in Vietnam Red River Delta and Their Policy Implications. Briefing Paper 9. Rural Urban Interaction and Livelihood Strategies. International Institute for Development.
- International Institute for Tropical Agriculture(1998). Project Thirteen. improvement of Yam-based Systems: Annual Report,1998. Ibadan:IITA. In Offori, F. and



- Hahn (eds.) proceedings of the Ninth Symposium of the International Society for Tropical Root Crops, October 1991, Accra: ISTRC.
- ✓ Knoth, J. (1993). Traditional Storage of Yams and Cassava and its Improvement. GTZ Post- Harvest Project, Humburg, Germany
- Langyintuo, A. (1993). Economic Analysis of Yam Production in Northern Ghana: In Radat, H. H. Mercer-Quarshie et al., Improving Farming Systems in the Interior Savanna Zone of Ghana: Proceedings of the Second Workshop on Improving Farming Systems ; Nyankpala, April 1990. Tamale: Crops Research Institute and Nyankpala Agricultural Experiment Station.
- Lancaster, P.A. and Coursey, D.G. (1984). Traditional Post-Harvest Technology of Perishable Tropical Staples, FAO (edi.). Agricultural Services Bulletin 59, Rome.
- Lynam, J.K. (1991). The Development of Root Crops in Africa, In: Entwicklung Und Lanlicher Raun, jg. 25
- Mc Neely, J.A. and Scherr, S. (2003). Ecoagriculture: Strategies to Feed the World and Save Wild Biodiversity. Island Press.
- Marfo, K., Haleegoah, J. and Otoo, J. (1998). Yam Miniset Survey in the Techiman and Nkoranza District of Brong Ahafo Region. Ghana: Crops Research Institute.
- Mabogunje, A. (2000). Global Urban Features: An African Perspective. Urban Forum.
- Mickell, G. (1989). Cocoa and Chaos in Ghana. New York, Paragon House.
- Mikell, G. (1997). African Feminism: The Politics of Survival in Sub- Saharan Africa. Philadelaphia: University of Pennsylvania Press.
- McNeely, J.A. (2000). Cultural Factors in Conserving Biodiversity: In Wilkes, A. Tillman, H., Selas, M., Grinter, T., and Shoating, Y. (eds.). links between Cultures and Biodiversity. Proceedings of the Cultures and Biodiversity Congress, Yunan Science and Technology Press, China.
- Mbokoko, B. (1996). Rural Poverty, Risks and Development. Oxford University.
- Nweke. F. I, Asadu, C.L.A, Ugwu, B.O, Okorhi, E.C, Njoku, J.E, and Ay.P (1989). The future of Yam. A food systems Analysis of Yam on Eastern Nigeria, Unpublished
- Nukunya, G.K. (2003). Tradition and Change in Ghana: An Introduction to Sociology. Ghana University Press, Accra, Ghana



- Ninsen, K.A. (1991). *The Informal Sector in Ghana's Economy*. Accra: Freedom Publications.
- Nukunya, G.K. (1972). *Land Tenure and Inheritance in Anloga*. Technical Publication Series No.30. ISSER, University of Ghana.
- Oke O. L. (1990). *Roots, Tubers, Plantains and Bananas in Human Nutrition*; FAO Food and Nutrition Series, No.24, Edited by J. Redhead, FAO, Rome, Italy.
- Otoo, E; Ankromah, R; Kolesnikoba-Allen. M; and Aseidu. (2009). *Delineation of Pona Complex of Yam in Ghana Using SSR Markets*: Crop Research Institute. Kwame Nkrumah University of Science and Technology, Kumasi. Ghana.
- Okigbo, B.N. (1973). *Introducing the Yam Bean. (Sphenotylis Stenocarpa) Harms*. Proceedings of the First IITA Grain Legume Improvement Workshop. 29th October –November 1973, Ibadan, Nigeria.
- Osei, O.A.F. (1990). *Household and Village Level Storage and Processing of Root and Tuber Crops in Ghana, Lessons for the Sub-Region-West Africa*, In: Food and Agricultural Organisation (1990b). *Action Programme for the Prevention of Food Losses, Improving Post-Harvest Handling, Storage and Processing of Root and Tuber Crops*, Rome.
- Okigbo, B.N. (1986). *Keynote Address: Root and Tubers in the African Food Crisis*, in: Terry, E.R. (eds.). *Tropical Root Crops and the African Food Crisis*, Nigeria.
- Onwueme, I.C. (1978). *The Tropical Tuber Crops*. Chic ester.
- Potts, D. (2004). *Urbanisation and Urban Livelihoods in the Context of Globalisation*. In: Potts, D .and Bowyer-Bower, T. (Eds.): *Eastern and Southern Africa Development Challenges in Violatile Region*. Pearson, pp.328-368.
- Pretty, J. (1999). *Can Sustainable Agriculture Feed Africa? New Evidence on Progress, Process and Impacts:Environment, Development and Sustainability*.
- Paulino, L.A. and Yeung (1981). *The Food Situation in Sub-Saharan Africa: A*
- Scott, C. and Amenuvegbe, B. (1991). *Recall Loss and Recall Duration; an experimental study in Ghana*; Inter-Stat, Vol.4.31-55
- Scott, G.J, Rosegrant, M.W and Ringer, C. (2000). *Roots and tubers for the 21st Century; Trends, Projections and Policy Option*; IFPRI 2020 Discussion paper, Brief No.66. 2000
- Shehu, J.F; Iyortyer, J.T; and Jongur, A.A.U. (2010). *Determinants of Yam Production and Tehnical Efficiency among Yam Producers in Benue State*. Nigeria Department of Agricultural Economics and Extension, Federal University of

Technology, Adamawa State, Nigeria.

Twumasi, P.A. (2001). Social Research in Rural Communities: The problems of field Research in Ghana. Ghana University Press.

Tilman, D; Cassman, K.G; Matson P.A; Naylor, R. and Polanski, S. (2002). Agricultural Sustainability and Intensive Production Practices.

Tetteh, J. and Saakwa, C. (1991). Prospects and Constrains to Yam Production in Ghana.

Toulmin, C. (2000). Diversification of Livelihood: Evidence from Mali and Ethiopia. IDS Research Report No. 47.

Wiebe, Beth, Nicole, Ballender and Anderson P.P (2001). Who will be Fed in the 21st Century: Challenges for Science and Policy. International Food Policy Research Institute. Economic Research Service of the US Department of Agriculture.

Terry, E.R. (1987). Tropical Root Crops, Root Crops and African Food Crisis, Nigeria.

Wickham, L.D. (1984a). Tuber Development, Storage and Germination In Yams (*Dioscorea* spp). In Response to Pre-Harvest Application of Plant Growth Regulators, In: Journal of Agriculture Science, Vol. 102.

Internet



APPENDIX A:

**Household Questionnaire on Yam Production and Its Contribution to Household
Income and Food Security in Zabzugu.**

HOUSEHOLD QUESTIONNAIRE, 2010

NOTE: TO BE ADMINISTERED TO HOUSEHOLD HEADS IN THE STUDY

AREA

INTRODUCTION

I am Alhassan Hamza, a student of the University for Development Studies carrying out a research into Yam production and its contribution to household income and food security in Zabzugu. This is an academic exercise pursued in partial fulfillment of the requirement for an award of a Master of Art degree in Non-Governmental Organization Management and Rural Development.

You are rest assured that all answers to the questions posed will remain confidential and used only for the intended purpose, the anonymity of respondents is also guaranteed.

Thanks in advance for your time.

SECTION 'A'

BACKGROUND INFORMATION OF RESPONDENTS

1. House No:

2. Age

18 - 28 [] 29 - 39 [] 40 - 50 [] 51 + []

3. Sex

Male [] Female []

4. Marital Status

Single [] Married [] Divorce [] Windowed []

5. Religions Status

Muslim [] Christian [] Traditionalist [] Others (specify).....

6. Education

Basic [] SHS [] Tertiary [] Others (Specify)

7. What is your household size?

Age interval (Years) Male Female Total

0 - 6

7 - 12

13 - 18



19 +

8. Occupation

Farming [] Trading [] Public/Civil Servant [] Others (specify).....

SECTION 'B'

SOURCES OF FINANCE

9. Where do you get finance for your yam production?

Personal savings []

Bank [], if bank, specify the name and the rate of interest

.....

Friends / relations [], if applicable, in what form do you pay back and when?

.....

Others (specify)

10. What is the size of your farm in acres?

≤ 1 [] 2 – 4 [] 5 – 7 [] 8 + []

11. What other crops do you produce apart from yam?

Maize [] Beans [] Rice [] others (specify)

12. Do you belong to any farmer Association?

Yes [] No []

13. If yes, what benefits do you derive from the association?

SECTION 'C'

SOURCES OF HOUSEHOLD INCOME

(i) INCOME FROM YAM PRODUCTION

14. Do you cultivate yam? Yes [] No []

15. If yes, provide the following information

16. How many tubers of yam did you get from your plot this year?

≤ 100 [] 101 – 300 [] 301 – 500 [] 500 + []

17. Estimate total income derived from the sale of the produce, GH¢

18. How many tubers of yam did you get from your plot last year?

≤ 100 [] 101 – 300 [] 301 – 500 [] 500 + []





19. Estimate total income derived from the sale of yam last year,GH¢
20. What is the price of an average tuber of yam this year?
0.50 [] 0.70 [] 1 [] 1.50 []
21. What was the price of an average tuber of yam last year?
0.50 [] 0.70 [] 1 [] others (specify)
22. For how long do you store yam after harvesting before selling it off?
≥1m [] 2 – 3m [] 4 – 5m [] 5 m+ [],
23. Why?

(ii) INCOME FROM OTHER CROPS

24. Do you cultivate other crops besides yam? Yes [] No []

25. If yes, complete the table that follows:

CROPS CULTIVATED	AREA (ACRES)	QUANTITY (BOWL / BAG)	HOUSEHOLD CONSUMPTION	SEED STOCK	QUANTITY SOLD	UNIT PRICE GH¢	TOTAL INCOME
Maize							
Groundnuts							
Beans							
Guinea Corn							
Others							
I							
II							
III							

26. Do you keep animals in addition to crop production? Yes [] No []

27. If yes, Supply the following information:

ANIMAL	NO. DURING LAST PRODUCTION SEASON	NO. CONSUMED DURING LAST SEASON	NO. SOLD DURING LAST SEASON	UNIT PRICE	TOTAL INCOME
Goals					
Sheep					
Cattle					
Fowls					
Guinea fowls					
Others					

28. Which of the following non-farm income generating activities do you engage in?

Trading [] Dress Making [] Service [] Others, Specify

29. Estimate the income accruing from the activities mentioned above.

I-----

Ii-----

Iii-----

30 What factors affect yam contribution to household income?

SECTION'D'

YAM CONTRIBUTION TO FOOD SECURITY

30. Do you produce yam? Yes [] No []

31. If yes, do you yet enough harvest for consumption all year round? Yes [] No []

32. If no, how do you supplement your food needs?

Relatives [] Gifts [] Sale of animals [] Others, specify.....

33. How many times do members of the household eat during harvest time per day?

Age Group	Number of times				
	1	2	3	4	5
Children (1 – 12 years)					
Adults (> 12 years)					

34. How many times do members of the household eat during the lean season?

Age Group	Number of times				
	1	2	3	4	5
Children (1 – 12 years)					
Adults (> 12 years)					

35. What are your suggestions for improving people's access to yam?

i -----

ii -----

iii -----

36 What factors negatively affect yam contribution to household food security?



SECTION 'E'

**FACTORS THAT HINDER THE ATTAINMENT OF IMPROVED INCOME
AND FOOD SECURITY THROUGH THE PRODUCTION OF YAM.**

37 Which of the following factors hinder the attainment of improved income and food security through the production of yam?

- | | | |
|---|-----|-----|
| 1. Inadequate extension services | [] | [] |
| 2. Inadequate capital for expansion | [] | [] |
| 3. Diseases and pests | [] | [] |
| 4. Lack of ready market for the produce | [] | [] |
| 5. High cost of production | [] | [] |
| 6. Low soil fertility | [] | [] |
| 7. Inadequate labour | [] | [] |
| 8. Marketing and transportation constraints | [] | [] |
| 9. Lack of improved varieties | [] | [] |
| 10. Erratic rainfall pattern | [] | [] |
| 11. Inadequate storage facilities | [] | [] |

38 Suggest the possible ways of improving income and food security through the production of yam

- I-----
II-----
III-----



APPENDIX B:

Interview Guide for Key Informants and Focus Group Discussion

- Do you think there are enough yams in the community?
- Why do you think so?
- What role does yam play in the community?
- Why is yam the most widely cultivated crop in the community?
- Do you see yam cultivation to be a lucrative enterprise? Why?
- What measures do you think can be put in place to boost yam production?
- What challenges do you encounter in yam production?
- What do you think could be done to address these challenges?
- What are the varieties of yam cultivated in the community?
- What are the major crops grown in the community?
- Which crop do you consume most? Maize or yam?
- If yam, do you produce enough for consumption all -year round?
- To what extent do social factors such as funerals, wedding ceremonies, marital rituals and others play a role in the incidence of food shortage at the household level?
- How do you supplement your food needs in the event of shortage?
- What is the mode of agriculture production in this community?
- What is the source of labour for production?
- What factors do you think affect yam contribution to food security in the community?
- What are your sources of income?
- How do you spend the income generated from the different sources?

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