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Full Length Research Paper

Food safety circumstances in northern Ghana, associated constraints and coping strategies

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This paper looks at the food security situation in three most deprived and poverty-stricken regions in the Northern parts of Ghana and examines how farmer households cope during food insecure periods. The study concludes that although farmers in these regions cultivate purposely for household consumption and sell the surplus, food was not available throughout the year in the farmer households interviewed. On the average staple foods produced lasted for seven months. Coping mechanisms during months of inadequate household food provision included migration to southern Ghana for wage labor, support from relatives and friends outside the regions, sales from livestock and household valuables as well as reduction of food intake and consumption of less preferred food. Erratic rainfall patterns, high cost of agrochemicals, lack of knowledge on improved farming and post harvest practices as well as lack of production credit and markets for farm produce were some of the constraints militating against increased production and improvement in food security. Measures to remove these constraints will therefore go a long way to improve the household food security situation in Northern Ghana.

Key words: Farming households, food security, constraints, coping strategies, Ghana.

INTRODUCTION

The issue of food security has been understood by many development workers as the availability of food in the world marketplace and on the food production systems of developing countries (FANTA, 2003). However, global food availability does not ensure food security in any particular country because what is available in the world market may not necessarily be accessible by famine-affected people in African countries, as the economies of these countries, in general, cannot generate the foreign currency needed to purchase food from the world market.

One of the most influential definitions of food security is that of the World Bank in 1986. The Bank defined it as the "access by all people at all times to enough food for an active and healthy life." This definition encompasses many issues. It deals with production in relation to food availability; it addresses distribution in that the produce should be accessed by all; it covers consumption in the sense that individual food needs are met in order for that individual to be active and healthy. In addition, the availability and accessibility of food to meet individual food needs should be sustainable. The recent World Food Programme report also emphasized that increasing food production in the developing countries would be the basis on which to build their food security. In Ghana the Ministry of Food and Agriculture's operational definition of food security is "good quality nutritious food hygienically packaged, attractively presented, available in sufficient quantities all year round and located at the right place at affordable prices (FASDEP, 2003).

Basically, there are two forms of food insecurity, namely chronic undernourishment and transitory food insecurity. Chronic food insecurity implies a persistent inability on the part of the household to access adequate food. Chronic food insecurity generally arises through inadequate access to resources, and is therefore structural in character. Transitory food insecurity come about as a result of shocks due to economic failures and human-induced as well as natural disasters creating food shortages that affect, temporarily, all or part of the country population. In addition, even in the absence of chronic and transitory hunger the population may suffer from the lack of essential micronutrients. This is often referred to as hidden hunger. As many as a third of the world's people do not meet their physical and intellectual potential because of vitamin and mineral deficiencies, according to a report released by UNICEF and The Micronu-

trient Initiative (http://www,fao.org/docrep/meeting)

The incidences of food insecurity and poverty are particularly devastating in the developing countries and a lot of resources are being channeled towards programmes aimed at eradicating food insecurity and poverty by various international organizations and government of the developing nations. Adequate nutrition is the first requirement for development. Without proper nutrition, children are stunted mentally, physically, and socially; and adults are faced with lives that fall short of their potential to the detriment of society as a whole. In terms of food insecurity, 852 million people worldwide are still chronically undernourished. In Africa, an estimated 200 million or 27.4 percent of the people on the continent are undernourished (IFPRI, 2002; FAO, 2003). This figure is expected to increase to 30 percent by 2010.

Some empirical studies argue that food security policies have failed to address the core livelihood risk issues of inadequate nutrition, malnutrition and poverty in developing countries (Pretty and Koohafkan, 2002; Ruivenkamp, 2005 and Windfuhr, 2005). The major complain is that food security policies have forced markets open to dumping of agricultural produce, privatized communal and public natural resources and concentrated resources in the hands of the rich minority. These concerns were reechoed by over 700 representatives of civil society, including farmer, fisher folks, pastoralist, indigenous and women organizations in Rome at the forum for Food Sovereignty in June 2002

Global studies highlight that the distribution and incidence of poverty is predominantly a rural phenomenon. Majority of the poor live in the rural areas of the developing world even with urbanization, this reality will not change for at least another 20 years (UN Millennium Task force on Hunger 2005). Although some of the rural poor may be helped by transfers from cities, for most poor households any improvement in their incomes will depend on generating more and better jobs in rural areas (IFPRI, 2007). Agriculture is likely to be central to rural development and rural poverty alleviation. Farming has high potential to create jobs, to increase returns to the assets that the poor possess—their labor and in some cases their land—and to push down the price of food staples, which is crucial when so many of the poor are net buyers of food.

The poor face the most severe difficulties in relation to the production of food for home consumption and to access marketed food, which make them the most vulnerable to the food security crisis (Maxwell, 2000). Again, other factors said to have depressed Africa's food production performance include the low level of input use, poor mechanization, weak research base, lack of incentives to producers, poor infrastructure and poor access to markets. In a work done by Nyanteng and Asuming-Brepong (2003) in Ghana, food security is also perceived to be affected by externalities in terms of deterioration of environmental, social and other factors that pose threat to or increase the cost of food production and distribution. The factors include irregular climatic conditions (rainfall and drought), soils degradation, outbreak of diseases and pests, bushfires, poor farm-to-market roads and storage facilities, increases in non-food prices, rural-urban migration, internal ethnic conflicts and government policies, etc.

Another approach of defining food security externality is in terms of physical outcomes that threaten physical attributes of people and human capital development. Where nutrition is inadequate or poor, adults are prone to sickness, poor rate of recovery and high mortality rate (Kurpad et al., 2005). This results in low productivity, low income, food insecurity that reinforces poor nutrition and the cycle continues. In children, poor nutrition is manifested in poor physical growth (stunted), low cognitive ability, low capacity to learn, low productivity of adulthood. Concerns have also been raised about the effect of climatic change on the food security situation in low income developing countries. These countries are more likely to experience a significant increase in food insecurity and hunger as a consequence of climate change, which may affect: the physical availability of food production, by shifts in temperature and rainfall; people's access to food, by lowering incomes from coastal fishing because of rising sea levels; or a country's foreign exchange earnings by the destruction of its export crops caused by the rising frequency and intensity of tropical cyclones.

Some authors (Migotto et al., 2005) have commented on nutrition security which requires several factors that are complementary to food security. Among these are a hygienic environment and access to health services. In these areas, the challenges are great, and important advances in nutrition security remain to be achieved through continued and increasing investment in these areas. Hunger, poverty and disease are interlinked, with each contributing to the occurrence of the other two. Hunger reduces natural defenses against most diseases, and is the main risk factor for illness worldwide (World Food Summit, 1986). People living in poverty often cannot produce or buy enough food to eat and so are more susceptible to disease. Sick people are less able to work or produce food. The UN Standing Committee on Nutrition concluded that nutrition is an essential foundation for poverty alleviation, and also for meeting MDGs related to improved education, gender equality, child mortality, maternal health and disease (UNDP, 2004). In 2005, the UN Millennium Project Task Force on Hunger concluded that hunger can be halved by 2015, but only with concerted action. Recommendations made included: increase political action; create an enabling environment (through policy reform); improve nutrition for the chronically hungry and vulnerable; increase agricultural productivity of food-insecure farmers; reduce vulnerability of the acutely hungry with productive safety nets; make markets work for the poor; and conserve natural re-

Table 1. Sample size for food security survey in Northern Ghana

Regions	Sample Frame			Sampling		
	Number of com'ties	Number of farmer groups	Total Membership	Sampled Communities	Number of farmer groups	Sampled Households
Northern	18	35	1639	15	30	300
Upper West	15	25	885	12	20	200
Upper East	12	31	740	11	20	200
Total	45	91	3264	38	70	700

sources.

In Ghana over 60 percent of the population depends on Agriculture for their livelihood (Al-Hassan and Diao, 2007), particularly the Northern Ghana where majority of the population is in Agriculture. With a population of close to 21million, more than 30 percent of Ghanaians live below the poverty line (UNDP, 2005) and per capita income is a little over $600. About 13 percent of the population (About 2.5 Million people) had dietary composition below minimum level in 2002 while prevalence of child malnutrition was about 22 percent in 2003; 30 percent stunted, 7 percent underweight and 22 percent wasted (GDHS, 2003). The northern parts of Ghana comprising of Northern, Upper East and Upper West Regions have been described as the most poverty-stricken and hunger spots in Ghana (GLSS, 2000). The high incidence of poverty in Northern Ghana has been attributed to exclusion from trade (Aryeetey and Mckay, 2004; ODI and CEPA, 2005) and the slow down of growth in the staple crop sub-sector.

This study broadly examined the food security situation in terms of household food availability in the three Regions of Northern Ghana. The study also investigated the coping or survival strategies used by the poor and vulnerable and make recommendations for policy directions.

Specifically the study examined the underlisted key food availability indicators

I. Annual yield of staple crops of selected farmer households;
II. Months of inadequate food provisioning
III. Coping mechanisms/survival strategies during hunger periods
IV. Production and other constraints
V. Constraints

METHODOLOGY

Questionnaire design

A household questionnaire was designed for data collection. The close-ended questionnaire consisted of five (5) main modules covering the underlisted headings:

I. Background information
II. Scale of Production and Yields
III. Agricultural input use and access to credit
IV. Household Food Insecurity and Coping Mechanisms

Demographic statistics of surveyed regions

Areas surveyed included Northern, Upper East and Upper West Regions of Northern Ghana. Regarding demographics, the population of the Northern Region was 1,820,806, representing 9.6 per cent of the Ghana's population. The population of the Upper East Region was 920,089, representing 4.9% of the national population. The total population of the Upper West Region was 576,583, representing 3% of the national population. http://www.ghana.districts.com

Sampling and data collection

A non governmental organization is implementing a Multi-Year Assistance Project in Northern parts of Ghana, which is aimed at building community and household resilience to food insecurity through agricultural assistance and institutional development. A list of all communities, groups and farmers that have been identified for assistance was compiled. Out of this, sample frames were prepared and a three-tier sampling approach at community, group and farmer levels used (see sampling in Table 1) to select farmer households for the survey.

A representative sample size of 10 percent of total number of assisted farmers was used. This translated into a sample size of 300 in Northern, 200 in Upper West, 200 in Upper East Regions. Farmer estimation data collection approach was used. This involves surveying farmers to obtain their estimates of crop harvest and divide by how much land they planted (ideally obtained by direct land area measurements) to estimate yields. A total of 700 households were successfully interviewed from 38 communities.

Data processing and analysis

Statistical Package for Social Scientist (SPSS) version 10.0 was used for data analysis. The data was cleaned and processed. SPSS analysis outputs were then exported into a well designed Excel Template to generate indicator results and relevant inferences made.

RESULTS AND DISCUSSIONS

Background information

Generally, men in the surveyed communities had limited sources of livelihood. For them, crop farming and animal rearing were the most important income generating activities. Few were engaged in trading, charcoal burning, hunting and other artisanal jobs. Women, on the other

Table 2. Total and Average Farm Sizes by Crop (Ha)

Crop	Upper West		Upper East		Northern	
	Total	Ave	Total	Ave	Total	Ave
Sorghum	42.88	0.81	31.45	0.58	29.64	0.71
Maize	129.77	0.96	91.00	0.98	207.40	0.84
Millet	40.35	0.68	97.88	0.68	59.03	1.00
Rice	32.10	0.47	60.94	0.52	5.70	1.14
Yam	10.50	0.37	-	-	118.91	1.21
Groundnut	75.69	0.53	59.72	0.47	161.58	0.76
Cowpea	37.50	0.67	1.75	0.44	11.80	0.47
Soybean	3.80	0.47	79.37	1.30	18.18	0.49

Source: Author's Compilation 2006 Survey

hand, were engaged in a variety of economic activities. These include crop farming, animal rearing (especially pigs and fowls), food processing, *Pito* brewing and Shea-butter extraction. Other activities were petty trading, soap making, food vending, firewood collection, pottery and weaving.

Family land tenure system for agricultural activities was predominant in the communities surveyed. Hiring or land rental and crop sharing systems were practiced in few communities. Labor use patterns in Upper West, Upper East and Northern Regions were similar. A combination of family, hired and communal labor was mostly adopted. Hired and communal labour was commonly used for land preparation while family labour was used for planting, weeding and harvesting. About 93 percent of the farm-ers were aged between 19 and 60 years, 6.4 percent over 60 years and just about 1 percent below 19 years. Analysis of key respondents (project participating farm-ers) showed that majority (73.2 percent) had no formal education. Only 16.6 percent and 6 percent were educated up to the primary and Secondary School levels respectively. Crop farming was the primary occupation as indicated by 93.5 percent of the total sample interviewed. The rest reported crop production as a secondary source of income. Farmers who cultivated main crops rather reported livestock rearing, trading and food processing as secondary income sources.

Acreage farmed

Farmers interviewed in the surveyed areas cultivated a total of 1407 hectares of land in the 2005 production season which was considered a normal year by the farmers interviewed. Out of this total, cereals constituted 59 percent (maize 30 percent, millet 14 percent rice 7 percent and sorghum 7 percent), and legumes 32 percent (groundnut 21 percent, soybean 7 percent and cowpea 4 percent and yam 9 percent. The average farm size cultivated was less than 1 hectare except yam which recorded an average of 1.13 hectares per farmer. This suggested that farming activity was rather on a small scale. Comparatively, farming was more intensive in Northern Region than Upper West and Upper East Regions. Table 2 depicts the total and average acreages cultivated by crop type in the surveyed areas.

A strong correlation was established between crops cultivated and consumption patterns. Generally, it was observed from the survey that farmers grow what they eat. For instance, yam and maize were widely cultivated by farmers in the Northern Region because of the significance in their diets. The four most important crops cultivated in decreasing order of importance in Upper West region were maize, groundnut, sorghum and millet. For Upper East Region, millet was identified as the most important followed by, maize, soybean and rice. A differ-rent trend was observed in the Northern Region with maize being the most important followed by groundnut, yam and millet.

Weight yield

A total of 1117MT of output was produced by the 700 farmers interviewed. Cereals accounted for 56 percent (maize 38 percent, millet 8 percent, rice 4 percent and sorghum 5 percent), yam 27 percent and legumes 17 percent (groundnut 12 percent, cowpea 3 percent and soybean 2 percent). Also, the survey established overall weight yields of 0.59 MT/Ha for sorghum, maize 1MT/Ha, millet 0.47 MT/Ha and rice 0.42 MT/Ha. In the case of legumes, weight yields were 0.47 MT/Ha for groundnut, cowpea 0.63 MT/Ha and soyabean 0.22 MT/Ha. Weight yield for yam was 2.3 MT/Ha for all the Regions com-bined. Table 3 depicts the total and average weight yields by crop type in the surveyed areas. Farmers interviewed source inputs from retailers as reported by 96 percent of those interviewed in Northern, 86 percent in Upper East and 85 percent in Upper West Region. Generally there was misapplication of agroche-mical in terms of qualities and quantities used by farmers. This could be due to lack of technical knowledge and affordability.

Table 3. Total Outputs (MT) and average yields by crop (Kg/Ha)

Crop	Upper West		Upper East		Northern	
	Total	Ave.	Total	Ave.	Total	Ave.
Sorghum	26.17	610	18.13	576	17.08	576
Maize	200.75	1,547	69.56	764	158.27	763
Millet	23.23	576	40.88	418	28.74	487
Rice	13.11	409	25.07	411	2.80	492
Yam	41.2	3,818	-	-	258.31	2172
Groundnut	71..41	944	37.53	629	101.97	631
Cowpea	26.37	703	0.39	227	5.18	439
Soyabean	3.11	823	12.22	154	7.33	403

Source: Author's Compilation 2006 Survey

Table 4. Distribution of agricultural input by type.

Input	Upper West	Upper East	Northern
Inorganic Fertilizer	31.9%	78.8%	39.6%
Organic Fertilizer	12.8%	6.8%	11.1%
Hybrid Seed	3.5%	5.2%	-
Insecticides	4.8%	0.7%	4.8%
Herbicides	3.5%	-	0.9%
Tractor	22.7%	2.6%	33.2%
Draught Animals	51.6%	48.7%	51.6%
Others	-	0.7%	0.4%

Source: Author's Compilation 2006 Survey

Table 5. Distribution of Loans by Source

Type	Upper West	Upper East	Northern
Rural Bank	28.2%	7.1%	6.3%
Other Bank	10.3%	-	9.4%
Cooperative	7.7%	10.7%	3.1%
NGOs	15.4%	25.0%	50.0%
SIF	-	-	9.4%
Traders	10.3%	14.3%	-
Money Lenders	15.4%	3.6%	3.1%
Others	12.8%	39.3%	18.8%

Source: Author's Compilation 2006 Survey

All the Regions surveyed reported well over 70 percent of households using agricultural input. By type, inorganic fertilizer was the most common agricultural input used. Its application was predominant in Upper East Region where soil fertility was reported to be very poor. Here, approximately 79% of the sample interviewed used inorganic fertilizer as compared to 32 percent in Upper West and 40% in Northern Region (Table 4).

The use of draught animals (usually donkeys) for land preparation and carting of agricultural produce was a prominent feature in Upper West (51.6 percent), Upper East (48.7%) and Northern (51.6 percent).The use of tractor services in the surveyed communities was limited. The survey also revealed low use of improved seeds by farmers. Generally, farmers used their own low yielding seeds which adversely affected productivity. Supply of improved seeds is therefore highly recommended. Less than 10% of the sample interviewed in the surveyed areas used improved seeds as second most important agric input used in the 2005 production season.

Credit/loans

Few farmers in the surveyed communities accessed credit during 2005 production season. Farmers generally used their own resources. The Upper West Region recorded the highest percentage (19 percent) of respondents accessing credit. This was followed by Northern Regions (14 percent) and Upper East (11 percent). The purpose of loans/credit contracted was basically for agricultural inputs purchases, food processing and business expansion. Table 5 depicts the percent distribution of credit/loans by source reported in the surveyed Regions.

Agriculture input usage

High cost of agricultural inputs, especially agrochemicals, was identified as one of the major constraints to improved productivity. The input supply chain was rather long. Most Disaggregating access to loans by source, the survey results showed rural banks as key providers of agricultural finance in the Upper West Regions; with approximately 28% of the sample interviewed reporting. This was followed by NGOs as reported by approximately 15% of those interviewed in Upper West Region. A slightly different trend was observed in Upper East and Northern Regions. NGOs and other sources played a key role in agricultural financing. In the Northern Region, half of the sample interviewed indicated NGOs as the main

Table 6. Months of Household Food Insecurity in Upper West, Upper East and Northern Regions of Ghana

Crop	Upper West			Upper East			Northern		
	Months of Harvest	Months of Stock Depletion	Months of food insecurity	Months of Harvest	Months of Stock Depletion	Months of food insecurity	Months of Harvest	Months of Stock Depletion	Months of food insecurity
Sorghum	October	June	4	August	February	6	November	June	5
Maize	October	June	5	October	April	6	September	June	3
Millet	September	April	4	July/Nov	January	6	November	June	5
Rice	October	June	5	November	April	7	October	May	5
Yam	October	May	6	NA	NA	NA	September	June	4
Groundnut	-	-	4	October	April	6	September	April	5
Cowpea	October	June	5	October	March	7	October	May	5
Soybean	September	April	-	NA	NA	NA	November	April	7

Source: Author's Compilation 2006 Survey

source of farm credit while a quarter was reported for the Upper East Region.

Household food security

Months of inadequate household food provisioning has been defined as the time between stock depletion and the next harvest (Bilinsky and Swindale, 2007) . It is usually used as a measure of food insecurity in a highly subsistence-oriented area where production is primarily for home consumption and households do not make significant sales or purchases in the market. In order to obtain information on months of inadequate food provision at the household level, farmers were asked at the time of survey whether they still had food stocks remaining from the previous year's harvest (2005 production season). If the household still had stocks, the expected time stocks ran out was obtained.

The survey data presented in Table 6 suggest that farmer households in the surveyed communities experience a significant degree of food insecurity with food insecure periods spanning between 3 and 7 months. Upper East Region was the worst affected as it experienced the longest food shortage period of 6 months. The Northern and Upper West regions recorded 5 months of food inadequacy.

Coping mechanisms

Although farmer households interviewed produce mainly for domestic consumption, their food reserves were low. As indicated in the food security analysis above, these farmers were either not able to produce enough to last throughout the year or were unable to store enough produce for home consumption throughout the year. The crucial question is: *how are they able to survive?* During food insecure periods, these households use a wide range of mechanisms and communal support networks to cope with the situation. Among these are collection of wild foods, market purchases, in-kind (food) payment, support from relatives and friends, sales from livestock and household valuables, migration and wage labor. Others include reduction in the number of meals served each day, reduction in the portions/ sizes of meals and consumption of less preferred foods.

The survey results showed that the first most important way of obtaining food when stocks run out was to buy the same food staples consumed from the market if the household could afford. This was reported by approximately 72% in Upper West, 78% in Upper East and 66% in Northern.

The next alternative was to obtain less preferred foods from the market if the most preferred foods were either not available or not affordable.

Basically, the survey revealed that food was rationed when households' food runs out.

Frequency of food intake was reduced from three to two while the por-tions/sizes of meals served were also reduced drastically. In the Upper East Region where prolonged food insecure months exist, sale of livestock to obtain money for household food purchases was predominant. Over 90% of respondents reported that rearing of livestock was crucial in building household resilience to food insecurity. Table 7 presents responses on households coping mechanisms during food insecure periods in a normal year situation.

In another study, Nyanteng and Asuming-Brepong (2003) reported that household strategies to sustain food security in Ghana include shifting to less expensive and less preferred foods, borrowing food or money to buy, purchasing food on credit, seeking assistance from friends and relatives and purchasing street food.

Where the quantity falls short, some households limit portion size at mealtimes, limit intake by adults for children to get enough, reduce the number of meals per day and skip whole days without eating.

Table 7. Distribution of households by reported coping mechanism adopted during hunger periods

Coping Mechanism	Upper West	Upper East	Northern
Reduce the number of meals served each day	87.2%	97.0%	71.6%
Reduce the portion/ sizes of meals	89.8%	89.9%	69.0%
Eat less preferred foods	76.2%	72.4%	40.3%
Eat wild vegetables and fruits	80.1%	71.3%	33.7%
Sell chicken & fowl	78.1%	97.0%	67.9%
Sell livestock (goats, pigs, sheep)	81.6%	96.0%	70.8%
Send certain members of household to live elsewhere	9.2%	9.1%	10.7%
Sell durable household possessions (small items)	16.5%	21.6%	21.5%
Sell personal valuables	17.0%	19.6%	22.8%
Seek food from relatives/Friends	24.4%	11.2%	17.1%
Members work for pay in food	7.5%	23.1%	12.4%

Source: Author's Compilation, 2006 Survey

Constraints

There were some agric related constraints common to all the Regions surveyed. These include low level of fertilizer application due to high cost and lack of credit, lack of bullocks/tractor services for farm preparation, unavailability of improved seeds and lack of knowledge on improved farming practices. Other agric related constraints were lack of market for farm produce, lack of storage structures and poor record keeping. Non agric-related constraints common to all were poor road networks, inadequate supply of drinking water and lack of electricity and schools in most farming communities.

Region specific constraints are listed below:

Upper west region

Agric related constraints

Limited land for farm expansion. Poor soils.
Lack of capital to procure fertilizers for soil fertility improvement.
Non-use of improved varieties.
Lack of irrigation for dry season farming.
Lack of water for livestock.
Discrimination against access to farmlands (women) and
High levels of poverty and food insecurity.

Other constraints: Lack of other income generating activities (idle after harvest) and Lack of day care-centers in farming communities.

Upper east region

Agric related constraints

Poor soils.
Lack of access to land by women.
Limited land for farm expansion.
Lack of irrigation services for dry season farming.
Inadequate donkeys for carting of produce.
Outbreak of livestock disease.
Destruction of crops by animals.

Other constraints

I. Insufficient classrooms for schools.
II. Lack of off-farm income generating activities.
III. Silted dams.

Northern region

Agric related constraints

I. Poor soils resulting in low yields in some communities.
II. Striga weed infestation.
III. Lack of dams for dry season farming.
IV. Lack of assistance in animal rearing.

Other constraints

I. Inadequate knowledge in best rice parboiling practices.
II. Destruction of farm by stray animals in some communities.
III. Women need working capital for processing activities and trading.
IV. Lack of grinding mills.
V. Lack of accommodation for teachers in some communities.
VI. Lack of alternative sources of income in some communities.

Conclusions

The study highlighted that productivity by farmer house-

hold interviewed in all the three Northern regions of Ghana (Upper West, Upper East and Northern Regions) was generally low. Average weight yields per hectare of surveyed crops were far below the recommended yield using improved agricultural practices. Yield obtained for cereals were maize (1.0 MT) sorghum (0.6 MT) and rice (0.4 MT). Weight yields per hectare of surveyed legumes were groundnut (0.5MT) cowpea (0.6 MT) and soyabean (0.2 MT). In the case of yam, yield obtained was 2.3 MT per hectare of land.

Production was on a small scale and basically for subsistence use. The average farm size cultivated was less than 1 hectare for all selected crops except yam which recorded an average of 1.13 hectares per farmer.

Almost all (97%) of the households interviewed experienced food insecure periods within the year. Household food insecure periods span between three (3) and seven (7) months. Upper East Region was the worst affected experiencing the longest food shortage period of six (6) months. The Northern and Upper West regions recorded five (5) months of food inadequacy. For all the three northern regions combined overall months of inadequate household staple food provisioning was five. Months of inadequate household cereals provisioning were maize four (4), sorghum five (5), and rice six (6). Months of inadequate household legumes provisioning were groundnuts five (5), cowpea five (5) and soyabean six (6).

Productivity in agricultural activities was constrained by several factors. These include low level of fertilizer application due to high cost and lack of credit, lack of bullocks/tractor services for farm preparation, unavailability of improved seeds and lack of knowledge on improved farming practices. Others were lack of market for farm produce, lack of storage structures and poor record keeping. Non agric-related constraints common to all the communities surveyed were poor road networks, inadequate supply of drinking water and lack of electricity and schools in most farming communities

Recommendations

Enhanced agricultural productivity for the long term food security of the majority of the world's hungry has been deemed crucial, due to the links to jobs, income generation and nutritional well-being of the people in developing countries. The need to increase commitments to agricultural technology improvements and natural resource sustainability through augmented investments in agricultural research and development that targets the needs of the vulnerable and impoverished households cannot be overemphasized.

From this study, in order to build resilience to the food insecurity situation in Northern Ghana, yield improvement and market linkage programs need to be strengthened through the following;

I. Improving access to hybrid seeds.
II. Training of seed growers to increase seed production
III. Conducting more farm demonstrations on improved agricultural practices
IV. Assisting in soil improvement interventions
V. Linking more farmers to input dealers and encouraging farmers to use agrochemicals in right quantities
VI. Organizing inventory credit programmes for commodities like maize
VII. Exploring market opportunities for non-traditional commodities like groundnut and yam
VIII. Involving more local people and stakeholders in setting priorities for public investments in food security programmes
IX. Assisting in livestock husbandry practices and feeding programs

In as much as the responsibility for ensuring that individuals are able to attain food security ultimately lies with national governments, the individual needs to be educated in order to make informed decision on food security issues. As governments establish the conditions and institutions necessary to enable citizens to access the basic requirements of food security—sufficient quantities of food necessary for a balanced diet; the means to acquire this food, whether through cash incomes or access to productive resources; education in order to provide proper nutritional care to one's dependents and oneself; clean water and adequate sanitation; and effective health services as suggested by many research-ers, the individuals must also be committed to take advantage of these developmental opportunities.

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