

BASELINE STUDY REPORT

**AGRO-SOURCE: LAST-MILE AGRICULTURAL INPUT SUPPLY
SYSTEMS**

SUBMITTED TO:



**THE COUNTRY DIRECTOR
CARE INTERNATIONAL IN GHANA**

BY

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LIST OF ABBREVIATIONS

AEAs	Agricultural Extension Agents
AGRA	Alliance for Green Revolution in Africa
AMSECs	Agricultural Mechanization Service Centres
BAC	Business Advisory Center
CBEA	Community Based Extension Agent
CRI	Crop Research Institute
CSIR	Council for Scientific and Industrial Research
DDA	District Department of Agriculture
DoA	Departments of Agriculture
EPA	Environmental Protection Agency
FBOs	Farmer Based Organizations
FGDs	Focus Group Discussions
GAIDA	Ghana Agriculture Input Dealers Association
GAPS	Good Agricultural Practices
GCAP	Ghana Commercial Agriculture Project
GHS	Ghanaian Cedi
GLDB	Grains and Legumes Development Board
GLSS	Ghana Living Standards Survey
GSID	Ghana Seed Inspection Division
IDE	International Development Enterprise
IFDC	International Fertilizer Development Company
IITA	International Institute of Tropical Agriculture
JHS	Junior High School
KIIs	Key Informant Interviews
MADE	Market Development Programme
MMDAs	Metropolitan, Municipal and District Assemblies
MoFA,	Ministry of Food and Agriculture
NAFCO	National Food Buffer Stock Company
NASTAG	National Seed Trade Association Ghana
NGGA	Northern Ghana Governance Activity
NGHDR	Northern Ghana Human Development Report
NGOs	Non-Governmental Organisations
NSEZ	Northern Savana Ecological Zone
PAS-G	Presbyterian Agriculture Station-Garu
PPEs	Personal Protective Equipment's
PPRSD	Plant Protection and Regulatory Services Directorate
PRUDA	Partnership for Rural Development Action
RGD	Registrar General's Department
SARI	Savanah Agricultural Research Institute
SEEDPAG	Seed Producers Association of Ghana
SHS	Senior High School

USAID-ADVANCE

United States Agency for International Development-Agricultural
Development and Value Chain Enhancement

VSLA

Village Savings and Loans Association

WANEP

West Africa Network for Peace-Building in Ghana

WAPs

Women in Agriculture Platforms

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EXECUTIVE SUMMARY

Background

CARE is a humanitarian non-governmental organization committed to working with poor women, men, boys, girls, communities, and institutions to have a significant impact on the underlying causes of poverty. It seeks to contribute to economic and social transformation, unleashing the power of the most vulnerable women and girls. The Agro-Source project in Ghana is a two and half (2½) year project (July 2018 to December 2020). The project aims to support smallholder women farmers to;

- Increase availability and access to good quality agricultural inputs in rural communities by 50 % through a private sector led agro dealership scheme that will establish and support 50 women and men rural agro dealers by the year 2020.
- Increase availability of and access to certified seed through a community seed production system in partnership with the private sector, which will engage 200 smallholder women farmers as out-growers.
- Improve utilization of good quality agricultural inputs by enhancing knowledge of smallholder farmers through input fairs, demonstration plots and trainings.
- Create an enabling environment for women in Agri-input systems through improving gender responsiveness of both private and government sector partners.

The overall goal of the Agro-Source project is to improve the productivity of 30,000 smallholder women farmers in five (5) districts i.e. Garu, Tempane, Bawku West, Lambussie-Karni and Nandom in the Upper East and West regions of Ghana through increased availability, access and use of good quality agricultural inputs by 2020.

Objectives of the Baseline Study

The baseline study was to establish a benchmark against which to measure the progress and achievements of the project. It was to generate: information on the current status on the availability of quality agro-inputs in the target locations and information regarding smallholder women farmers' access to and utilization of agro-inputs to improve their productivity.

Methodology of the Study

The baseline study was conducted in five (5) project implementation districts from Upper West and Upper East regions of Ghana. Three (3) of the districts were Pathways project intervention districts which was implemented by Care International in Ghana whilst the two (2) districts are new districts with Northern Ghana Governance Activity presence. The study adopted a three-stage random sampling technique in selecting the communities and households. In the first stage, all the 5 Agro-Source project districts were selected, then communities (4 per district) and finally households (80 per district). Respondents from each district included 60 women and 20 men and 20 household respondents (15 women and 5 men) per community. Data was collected using household questionnaires, Focus Group Discussions, Key Informant Interviews, and review of secondary data. With a target of 30,000 smallholder women farmers, a total of 400 households were therefore sampled using the Taro Yamene's method. The primary quantitative data was cleaned, processed and analyzed by considering gender disaggregation using SPSS Version 24 and the results presented in the form of

charts/graphs and tables.

Field Findings and Discussions

Demographic Profile and Respondent Characteristics

A typical household size in the Upper East region was 6 with 7 persons in Upper West region. The average age of respondent farmers was also noted as 48 years. The survey results indicate that a total of 63 % males and 73 % females had no formal education out of which 80 % female farmers in the Upper East region and 63 % in the Upper West region did not receive any formal education. Education of females have been observed to impact so much on their resource utilization skills and capacity in agricultural production activities.

Women's Access to Land and Tillage Methods

66 % of the interviewed women farmers in the Upper East region indicated that they do not have access to land for agricultural production purposes whilst 37 % in the Upper West reported same thus indicating the challenging nature of access to productive lands. Land area allocated to women for agricultural purposes was characterized with hard pans, water logging or with fertility challenges. To improve access to lands with good production characteristics such as high-level soil fertility, the following were suggested by the women respondents; education of chiefs, landlords/owners and men through community durbars and, increased access to credit to allow women rent fertile lands.

Tillage methods commonly used in the various communities were identified as bullock/donkey ploughing, tractor plough, zero tillage and hand hoeing. It was however noted that in the Upper East region, bullock/donkey ploughing was predominant at 85 % for males and 93 % for females and this was because of its low cost and accessibility. Tractor use was highest at 63 % and 47 % for males and females respectively in the Upper West region although this was associated with high cost and limited access.

Farm Plot Characteristics, Crops Grown, and Yield

Crops commonly grown in the survey communities include soya bean, maize, rice and millet. The cultivation of these crops was seen to be on a limited small scale or at the peasant farmer level normally on an average land size of 2.5 acres. Family labour is commonly used in crop cultivation activities. Low crop yields were however associated with poor rainfall, lack of fertilizer, floods/disaster, increase pests/diseases, no inputs/tools and decreasing soil fertility as causal factors. Other notable causes of decrease in crop yield in the various districts and communities were: limited land for cropping, late planting/cultivation due to limited access to inputs and variable rainfall, poor quality seeds, poor farm practices, high cost of inputs and poor soil fertility.

Practices for increasing yields of crops as per farmers assessment for the various cultivated crops resulted from crop tolerance to drought and water logging conditions, early planting to avert future limited rains, use of compost/manure, improved practices and fertilizers.

Income Levels and Economic Status of Farmers

In the Upper East region 64 % of the women and 44 % in the Upper West region have agricultural wage labour as their source of income. 8 % and 31 % men from the Upper East and Upper West regions respectively earn their income as agricultural wage labourers. 5 % and 8 % of women in the Upper East and West regions respectively engage in firewood/charcoal sales as a source of income for the household. The sources of agricultural income were noted as crop sales, livestock and livestock products sale e.g. meat and milk, nursery products e.g. vegetables, fruits and seedling sales.

Depending on the source of income and the generators of the income, the decision on spending could be from men, women or both. It was however noted that, women could decide on what to expend their income on and therefore did not have decisions relating to expending their incomes handed-down to them by their male partners.

Farmers' Access to Production Loans and Capital

Over 90 % of the farmer respondents in the Upper East region were not able to access credit for their production activities whilst in the Upper West region it was 70 %. Credit access mainly from VSLAs in the Upper West region was therefore noted to be better than the Upper East region.

The length of time before women farmers could access loan facilities varied from 3 months to 36 months and this depended so much on the source and amount of credit/loan. Amounts that individuals accessed varied from GHS 50.00 (USD \$ 9.4) to GHS 8,000.00 (USD \$ 1,509.4).

42 % and 48 % of women farmers in the Upper East and Upper West regions used their credit for purchasing agro-inputs e.g. seeds, fertilizers, pesticides, etc.

Farmers' Ownership of Assets in Survey Districts

54 % and 56 % of the male and female respondents respectively indicated ownership of donkey or bullock trailers whilst 19 % males and 11 % females own agro-chemical knapsack spray pumps. Mobile phone which promotes ease of communication and exchange of knowledge and agricultural information by farmers was noted as 18 % and 16 % for male respondent farmers in the Upper East and Upper West regions respectively but with the females being 16 % for the Upper East and 17 % for the Upper West regions. Farmers also owned radio and television sets which served as a medium of communication and the transmission of improved agricultural technologies and production knowledge or messages to a larger farmer population for the purposes of education for improved productivity. These serve as a suitable platform for the introduction and communication of improved farmer and scientific knowledge as well as updates especially weather and market information to support the activities of farmers. Mobility and transport of agro-inputs as well as farm produce was undertaken using bicycles, motor cycles and tri-cycles.

Food Security in Survey Districts

48 % of the respondents indicated the non-availability of sufficient food throughout the year in the survey districts at the household level. The severity was however more pronounced from April to July. Farmers coped with non-availability of food by borrowing food/money to buy food, reliance on less preferred or less expensive foods, reduced number of meals or quantity eaten per day, skipping meals

due to lack of food for entire day or lack of money, consumption of taboo/wild/famine foods which are normally not eaten, restricted consumption of some family members so that others could eat normally or more, eating of seed stock held for next season, begging or scavenging.

Availability and Access to Good Quality Agricultural Inputs

Farmers indicated that there were difficulties in accessing agricultural inputs such as certified seeds, fertilizer, agro-chemicals, etc. An average of 71 % of farmers (51 % women) were satisfied in accessing agri-inputs in the Upper West region whilst in the Upper East region 85 % (48 % women) were satisfied. Good quality services as well as competitive prices contributed greatly to the satisfaction levels of farmers whilst distance to source of input or service, price of inputs/service and lack of credit affected the satisfaction levels. 19 % of the female respondents and 81 % of the male respondents have knowledge on the proper use of agro-chemicals. Knowledge levels of women farmers on proper use of agro-chemicals was generally low and this will consequently have an effect on crop yield. Inorganic fertilizer and herbicides were widely used by farmers in the survey districts whilst the use of weather information and availability of crop threshers was limited.

15 % of the respondents in the Upper East region and 9 % in the Upper West region did not access and use agri-inputs in the last season. Agri-inputs are mostly sourced from government program, agro-input dealers local seed producers and agri-input fairs in the Upper East region. In the Upper West region however sources of agri-inputs were noted as; government program, agro-input dealers local seed producers and agri-input fairs. In the case of accessing agri-inputs from distances farther than 5 km, 59 % males and 41 % females in the Upper East region indicated this whilst 85 % males and 15 % females in the Upper West region accessed agri-inputs from agri-input dealers located farther than 5km from their communities. In the area of information (dealers, preparation and use, etc) on agricultural inputs VSLA groups, family and friends, and NGOs were mentioned in the Upper East region, and VSLA, family and friends and NGOs were mentioned in the Upper West region.

Source of Knowledge on Proper Use of Agro-chemicals

Community development NGOs and Agricultural Extension Agents (AEAs) were mentioned as the main source of information on the proper use of agro-chemicals.

Input fairs also serve the needs of farmers in the provision of knowledge on the proper use of agro-chemicals in all the districts except Nandom district in the Upper West region. It is evident that a high percentage of women accessed agri-inputs through agri-input fairs in the last 12 months. Aside obtaining agricultural production inputs from agri-inputs fairs, it also served as source of relevant information on the activities of input dealers and their services.

Farmers across the two (2) regions indicated that the application of agro-chemicals is most appropriate at 4:00 am to 10:30 am and 4:30 pm to 6:30 pm.

Challenges on the Use of Agro-Chemicals

Challenges of farmers in accessing and use of agri-inputs included; inadequate knowledge on the use/application of agro-inputs, limited access to fertilizer coupons, high cost of inputs and services, unavailability or limited supply of inputs and services, lack of financial resources, distance, timeliness in application of agri-inputs, lack of transport, lack of credit and, absence of input dealers in farmers' communities.

It was observed that there were more challenges regarding the use of agro-chemicals in the Upper West region compared to the Upper East region. The improper use/application of agro-chemicals was said to have deleterious effects on farmers, crops and the environment and therefore there is the need to ensure farmers and environmental safety. Education of farmers on safety measures as well as the preparation and application of agro-chemicals will lead to increased crop yields, environmental safety and better lifestyles of farmers.

Farmers indicated the following as solutions to the challenges of farmers; availability of input dealers in communities, input subsidies especially targeted at women and widows and establishment of agricultural mechanization centers to provide traction services.

Community Agro-Input Dealers and Business Relationships

Twelve (12) and ten (10) agro-input dealers in the Upper West and Upper East regions respectively were operational in the survey districts and communities and have been operational for 2 to 19 years. The agri-inputs that these businesses traded included; fertilizer, seeds, weedicides/herbicides, protective clothing, cutlass, application equipment e.g. knapsack, etc. Agro-input dealers indicated they are registered with the Registrar General's Department and Business Advisory Center (BAC) at the District Assembly in the Upper West region with no indication of registration with regulatory agencies. In the Upper East region however, they indicated they are registered with Registrar General's Department (RGD), Environmental Protection Agency (EPA) and/or Plant Protection and Regulatory Services Department (PPRSD).

8 % of the interviewed agro-input dealers in the Upper West region and 80 % in the Upper East region indicated that they have retailers or distributor networks for their goods whilst 70 % agro-input dealers in the Upper East and 8 % in the Upper West regions have business partnership relationships with their suppliers. The benefits of business partnerships included access to credit, capacity building opportunities, and support to improve distribution network.

All (100 %) of the interviewed agro-input dealers in the Upper East region indicated that they undertake farmer and retailer training programmes to enhance their skills and knowledge in the use/sales of agro-chemicals whilst only 42 % of the agro-input dealers in the Upper West indicated same. Trainings were noted to mainly focus on the recommended practices and use of agro-chemicals, the use of Personal Protective Equipment's (PPEs), etc. Education of farmers was noted to be undertaken using field demonstrations, group meetings and posters.

Some benefits noted from the participation in the agri-input fairs were: increased and improved business network with farmers and retailers, exposure of business to more farmers, establishment of more business linkages with smaller businesses/retailers, exposure to new products or tools, increase in sale of products and increased knowledge level in record keeping, sales, etc.

However, some agri-input dealers indicated lack of transport, low prices at fairs because of competition from distributors at the fairs as their challenges.

Availability of Certified Seed and Establishment of Seed Out-grower Partnerships

Farmers mainly selected and used their own seed and as well bought seed from agro-input dealers. 67 % male farmers in the Upper East region and 80 % in the Upper West region had knowledge on the proper use of seed compared to 25 % and 20 % female farmers of the Upper East and Upper West regions respectively. In the Upper East region it was noticed that 79 % males and 21 % females had knowledge on the conduct of germination tests whilst 91 % males and 9 % females indicated they had knowledge on same in the Upper West region. In the Upper West region 71 % of the farmers indicated that they could purchase more seed if they wanted whilst 66 % of the farmers in the Upper East region indicated same. Four (4) qualities of good seed were noted by farmers as big grains, absence of cracks, absence of insect holes, etc, absence of discoloration and matured seeds with cotyledon.

Access to certified seed was very difficult coupled with high prices. 56 % (56 % males and 44 % females) farmers indicated they use certified seed in the Upper West region whilst 88 farmers (57 % males and 43 % females) in the Upper East region also used certified seed in their crop production activities.

Community Seed Out-growers and Established Partnerships

All (100 %) respondent seed producers were registered and they are engaged in the production and sales of soya bean, groundnut, maize (both Open Pollinated Varieties and hybrid), rice, cowpea, sorghum and cowpea seed. Requirements for registration as seed grower were said to include availability of land, knowledge in crop production, application and passing of interview. A registration certificate from Ghana Seed Inspectorate Division - the regulatory body indicates that one is a certified seed producer. The respondent seed companies had between 40 to 275 men and 30 to 245 women as seed out-growers across the various districts of the survey.

Seed producers also indicated that they organise technology transfer sessions such as demonstrations with their out-growers in the various locations and these focused on new production technologies/GAPS for improved yield, climate smart agriculture, use of high yielding varieties, etc. Challenges faced by seed growers/companies were: women do not have access to large parcels of fertile lands although they are majority of the out-growers, supply of poor-quality foundation seed by some companies, high price of foundation seeds thus affecting profit margins of seed out-growers, availability of several varieties and limited knowledge on varietal purity, high initial cost of investment, unpredictable weather affecting agricultural activities and pests and diseases prevalence.

Also, seed out-growers faced some challenges and these were: little understanding of operations of seed companies thus affecting seed out-grower activities, delay in release of agro-inputs to seed out-growers, limited access to fertile lands for seed growing, delays in accessing traction services and climate change thus affecting weather and cultivation activities of seed out-growers.

Some identified strategies for engaging smallholder women farmers were; linking with women farmers as priority, identification and establishment of working links with VSLA and FBOs, provision of free

seed and agri-input credit support, education of smallholder women farmers on GAPs and, early traction services support.

Challenges of women seed out-growers were noted as: limited access to tractor services for farmland cultivation, lack of funds to procure needed agri-inputs and as capital to start/expand business, limited access to fertile and productive lands, limited credit facilities available to support women out-growers and marketing challenges of produce/seeds for women.

Women's Decision Making and Gender Constraints.

VSLAs existed in all survey communities and respondents indicated that they were active members of and involved in all activities. In the area of decision making, more women decided on the type of crops to grow for home consumption. 55 % of the women indicated that they could decide on the type of cash crop to cultivate whilst 44 % noted that they can raise livestock of their choice without any difficulty or problems in the family. Decisions jointly taken through consultation were noted to promote unity and co-existence within families. Women noted that they are comfortable as women and they speak in public freely and with confidence.

56 % of the females interviewed during the survey indicated that they can decide on the type of non-farm business activity to engage in without consulting or requiring approval from their male counterparts or husbands whilst 41 % indicated that the decision must be a joint decision. Decision on the type of agri-input to purchase and apply could be taken by 55 % of the women in all the districts without requiring clearance from their husbands whilst only 6 % men decided on this for women whilst 39 % noted that it was as a joint decision.

41 % and 57 % of the women can take decisions on major and minor expenditures respectively whilst 66 % of the women can decide on the type of clothing to buy without requiring approval from their husbands. Gender barriers to women participation in project activities were noted as inadequate financial resources, lack of collateral, limited or non-existent input credit, limited fertile agricultural land, etc. Long distances to source of agro-chemical/agro-inputs was also noted as a major barrier to the access whilst ability of women to carry a Knapsack sprayer during a spraying activity due to the weight was also a major challenge.

Regulatory Requirements for Agri-Input Sales and Seed Production

The Environmental Protection Agency (EPA) indicated it provides essential service to agro-input dealers and has a mandate according to the EPA Act (490), to regulate, inspect and license agro-chemical dealers. They ensure compliance in the provisions of the registration and in case of any violation, a notice of non-compliance is issued based on the Act. In setting up an agro-chemical dealership, the EPA demands that a person should have been registered with the Registrar General's Department (RGD), Plant Protection and Regulatory Services Division (PPRSD) of the Ministry of Food and Agriculture (MoFA) and have an EPA license to operate.

It was however noted that few women were engaged in agri-input business and this is because of their low-income levels.

Ghana Seed Inspection Division (GSID) of the Ministry of Food and Agriculture provides services to the Seed industry and which include; registration of seed growers, training of seed growers, field inspection and monitoring of seed growers, laboratory seed testing and certification.

The Departments of Agriculture (DoA) has a responsibility to regulate the agriculture industry through the implementation of government policies. They are also engaged in seed and fertilizer distribution, capacity building, etc. In setting up an agri-input business, the Department of Agriculture mentioned the following as the criteria; a business license/registration from RGD is required, a suitable store, registration with the District Assembly, registration with PPRSD of MoFA.

Suggested Recommendations

Following the field findings, the following are suggested recommendations:

1. The Agro-source project should as part of its activities organize agri-input fairs/agriculture knowledge festivals at the zonal/community level to help improve the access of farmers especially women to agro-inputs.
2. Widows and resource poor women in the project communities should be identified and supported in the form of input credit through partnerships established with agro-input dealers on the project.
3. Farmer education on proper handling, use of agro-chemicals and PPEs is very necessary in the various communities to promote environmental security and enhance productivity.
4. Access to productive/fertile land is a challenge especially by women seed out-growers in the project communities and it is suggested that the project should facilitate access of women to fertile parcels of land especially seed out-growers.
5. The project should support in nurturing individual community seed growers through the provision of logistics, capacity building and financial support for seed out-growers/seed companies as well as agro-input dealerships into major distributors in the implementation districts.
6. There is the need to organize a advocacy/campaign on input subsidies especially targeted at supporting women and especially widows targeted at the inclusion of agro-chemicals and seed in the government subsidy programme.
7. There is the need to organize a capacity building programme as part of the project activities for agro-input dealers and seed companies especially in the area of business development, networking and sensitivity or perception towards women farmers in communities.
8. Support in the establishment of partnerships between service providers e.g. traction service and farmers/seed out-growers (VSLAs) to promote their activities especially to support early planting.
9. The Agro-Source Project should leverage on the existence of VSLAs, Seed Companies and Agro-input dealers in the various locations for the implementation of its activities.

1.0 BACKGROUND

CARE is a humanitarian non-governmental organization committed to working with poor women, men, boys, girls, communities, and institutions to have a significant impact on the underlying causes of poverty. CARE seeks to contribute to economic and social transformation, unleashing the power of the most vulnerable women and girls.

The Agro Source project in Ghana is a two and half (2½) year project running from July 2018 to December 2020. The project aims to support smallholder women farmers to;

- Increase availability and access to good quality agricultural inputs in rural communities by 50 % through a private sector led agro-dealership scheme that will establish and support 50 women and men rural agro-dealers by the year 2020.
- Increase availability of and access to certified seed through a community seed production system in partnership with the private sector, which will engage 200 smallholder women farmers as out-growers.
- Improve utilization of good quality agricultural inputs by enhancing knowledge of smallholder farmers through input fairs, demonstration plots and trainings.
- Create an enabling environment for women in agri-input systems through improving gender responsiveness of both private and government sector partners.

The project will build on existing work done by CARE's Pathways project in establishing a private sector led agro-dealership scheme. Over the course of the project implementation, the number of community agro-input dealers are expected to increase from 24 in two project districts to 50 dealers in five (5) districts. In addition, the project also expects to build on community seed production system started by the Pathways project in collaboration with a seed producer (Heritage seed). Under this system, the number of seeds out-growers will increase to 200 with the aim of graduating about 10 % of them to become certified seed producers who will in turn engage other farmers as out-growers. The project will improve the knowledge of agro-dealers and farmers on appropriate use of agro-inputs and Personal Protection Equipment (PPEs) through community and zonal inputs fairs. As part of these fairs, relationships will be established between agro-dealers and Meteorological Department to facilitate agro-dealers' access to information on the rainfall forecasts for cropping seasons. Capacity of agro-dealers and other private sector partners will be built to understand the needs of women farmers and how to make their businesses more gender responsive.

The overall goal of the Agro-Source project is to improve the productivity of 30,000 smallholder women farmers in five (5) districts i.e. Garu, Tempene, Bawku West, Lambussie-Karni and Nandom in the Upper East and West regions of Ghana through increased availability, access and use of good quality agricultural inputs by 2020. The Agro-Source project is implemented by CARE Pathways team in partnership with a local NGO; Partnership for Rural Development Action (PRUDA) and in

collaboration with Northern Ghana Governance Activity (NGGA), Environmental Protection Agency (EPA), input dealers, seed producer companies, Ghana Seed Inspection Division (GSID), Department of Agriculture, Plant Protection and Regulatory Services Directorate (PPSRD) and Ghana Agriculture Input Dealers Association (GAIDA).

NGGA is a five (5) - year USAID-funded project, implemented by a consortium led by CARE International in 30 Metropolitan, Municipal and District Assemblies (MMDAs) in the 3 regions of northern Ghana. Other members of the consortium include Action Aid Ghana, SEND Ghana, and the West Africa Network for Peace-Building in Ghana (WANEP). The goal of NGGA is to ensure more responsive governance for improved agricultural development in Ghana. The Agro-source project will leverage on the work done by NGGA project in Bawku West and Nandom Districts to reach out to smallholder women farmers through the Women in Agriculture Platforms (WAPs) that were formed.

Partnership for Rural Development Action (PRUDA) as an implementing partner will mobilize communities for project activities. They will also engage in community level sensitizations and be fully in-charge of field activities in Lambussie-Karni and Nandom Districts.

Environmental Protection Agency (EPA) will also support the Agro-Source project in developing training manuals for the community level input dealers and facilitate capacity building sessions and registration of community level input dealers.

Plant Protection and Regulatory Services Directorate (PPSRD) will facilitate capacity building sessions on disease and pest control for both input dealers and seed growers and also support the registration of seed growers.

The District Department of Agriculture (DDA) will support in development of training manuals and facilitate capacity building of community input dealers on production protocols whiles GAIDA will provide a platform for the identification of major input dealers for linkage activities.

2.0 OBJECTIVES OF THE BASELINE STUDY

2.1 Main Objective

The baseline study was conducted to establish a benchmark against which to measure the progress and achievements of the project.

2.2 Specific Objectives

The baseline study therefore was to generate:

1. Information on the current status on the availability of quality agro-inputs in the target locations.
2. Information regarding smallholder women farmers' access to and utilization of agro-inputs to improve their productivity.

3.0 METHODOLOGY OF THE STUDY

3.1 Study Locations

The baseline study was conducted in five (5) project implementation districts from Upper West and Upper East regions of Ghana. Three (3) of the study districts were Pathways project districts which was implemented by CARE International in Ghana whilst the two (2) districts are new districts but with NGGA presence. The sampled districts and the sampled communities are presented in Table 1 and Figure 1.

Table 1: Sampled Districts for Baseline Study

Region	Upper East			Upper West	
Districts	Bawku West	Garu	Tempne	Nandom	Lambussie-Karni
Sampled Communities	Sapeliga	Menateng	Zamballa	Pataal	Ul Tampoie
	Anaego	Kpatua #2	Yabrago	Ko	Kpanagan
	Ankpaliga	Kariyata	Ankara-Teshie	Brutu	Buu
	Sapeliga-Kare Natinga	Bulpielsi	Kolsabiliga	Gaamo Yiri	Billaw

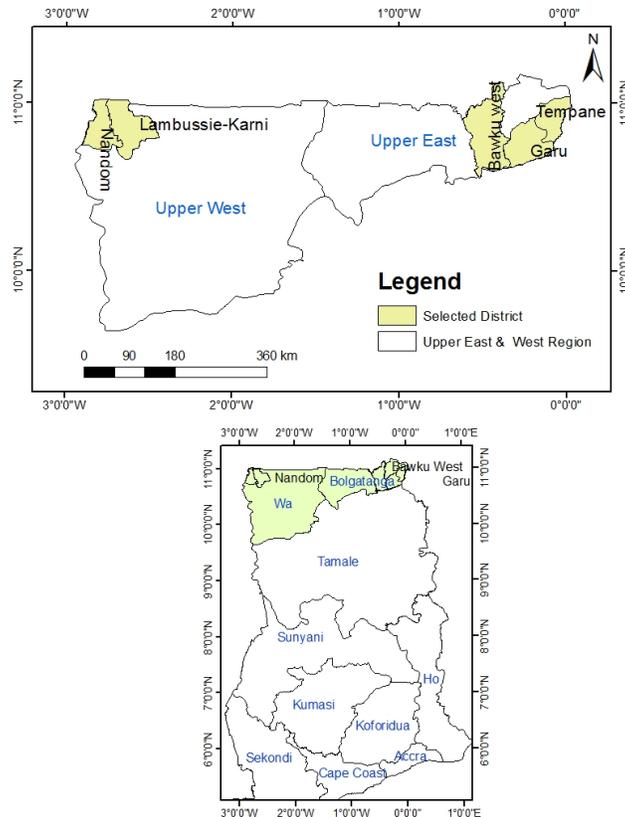


Figure 1: Project Implementation Districts of the Agro-Source Project

The Pathways project districts were Garu and Tempene in the Upper East region and Lambussie-Karni in the Upper West region. The selected NGGA districts were Bawku West and Nandom in the Upper East and Upper West regions respectively.

3.2 Sampling Method

The baseline study adopted a three-stage random sampling technique in selecting the districts, communities and households.

In the first stage, all the five (5) Agro-Source project districts were selected followed by sampling of communities in the second stage and finally the sampling of households.

Four (4) communities were sampled from each district and a total of twenty (20) household respondents with fifteen (15) being women and five (5) men. A total of eighty (80) household respondents consisting of sixty (60) women and twenty (20) men were therefore selected and interviewed from each district. With a target of 30,000 smallholder women farmers, a total of 400 households were therefore sampled using the Taro Yamene's method presented below:

$$n = \frac{N}{1 + N(e)^2} = \frac{30,000}{[1 + 30,000(0.05)^2]} = 399.98 \cong 400 \text{ household}$$

Where;

- N = 30,000 is the sampling frame
- n = is the sample size
- e = is the margin of error ($\pm 5\%$)

3.3 Methods of Data Collection

The study employed mixed method approach in field data collection. This involved quantitative data collection through the use of household surveys for sampled participants and qualitative data among stakeholders in the agro-input value chain through;

- In-depth Focus Group Discussions (FGDs)
- Key Informant Interviews (KII).

Focus Group Discussions (FGDs) were conducted for groups of between 9 to 12 persons (women) in each of the communities whilst Key Informant Interviews (KIIs) were conducted for Agro-Input dealers, Seed producers/out-growers, EPA, PRUDA, NGGA, GSID, DDA, PPRSD and GAIDA, etc.

Five (5) seed producers (Table 2) and 22 agro-input dealers (10 in Upper East region and 12 in Upper West region) as presented in Table 3 were also interviewed as Key Informants.

Table 2: Seed Companies Interviewed

REDACTED FOR PRIVACY

Table 3: Agro-Input Dealers Interviewed in Upper East and West Regions

Region	District	Name of Community	Name of Company	Years of Business Experience
Upper East	Tempene	Basyonde	Ali Karim Ayimanga Enterprise	16
	Tempene	Basyonde	Tahiru Issah Enterprise	9
	Garu	Garu	Asonkpat Enterprise	13
	Garu	Garu	Grande Enterprise	16
	Garu	Garu	T9 Ventures	10
	Garu	Garu	Yaalah Enterprise	-
	Bawku West	Zebilla	Abare's Enterprise	19
	Bawku West	Zebilla	Abdala First Enterprise	8
	Bawku West	Sapelliga	Ayeltokolog Enterprise	2
Upper West	Bawku West	Zebilla	Salamatu Sani Enterprise	9
	Nandom	Nandom	Tieme Ndo	2
	Nandom	Nandom	Luke Yaasan	9
	Nandom	Nandom	Mahmud Mashud Ventures	16
	Nandom	Nandom	Maalyel Enterprise	2
	Nandom	Ko	Kyolusanyuur Enterprise	5
	Nandom	Ko	Eric Maaboryele Enterprise	4
	Nandom	Brutu	Gegera So Tuo	3
	Lambussie	Billaw	Lawrance Bayuo Enterprise	6
	Lambussie	Ul-Tampoe	Saana Musah Enterprise	-
	Lambussie	Kpanagan	Yiire Emma Enterprise	4
	Lambussie	Lambussie	Anady Enterprise	2
Lambussie	Lambussie	Big Joe Agro-Chemical Enterprise	8	

The study also drew information from secondary data sources including the project proposal, Pathways' Project annual and evaluation reports, etc. whilst primary data was collected to include both qualitative and quantitative data.

3.4 Data Analysis

The primary quantitative data was cleaned, processed and analyzed by considering gender disaggregation using SPSS Version 24 and the results presented in the form of charts/graphs and tables.

Also, the qualitative data provided insights for a better understanding and interpretation of the quantitative data and the identification of issues around gender and power or decision making at the household level and how these factors affect resource poor women farmers and the key factors critical to the success of the Agro-Source project.

4.0 FIELD FINDINGS AND DISCUSSIONS

4.1 Demographic Profile and Respondent Characteristics

4.1.1 Household Characteristics of Respondents

In the Upper East Region, the households in the various districts had 1 to 6 males with an average of 4 males whilst females were 1 to 4 with an average size of 3 females. A typical household size in the Upper East region was noted as 6. In the Upper West region, the number of males in a household was between 1 to 8 with an average of 5 whilst the females were between 1 to 6 with an average of 4 females. Household size in the two (2) districts of the Upper West region was noted as 7. According to the Northern Ghana Human Development Report (2018), The Upper East and Upper West Regions have 5.9 and 6.3 persons as average household sizes¹. The GLSS 6 in 2014 however reported average household sizes as 5.5 for Upper West and 4.5 for Upper East Region².

The ages of the respondent farmers were noted as ranging from 21 to 90 years for both the Upper East and Upper West regions with an average age of 48 years.

Majority of the respondents in the survey districts were polygamously married in the Upper East region and this may be influenced by the traditional and religious beliefs (Islamic and Traditional religions) of the indigenes whilst in the Upper West region (predominantly Christian religion), respondents were noted to be more monogamously married.

Also, it was observed that, there were more widows in the two (2) districts of the Upper West region compared to that of the Upper East region. The details on the marital status of respondent farmers is presented in Table 4.

Table 4: Marital Status of Respondent Farmers

Region	Districts	Sex of Respondent	Marital Status				
			Single (%)	Monogamously Married (%)	Polygamously Married (%)	Widowed (%)	Divorced (%)
Upper East	Garu	Male	4	36	60	0	0
	Tempene		4	40	49	8	0
	Bawku West		4	57	34	6	0
Upper West	Lambussie-Karni		0	71	23	6	0
	Nandom		0	95	5	0	0
Upper East	Garu		Female	0	42	15	42
	Tempene	4		48	19	30	0
	Bawku West	4		12	54	31	0
Upper West	Lambussie-Karni	0		27	33	40	0
	Nandom	0		33	0	60	7

Formal education plays a key role in the adoption of technologies, improvement of productivity and also reducing the environmental consequence of the activities of farmers. The survey results in the two (2) regions indicate that a total of 63 % males and 73 % females had no formal education. Only 15 % males and 12 % females indicated they had received education at the primary level. Out of the

¹ Northern Ghana Human Development Report (2018), Bridging the Poverty Gap and Fostering Socio-Economic Transformation to Contribute to Human Development for All.

² Ghana Living Standards Survey Round 6 (GLSS 6). Main Report 2014. Ghana Statistical Service

total respondents, male farmers who did not receive formal education in the three (3) districts in the Upper East region were 67 % whilst the Upper West region it was 57 %. 80 % female farmers in the Upper East region and 63 % in the Upper West region did not receive any formal education as can be seen in Table 5. The effect of education especially on female resource poor farmers on their resource utilization and skills capacity to productivity may be linearly related and therefore the need to improve upon the education of farmers on crop production practices as well as handling and application of agro-chemicals. The Northern Ghana Human Development Report (2018) noted that education is a key for breaking the intergenerational cycle of poverty and the quality of education, not just enrolment, is critical for improved human development outcomes and socio-economic transformation in the Northern Savana Ecological Zone (NSEZ).³

Table 5: Highest Level of Education of Respondent Farmers

Region	District	Sex of Respondent	Level of Education					
			Primary (%)	JHS (%)	SHS/Technical/Vocational (%)	Tertiary (%)	Arabic (%)	None (%)
Upper East	Garu	Male	19	2	4	6	0	68
	Tempne		9	4	15	2	4	66
	Bawku West		15	4	8	6	0	68
Upper West	Lambussie-Karni		19	8	10	6	0	58
	Nandom		11	9	15	9	0	56
Upper East	Garu		Female	9	3	3	0	3
	Tempne	0		7	0	0	0	93
	Bawku West	27		0	8	0	0	65
Upper West	Lambussie-Karni	13		7	7	0	0	73
	Nandom	13		33	0	0	0	53

It was also observed that 89 % of the male respondents in the Upper East region and 87 % in the Upper West region have farming as their only occupation with 38 % and 47 % female respondent farmers in the Upper East and Upper West regions respectively indicating same. Within the primary sector in the Northern Savana Ecological Zone (NSEZ), the NGHDR (2018) reported that majority of households were found to be focused on crop farming and the zone produces cereals, roots and tubers and legumes but dominates in the production of rice, maize, cowpea, groundnuts and yam.⁴ The other categories/minor occupations in the survey communities aside farming for respondents were; business e.g. butcher, caterer, etc (2 % males and 20 % females), local artisanal works e.g. seamstress, carpentry, masonry, etc (2 % males and 3 % females), agribusiness activities (0 % males and 11 % females), teaching (4 % males and 2 % females) and petty trading (3 % males and 23 % females). Table 6 presents the occupations of respondents in the two (2) regions.

³Northern Ghana Human Development Report (2018), Bridging the Poverty Gap and Fostering Socio-Economic Transformation to Contribute to Human Development for All.

⁴ Northern Ghana Human Development Report (2018), Bridging the Poverty Gap and Fostering Socio-Economic Transformation to Contribute to Human Development for All.

Table 6: Occupations of Respondents

Region	District	Sex of Respondent	Major Occupation	Minor Occupations				
			Farmer (%)	Business e.g. butcher, caterer (%)	Local Artisan e.g. mason, carpenter, seamstress (%)	Agri-business (%)	Teacher (%)	Petty Trading (%)
Upper East	Garu	Male	89	1	0	0	5	5
	Tempane		92	2	2	0	0	4
	Bawku West		86	2	0	0	6	6
Upper West	Lambussie-Karni		86	8	0	0	4	2
	Nandom		88	0	8	0	4	0
Upper East	Garu		Female	58	12	3	3	0
	Tempane	42		31	4	4	0	19
	Bawku West	13		25	0	0	0	63
Upper West	Lambussie-Karni	57		21	7	14	0	0
	Nandom	36		9	0	36	9	9

4.1.2 Crops Cultivated

64 % (63 % males and 37 % females) of the farmers in the Upper East region cultivated cereals with 36 % (81 % males and 19 % females) in Upper West region cultivating same. Table 7 presents information on crop cultivation of four (4) cereal crops in the two (2) survey regions.

Table 7: Cultivation of Cereals in Survey Regions

Region	District	Number of Respondents	Cereal Crops Cultivated/Gender							
			Maize		Rice		Millet		Sorghum	
			Male (%)	Female (%)	Male (%)	Female (%)	Male (%)	Female (%)	Male (%)	Female (%)
Upper East	Garu	153	25	18	17	9	17	10	3	1
	Tempane	167	27	15	27	14	10	7	0	0
	Bawku West	150	29	13	26	15	9	7	0	1
Upper West	Lambussie-Karni	130	38	11	17	6	19	3	5	1
	Nandom	132	41	10	6	4	22	4	13	1

Out of the total number of farmers interviewed in the two (2) regions on the cultivation of legumes and pulses (Table 8), 59 % (61 % males and 39 % females) were from the Upper East and 41 % (83 % males and 17 % females) from the Upper West regions.

Table 8: Legumes and Pulses Cultivated

Region	District	Total Number of Respondents	Legume Crops Cultivated/Gender									
			Bambara Beans		Common Beans		Cowpea		Soya		Groundnut	
			Male (%)	Female (%)	Male (%)	Female (%)	Male (%)	Female (%)	Male (%)	Female (%)	Male (%)	Female (%)
Upper East	Garu	106	13	11	7	7	4	2	28	20	2	7
	Tempene	89	6	2	2	6	6	1	49	26	1	1
	Bawku West	80	0	0	3	9	14	0	33	18	16	9
Upper West	Lambussie-Karni	138	8	0	9	1	12	3	19	7	33	9
	Nandom	57	11	2	9	2	12	0	12	0	42	11

Except in Garu (100 %) and Tempene (50 %) where female respondents indicated they cultivated Sweet Potato, Bawku West did not record the cultivation of the crop whilst in the Nandom and Lambussie-Karni districts only males (100 %) cultivated the crop (Figure 2).

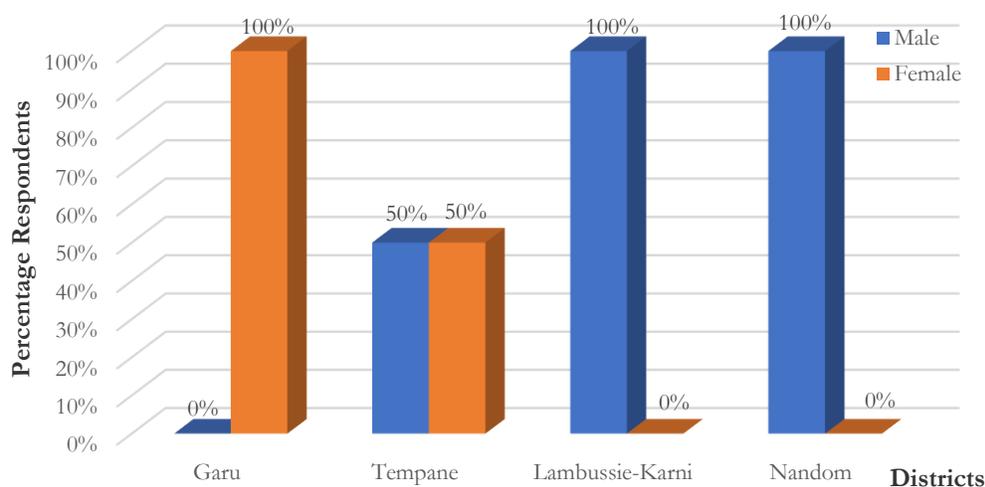


Figure 2: Sweet Potato Cultivation in Study Districts

For vegetable crop production as presented in Table 9, 90 % (32 % males and 68 % females) of the interviewed farmers cultivated vegetables in the Upper East and 10 % (60 % males and 40 % females) in the Upper West regions. It is clear from Table 9 that onion is predominantly cultivated in the Upper East region.

Table 9: Vegetable Crop Production in Study Districts

Region	District	Total Number of Respondents	Vegetable Crops Cultivated/Gender					
			Onion		Pepper		Tomato	
			Male (%)	Female (%)	Male (%)	Female (%)	Male (%)	Female (%)
Upper East	Garu	11	0	9	9	55	9	18
	Tempene	16	25	75	0	0	0	0
	Bawku West	26	35	31	8	4	12	12
Upper West	Lambussie-Karni	5	0	0	20	40	0	40
	Nandom	1	0	0	0	0	100	0

4.1.3 Access of Women to Land for Agricultural Production

In the Upper East region, 61 % of the respondent men indicated that women have access to land for agricultural production activities whilst in the Upper West region it was 60 %. However, according to the women themselves, 66 % in the Upper East region indicated that they do not have access to land for agricultural production purposes with 37 % in the Upper West indicating same. This indicates that access to production land in the Upper East region is more challenging than in the Upper West region. In the Northern, Upper East and Upper West regions and parts of northern Volta, societal rules and practices that regulate access to use of, and rights in land effectively discriminate against women. A woman's access to land is tied to that of her husband. Landed property is inherited by men through the patrilineal system and wives and daughters do not inherit landed property (Djokoto & Opoku, 2010; Kotey, 1995).⁵

The reasons that limit women access' to land were noted as mainly cultural i.e. women do not own lands. Settler farmers were also noted to have limited access to land. Where allocations were made to women for agricultural purposes, the land may be a hard pan area, water logging or largely with fertility level as presented in Table 10.

Table 10: Fertility of Land Allocation by Gender

Region	District	Fertility Status of Land Allocated to Women									
		% Males					% Females				
		Very Fertile	Fertile	Somewhat Fertile	Less Fertile	Not Fertile	Very Fertile	Fertile	Somewhat Fertile	Less Fertile	Not Fertile
Upper East	Garu	0	29	46	20	6	6	35	6	47	6
	Tempene	0	17	33	38	13	0	0	0	100	0
	Bawku West	3	70	18	6	3	10	40	0	50	0
	Average	1	38	32	21	7	5	25	2	66	2
Upper West	Lambussie-Karni	13	51	33	3	0	15	77	8	0	0
	Nandom	12	48	36	0	4	50	50	0	0	0
	Average	12	50	35	1	2	33	63	4	0	0

⁵ Djokoto, G., and Opoku, K. (2010). *Land Tenure in Ghana: Making a Case for Incorporation of Customary Law in Land Administration and Areas of Intervention by the Growing Forest Partnership*, International Union for the Conservation of Nature and Growing Forest Partnership.

Kotey, N. A. (1995). Land and tree tenure and rural development forestry in Northern Ghana *University of Ghana Law Journal*, 102-132.

To improve access to lands with good production characteristics such as high-level soil fertility, the following were suggested by the women respondents;

- education of chiefs, landlords/owners and men through community durbars and,
- increased access to credit to allow women rent fertile lands

Access to fertile and productive agricultural land was noted to be limited as lands are owned by families so its difficult accessing it for agricultural activities. This makes it very difficult for group members to access fertile and productive agricultural land and it was recommended that land owners should be able to release fertile and productive land especially for use by women farmers in the community.

It was also mentioned during the FGDs at Ankpaliga community in the Bawku West District by members of the Asungtaaba, Suguru and Noriyini VSLAs that culturally women do not own lands so the VSLA does not play a role in assisting in the area of accessing fertile/productive lands in the community. They also noted that some of them who are said to be migrants in this community do not own land and so makes access very difficult. Also, there is competitive needs in the area of land for other developmental projects. It was indicated that, members of the VSLA are able to hire lands especially in the Tilli community using VSLA funds or proceeds. This has made the cost of fertile land to go high and also difficult to access in the other communities.

It was suggested that an inter-community negotiation should take place on making available fertile lands to especially women and widows.

4.1.4 Tillage Methods

The tillage methods that are adopted in the preparation of lands in the various communities of the survey importantly impact on the productivity of crops but largely depend on the availability of resources. In all the districts, bullock/donkey ploughing, use of tractor, zero tillage and hand hoeing were commonly used. It was however noted that in the Upper East region, bullock/donkey ploughing was predominant at 85 % for males and 93 % for females as the level of usage. The low cost and accessibility of animal traction in the Upper East cannot however be discounted as this is widespread in the region and thus contributing to high level of usage.

In the Upper West region however, the use of tractor was common to both males and females at 63 % and 47 % respectively. The high cost and limited access associated with the use of tractor for tillage were noted to greatly impact on level of land cultivation. Table 11 presents the various methods of land preparation and their level of usage in the various districts.

Table 11: Methods of Land Preparation and Level of Usage

Region	District	Method of Land Preparation/Gender							
		% Males				% Females			
		Bullock/Donkey Ploughing	Zero Tillage	Use of Tractor	Other e.g. hand hoeing	Bullock/Donkey Ploughing	Zero Tillage	Use of Tractor	Other e.g. hand hoeing
Upper East	Garu	98	0	2	0	88	0	6	6
	Tempane	100	0	0	0	100	0	0	0
	Bawku West	58	4	28	9	92	0	4	4
	Average	85	1	10	3	93	0	3	3
Upper West	Lambussie-Karni	13	4	75	8	40	7	40	13
	Nandom	5	0	51	44	13	0	53	33
	Average	9	2	63	26	27	3	47	23

4.1.5 Farm Plot Characteristics, Crops Grown, and Yield

The survey results indicate that there are no crops classified as a preserve of males or females except to a limited extent some vegetable crops which are mostly cultivated by females than males in the survey communities. Soya bean, maize, rice and millet were however seen to be widely cultivated by both males and females in both regions and these were seen to be more of cash crops than food crops even though a higher proportion is consumed by members of the households.

The cultivation of these crops was seen to be on a limited small scale or at the peasant farmer level normally on an average land size of 2.5 acres.

Table 12 presents the average land area of the cultivated crops and crop yield based on farmers assessment. It is very clear from the yield data from farmers own assessment that very low yields were recorded compared to the expected optimum yields. Farmers assessment of crop outputs over the past five (5) years is presented in Table 13 whilst the causes of these low yields as noted by farmers are presented in Table 14.

Table 12: Crops Cultivated, Area and Average Yield Per Acre

Crop	Average Land Area Cultivated (Acres)	Average Yield (No. of 100 Kg Bags)/Acre
Maize	5	13.5
Rice	4	5.5
Millet	5	3.0
Sorghum	1.1	9.5
Bambara Beans	1.8	0.9
Groundnut	10	2.3
Cowpea	3	1.6
Common Beans	1.5	2.0
Tomato	0.8	17.2
Onion	1.6	12.13
Pepper	0.6	5.5
Sweet Potato	0.8	3.9

In the Upper East region, notable factors that cause low crop yield include; no/poor rainfall (19 %), no fertilizer (15 %), floods/disaster (12 %), increase pests/diseases (10 %), no inputs/tools and decreasing soil fertility (9 %), etc. In the Upper West region; no/poor rainfall (25 %), decreasing soil fertility (18 %), cultivation of less area (14 %), no fertilizer and less labour at 9 % each amongst others are indicated as contributing greatly to decreased crop yields.

Table 13: Farmer Assessment of Crop Output Over Past 5 Years

Region	Rice	Farmers Assessment of Crop Output											
		Increased	No change	Decreased	Increased	No change	Decreased	Increased	No change	Decreased	Increased	No change	Decreased
		Maize			Millet			Rice			Sorghum		
Upper East	Garu	26 (40 %)	16 (25 %)	23 (35 %)	11 (46 %)	0 (0 %)	13 (54 %)	17 (65 %)	9 (35 %)	0 (0 %)	4 (100%)	0 (0 %)	0 (0 %)
	Tempone	43 (60 %)	14 (19 %)	15 (21 %)	7 (44 %)	0 (0 %)	9 (56 %)	36 (65 %)	19 (35 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)
	Bawku West	35 (54 %)	18 (28 %)	12 (18 %)	3 (38 %)	0 (0 %)	5 (63 %)	28 (58 %)	20 (42 %)	0 (0 %)	0 (0 %)	1 (100 %)	0 (0 %)
Upper East	Lambussie-Karni	24 (35 %)	22 (32 %)	22 (32 %)	8 (53 %)	0 (0 %)	7 (47 %)	5 (26 %)	14 (74 %)	0 (0 %)	1 (33 %)	2 (67 %)	0 (0 %)
	Nandom	24 (36 %)	22 (33 %)	20 (30 %)	10 (53 %)	0 (0 %)	9 (47 %)	1 (50 %)	1 (50 %)	0 (0 %)	7 (64 %)	4 (36 %)	0 (0 %)
		Soya Bean			Cowpea			Common Beans			Groundnut		
Upper East	Garu	14 (29 %)	14 (29 %)	21 (43 %)	2 (67 %)	1 (33 %)	0 (0 %)	2 (29 %)	5 (71 %)	0 (0 %)	2 (33 %)	0 (0 %)	4 (67 %)
	Tempone	28 (42 %)	19 (28 %)	20 (30 %)	1 (33 %)	2 (67 %)	0 (0 %)	2 (67 %)	1 (33 %)	0 (0 %)	0 (0 %)	0 (0 %)	1 (100 %)
	Bawku West	17 (43 %)	15 (38 %)	8 (20 %)	2 (29 %)	5 (71 %)	0 (0 %)	3 (50 %)	3 (50 %)	0 (0 %)	7 (39 %)	11 (61 %)	0 (0 %)
Upper West	Lambussie-Karni	10 (29 %)	16 (46 %)	9 (26 %)	2 (14 %)	12 (86 %)	0 (0 %)	2 (20 %)	8 (80 %)	0 (0 %)	17 (31 %)	24 (44 %)	14 (25 %)
	Nandom	1 (14 %)	5 (71 %)	1 (14 %)	1 (13 %)	7 (88 %)	0 (0 %)	0 (0 %)	3 (100 %)	0 (0 %)	8 (33 %)	11 (46 %)	5 (21 %)
		Onion			Pepper			Tomato			Bambara Beans		
Upper East	Garu	1 (100 %)	0 (0 %)	0 (0 %)	3 (60 %)	2 (40 %)	0 (0 %)	3 (100 %)	0 (0 %)	0 (0 %)	4 (24 %)	0 (0 %)	13 (76 %)
	Tempone	7 (58 %)	0 (0 %)	5 (42 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	2 (67 %)	0 (0 %)	1 (33 %)
	Bawku West	3 (33 %)	0 (0 %)	6 (67 %)	1 (100 %)	0 (0 %)	0 (0 %)	1 (25 %)	3 (75 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)
Upper West	Lambussie-Karni	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	1 (100 %)	0 (0 %)	1 (33 %)	2 (67 %)	0 (0 %)	2 (40 %)	0 (0 %)	3 (60 %)
	Nandom	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	2 (29 %)	0 (0 %)	5 (71 %)

Other notable causes of decrease in crop yield in the various districts and communities as noted included: limited land for cropping, late planting/cultivation due to limited access to inputs and variable rainfall, poor quality seeds, poor farm practices, high cost of inputs and poor soil fertility.

Table 14: Farmers Assessment of Causes of Decrease in Crop Yield

Causal Factors	% Respondent Assessment	
	Upper East	Upper West
Increased Pests/Diseases	10	7
No Inputs/Tools	9	3
Less Labour	6	9
No/Bad Rains	19	25
Floods/Disaster	12	3
Cultivated Less Land	5	14
Decreasing Soil Fertility	9	18
No Fertilizer	15	9
No Tractor Services	4	3
No Seeds	4	4
No Herbicides	7	5

Increasing yields of crops as per farmers assessment for the various cultivated crops were noted to be resulting from crop tolerance to drought and water logging conditions, early planting to avert future limited/poor rains, use of compost/manure, improved practices and fertilizers. The assessment of the factors contributing to increase in crop yield by the farmers is presented in Table 15 as percentage of farmer respondents.

Table 15: Factors Contributing to Increased Crop Yield

Factors	% Respondent Assessment	
	Upper East	Upper West
Fewer Pests and/or Diseases	6	10
Improved Tools (Farm Implements)	1	5
More Labour	5	9
Good Rains	20	27
No Floods/Disaster	2	5
Cultivated More Land	14	7
Increased Use of Fertilizers	6	4
Use of Pesticides	7	7
Improved Seeds	4	5
Use of improved Practices	13	6
Improved Irrigation	2	1
Improved Access to Extension Education	9	6
Use of Herbicides	8	4
Improved Soil Fertility	3	4

Labour on the farmlands is usually provided by the family of the farmer and involves largely the farmer, wife/husband and children of the working age.

4.2 Income Levels and Economic Status of Farmers

4.2.1 Sources of Income

In the Upper East region 64 % of the women and 44 % in the Upper West region have agricultural wage labour as their source of income. 8 % and 31 % men from the Upper East and Upper West regions respectively earn their income as agricultural wage labourers.

4.4 % (14) and 2.5 % (8) women in the Upper East and West regions respectively and 1.3 % (1) and 6.3 % (5) men respectively from Upper East and West regions also earn income in the form of non-agricultural wages.

For skilled labour as a source of income in the survey districts, 20 % (1) and 3.3 % (2) each of men and women respectively in the Bawku West and Lambussie-Karni districts was recorded whilst in the Nandom district 100 % (5) men sourced their income through skilled labour provision.

More women 86 % (138) in the Upper East region and 46.9 % (75) in the Upper West region were engaged in small businesses such as shop keeping to earn income.

It was only in Garu and Tempene districts that 2 (40 %) and 1 (20 %) men respectively were engaged in the production of handicrafts as a source of income. Also, 1 (20 %) man in the Nandom district was engaged in the handicrafts business as a source of non-agricultural income source.

5 % (8) and 8 % (13) of women in the Upper East and West regions respectively engage in firewood/charcoal sales as a source of income for the household. The effects of the activities in firewood cutting and charcoal production on the health of the producers as well as the environment e.g. loss of biodiversity, loss of carbon sinks resulting in increased levels of carbon dioxide, etc are known to negatively affect especially the local climatic conditions.

Charcoal production is noted as a means to diversify income; however, it is also a major challenge as a result of the indiscriminate felling of trees, including economic trees such as shea. Wood fuel accounts for about 70 % of total primary energy supply of Ghana, and 90 % is obtained directly from the natural forest (NGHDR, 2018).⁶

Also, Anang *et al.* (2011) reported that in the Gushegu District of the Northern Region, charcoal ranked as the second major occupation and source of income generation in the area and involved mostly women as producers.⁷

Domestic remittances were only recorded in the Upper West region districts where 1 (0.6 %) woman received her income from family relations in the Lambussie-Karni district whilst in the Nandom district, 2 (1.3 %) women received their income as remittance.

The NGHDR (2018) indicated that remittances typically contribute to consumption, but depending upon the amounts, it may also contribute to investment⁸.

Appendix A.1 presents the non-farm sources of income in the various districts of the survey.

⁶ Northern Ghana Human Development Report (2018), Bridging the Poverty Gap and Fostering Socio-Economic Transformation to Contribute to Human Development for All.

⁷ Anang, Benjamin Tetteh, Margaret Atosina Akuriba and Aaron Adongo Alerigesane (2011). "Charcoal Production in Gushegu District, Northern Region, Ghana: Lessons for Sustainable Forest Management" Anayah., and Kaluarachch (2009). <http://gw-africa.iwmi.org/Data/Sites/24/media/pdf/fieldreport-usu.pdf> 25.07.2014

⁸ Northern Ghana Human Development Report (2018), Bridging the Poverty Gap and Fostering Socio-Economic Transformation to Contribute to Human Development for All.

The sources of agricultural income were noted as crop sales, livestock and livestock products sale e.g. meat and milk, nursery products e.g. vegetables, fruits and seedling sales as well as persons who earn various incomes (agricultural and non-agricultural) are presented in Appendix A.2 whilst the lowest and highest amounts earned per month are presented in Appendix A.3.

The lowest amount earned as income per month was noted to be from small business (GHS 5.00 = USD \$ 0.94) whilst the highest was from the sale of livestock (GHS 2,000.00 = USD \$ 376). Crop sales which is predominant among farmers especially when surplus production was realised also recorded a lower amount of GHS 115.00 (USD \$ 21.62) per month but varied up to GHS 4,000.00 (USD \$ 752). The highest amount obtained under crop sales was however related to medium scale/large scale or commercial producers within the communities.

The number of months the income was generated for the various sources of income varied from 1 month to 12 months with some sources having a good spread throughout the year. Agricultural wage labour was noted to only be available for up to seven (7) months from the time of land preparation to harvest whilst non-agricultural wage labour had a spread up to 12 months. Even though many of the respondents were not engaged in skilled labour provision, the few respondents recorded a spread of income for all 12 months of the similar to formal sector employees. The income earned from small business activities was also noted to have a good spread across the months of the year. Appendix A.4 presents details of the number of months each type of income is earned in the various districts.

Depending on the source of income and the generators of the income, the decision on spending could be from men, women or both. It was however noted that, women could decide on what to expend their income on and therefore did not have decisions relating to expending their incomes handed-down to them by their male partners.

4.2.2 Farmer Access to Production Loans and Capital

Due to the requirements relating to access to credit such as collateral, it was realized during the FGDs that it is very difficult for VSLA members to access agricultural credit services and this has an effect on the level of production and the yield of the crops cultivated.

From Figure 3, it can be observed that over 90 % of the farmer respondents in the Upper East region were not able to access credit for their production activities whilst in the Upper West region up to 70 % of the respondent farmers did not have access to farm credit. It is clear that farmers in the Upper West region had better access to credit for their farming activities compared to those in the Upper East region.

The source of credit for most farmers as presented in Table 16 is VSLA as this has been shown to play a very important role in the activities of the farmers and the farmer groups at the community level. It is clear from Table 16 that all female respondents (100 %) in the Tempene district sourced their credit from VSLA's.

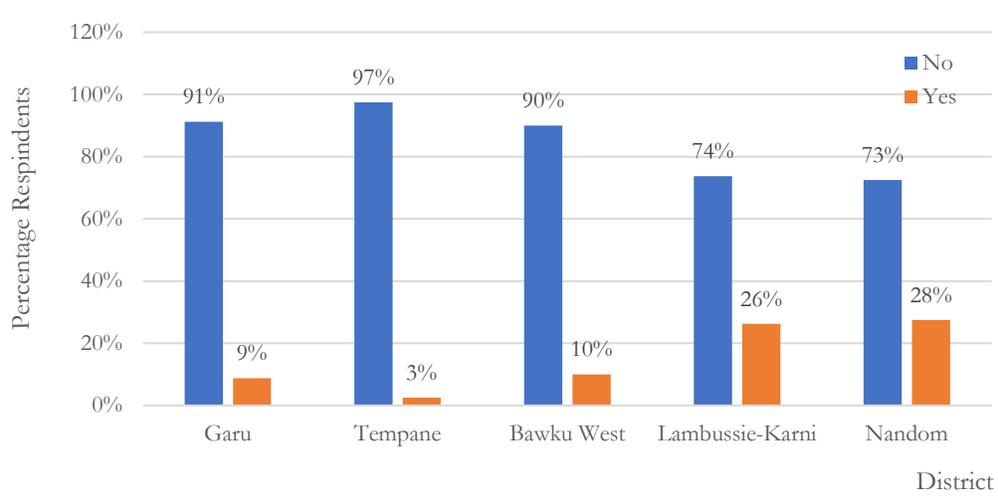


Figure 3: Access to Loans and Production Capital

Significantly observed was the non-availability of credit to 19 %, 20 % and 14 % female farmers in the Bawku West, Lambussie-Karni and Nandom districts. The formal banks did not play a significant role in the area of provision of credit to farmers except only 4 % male farmers from Tempane, Bawku West and Nandom districts who indicated that formal banks provided credit facility for their production activities.

Table 16: Source of Farmer Credit

Region	District	Sex of Respondent	Formal Bank (%)	Other NGO (%)	Family/Friend (%)	VSLA (%)	Other Sources (%)	No Credit (%)
Upper East	Garu	Male	0	0	2	83	2	13
	Tempane		4	0	0	92	0	4
	Bawku West		4	2	0	88	0	6
Upper West	Lambussie-Karni		0	0	0	67	2	31
	Nandom		4	2	2	64	0	28
Upper East	Garu		Female	0	0	0	94	3
	Tempane	0		0	0	100	0	0
	Bawku West	0		0	0	81	0	19
Upper West	Lambussie-Karni	0		0	0	80	0	20
	Nandom	0		0	0	86	0	14

The length of time before farmers could access loan facilities varied from 3 months to 36 months and this depended so much on the source and amount of credit/loan. Amounts that individuals accessed were indicated to vary from GHS 50.00 (USD \$ 9.4) to GHS 8,000.00 (USD \$ 1,509.4).

In the Upper East region, 42 % of the respondents used their credit for purchasing agro-inputs e.g. seeds, fertilizers, pesticides, etc, 24 % for small businesses, 21 % for home improvement and 13 % farm equipment. 34 % of the farmers in the Upper West region invested their credit in farm equipment, 27 % in business ventures, 21 % in agro-inputs e.g. seeds, fertilizers, pesticides, etc, and

17 % in home improvement activities. The investments/use of credit by farmers across the various districts is presented in Table 17.

Table 17: Uses of Credit/Loans by Farmers

Region	Districts	Farm Equipment (%)	Business (%)	Home Improvement (%)	Agro-inputs e.g. seeds, Fertilizers, Pesticides, Other Chemical Inputs (%)
Upper East	Garu	13	16	30	41
	Tempone	9	23	23	45
	Bawku West	17	35	11	37
Upper West	Lambussie-Karni	35	23	14	28
	Nandom	33	31	20	16

4.2.3 Farmer Assets in Survey Districts

54 % and 56 % of the male and female respondents respectively indicated that they own donkey or bullock trailers whilst 19 % males and 11 % females own spray pumps which are used for the application of agro-chemicals. In the Upper East region, 17 % of the males owned spray pumps with 21 % for the Upper West region whilst 14 % of the females in the Upper West region and 9 % in the Upper East Region own spray pumps. It is clear that ownership of spray pumps contributes tremendously to the proper use and application of agro-chemicals if farmers follow precautionary measures as indicated to safeguard human life and the environment whilst promoting increase productivity. Table 18 presents farmer production related assets for the Upper East and Upper West Districts of the survey.

Table 18: Farmer Production Assets in the Upper East and West Regions

Production Assets	Upper East			Upper West		Upper East			Upper West	
	Garu	Tempone	Bawku West	Lambussie-Karni	Nandom	Garu	Tempone	Bawku West	Lambussie-Karni	Nandom
	% Male					% Female				
Tractor	0	0	0	1	0	0	2	0	9	0
Plough Sets	10	6	1	5	1	9	14	16	6	5
Carts	8	9	12	7	5	5	4	9	6	0
Wheelbarrow	0	1	2	5	2	0	2	2	6	0
Spray Pumps	13	21	18	25	17	9	6	11	12	15
Diesel Pumps	0	2	1	0	0	0	0	0	0	0
Water Tanks	0	0	1	0	4	0	0	0	0	0
Beehives	0	1	0	0	0	0	0	0	0	0
Trailers	53	46	56	48	65	57	55	46	45	75
Grinders	0	0	0	0	0	0	2	0	0	0
Storage Facility	16	16	9	9	6	21	14	18	15	5

Household assets are also known to play a role in enhancing the quality of life of farmers in all the study districts and therefore the need to undertake a survey to ascertain the level to which some household assets are owned.

Mobile phone which promotes ease of communication and exchange of knowledge and agricultural information by farmers was noted as 18 % and 16 % for male respondent farmers in the Upper East and Upper West regions respectively but with the females being 16 % for the Upper East and 17 % for the Upper West regions. Also, radio and television which serve as a medium of communication

and the transmission/broadcast of improved agricultural technologies and production knowledge or messages to a larger farmer population were noted to also be owned by farmers as presented in Table 19. These serve as a suitable platform for the introduction and communication of improved farmer and scientific knowledge as well as updates especially weather and market information to support the activities of farmers.

Farmer mobility was noted to be facilitated by the use of bicycle and motor cycle as well as tricycles for the carting of goods especially farm produce and agro-inputs to-and-fro farms. 16 % and 17 % of male farmers in the Upper East and Upper West regions respectively owned bicycles with 16 % and 13 % females in the Upper East and Upper West regions respectively also owning a bicycle. The details of other means of transportation such as motor cycles and tricycles are presented in Table 19 which is a detail presentation of farmer household assets of the five (5) districts of the survey regions.

Table 19: Farmer Household Assets

Production Assets	Upper East			Upper West		Upper East			Upper West	
	Garu	Tempene	Bawku West	Lambussie-Karni	Nandom	Garu	Tempene	Bawku West	Lambussie-Karni	Nandom
	% Male					% Female				
Bicycle	16	17	16	16	17	20	15	12	11	14
Radio	12	13	11	6	7	10	13	9	5	4
Car Battery	0	0	0	0	0	0	0	1	0	0
TV	2	5	7	3	4	0	5	11	7	0
Mobile Phone	19	16	18	15	16	19	16	14	14	20
Solar Panel	0	0	0	1	0	0	1	0	1	2
Chair	13	10	8	11	11	9	8	9	9	9
Table	7	6	6	7	7	8	10	10	8	11
Bed	3	7	3	7	10	7	5	7	5	13
Mosquito Net	22	17	18	17	19	25	20	17	17	21
Motor Cycle	6	9	10	13	8	2	5	9	12	7
Tricycle	0	0	2	3	1	0	2	1	5	0
Grinding Mill	0	0	2	0	0	0	2	1	5	0

4.3 Food Security in Survey Districts

4.3.1 Food Security Indices

The survey recorded the availability of food throughout the year for all the districts to range from 53 % of the respondents in the Nandom district and up to 68 % respondents in Garu district in the Upper East region. Up to a maximum of 48 % of the respondents were noted to be food insecure in some of the communities of the survey districts. Figure 4 presents the responses in-terms of the availability of food at the household level for the past 12 months.

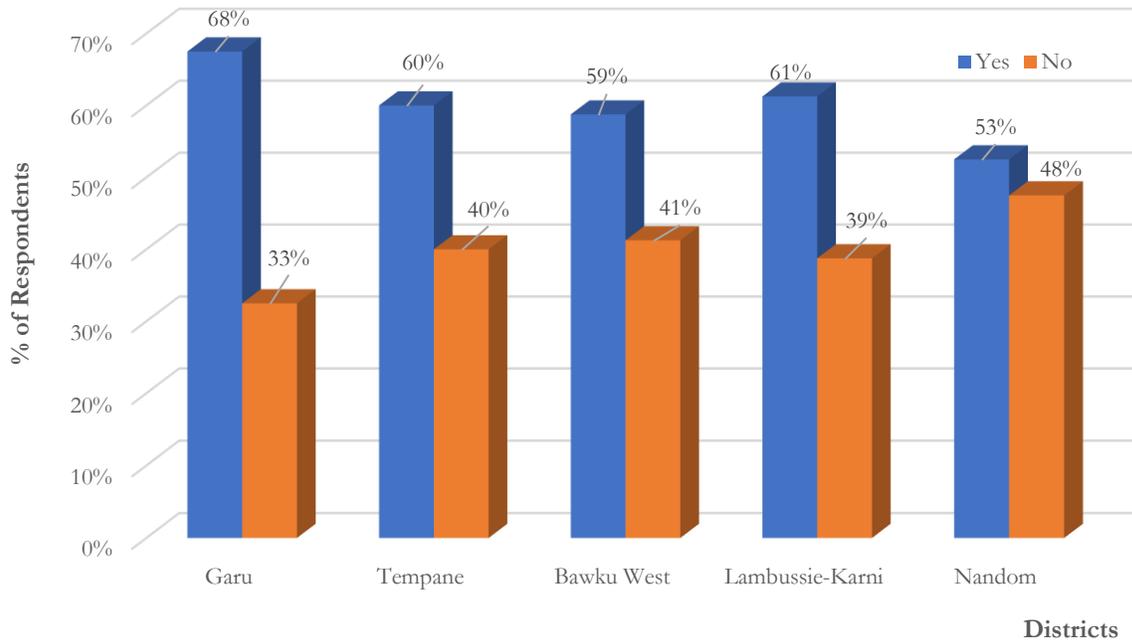


Figure 4: Availability of Food throughout the Year

4.3.2 Coping Strategies

The responses relating to the strategies adopted to cope with the unavailability of food at the household level for the past 12 months were noted to include: borrowing of food/money to buy food, reliance on less preferred or less expensive foods, reduced number of meals or quantity eaten per day, skipped meals due to lack of food for entire day or lack of money, consumption of taboo/wild/famine foods which are normally not eaten, restricted consumption of some family members so that others could eat normally or more, eating of seed stock held for next season or begged or scavenges. The coping strategies adopted and their frequency in the various districts are presented in Table 20.

Also, as presented in Appendix B.1, strategies used by households in the last 3 months to cope with food or income scarcity were noted to include: pledge or selling labour/crops/livestock in advance, dependence on remittances received from friends and relations, taking of loans with interest, slaughtering of more animals than usual, seeking assistance from local government authorities, lowering of children school attendance or dropping out to support household food issues, reduction

of expenditure, selling livestock, migration, unusual sales of animals and seed stock, etc. The level to which these coping strategies influenced food security are as in Appendix B.1 for the various districts.

Table 20: Main Household Coping Strategies During the Hunger Period

Region	District	Coping Strategy	Frequency of Use of Coping Strategy in Past 30 Days				
			Never	2 day each week	2-3 days each week	4-6 days each week	Daily
Upper East	Garu	Borrowed food or Borrowed Money to Buy Food	9 (17 %)	31 (57 %)	10 (19 %)	2 (4 %)	2 (4 %)
	Tempane		6 (13 %)	30 (63 %)	6 (13 %)	9 (0 %)	6 (13 %)
	Bawku West		7 (15 %)	28 (60 %)	6 (13 %)	2 (4 %)	4 (9 %)
Upper West	Lambussie-Karni		10 (20 %)	17 (35 %)	14 (29 %)	5 (10 %)	3 (6 %)
	Nandom		10 (24 %)	11 (26 %)	10 (24 %)	10 (24 %)	1 (2 %)
Upper East	Garu		Relied on Less Preferred or Less Expensive Foods	1 (2 %)	27 (50 %)	13 (24 %)	3 (6 %)
	Tempane	3 (6 %)		22 (46 %)	16 (33 %)	1 (2 %)	6 (13 %)
	Bawku West	4 (9 %)		22 (47 %)	12 (26 %)	4 (9 %)	5 (11 %)
Upper East	Lambussie-Karni	5 (10 %)		15 (31 %)	8 (16 %)	12 (25 %)	9 (18 %)
	Nandom	0 (0 %)		8 (19 %)	9 (21 %)	13 (31 %)	12 (29 %)
Upper East	Garu	Reduced Number of Meals or Quantity Eaten Per Day		0 (0 %)	24 (44 %)	16 (30 %)	3 (6 %)
	Tempane		1 (2 %)	25 (52 %)	7 (15 %)	3 (6 %)	12 (25 %)
	Bawku West		2 (4 %)	23 (49 %)	11 (23 %)	3 (6 %)	8 (17 %)
Upper West	Lambussie-Karni		2 (4 %)	13 (27 %)	12 (25 %)	11 (22 %)	11 (22 %)
	Nandom		0 (0 %)	7 (17 %)	10 (24 %)	12 (29 %)	13 (31 %)
Upper East	Garu		Skipped Meals Due to Lack of Food for Entire Day or Lack of Money	5 (9 %)	19 (35 %)	13 (24 %)	6 (11 %)
	Tempane	5 (10 %)		28 (58 %)	8 (17 %)	2 (4 %)	5 (10 %)
	Bawku West	13 (28 %)		14 (30 %)	7 (15 %)	5 (11 %)	8 (17 %)
Upper West	Lambussie-Karni	15 (31 %)		9 (18 %)	13 (27 %)	4 (8 %)	8 (16 %)
	Nandom	2 (5 %)		6 (14 %)	15 (36 %)	7 (17 %)	12 (29 %)
Upper East	Garu	Consumed taboo food, wild food, famine foods which are normally not eaten		37 (69 %)	10 (19 %)	4 (7 %)	1 (2 %)
	Tempane		29 (60 %)	12 (25 %)	5 (10 %)	0 (0 %)	2 (4 %)
	Bawku West		23 (49 %)	21 (45 %)	1 (2 %)	1 (2 %)	1 (2 %)
Upper West	Lambussie-Karni		43 (88 %)	5 (10 %)	0 (0 %)	0 (0 %)	1 (2 %)
	Nandom		41 (98 %)	0 (0 %)	0 (0 %)	1 (2 %)	0 (0 %)
Upper East	Garu		Restricted consumption of some family members so that others could eat normally or more	15 (28 %)	21 (39 %)	11 (20 %)	1 (2 %)
	Tempane	6 (13 %)		29 (60 %)	9 (19 %)	0 (0 %)	4 (8 %)
	Bawku West	10 (21 %)		21 (45 %)	9 (19 %)	1 (2 %)	6 (13 %)
Upper West	Lambussie-Karni	20 (41 %)		12 (24 %)	9 (18 %)	6 (12 %)	2 (4 %)
	Nandom	22 (52 %)		5 (12 %)	12 (29 %)	1 (2 %)	2 (5 %)
Upper East	Garu	Eat seed stock held for next season		15 (28 %)	14 (26 %)	11 (20 %)	5 (9 %)
	Tempane		15 (31 %)	19 (40 %)	6 (13 %)	1 (2 %)	7 (15 %)
	Bawku West		12 (26 %)	22 (47 %)	2 (4 %)	0 (0 %)	11 (23 %)
Upper West	Lambussie-Karni		19 (39 %)	6 (12 %)	6 (12 %)	5 (10 %)	13 (27 %)
	Nandom		22 (59 %)	4 (10 %)	2 (5 %)	2 (5 %)	12 (29 %)
Upper East	Garu		Beg or Scavenge	37 (69 %)	9 (17 %)	6 (11 %)	0 (0 %)
	Tempane	32 (67 %)		11 (23 %)	3 (6 %)	0 (0 %)	2 (4 %)
	Bawku West	40 (85 %)		5 (11 %)	0 (0 %)	1 (2 %)	1 (2 %)
Upper West	Lambussie-Karni	40 (82 %)		2 (4 %)	2 (4 %)	5 (10 %)	0 (0 %)
	Nandom	36 (86 %)		3 (7 %)	2 (5 %)	1 (2 %)	0 (0 %)

4.4 Increase Availability and Access to Good Quality Agricultural Inputs

4.4.1 Smallholder Farmers Access to Agri-Inputs

Group members during FGDs noted that it is difficult accessing agricultural inputs such as certified seeds, fertilizer, agro-chemicals, etc when needed during the farming season in their communities.

In the area of the satisfaction of farmers on inputs and services that are provided, Figure 5 presents the percentage of respondents for the various districts in the two (2) regions. Farmers in the Nandom (40 %) and Garu (21 %) districts were the highest in terms of respondents who were not satisfied with the inputs and services that are provided for their agricultural activities.

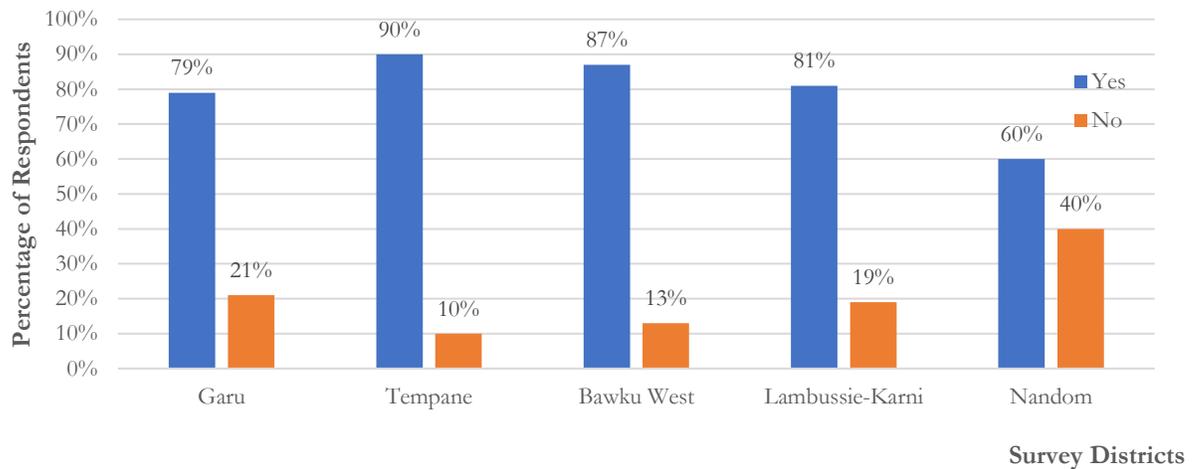


Figure 5: Farmers Satisfaction with Inputs/Services

Out of an average of 71 % satisfaction of farmers relating to access to agri-inputs in the Upper West region, an average of 51 % were women farmers. 85 % of the farmers in the Upper East region indicated their satisfaction in terms of access to agri-inputs with an average of 48 % being women in the three (3) districts. Details of satisfaction of access to agri-inputs according to gender is presented in Figure 6.

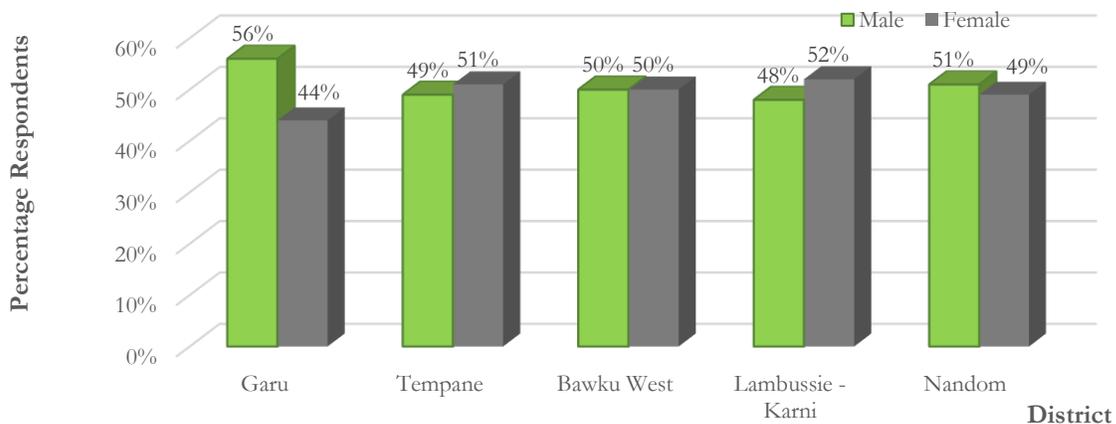


Figure 6: Farmers Satisfaction in Accessing Agro-Inputs by Gender

Good quality services as well as competitive prices were noted to contribute greatly to the satisfaction levels of farmers in the area of inputs and services that they are currently using whilst distance to source of input or service, price of inputs/service and lack of credit did not contribute much to the level of farmer satisfaction. Distance especially for respondent farmers in Lambussie-Karni district was largely noted as there are only few agri-input dealers in the district capital and no input dealers in the communities. The spread of agri-input dealers in the Upper East region was largely better than the Upper West region. The results on the assessment of the reasons for farmer satisfaction with inputs and services in their locality is presented in Table 21.

Table 21: Reasons for Farmer Satisfaction with Inputs/Services

Region	District	Prices (%)	Good Prices & Quality Services (%)	Good Quality Services (%)	Distance (%)	Credit Availability (%)
Upper East	Garu	9	40	49	0	2
	Tempane	0	30	70	0	0
	Bawku West	0	38	62	0	0
	Average Percent	3	36	60	0	1
Upper West	Lambussie-Karni	10	33	56	2	0
	Nandom	0	28	72	0	0
	Average Percent	5	31	64	1	0

19 % of the female respondents (17 % in the Upper East and 21 % in the Upper West regions) and 81 % of the male respondents (83 % in the Upper East and 79 % in the Upper West regions) as presented in Figure 7 and Table 22 indicates that they have knowledge on the proper use of agro-chemicals.

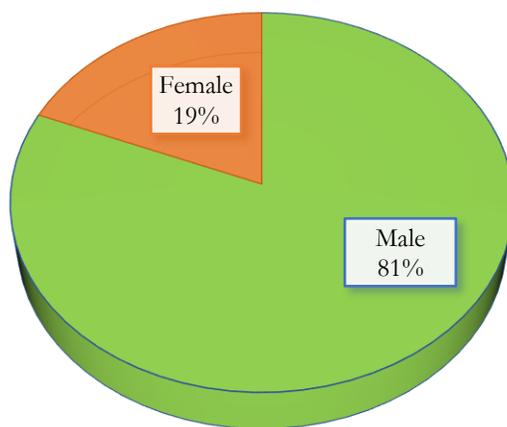


Figure 7: Knowledge on Proper Use of Agro-chemicals

It was also realized that 61 % and 78 % males in the Upper East and Upper West regions and 39 % and 22 % females in the Upper East and Upper West regions respectively had adequate knowledge and skills on the proper application of agro-chemicals.

Knowledge levels of women farmers on proper use of agro-chemicals was generally low compared to their male counterparts. 63 % and 84 % males in the Upper East and West regions and 37 % and 16

% females in the Upper East and West regions respectively indicated that inappropriate use/application of agro-chemicals have effects.

Table 22: Knowledge on Proper Use of Agro-Chemicals by District and Gender

Region	District	Knowledge on Proper Use of Agro-Chemicals		Adequacy of Knowledge and Skills		Effects of Inappropriate Use of Agro-Chemical	
		Male (%)	Female (%)	Male (%)	Female (%)	Male (%)	Female (%)
Upper East	Garu	84	16	58	42	59	41
	Tempene	89	11	62	38	65	35
	Bawku West	76	24	65	35	67	33
Upper West	Lambussie-Karni	82	18	65	35	73	27
	Nandom	76	24	90	10	94	6

In the Upper East and West regions, farmers in the survey districts used more inorganic fertilizer followed by herbicides. Table 23 presents the various agricultural services and the inputs that farmers use in their agricultural production activities. It was noted that farmers in the two (2) regions use less weather information for their production activities whilst there is limited access to the services of crop threshers.

Although the services and inputs as presented in Table 23 are available in the various districts, their level of availability and access is indicated by the percentage response on the level of usage.

Table 23: Level of Access/Usage of Agricultural Services and Inputs

Region	District	Herbicides	Certified Seeds	Own Seeds	Fertilizer	Extension Services	Weather	Threshing	Traction Services	Spraying
		% Respondents on Level of Usage								
Upper East	Garu	13	8	20	17	13	3	6	11	10
	Tempene	13	9	16	18	12	4	5	13	12
	Bawku West	15	9	16	17	8	4	5	13	13
	Average	14	9	17	17	11	4	5	12	12
Upper West	Lambussie-Karni	14	6	18	17	12	3	3	14	14
	Nandom	13	4	22	22	13	2	2	12	9
	Average	14	5	20	20	13	3	3	13	12

As presented in Table 24, 15 % of the respondents in the three (3) districts of the Upper East region did not access agricultural inputs in the last 12 months compared to 9 % of the respondents in the Upper West region. The level of access to agri-inputs relates well with the level of usage and its impact on productivity.

Table 24: Sources of Agri-Inputs

Region	Districts	Government Program (%)	Agro-dealer/Input Supplier within 5 km (%)	Agro-dealer/Input Supplier Farther than 5 km (%)	Local Seed Producer (%)	Agri-Input Fairs (%)	Did Not Access Inputs (%)
Upper East	Garu	4	8	24	33	4	20
	Tempene	6	7	40	20	8	17
	Bawku West	8	25	41	16	4	8
	Average	6	13	35	23	5	15
Upper West	Lambussie-Karni	2	11	38	29	3	16
	Nandom	1	11	74	11	0	1
	Average	2	11	56	20	2	9

Farmers on a regional average percentage basis sourced their agri-inputs from government program (6 %), agro-input dealers within 5 km distance (13 %), agro-input dealers farther than 5 km (35 %), local seed producers (23 %) and agri-input fairs (5 %) for the Upper East region. In the Upper West region, however the two (2) districts i.e. Lambussie-Karni and Nandom recorded 2 % access to inputs from government program, 11 % from agro-input dealers within 5 km distance, 56 % from agro-input dealers farther than 5 km, 20 % from local seed producers and 2 % from agri-input fairs. As presented in Table 25, 62 % of the farmers who access inputs within 5 km of travel distance were males in the Upper East region whilst 38 % are females. In the Upper West region 77 % males and 23 % females accessed inputs within a travel distance of 5 km. In the case of accessing agro-inputs for distances farther than 5 km, 59 % males and 41 % females indicated this in the Upper East region whilst 85 % males and 15 % females in the Upper West region. The reason is the absence of agro-input dealers in the communities of the farmers as can be seen in Table 25.

Table 25: Distance Travelled by Farmers to Access Agri-Inputs

Region	District	Distance Travelled by Farmers			
		Within 5 km		Farther than 5 km	
		Male (%)	Female (%)	Male (%)	Female (%)
Upper East	Garu	54	46	60	40
	Tempene	58	42	72	28
	Bawku West	74	26	44	56
	Average	62	38	59	41
Upper West	Lambussie-Karni	75	25	80	20
	Nandom	78	22	90	10
	Average	77	23	85	15

In the past 12 months, farmers acquired their agri-inputs commonly by buying individually from the local markets or input dealers. It was however noted that some farmers acquired their inputs through farmer or producer groups, middlemen on from agreed contract terms with formal sector dealers in their locality. Figure 8 presents the methods used by farmers in the of acquisition of agri-inputs in the various districts.

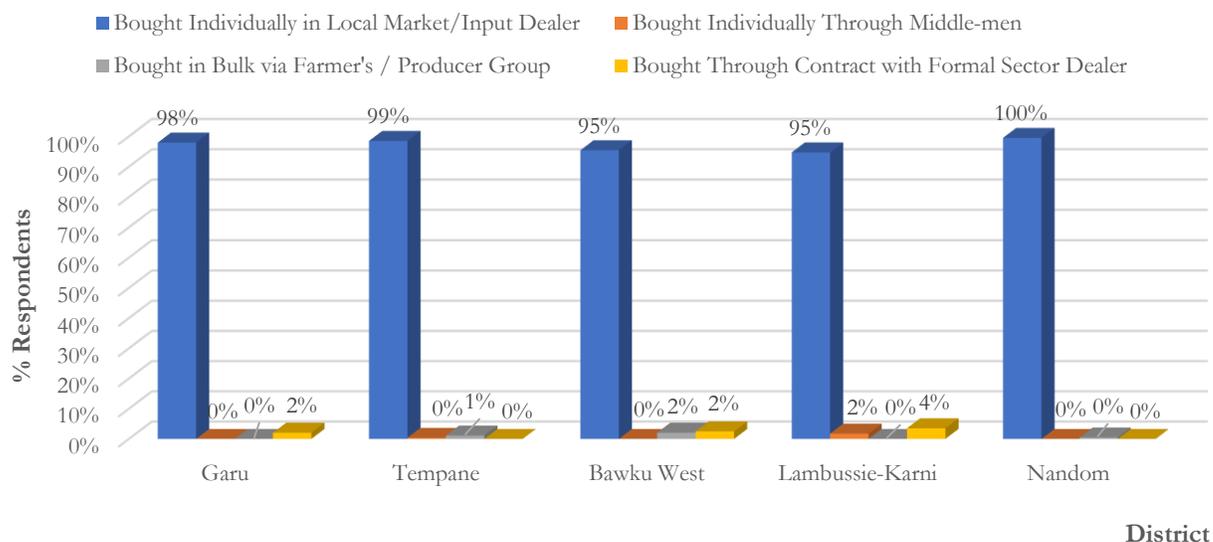


Figure 8: Method of Acquisition of Agri-Inputs

It was very clear that farmers spend more time and resources in accessing agricultural inputs as 59 % men in the Upper East and 85 % men in the Upper West regions as well as 41 % women in the Upper East and 15 % women in the Upper West regions travel more than 5 km in search of agri-inputs. This will have an effect on the limited resources as well as time which could have been used for engagement in other productive activities. The main problem relating to access to agri-inputs is the absence of agricultural input dealers or outlets in most communities at the time of the baseline survey.

Farmers in the Upper East region indicated that they do not obtain information on agricultural input dealers from the use of cell phones or SMS updates and also from collectors or traders (middlemen) as this was noted at 2 % and 1 % for both cell phone or SMS update as well as collectors or traders of commodities i.e. middlemen respectively in the Upper West region.

In the Upper East region, VSLA groups (26 %), family and friends (23 %), and NGOs (18 %) and Upper West region VSLA (30 %), family and friends (24 %) and NGOs (17 %) provided most of the information on agricultural inputs. Table 26 presents the details of the field survey on the sources of information for farmers in the area of the activities of agri-input dealers or services as well as their vendors.

Table 26: Source of Information on Activities/Services of Agri-input Dealers and Vendors

Region	District	Agriculture Input Fairs (%)	Radio (%)	Family & Friends (%)	VSLA (%)	Cell Phone/SMS Update (%)	Television (%)	Government Extension Agents (%)	Collectors/Traders i.e. Middlemen (%)	Other Input Suppliers/ Agro-dealers/ Vendors (%)	NGOs (%)
Upper East	Garu	6	17	22	24	0	0	9	0	3	18
	Tempne	3	16	21	28	0	1	9	0	2	19
	Bawku West	3	11	25	27	0	1	11	0	4	18
	Average	4	15	23	26	0	1	10	0	3	18
Upper West	Lambussie-Karni	5	6	22	28	2	1	12	1	6	17
	Nandom	1	3	26	31	0	0	15	0	7	16
	Average	3	5	24	30	1	1	14	1	7	17

4.4.2 Level of Agro-Input Use

Herbicides or weedicides which were purchased by farmers were either used before ploughing as in the case of zero tillage or as a pre/post-emergence herbicide and thus controlling weeds in crop lands. The level of use of herbicides in this regard for the various crops cultivated in the five (5) survey districts is presented in Table 27.

Table 27: Use of Herbicides for Weed Control During the Crop Growing Stage/Before Ploughing

Region	District	Soya Bean	Groundnut	Maize	Rice	Cowpea	Tomato	Common Beans	Sweet Potato	Onion	Pepper	Millet	Sorghum	Bambara Beans
		% of Respondents												
Upper East	Garu	70	44	71	70	83	67	100	0	100	80	60	20	36
	Tempane	65	50	73	75	67	0	86	0	89	0	55	0	71
	Bawku West	52	65	78	84	91	100	100	94	100	59	0	0	0
Upper West	Lambussie-Karni	74	52	64	66	61	33	75	100	0	50	55	89	38
	Nandom	43	42	61	54	25	0	100	100	0	0	43	38	38

The availability of these pre- and post-emergence herbicides and whether farmers could buy more for use and the level of easiness in accessing and purchase of these herbicides are presented in Tables 28 and 29 respectively.

Table 28: Knowledge of Farmers on availability of Weedicides/Herbicides

Region	District	Soya Bean	Groundnut	Maize	Rice	Cowpea	Tomato	Common Beans	Sweet Potato	Onion	Pepper	Millet	Bambara Beans
		% Respondents											
Upper East	Garu	66	56	74	70	100	67	100	0	100	80	60	64
	Tempane	72	100	79	75	83	0	100	100	83	0	0	86
	Bawku West	62	70	78	65	100	100	75	0	94	50	0	0
	Average	67	75	77	70	94	56	92	33	92	43	20	50
Upper West	Lambussie-Karni	82	61	72	75	65	33	75	100	0	50	89	62
	Nandom	57	61	60	54	38	0	100	50	0	0	44	8
	Average	69	61	66	64	51	17	88	75	0	25	66	35

Table 29: Ease of Purchase of Weedicides/Herbicides

Region	District	Easy (%)	Somehow Easy (%)	Difficult (%)	Easy (%)	Somehow Easy (%)	Difficult (%)	Easy (%)	Somehow Easy (%)	Difficult (%)
		Soya Bean				Groundnut			Maize	
Upper East	Garu	64	12	24	56	11	33	70	8	23
	Tempene	75	9	16	100	0	0	80	9	12
	Bawku West	64	14	21	75	5	20	76	16	8
Upper West	Lambussie-Karni	68	21	11	59	22	19	59	22	19
	Nandom	29	43	29	48	16	35	38	31	31
		Cowpea			Tomato			Common Beans		
Upper East	Garu	67	33	0	67	33	0	91	9	0
	Tempene	83	17	0	0	0	0	100	0	0
	Bawku West	82	18	0	100	0	0	88	0	13
Upper West	Lambussie-Karni	48	35	17	33	33	33	67	25	8
	Nandom	13	50	38	0	100	0	83	0	17
		Sweet Potato			Onion			Pepper		
Upper East	Garu	100	0	0	100	0	0	100	0	0
	Tempene	100	0	0	94	0	6	0	0	0
	Bawku West	0	0	0	76	18	6	100	0	0
Upper West	Lambussie-Karni	100	0	0	0	0	0	50	25	25
	Nandom	50	0	50	0	0	0	0	0	0
		Millet			Sorghum			Bambara Beans		
Upper East	Garu	71	17	12	60	20	20	68	14	18
	Tempene	76	7	17	0	0	0	86	0	14
	Bawku West	82	5	14	0	0	100	0	0	0
Upper West	Lambussie-Karni	42	30	27	33	56	11	69	8	23
	Nandom	31	26	43	25	56	19	0	8	92

67 % of the farmers indicated that they were taught the proper use/application of weedicides/herbicides in the cultivation of crops in the Upper East region whilst 51 % of the respondent farmers in the Upper West region mentioned same. Table 30 presents the percentage respondents for the various crops and the level of education received across the survey districts.

Table 30: Farmer Education on Proper Application of Weedicides/Herbicides

Region	District	% Farmer Respondents
Upper East	Garu	71
	Tempene	53
	Bawku West	61
	Average	62
Upper West	Lambussie-Karni	60
	Nandom	42
	Average	51

In the Upper East region, for nine (9) crops (Table 31), 69 % of the farmers indicated that they use inorganic fertilizer for soil improvement in their croplands whilst it was 42 % of the farmers in the Upper West region. Details on the level of use/application of inorganic fertilizer in the various crop fields is presented in Table 31. The NGHDR (2018) noted that farmers need guidance on much more

targeted use of improved seeds and fertilizers in line with the specific soil and nutrient quality of their land (NGHDR, 2018). Jayne *et. al.* (2015), amongst others, underscored that knowledge of soil characteristics and processes regulating nutrient availability and supply to crops is essential to raise productivity per unit of fertilizer nutrient applied. They further underscored the fact that insufficient and unbalanced fertilization of soils using fertilizers as well as lack of nutrient conservation technology adoption by farmers can contribute to rapid decline in soil fertility.⁹

The use of fertilizer has also been noticed to be caused by the short fallow periods or in some cases non-existing fallow periods as well as pressure on the limited land resources in the two (2) regions.

Table 31: Use of Fertilizer for Soil Fertility Improvement

Region	District	Soya Bean	Groundnut	Maize	Rice	Cowpea	Tomato	Common Beans	Onion	Sweet Potato
		% Respondents								
Upper East	Garu	74	78	55	62	17	100	91	100	100
	Tempene	71	100	69	67	50	0	100	94	100
	Bawku West	74	45	69	76	30	67	88	82	0
Upper East	Lambussie-Karni	76	45	68	59	23	67	58	0	100
	Nandom	43	35	69	54	14	0	50	0	0

The level of ease with which farmers purchased fertilizer for crop cultivation purposes is presented in Table 32. The criteria that was used in the assessment of ease of purchase of fertilizer were easy, somehow easy and difficult.

Table 32: Ease of Purchase of Fertilizer

Region	District	Easy (%)	Somehow Easy (%)	Difficult (%)	Easy (%)	Somehow Easy (%)	Difficult (%)	Easy (%)	Somehow Easy (%)	Difficult (%)
		Soya Bean			Groundnut			Maize		
Upper East	Garu	65	14	29	67	11	22	60	10	25
	Tempene	46	18	37	50	0	50	53	19	29
	Bawku West	64	24	12	60	20	20	72	18	9
Upper West	Lambussie-Karni	63	24	8	38	33	29	55	27	18
	Nandom	14	29	57	26	29	45	27	39	35
Upper East	Garu	54	13	33	67	17	16	67	0	33
	Tempene	48	20	32	67	0	33	0	0	0
	Bawku West	68	22	10	40	40	20	83	0	17
Upper West	Lambussie-Karni	50	25	25	17	53	30	0	67	33
	Nandom	31	31	38	0	38	63	0	100	0
Upper East	Garu	55	0	45	100	0	0	100	0	0
	Tempene	71	14	14	0	50	50	67	17	17
	Bawku West	88	12	0	0	0	0	65	24	12
Upper East	Lambussie-Karni	42	25	33	0	0	100	0	0	0
	Nandom	33	0	67	50	0	50	0	0	0
Upper East	Garu	80	0	20	67	19	14	83	17	0
	Tempene	0	0	0	60	20	20	0	0	0
	Bawku West	50	50	0	100	0	0	40	60	0
Upper West	Lambussie-Karni	0	67	33	56	44	0	57	43	0
	Nandom	0	0	0	6	69	25	0	100	0

⁹ Northern Ghana Human Development Report (2018), Bridging the Poverty Gap and Fostering Socio-Economic Transformation to Contribute to Human Development for All.

The control of insect pests on croplands with the aim of improving the yield and quality of crop produce was also noted as a common practice amongst farmers in the survey communities. The use of insecticides (Table 33) was however observed to be almost absent in the cultivation of sweet potato except for Tempene district where 33 % males and 67 % females indicated they use insecticides on sweet potato farms.

Although the use pesticides contribute significantly to the yield and quality of produce, NHDR (2018) reported that the use of pesticides and inorganic fertilizer for farming have a major health risk in the zone.¹⁰

The development and use of pests resistant varieties of crops as a sustainable agriculture practice also contributes tremendously to some benefits in terms of yield and produce quality.

Table 33: Use of Insecticides or Fungicides

Region	District	Soya Bean		Groundnut		Cowpea		Common Beans		Bambara Beans		Sweet Potato		Tomato	
		Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
Upper East		% Respondent													
	Garu	41	59	17	83	0	100	60	40	40	60	0	0	33	67
	Tempene	59	41	0	100	100	0	43	57	50	50	33	67	0	0
	Bawku West	56	44	33	67	100	0	25	75	0	0	0	0	50	50
Upper West	Lambussie-Karni	90	10	65	35	85	15	88	13	100	0	0	0	0	100
	Nandom	0	100	67	33	100	0	100	0	0	0	0	0	0	0
Upper East		Maize		Rice		Millet		Sorghum		Onion		Pepper			
	Garu	50	50	62	38	53	47	0	0	0	100	20	80		
	Tempene	56	44	52	48	46	54	0	0	25	75	0	0		
	Bawku West	65	35	45	55	36	64	0	0	45	55	100	0		
Upper West	Lambussie-Karni	74	26	61	39	92	8	100	0	0	0	33	67		
	Nandom	78	22	75	25	78	22	100	0	0	0	0	0		

4.4.3 Source of Knowledge on Proper Use of Agro-chemicals

Community development NGOs, Agricultural Extension Agents (AEAs) and agro-input dealers were mentioned as the main source of information/education on the proper use of agro-chemicals for agricultural production purposes. In the Upper East region, NGOs were observed to have contributed to this information and accounted for 64 % of farmers knowledge followed by AEAs with 23 %, agro-input dealers/vendors with 8 % whilst the Upper West region had AEAs contributing 58 % of the educators on proper agro-chemical usage, NGOs accounted for 27 % whilst agro-input dealers contributed only 5 %. The low level of education received by farmers from agro-input dealers may be as a result of limited knowledge of these vendors as they do not have in-depth understanding of the composition, preparation and application methods necessary to ensure safety and increased yields.

Farmers across the two (2) regions indicated that the application of agro-chemicals is most appropriate at 4:00 am to 10:30 am and 4:30 pm to 6:30 pm. Sources of information/knowledge on agro-chemicals usage is presented in Table 34.

¹⁰ Northern Ghana Human Development Report (2018), Bridging the Poverty Gap and Fostering Socio-Economic Transformation to Contribute to Human Development for All.

Table 34: Sources of Knowledge on Agro-Chemical Usage

Region	District	AEA's	Agro-input Fairs	Agro-Input Dealers/Vendors	NGO's e.g. Care Int., PRUDA, PAS-G, etc	Radio	Self-Experience	Family members	Other/Colleague Farmers
		% Respondents							
Upper East	Garu	9	0	9	76	6	0	0	0
	Tempene	25	0	4	72	0	0	0	0
	Bawku West	36	0	10	43	5	2	2	2
	Average	23	0	8	64	4	1	1	1
Upper West	Lambussie-Karni	55	3	7	34	0	0	0	0
	Nandom	60	0	3	20	0	13	3	0
	Average	58	2	5	27	0	7	2	0

Agri-input fairs were facilitated by the Pathways Project of CARE International in Ghana in the Garu-Tempene and Lambussie-Karni Districts and with an objective to introduce the smallholder farmers to new technologies, make accessible quality agri-inputs (improved seeds, pesticides, farm tools and equipments etc) to farmers, serves as platform for information on use of agro-chemicals and government policies on agriculture, and as well reduce costs associated with transportation emanating from longer travel distances to sources. It is clear from Figure 9 that input fairs are currently serving the needs of farmers in all the districts except Nandom district in the Upper West region. It is evident that a high percentage of women accessed agri-inputs through agri-input fairs in the last 12 months. During the FGDs, leaders of VSLAs indicated they attended agricultural input fairs and were able to educate other members of the groups on what was learnt in the fairs. A seed company by name 18th April in the Upper West region was mentioned in the Lambussie – Karni district as one of the exhibitors in a fair organized in Wa Municipality. Farmers indicated that the agri-fairs presented an opportunity for education especially on the proper handling, use/application and storage of agricultural inputs.

It was recommended that more agricultural input fairs should be organized at local or community level to allow most members to attend and maximize the benefits associated with them.

Community input fairs are also considered effective in helping farmers to access and obtain inputs, including quality seeds, and to reduce their transportation costs. Interventions perceived as less effective include market committees, input credit (piloted in small scale in Garu-Tempene and Lambussie-Karni), and meetings with value chain actors.¹¹

¹¹ Jeanne Downen, Stephanie Martin, Lloyd Banwart (2018). CARE Ghana Pathways Project Final Evaluation. TANGO International

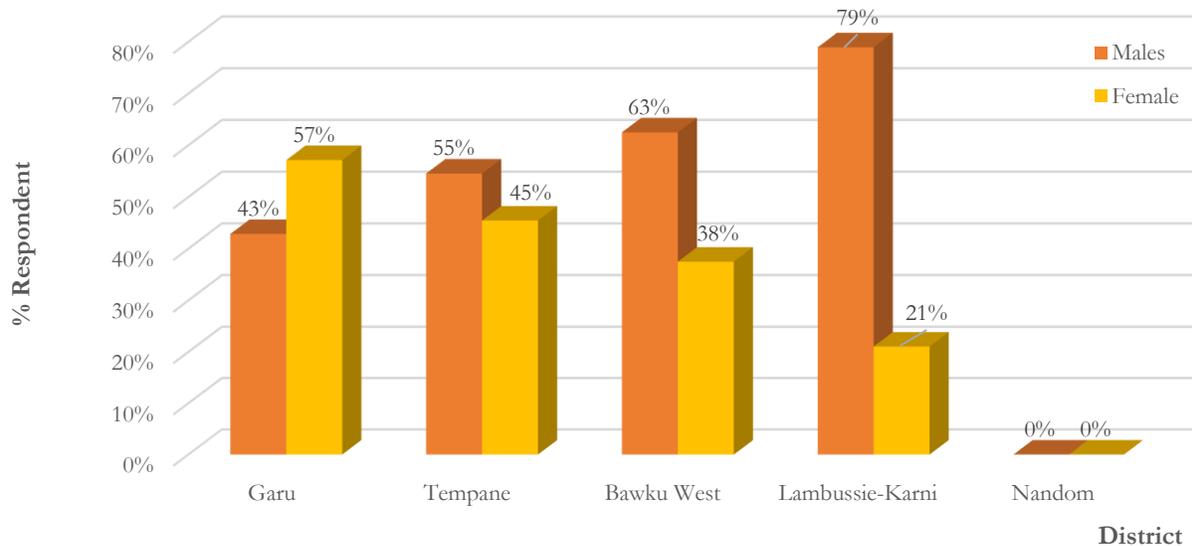


Figure 9: Agri-input fairs as Source of Production Inputs

Aside obtaining agricultural production inputs from agri-inputs fairs, they also served as source of information on the activities of input dealers and availability of services. Except the Lambussie-Karni district where only 23 % of female respondent farmers indicated that they obtained information on the activities of agri-input dealers and production services during agri-input fairs, the other locations (Garu and Tempene districts) which benefited from the Pathways project community agri-input fairs were higher as presented in Figure 10. 100 % of the male farmers indicated they obtained agri-information from agri-input fairs with no female indicating agri-input fairs as source of agricultural information in the Nandom district. In the Bawku West district, 50 % each of males and females also indicated agri-input fairs as source of agricultural production information and inputs. The information relating to agri-input fairs in the Nandom and Bawku West districts may likely be related to the annual agricultural fairs organized at the district level by MoFA and supported by other organisations/NGOs.

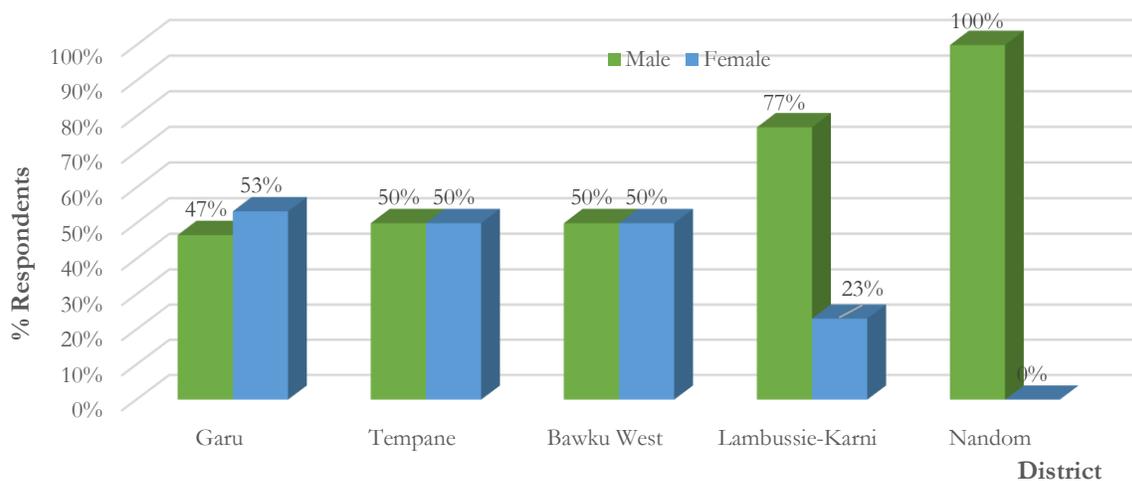


Figure 10: Agri-fairs as Source of Information on Input Dealers/Services

77 % of the farmer respondents in the three (3) districts of the Upper East region indicated that the knowledge and skills acquired from the various sources was adequate for their activities with 23 % indicating that they need more knowledge and skills to promote their understanding and application or use of agro-chemicals.

In the Upper West region, only 20 % of the respondents required additional training or capacity building whilst 80 % indicated that their knowledge level allowed them to undertake their activities satisfactorily. It is therefore evident from the field survey results that, farmer education on proper handling and use of agro-chemicals is very necessary in the various communities to promote farmer safety, environmental security and enhanced productivity. The level of adequacy of farmers knowledge and skills on the proper use of agro-chemicals is presented in Figure 11.

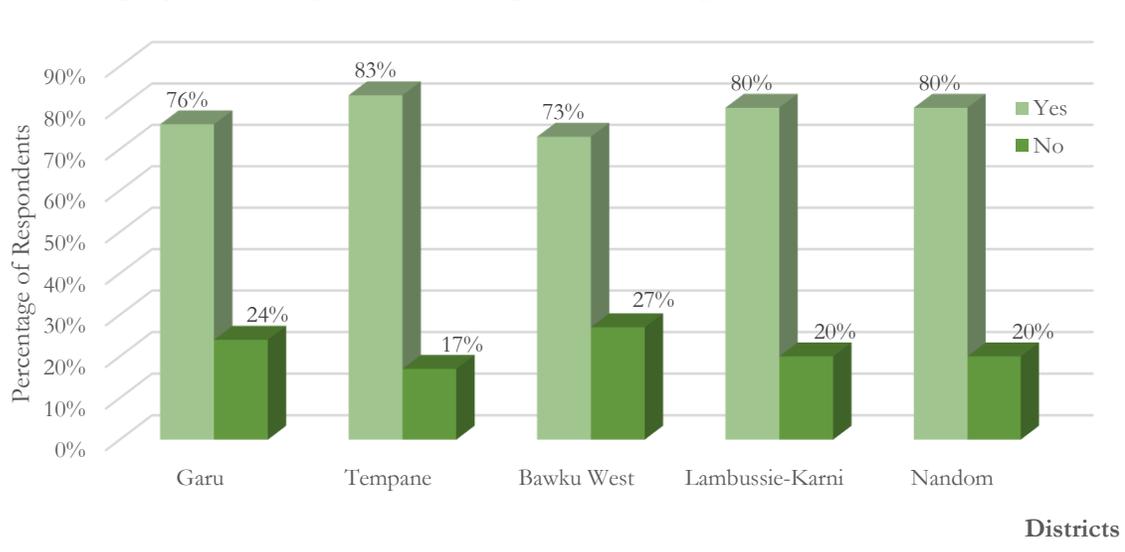


Figure 11: Adequacy of Farmer Knowledge and Skills on Proper Use of Agro-Chemicals

4.4.4 Challenges on the Use of Agro-Chemicals

The level to which farmers in the various communities of the survey districts encounter challenges in obtaining agri-inputs is presented in Figure 12. These challenges ultimately hamper the production activities of farmers and thus greatly will impact on crop yield and output.

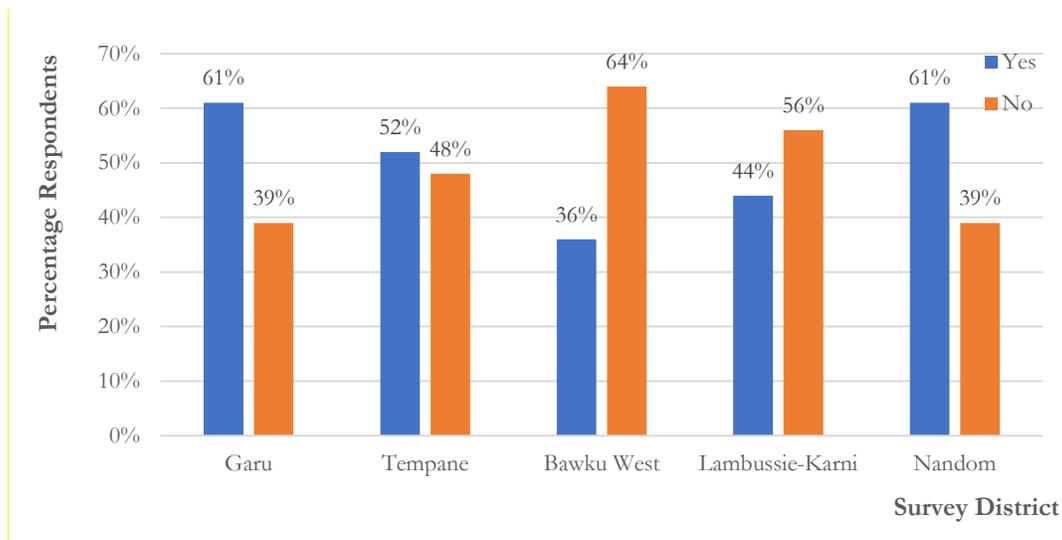


Figure 12: Farmer Challenges in Obtaining/Accessing Agri-inputs

Some of the challenge's farmers encounter in their quest to obtain and use production inputs include;

- inadequate knowledge on the use of agro-inputs,
- limited access to fertilizer coupons,
- high cost of inputs and services,
- unavailability or limited supply of inputs and services,
- lack of financial resources,
- distance,
- timeliness in application of agri-inputs,
- lack of transportation,
- lack of credit and,
- absence of input dealers in farmers' communities.

The percentage of respondents and the challenges associated with access to agri-inputs as noted above in the various districts are presented in Table 35.

It is clear from Figure 13 that there are more challenges in the use of agro-chemicals in the Upper West region compared to the Upper East region. The improper use of agro-chemicals is said to have deleterious effects on farmers, crops and the environment and therefore there is the need to ensure farmers and environmental safety in the application of agro-chemicals. Education of farmers on safety measures as well as the preparation and application of agro-chemicals will lead to increased crop yields, environmental safety and better lifestyles of farmers.

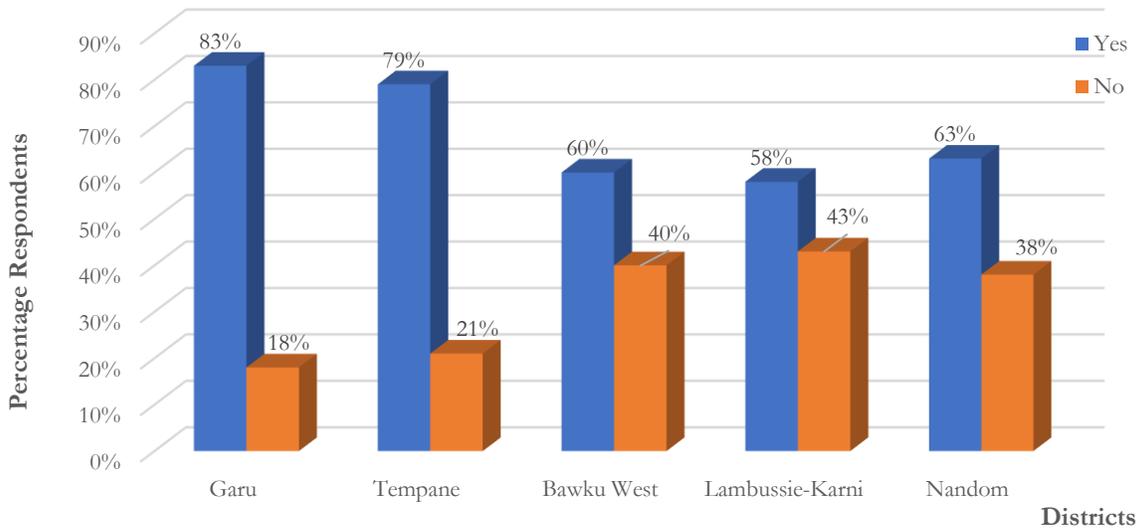


Figure 13: Challenges in the Use of Agro-Chemicals

Although, there was a high level of satisfaction of the respondents in the various districts and communities, 51 % of the male (52 % in Upper West and 50 % in Upper East regions) and 49 % female respondents (48 % in Upper West and 50 % in Upper East regions) noted challenges in the area of obtaining/accessing agri-inputs and services. Figure 14 presents the challenges regarding access to agro-inputs in the study districts by both women and men. During the FGDs, the members of the various VSLAs indicated they were limited in supporting group members access to agricultural inputs and services and thus affecting the timeliness of the production activities. It was also mentioned that, even though group members purchased agro-inputs on their own, there is no regular training on the proper handling, use and disposal of agro-chemicals. Agro-inputs were also said to be generally expensive and group savings are always not enough to support the acquisition of the required quantities for members.

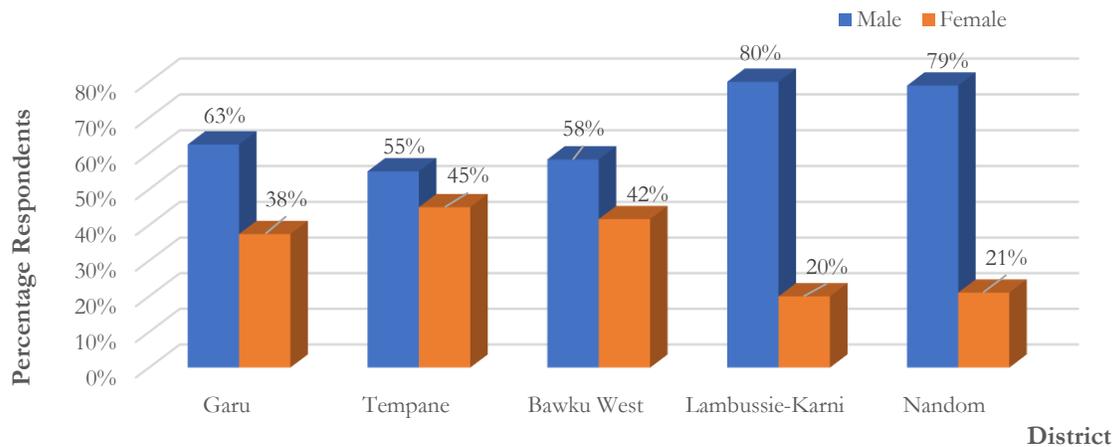


Figure 14: Challenges in Accessing Agri-Input by Gender

Table 35: Challenges of Farmers in Accessing Agri-inputs

Production Assets	Upper East				Upper West		
	Garu	Tempane	Bawku West	Average	Lambussie-Karni	Nandom	Average
	% Respondents						
Inadequate Knowledge on agro-input use	2	0	0	1	0	2	1
Cannot Access Fertilizer Coupon	0	4	0	1	4	5	5
High Costs of Inputs & Services	35	15	25	25	24	27	26
Unavailability/limited supply/delays in accessing services e.g. bullock ploughing, fertilizer, etc	7	10	9	9	9	8	9
Lack of Funds	23	38	16	26	15	25	20
Distance	15	8	9	11	24	11	18
Timeliness in agri-input application	1	1	20	7	1	2	2
Lack of Transportation	4	3	0	2	8	11	10
Lack of Credit	0	0	4	1	0	0	0
Absence of Input Dealer in Community	12	22	18	17	14	10	12

In the Upper West region, suggested solutions to the challenges of farmers were noted as, 18 % each for the availability of input dealers in the community's and input subsidies especially targeted at women and widows, whilst the establishment of agricultural mechanization centers (16 %) was mentioned as very necessary to support traction services. In the Upper East region however, farmers indicated that they would need financial support (26 %), subsidy for women and widows (20 %) and establishment of agricultural mechanization centers (18 %) as solutions to some of their problems related to accessing inputs from crop production. Table 36 presents the details of the various suggested solutions to the challenges of farmers in accessing agri-inputs by farmers.

Table 36: Suggested Solutions to Challenges in Accessing Agri-Inputs by Farmers

Production Assets	Upper East				Upper West		
	Garu	Tempane	Bawku West	Average	Lambussie-Karni	Nandom	Average
	% Respondents						
Availability of Input Credit	3	7	5	5	5	5	5
Improved Availability & Accessibility of Inputs e.g. Input coupons for women especially widows	12	5	14	10	10	19	15
Establishment of Agric Mechanisation Centers	18	5	30	18	19	12	16
Financial Support to Individuals	19	36	22	26	19	10	15
Financial Support to VSLAs	9	15	0	8	5	17	11
Timely Release of Inputs	3	0	5	3	2	2	2
Subsidy (targeted at women & widows) on Agri-inputs/Low Prices	18	20	22	20	15	21	18
Availability of Input Dealers in Community	13	7	0	7	24	12	18
Training on Proper Use of Inputs, Business and Financial Literacy	4	4	3	4	2	2	2

4.4.5 Effects of Inappropriate Application of Agro-Chemicals

Except the Nandom district that recorded 86 %, all other districts recorded 90 % and above as farmers knowledge on the existence of effects of agro-chemicals on themselves, crops, animals, water bodies and the general environment. Figure 15 shows the number of farmers in the survey districts who responded and indicated their awareness or otherwise of the effects of agro-chemicals.

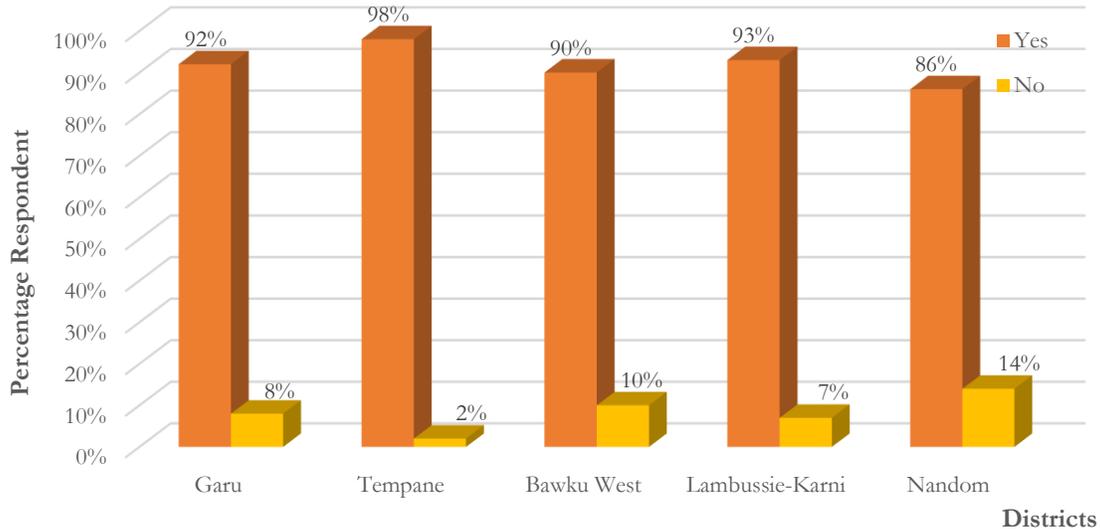


Figure 15: Farmers Knowledge on Effects of Application of Agro-Chemicals

Respiratory diseases were indicated as most prevalent in the Upper East and West regions with 41 % and 34 % prevalence level respectively whilst skin irritation, burns and blisters recorded 22 % and 29 % for the Upper East and Upper West regions were noted in that order.

In the Upper East region, infertility or impotence was recorded at 1 % whilst headache and catarrh as well as loss of investment, no motivation and economic loss to farmers all recorded 6 % each in the Upper West region. These were the lowest records of effects of inappropriate agro-chemical application on farmers and their families.

Other health issues observed amongst farmers and their families as well as farm workers include reduced vision/blindness, poison or death. All these effects were indicated to be prevalent due to the inappropriate methods adopted in the preparation, level of protection and the application methods used by farmers for agro-chemicals. Table 37 presents details of the effects of inappropriate agro-chemical application on farmers in the project communities.

Table 37: Effects of Inappropriate Agro-Chemical Application on Farmers

Production Assets	Upper East			Upper West	
	Garu	Tempane	Bawku West	Lambussie-Karni	Nandom
	% Respondents				
Reduced Vision/Blindness	6	3	9	6	15
Skin Irritation, Burns and Blisters	19	22	24	30	27
Respiratory Diseases and Stomach Disorders	35	44	43	29	38
Poison and can lead to death	10	5	5	13	7
Headache and Catarrh	16	16	16	6	6
Loss of investment, No Motivation and Economic Loss of Farmer e.g. crop failure	15	12	1	12	0
Infertility/Impotence	0	0	2	6	7

Due to limited knowledge on preparation, application levels and methods, etc by farmers, the use of agro-chemicals was noted aside the positive effects on crop plants to as well impact negatively on food crops. In both regions of the survey, farmers observed that low yields of crops may result when the levels and methods of application of agro-chemicals do not conform to the recommended levels and this was followed by destruction of crop plants. Some other effects of inappropriate application of fertilizers included burning of crop plants, the hindering of crop growth as well as leaf colour change and killing of crops. Table 38 presents the level of effects of the inappropriate application of agro-chemicals on crop plants in the five (5) districts of the survey.

Table 38: Effects of Inappropriate Agro-Chemical Application on Crop Plants

Region	District	Burn Crop Plants	Hinder Crop Growth	Leaf Colour Change	Kill Crop Plants	Low Crop Yield	Crop Destruction
		% Respondents					
Upper East	Garu	4	12	5	20	34	25
	Tempane	6	9	3	19	30	33
	Bawku West	3	3	1	16	37	39
Upper West	Lambussie-Karni	4	19	5	22	28	23
	Nandom	3	10	4	18	36	29

Contamination of water bodies and the general environment as well as destruction of aquatic life were mentioned by 33 % of the interviewed farmers in the Garu, Tempane and Bawku West districts as the leading effects of inappropriate agro-chemical application on water bodies and the environment whilst in the Lambussie-Karni and Nandom districts 50 % of the farmers indicated that inappropriate application of agro-chemicals pollutes water bodies and the environment whilst 18 % noted the destruction of soil organisms leading to reduction or low soil fertility. The effect of inappropriate application of agro-chemicals on water bodies and the environment are presented in Table 39.

Table 39: Effects of Inappropriate Agro-chemical Application on Water Bodies/Environment

Production Assets	Upper East				Upper West		
	Garu	Tempane	Bawku West	Average	Lambussie-Karni	Nandom	Average
	% Respondents						
Contaminates/Pollutes Water Bodies and Environment	31	36	32	33	47	50	49
Poses danger to human beings and animals who drink water from contaminated sources	23	17	22	21	27	13	20
Destroys aquatic life	35	28	37	33	16	17	17
Destroys soil organisms thus reducing soil fertility e.g. useful soil bacteria death	12	18	8	13	10	18	14
Kills animals which consume contaminated plants	0	1	2	1	0	2	1

4.4.6 Registered Community Agro-Input Dealers and Business Relationships

Twelve (12) and ten (10) agro-input dealers in the Upper West and Upper East regions respectively were interviewed and operational in the survey districts and communities. The agro-input dealers in the various communities and districts were observed to be operating with a minimum of 2 years and a maximum of 19 years across the districts of the two regions. The agri-inputs that these businesses traded include; fertilizer, seeds, weedicides/herbicides, protective clothing, cutlass, application equipment e.g. knapsack, etc.

Agro-input dealers indicated in the two (2) districts of the Upper West region that they have registered their businesses with the Registrar General's Department or with the Business Advisory Center (BAC) at the District Assembly. However, there was no indication of registration with Environmental Protection Agency (EPA) and Plant Protection and Regulatory Services Department (PPRSD) the regulatory agencies

In the Upper East region, agro-input businesses in communities or district capitals of the study indicated that their businesses were registered with Registrar General's Department (RGD), Environmental Protection Agency (EPA), or Plant Protection and Regulatory Services Department (PPRSD). It was observed however that aside registering to undertake business, input dealers also registered with some regulatory institutions.

Three (3) of the businesses in the Upper East and two (2) in the Upper West regions indicated that they had outlets with the minimum being 2 and the maximum being 4 at various locations.

All employees and owners of agro-input business owners indicated that they do not have a related background training in agri-inputs but with some especially in the Upper East region indicating that they have received some on-the-job trainings from Ministry of Food and Agriculture (MoFA), EPA and some NGOs in the handling and use of agro-chemicals.

Business strategies adopted by agro-input dealers were noted to include; provision of credit sales, free delivery services for large quantities, education on proper use of agro-chemicals e.g. using demonstration farms, reduction sales, radio advertisements, etc. In the Upper West region, 50 % of the agro-input dealers indicated that they undertake outreach services at least twice per a growing season whilst in the Upper East region only 1 (10 %) of the agro-input dealers undertakes outreach once in the planting season of crops.

Across the two (2) regions, agro-input dealers source their goods from wholesalers or the companies which produce these products directly or from main regional distributors. The sources include Kumasi, Accra, Techiman, Wa, Bolga.

Only one (1) i.e. 8 % of the interviewed agro-input dealer in the Upper West region and eight (8) i.e. 80 % in the Upper East region indicated that they have retailers or distributor networks who are not registered in their business name but owned by other individuals mainly for the supply of their goods. Also, 7 (70 %) agro-input dealers in the Upper East and 1 (8 %) in the Upper West regions have business partnership relationships with their suppliers. The benefits of the partnerships were noted as allowing the local input dealers to access credit, undergo training especially on new products and also improve upon their distribution network.

It was also realized that in the Upper West region that during the wet season a weekly average of 45 farmers were served by agro-input dealers with at least 60 % (27) being women and a weekly average

sale of GHS 330.00 (USD \$ 62.3). In the Upper East region however, agro-input dealers in the three (3) districts were noted to deal with large number of customers averaging 117 per week but with a low number/percentage (30 %) or 35 being women on weekly basis. The average sales in the districts of the Upper East region were noted as GHS 7,000.00 (USD \$ 1,320.8).

42 % of the agro-input dealers in the Upper West region indicated they have workplace manuals whilst in the Upper East, this was noted to be non-existent.

All (100 %) of the interviewed agro-input dealers in the Upper East region indicated that they undertake farmer and retailer training programmes to enhance their skills and knowledge in the use/sales of agro-chemicals whilst only 42 % of the agro-input dealers in the Upper West undertake trainings for farmers. Trainings were noted to mainly focus on the recommended practices and use of agro-chemicals, the use of Personal Protective Equipment's (PPEs), etc and agro-input dealers indicated demonstrations, group meetings and the use of posters in their education campaigns.

It was also realized that all (100 %) of the agro-input dealers in the Upper East region have participated in agri-input fairs in their district or community and these were noted to have been organized by MoFA, District Assembly (DA), MADE, PAS-Garu, IDE, IFDC or USAID-ADVANCE. In the Upper West region only 50 % of the agro-input dealers indicated they have attended or participated in agri-input fairs organized by CARE International in Ghana, PRUDA and MEDA.

Some benefits noted from the participation in the agri-input fairs were:

- Increased and improved business network with farmers and retailers.
- Exposure of business to more farmers/customers.
- Establishment of more business linkages with smaller businesses/retailers.
- Exposure to new products or tools.
- Increase in sale of products.
- Increased knowledge level in record keeping, sales, etc.

Some challenges noted during the agri-input fairs by the agro-input dealers include:

- Lack of transport.
- Low prices at fairs because of competition from distributors at the fairs.
- Long and unproductive time spent at the fairs with little sales.

In the area of trainings received by agri-input dealers, only 42 % received training from MoFA, CARE International in Ghana and PRUDA in the Upper West region whilst all (100 %) of the agro-input dealers in the Upper East region received trainings organised by MoFA, EPA, PAS-Garu, MADE, IDE and USAID-ADVANCE. These trainings were noted to center on handling, storage and use of agro-inputs. These trainings were noted to benefit agro-input dealers in the following ways:

- Equips them with knowledge on precautionary measures in the handling and storage of agro-chemicals.
- Increase their knowledge on all kinds of agro-chemicals in the market.
- Improve their networking and customer relations.
- Broaden their knowledge and skills in the handling, storage and application/use of agro-chemicals.

Some noted challenges of the agri-input business in all the districts as indicated by the agro-input dealers included:

1. Difficulty in mobilizing farmers for the purpose of training.
2. Delay in payment by farmers when credit system is used or high rates of default from credit sales.
3. Lack of capital or poor financial base of businesses to allow increased investments.
4. Difficulty or poor business linkages with suppliers at the community level.
5. Lack of storage facility for products.
6. Presence of cheap, and fake/unapproved agro-chemicals in the market.
7. Inadequate supply channels.
8. Lack of technical know-how on inputs.
9. Lack of transportation to aid expansion of business to the community level.
10. Unpredictable weather thus imparting on level of sales per season.

To improve the capacity of agro-input dealers in the delivery of high-quality services to farmers and retailers especially smallholder women farmers in the various communities and districts, the following were suggested:

1. Regular training or capacity building of agro-input dealers e.g. handling and use of agro-inputs.
2. Enforcement of regulations relating to importation and sale of agro-chemicals to reduce smuggling.
3. Support of smallholder women farmers by guaranteeing input credit schemes.
4. Capital support of small businesses in agri-inputs.

The agro-input dealers also observed some challenges which hinder smallholder women farmers in their bid to access and use agro-inputs and these include:

1. Limited knowledge on the appropriate/proper use of agri-inputs.
2. Limited access to agri-inputs due to limited business outlets in the communities as a result of long distances to the shops in district capitals since women often travel long distances to obtain inputs.
3. Lack of funds to purchase agri-inputs by smallholder women farmers.
4. Lack of PPEs and agro-chemical application equipment.
5. Limited or unavailable access to credit.
6. High cost of inputs.

To address the above listed challenges of smallholder women farmers, agro-input dealers have undertaken the following measures within their means:

1. Education or training of women farmers on appropriate ways of handling and application of agro-chemicals.
2. Extension of credit facility to women to support their purchase and use of agri-inputs.
3. Some businesses have established outlets whilst others have plans to open outlets in communities to help reduce travel distance and time of resource poor women.
4. Some agro-input dealers indicated that they sometimes discounted the cost of their products for smallholder resource poor women farmers.

It was also suggested that government should target smallholder resource poor women and widow farmers in their subsidy strategies and as well make inputs accessible and available at community level where these women are. Also, the timely release of agri-input (fertilizer) coupons as well as the expansion of subsidy to include herbicides and insecticides especially for smallholder women and widow farmers was also suggested.

4.4.7 Increase Availability of Certified Seed and Establishment of Seed Out-grower Partnerships

4.4.7.1 Farmer Sources and Availability of Seed

The availability and farmer satisfaction of seed for use in the various districts was accessed and the outcome is as presented in Table 40. It was noted that farmers selected and used their own seed and as well bought seed from agro-input dealers.

Table 40: Farmers Satisfaction on Seed Availability

Region	District	Millet	Sorghum	Onion	Pepper	Tomato	Cowpea	Groundnut	Rice	Maize	Bambara Beans	Common Beans	Soya Bean
		% Respondents											
Upper East	Garu	81	60	100	60	67	83	56	78	83	68	73	74
	Tempane	79	0	72	100	0	100	50	81	86	86	71	81
	Bawku West	77	0	82	0	100	100	90	81	89	92	63	86
Upper West	Lambussie-Karni	91	89	0	0	67	100	78	78	88	85	75	82
	Nandom	88	100	0	0	100	100	90	85	93	80	100	86

On the proper use of seeds, 67 % male farmers in the Upper East region and 80 % in the Upper West region had knowledge on the proper use of seed compared to 25 % and 20 % female farmers of the Upper East and Upper West region respectively as in Figure 16.

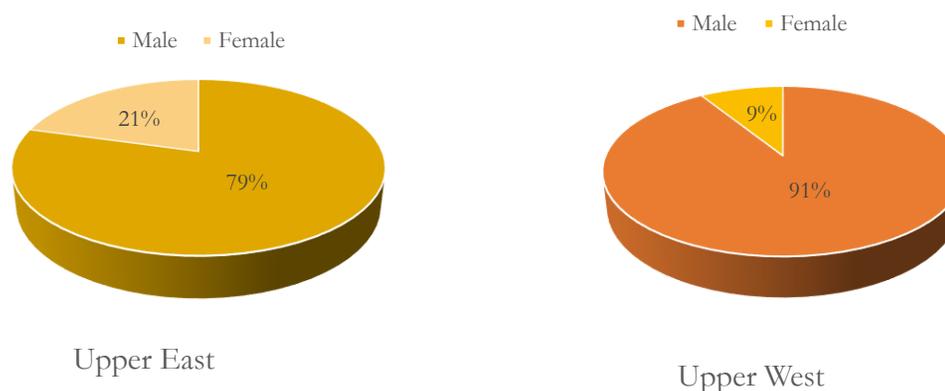


Figure 16: Knowledge Levels on Performance of Germination Tests

In the Upper East region it was noticed that 79 % males and 21 % females had knowledge on the conduct of germination tests whilst 91 % males and 9 % females indicated they had knowledge on same in the Upper West region. The knowledge levels of farmers on the performance of germination tests in the districts is presented in Table 41.

Table 41: Knowledge on Performance of Germination Tests

Region	District	Male (%)	Female (%)
Upper East	Garu	66	34
	Tempone	79	21
	Bawku West	93	7
Upper West	Lambussie-Karni	90	10
	Nandom	92	8

The level to which farmers conducted gemination tests and whether seed is of high quality in terms of germination tests for the various crops grown in the communities is presented in Table 42.

Table 42: Quality of Seeds in Terms of Germination

Region	District	Soya Bean		Groundnut		Rice		Common Beans		Cowpea		Tomato	
		No. of Respondents	% of Respondents										
Upper East	Garu	37	74	3	43	33	83	8	73	4	67	2	67
	Tempane	55	81	0	0	57	83	5	71	6	100	0	0
	Bawku West	38	90	6	86	57	90	6	75	11	100	6	100
Upper West	Lambussie-Karni	27	71	9	69	25	78	9	75	17	74	2	67
	Nandom	5	71	5	83	8	62	6	100	4	50	0	0
		Sweet Potato		Onion		Pepper		Millet		Sorghum		Bambara Beans	
Upper East	Garu	0	0	1	100	3	60	25	60	3	60	16	73
	Tempane	2	100	13	72	0	0	22	76	0	0	5	71
	Bawku West	0	0	14	82	2	100	18	82	0	0	0	0
Upper West	Lambussie-Karni	1	100	0	0	4	100	22	67	7	78	10	77
	Nandom	2	100	0	0	0	0	28	67	10	63	10	77

In the Upper West region 71 % of the farmers indicated that they could purchase more seed if they wanted for all the crops whilst 66 % of the farmers in the Upper East region indicated same (Table 43).

Table 43: Availability of More Seed for Purchase by Farmers

Region	District	Millet	Soya Bean	Tomato	Groundnut	Cowpea Beans	Maize	Sweet Potato	Rice	Onion	Cowpea	Bambara Beans	Pepper
		% Respondents Indicating Availability of More Seed to Purchase											
Upper East	Garu	76	72	67	67	100	74	0	70	100	83	77	80
	Tempane	83	79	0	100	100	79	100	75	83	83	86	0
	Bawku West	73	69	100	75	0	78	0	75	76	91	0	0
Average		77	73	56	81	67	77	33	73	87	86	54	27
Upper West	Lambussie-Karni	67	92	67	81	100	75	100	88	0	74	62	78
	Nandom	76	86	100	84	100	75	50	85	0	75	31	56
Average		71	89	83	83	100	75	75	86	0	74	46	67

Four (4) qualities of good seed mentioned as big grains, absence of cracks, insect holes, etc, absence of discoloration and matured seeds with cotyledon and the level to which these qualities influence seed selection and use is presented in Figure 17.

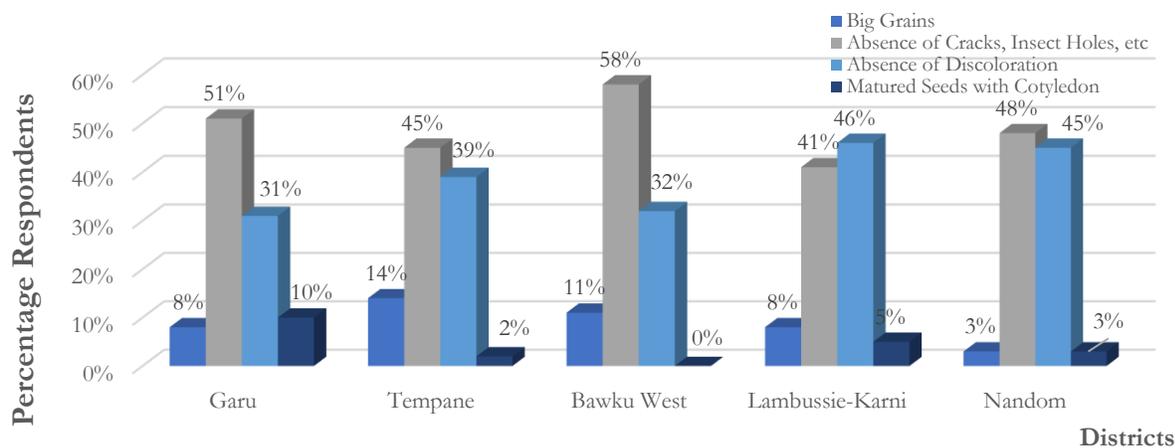


Figure 17: Farmers Assessment of Qualities of Good Seed

The level of easiness that seeds can be purchased by farmers for the various kinds of seeds have been tabulated and presented in Table 44 with the percentages indicating the percentage of the number of respondents for each assessment criterion.

Table 44: Level of Access to Purchase of Seed by Farmers

Region	District	Easy (%)	Somehow Easy (%)	Difficult (%)	Easy (%)	Somehow Easy (%)	Difficult (%)	Easy (%)	Somehow Easy (%)	Difficult (%)
		Soya Bean				Groundnut			Maize	
Upper East	Garu	70	16	14	67	0	33	72	15	12
	Tempane	85	4	10	100	0	0	90	3	7
	Bawku West	74	7	19	80	5	15	77	8	15
Upper West	Lambussie-Karni	71	18	11	77	16	8	68	17	15
	Nandom	57	29	14	84	6	10	69	16	15
Upper East	Rice				Cowpea			Tomato		
	Garu	70	15	15	83	17	0	100	0	0
	Tempane	81	10	9	100	0	0	0	0	0
Upper West	Bawku West	76	13	11	82	9	9	100	0	0
	Lambussie-Karni	63	31	6	52	48	0	33	33	33
Upper East	Nandom	46	38	15	38	38	25	100	0	0
	Common Beans				Onion			Pepper		
	Garu	91	9	0	100	0	0	80	0	20
Upper West	Tempane	86	14	0	89	6	6	0	0	0
	Bawku West	88	0	13	76	24	0	50	50	0
Upper East	Lambussie-Karni	58	33	8	0	0	0	25	75	0
	Nandom	67	17	17	0	0	0	0	0	0
Upper West	Millet				Sorghum			Bambara Beans		
	Garu	64	19	17	80	20	0	73	14	14
	Tempane	83	7	10	0	0	0	71	0	29
Upper East	Bawku West	86	0	14	0	0	100	0	0	0
	Lambussie-Karni	61	30	9	22	78	0	62	31	8
Upper West	Nandom	90	0	10	38	50	13	69	8	23

4.4.7.2 Farmer Access and Use of Certified Seed

It was noted during the FGDs that access to certified seed was very difficult and members of the VSLAs indicated seeds are generally expensive and their group savings are always not enough to support the acquisition of the required quantities for members.

Regarding the use of certified seed in the two (2) districts in the Upper West region, out of 56 farmers, 56 % are males whilst 44 % are females. Also, out of the 88 farmers in the Upper East region who indicated that they use certified seed, 58 % are males whilst 42 % are females. Table 45 presents the level of use of certified seed in the various districts of the survey.

Table 45: Level of Use of Certified Seeds

Region	District	Total Number Using Certified Seed	Male (%)	Female (%)
Upper East	Garu	24	50	50
	Tempene	33	67	33
	Bawku West	31	57	43
Upper West	Lambussie-Karni	32	47	53
	Nandom	24	64	36

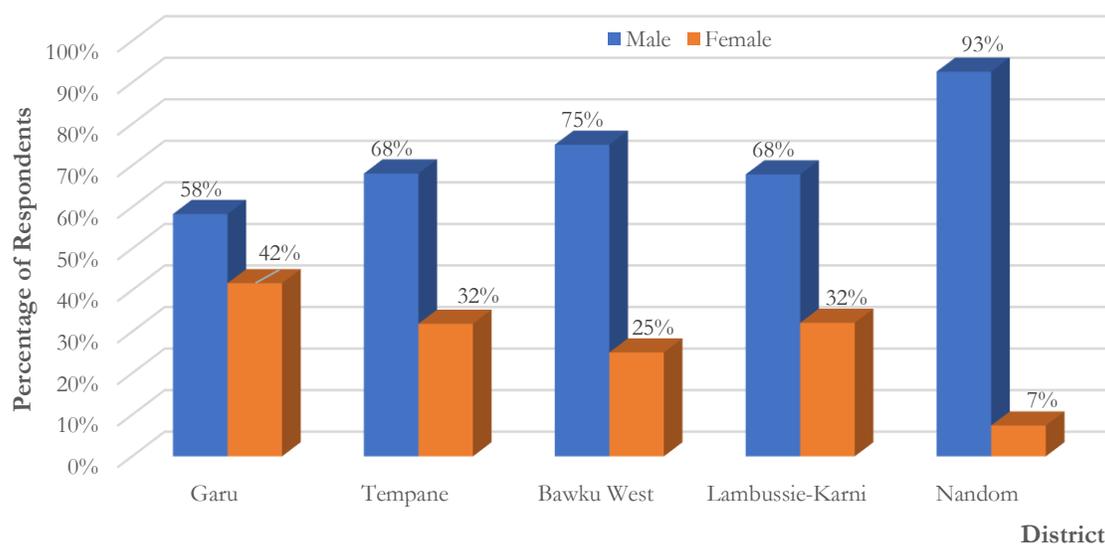


Figure 18: Adequacy of Knowledge and Skills on Proper Use of Seed

As presented in Figure 18, generally more males have adequate knowledge and skills on the proper use of seed in all the study districts. Females or women farmers in the Nandom district were however observed with a 7 % indication of adequacy in knowledge and skills in the area of seed use and this was noted as the lowest.

4.4.8 Community Seed Out-growers and Established Partnerships with Commercial Seed Companies

All (100 %) seed producers were registered and they are engaged in the sale of soya bean, groundnut, maize (both OPV and hybrid), rice, cowpea, sorghum and cowpea seeds. Requirements for registration as seed grower were said to include availability of land, knowledge in crop production, application and passing of interview. A registration certificate from the regulator bodies such as MoFA, PPRSD, GSID indicates that one is a certified seed producer.

According to the NGHDR (2018), the seed production system has a good regulatory framework, however, the capacity of the institutions (staff, resources) is limited. The report also noted that the Ghana Commercial Agriculture Project (GCAP); Agricultural Mechanization Service Centres (AMSECs); National Food Buffer Stock Company (NAFCO); the Block Farms project; and the Seed and Fertilizer Law are expected to contribute to improving the environment for the supply and use of quality seeds.¹²

It was indicated by the commercial seed producer companies that seed out-growers of these seed producers varied from 40 to 275 men and 30 to 245 women across the various districts of the survey. Seed producers also indicated that they organise technology transfer sessions such as demonstrations with their out-growers in the various locations. At least three (3) demonstrations were organised for out-growers by the seed producers in the past season. The demonstrations discussed Good Agricultural Practices (GAPs), new production technologies for improved yield, climate smart agriculture, use of high yielding varieties, etc. Three (3) field days were organised by seed producers in the last season for out-growers.

Some challenges faced by seed growers/companies included:

1. Women do not have access to large parcels of fertile lands although they are majority of the out-growers.
2. Supply of poor-quality foundation seed by some companies.
3. The price of foundation seeds is high and thus affecting profit margins of out-growers.
4. Availability of several varieties and limited knowledge on varietal purity.
5. High initial cost of investment.
6. Unpredictable weather affecting the agricultural activities.
7. Pests and diseases.

Suggested solutions to the challenges of seed growers/companies were noted as:

1. Collaboration with the traditional authorities and land owners for the release of large tracts of fertile lands to more women.
2. Sensitization on varieties of seeds and qualities of good seed.
3. Establishment of more linkages or networks of seed growers/companies to support out-growers in the area of prices of foundation seed.
4. Provision of financial support to seed growers/companies as well as seed out-growers.
5. Installation and use of modern weather equipment for weather reporting.

¹² Northern Ghana Human Development Report (2018), Bridging the Poverty Gap and Fostering Socio-Economic Transformation to Contribute to Human Development for All.

Challenges seed out-growers face in their activities were reported to include:

1. Little understanding of operations of seed companies thus affecting seed out-grower activities.
2. Delay in release of agro-inputs to seed out-growers.
3. Limited access to fertile lands for seed growing.
4. Delays in accessing traction services.
5. Climate change thus affecting weather and cultivation activities of seed out-growers.

Suggested solutions to the challenges faced by seed out-growers in their production activities of seed as noted by seed growers/companies were:

1. Limited knowledge in setting-up of demonstration plots.
2. Support from seed growers/companies in offering timely traction services to seed out-growers.
3. Timely release of agro-inputs to seed out-growers on credit basis.

Trainings were organized at least twice (2) every season for seed out-growers, usually by setting-up of demonstration fields and conduct of field trials.

Sources of foundation seeds were said to be Savannah Agricultural Research Institute (SARI), Nyankpala; Crop Research Institute (CRI), Fesusua, Kumasi; Grains and Legumes Development Board (GLDB), Kumasi and LCIC, Koforidua,

Seed producers/companies mentioned the following as their collaborators: PRUDA, Care International in Ghana, Smallholder farmers/out-growers, MoFA, CSIR-SARI, PAS-Garu, AGRA, IITA, CSIR-CRI GSID, NASTAG, SEED PAG, Ganorma Agro-chemicals and Inter-continental Agro-Chemicals.

Some identified strategies for engaging smallholder women farmers were;

- linking with women farmers as priority,
- identification and establishment of working links with VSLA and FBOs,
- provision of free seed and agri-input credit support,
- education of smallholder women farmers on GAPs and,
- early traction services support.

It was indicated by the seed growers/companies that female/women seed out-growers were more reliable and readily adopt new technologies, they use inputs supplied to them for the intended purpose of increasing yield, they are honest, dedicated and hardworking.

However, women seed out-growers were faced with the following challenges:

1. Limited access to tractor services for land cultivation.
2. Lack of funds to procure needed agri-inputs, start business and/or expand.
3. Limited access to fertile and productive lands.
4. Limited credit facilities available to support women out-growers.
5. Marketing challenges of produce/seeds for women.

The following were however suggested solutions by seed producers/companies to ameliorate the challenges of smallholder women farmers. These were:

1. Establishment of tractor service provider – smallholder women seed out-growers support platform.
2. Link to financial institutions with low interest rates.
3. Continued training/capacity building of smallholder women seeds out-growers and involvement of community opinion leaders.
4. Support women with ready market outlets.

Seed growers/companies also noted that there was the need for targeted interventions by government and NGOs to smallholder women seed out-growers especially in the area of provision of subsidised agro-inputs and traction services, enactment and enforcement of agriculture policies to support smallholder women farmers, etc.

4.5 Good Agricultural and Farmer Practices

4.5.1 Use of Recommended GAPs and Inputs Application Practices

Good Agricultural Practices (GAPS) are very important for improved yield and environmental protection. Farmers knowledge on these practices was therefore evaluated in the various communities of the study districts. GAPs trainings were indicated to have been conducted by PRUDA/CARE International in Ghana and this resulted in early planting and harvesting of crops before the tailing-off of the rains. This was also mentioned by members of the VSLAs during FGDs that they have been trained on Good Agricultural Practices (GAPS) and this they noted will contribute greatly to improved crop yield. The difficulty in row planting, fertilizer application through dibbling and the high cost of certified seeds were however mentioned as challenges that affect their full adoption of the GAPS, they were trained in.

It was suggested that input loans should be made available to farmers and repayment done at the time of harvest as in-kind or cash.

95 % of the women indicated that the site that is selected for the cultivation of a particular crop is very important and also contributes to the improvement in yield of the crops cultivated. 97 % of the women noted that planting in lines increases plant population and yield whilst 96 % observed that it leads to ease in undertaking cultural practices. 92 % of the women also mentioned that good crop yield from timely planting of crops is possible whilst 97 % of the women also observed that improved seed contributes to good plant population and increased crop yield. The responses in relation to the various practices are presented in Table 46.

Table 46: Farmer Practices in Site Selection and Crop Planting

District	Sex of Respondent	Site Selection				Planting							
		Site Selection is as Important as the Crop		Good Site Improves Crop Yield		Planting in Lines Increases Plant Population & Yield		Line Planting Allows Cultural Practices		Leads to Good Crop Yield		Improved Seeds has Good Plant Population and Yield	
		False (%)	True (%)	False (%)	True (%)	False (%)	True (%)	False (%)	True (%)	False (%)	True (%)	False (%)	True (%)
Garu	Male	4	96	9	91	9	91	0	100	4	96	4	96
Tempene		6	94	8	92	8	92	8	92	4	96	4	96
Bawku West		17	83	11	89	11	89	2	98	4	96	6	94
Lambussie-Karni		10	90	13	87	10	90	2	98	6	94	10	90
Nandom		11	89	15	85	7	93	0	100	5	95	4	96
Garu	Female	3	97	3	97	3	97	3	97	9	91	3	97
Tempene		7	93	7	93	7	93	7	93	7	93	7	93
Bawku West		8	92	8	92	4	96	4	96	15	85	4	96
Lambussie-Karni		0	100	0	100	0	100	0	100	0	100	0	100
Nandom		7	93	7	93	0	100	7	93	7	93	0	100

In the area of inputs such as tillage and fertilisers used by farmers, 96 % of the women and 94 % of the men observed that when they apply manure to their crop lands, it improves the water holding capacity of the soils whilst 99 % each of the men and women mentioned that inorganic fertilizer increases the soil nutrients and also improves crop yield. 68 % of the men in the five (5) districts indicated that they plant their crops without ploughing whilst 73 % of the women indicated that they

do not plant without ploughing. Tillage as undertaken by 97 % of the women respondents and 95 % of the men was said to support infiltration of soil water and thus promote uniform crop growth. Table 47 presents the importance of tillage and fertilizer use by farmers.

Table 47: Farmer Tillage and Fertilizer Use

Region	District	Sex of Respondent	Tillage & Fertilizer Use							
			Manure Improves Soil Water Holding Capacity		Fertilizer Increases Nutrient for the Soil and Improves Yield		Planting Directly without Ploughing		Tillage Assists in Water Infiltration	
			False (%)	True (%)	False (%)	True (%)	False (%)	True (%)	False (%)	True (%)
Upper East	Garu	Male	4	96	0	100	34	66	2	98
	Tempane		8	92	2	98	40	60	6	94
	Bawku West		4	96	0	100	32	68	4	96
Upper West	Lambussie-Karni		6	94	2	98	23	77	8	92
	Nandom		9	91	0	100	29	71	7	93
Upper East	Garu		Female	0	100	0	100	76	24	0
	Tempane	0		100	0	100	81	19	0	100
	Bawku West	0		100	0	100	73	27	0	100
Upper West	Lambussie-Karni	7		93	0	100	60	40	7	93
	Nandom	13		87	7	93	73	27	7	93

Timely weed control during the crop growth stage was indicated by 98 % and 97 % of the men and women respondents respectively to reduce competition between weeds and crop plants over plant nutrients on farmlands. As presented in Table 48, weed control was indicated by 91 % of the men and 95 % of the women to contribute to improvement in soil aeration. The ultimate goal of timely weed control was noted by 93 % of the men and 96 % of the women to be a major contributor to improved crop yield on their farms.

Table 48: Farmers and Weed Control on Croplands

Region	District	Sex of Respondent	Weed Control					
			Timely Weed Control Reduces Competition Between Weeds and Plants for Nutrients		Weed Control Improves Aeration in the Soil		Weed Control Improves Yield	
			False (%)	True (%)	False (%)	True (%)	False (%)	True (%)
Upper East	Garu	Male	0	100	6	94	4	96
	Tempane		6	94	6	94	4	96
	Bawku West		4	96	6	94	9	91
Upper West	Lambussie-Karni		2	98	10	90	8	92
	Nandom		0	100	18	82	9	91
Upper East	Garu		Female	0	100	3	97	3
	Tempane	4		96	0	100	4	96
	Bawku West	4		96	8	92	0	100
Upper West	Lambussie-Karni	0		100	7	93	0	100
	Nandom	7		93	7	93	13	87

In the area of the use of cover crops and the practice of crop rotation by farmers in the various communities, 95 % men and 93 % women noted that these practices lead to improved soil fertility whilst 88 % of the men and 92 % of the women indicated that the practices contribute to increase levels of soil microbes. 88 % of the men and 92 % of the interviewed women farmers observed that the use of cover crops and the practice of crop rotation contributes to the prevention of plant diseases. Also, 93 % men and 94 % women noted the contribution of cover crops and crop rotation to the prevention of soil erosion. Details on the importance of cover crops and crop rotation are presented in Table 49.

Table 49: Crop Rotation and Cover Crops Use by Farmers

Region	District	Sex of Respondent	Crop Rotation and Cover Crops							
			Improves Soil Fertility		Prevents Some Plant Diseases		Prevents Soil Erosion		Increases the Microbes in the Soil	
			False (%)	True (%)	False (%)	True (%)	False (%)	True (%)	False (%)	True (%)
Upper East	Garu	Male	4	96	9	91	4	96	11	89
	Tempone		2	98	8	92	8	92	9	91
	Bawku West		8	92	13	87	8	92	13	87
Upper West	Lambussie-Karni		8	92	12	88	10	90	12	88
	Nandom		5	95	20	80	7	93	16	84
Upper East	Garu		Female	3	97	3	97	3	97	3
	Tempone	7		93	7	93	7	93	7	93
	Bawku West	4		96	8	92	4	96	8	92
Upper West	Lambussie-Karni	7		93	7	93	7	93	7	93
	Nandom	13		87	13	87	7	93	13	87

All (100 %) female farmer respondents and 98 % of the male farmers noted that improper rates of the application of agro-chemicals have a deleterious effect on the environment with the same percentage of females (100 %) and 99 % of the males indicating that improper application rate of fertilizer has detrimental effect on crop plants.

The use of protective clothing (nose mask, gloves, etc) was noted by 99 % each of the men and women to protect them from the negative effects of agro-chemicals which have dire health implications. 99 % and 100 % of the men and women respectively noted that there is the need to store agro-chemicals away from the reach of children and in a cool dry place whilst 97 % of the men and 99 % of the women respondents observed that safe disposal of agro-chemicals contributes to environmental health. Table 50 presents the farmer practices in relation to agro-chemicals in the various districts.

Table 50: Agro-Chemicals and Farmer Practices

District	Sex of Respondent	Agro-Chemicals									
		Detrimental Effect of Improper Rate of Chemical Application on the Environment		Detrimental Effect of Improper Rate of Chemical Application on Crops		Use of Protective Clothing Protects a Person from Effects of Chemicals		Agro-chemicals Should be Stored in a Cool Place far from Reach of Children		Safe Disposal of Agro-chemicals is as Important as Keeping the Environment Safe	
		False (%)	True (%)	False (%)	True (%)	False (%)	True (%)	False (%)	True (%)	False (%)	True (%)
Garu	Male	0	100	0	100	0	100	0	100	0	100
Tempane		2	98	2	98	2	98	4	96	2	98
Bawku West		2	98	0	100	0	100	0	100	9	91
Lambussie-Karni		2	98	2	98	2	98	2	98	2	98
Nandom		2	98	0	100	0	100	0	100	0	100
Garu	Female	0	100	0	100	0	100	0	100	0	100
Tempane		0	100	0	100	0	100	0	100	0	100
Bawku West		0	100	0	100	4	96	0	100	4	96
Lambussie-Karni		0	100	0	100	0	100	0	100	0	100
Nandom		0	100	0	100	0	100	0	100	0	100

Members of the VSLAs during FGDs mentioned that they have been trained on good agricultural practices (GAPS) and this they noted will contribute greatly to improved crop yield. The difficulty in row planting, fertilizer application through dibbling and the high cost of certified seeds are challenges that affect their full adoption of the GAPS they were trained in.

4.6 Women's Decision Making and Gender Constraints.

4.6.1 Affiliations to Organizations

VSLAs existed in all survey communities and respondents indicated that they were active members of the VSLAs and were involved in all activities. This allows the Agro-Source Project to leverage on the existence of these Associations and the activeness of the members to introduce interventions.

Many farmers (both male and females) also belong to other groups like FBOs, Religious Groups, Women Groups, CBEAs, Civic Groups, etc.

In the development and transfer of technology, the existence of farmer groups eases largely some difficulties in the introduction and adoption of these technologies. Table 51 presents the groups that farmers who participated in the survey belonged and it is very clear from the results presented that more women were members of more than one group as compared to men. This makes it easier and better for the project to adopt one or more of the groups as a means of introduction of its programmes.

Table 51: Groups/Associations Farmers are Affiliated to in their Communities

Region	District	Sex of Respondent	VSLA	VSLA, Civic, Religious Group	VSLA, FBO and Other Women Group
			% of Respondents		
Upper East	Garua	Male	93	2	4
	Tempane		100	0	0
	Bawku West		98	0	0
Upper West	Lambussie-Karni		100	8	0
	Nandom		91	9	0
Upper East	Garua		Female	73	3
	Tempane	85		7	7
	Bawku West	92		4	4
Upper West	Lambussie-Karni	94		7	0
	Nandom	100		0	0

4.6.2 Decision Making at the Household Level

One of the most important areas of intervention especially targeted at women is their ability to take decisions on their own. It was therefore necessary to assess the decision-making ability in relation to some agricultural activities. It can be observed that more women decided on the type of crops to grow for home consumption as compared to men and where men were involved, this was largely done in consultation with the women.

Some gender barriers to women participation in project activities were noted during FGDs as inadequate funds, limited fertile agricultural land, lack of collaterals, etc. Long distance was also noted as a major barrier to the access of agro-chemicals as well as the ability of women to carry a spray pump during a spraying activity due to the weight.

Women noted that they are comfortable as women and they speak in public freely and with confidence. All views of members of VSLAs during meetings are taken into consideration and gender roles are handled with respect. Interestingly, poverty was however mentioned as the driving force for the confidence of women as they see that speaking out reduces the level of marginalization and also their poverty level. Women mentioned that they are able to decide on what to plant or cultivate on their own. They however mentioned that they need to be empowered more through capacity building.

55 % of the women indicated that they could decide on the type of cash crops to cultivate whilst 44 % noted that they can raise livestock of their choice without any difficulty or problems in the family. Table 52 presents farmers decision making at the household level in relation to food crop, cash crop and livestock production.

Table 52: Household Decision on Food Crop, Cash Crop and Livestock Production

Region	District	Sex of Respondent	Crops Grown for Household Consumption			Cash Crop Farming (Crops for Sale)			Livestock Raising		
			Women	Men	Joint	Women	Men	Joint	Women	Men	Joint
% Respondents											
Upper East	Garu	Male	23	36	40	34	21	45	13	60	28
	Tempone		30	36	34	38	19	43	17	55	28
	Bawku West		21	38	42	32	17	51	23	30	47
Upper West	Lambussie-Karni		12	37	52	21	21	58	13	46	40
	Nandom		4	25	71	4	27	69	4	45	51
Upper East	Garu		Female	64	0	36	67	9	24	42	18
	Tempone	48		7	44	56	4	41	30	19	52
	Bawku West	50		0	50	50	0	50	27	23	50
Upper West	Lambussie-Karni	47		7	47	40	7	53	40	13	47
	Nandom	60		0	40	60	7	33	60	7	33

56 % of the females interviewed during the survey indicated that they can decide on the type of non-farm business activity to engage in without consulting or requiring approval from their male counterparts or husbands whilst 41 % indicated that the decision must be a joint decision. In the area of the marketing of agricultural commodities, 60 % of the women noted that they were involved in the marketing of agricultural products and the decision to sell cash crops or agricultural commodities produced at home can be done without the involvement of men.

For the production of food and cash crops, the decision on the type of agri-input to purchase and apply could be taken by 55 % of the women in all the districts without requiring clearance from their husbands whilst only 6 % men decided on this for women whilst 39 % noted that it was as a joint decision.

As noted in the decision on the marketing of agricultural commodities, women (62 %) were more involved and take their own decisions during the negotiations with buyers whilst 38 % of the women respondents indicated that the decision had to be jointly taken. Details of the field results are presented in Table 53.

Table 53: Decision on Non-Farm Business Activity and Marketing of Agricultural Products

District	Sex of Respondent	Non-Farm Business Activity			Decision on Marketing of Agricultural Products			Decision on Input Purchase			Buyer Negotiations		
		Women	Men	Joint	Women	Men	Joint	Women	Men	Joint	Women	Men	Joint
% Respondents													
Garu	Male	38	23	38	43	23	34	26	32	43	53	15	32
Tempane		49	8	43	53	11	36	32	23	45	57	9	34
Bawku West		40	13	47	42	9	49	17	23	60	51	8	42
Lambussie-Karni		37	10	54	40	12	48	12	33	56	52	4	44
Nandom		27	5	67	35	16	49	5	45	49	51	4	45
Garu	Female	73	3	24	73	6	21	64	3	33	76	0	24
Tempane		56	0	44	59	0	41	59	0	41	59	0	41
Bawku West		50	0	50	50	0	50	50	0	50	50	0	50
Lambussie-Karni		40	7	53	60	0	40	40	20	40	60	0	40
Nandom		60	7	33	60	7	33	60	7	33	67	0	33

The decisions relating to expenditures at the household level were noted to match and widely spread across the women and men and as presented in Table 54, 41 % and 57 % of the women can take decisions on major and minor expenditures respectively whilst 66 % of the women can decide on the type of clothing to buy without requiring approval from their husbands. 62 % of the women indicated that they decide on what to spend money they have earned without involvement of men whilst 38 % indicated that this is a joint decision between the men and women. Women however were seen to have a voice in contributing to what to spend on in relation to money that has been earned by a spouse. These results present a clear picture of what pertains in all the communities and districts of the Upper East and Upper West regions and with the details presented in Table 54.

Table 54: Decision on Major and Minor Household Expenditures

District	Sex on Respondent	Major Household Expenditure			Minor Household Expenditures			Buying Clothing			Spending Money You Earned			Spending Money Earned by Spouse		
		Women	Men	Joint	Women	Men	Joint	Women	Men	Joint	Women	Men	Joint	Women	Men	Joint
% Respondents																
Garu	Male	17	40	43	51	6	43	47	15	38	49	17	34	11	51	38
Tempane		25	42	34	58	11	30	53	15	32	47	13	40	23	34	43
Bawku West		13	40	47	51	2	47	32	9	58	64	6	30	6	57	38
Lambussie-Karni		12	46	42	58	2	40	79	2	19	75	2	23	17	62	21
Nandom		4	56	40	58	4	38	84	0	16	73	2	25	2	64	35
Garu	Female	45	9	45	61	3	36	70	3	27	76	0	24	48	6	45
Tempane		22	22	56	52	4	44	52	4	44	56	0	44	41	7	52
Bawku West		38	12	50	38	4	58	54	0	46	46	0	54	27	8	65
Lambussie-Karni		40	13	47	67	0	33	80	7	13	67	0	33	40	13	47
Nandom		60	7	33	67	0	33	73	0	27	67	0	33	47	13	40

4.7 Role of Regulatory Agencies

4.7.1 Environmental Protection Agency (EPA)

Although, the EPA had no knowledge of the Agro-Source project being implemented by CARE International in Ghana, it provides essential service to agro-input dealers especially those involved in agro-chemical. It was indicated that it's as per the mandate according to the EPA Act (490), they regulate, inspect and license agro-chemical dealers before they operate. They ensure compliance in the provisions of the registration and any contra-indication on the violation, a notice of non-compliance is issued based on the Act. Constraints noted in non-compliance is high illiteracy rate among the agro-input dealers as they do not understand the provisions in the license/Act. It is therefore necessary for regular sensitization workshops through training to improve the knowledge of the input dealers to ensure compliance.

About 250 input dealers in the Upper East Region were noted to have registered with the EPA formally.

Trainings were provided on safe use of agro-chemicals in 2018. The following were mentioned as the challenges of agro-chemical usage/application;

- Soil contamination.
- Pollution of water bodies.
- Health hazards to humans and animals.

In setting up an agro-chemical dealership, the EPA demands that a person should have been registered with the Registrar Generals Department, Plant Protection and Regulatory Services Division of the Ministry of Food and Agriculture and have an EPA license to operate.

It was however noted that few women were engaged in agri-input business and this is because of their low-income levels.

4.7.2 Ghana Seed Inspection Division (GSID)

Ghana Seed Inspection Division (GSID) of the Ministry of Food and Agriculture in the Upper East region was aware of the Agro-Source project being implemented by CARE International in Ghana but not in the Upper West region. Services of GSID in the Seed industry were noted as follows;

- Registration of seed growers,
- Training of seed growers, field inspection and monitoring of seed growers,
- Laboratory seed testing and,
- Certification.

In ensuring compliance by the seed companies, regular field monitoring of seed growers fields are conducted to ensure adherence to standard practices. In enforcing the compliance, GSID have challenges such as logistical support, etc. Regular training of seed growers' was noted to ensure adherence to seed policy regulations.

Also, campaigns to create awareness on seed policy regulations is being promoted. GSID in the Upper East region has 3 seed companies registered with them whilst that of the Upper West region has about 4 registered seed companies.

The modalities involved in registering a seed production business with the division were noted as follows;

- Obtain a business license from Registrar Generals Department.
- An application to GSID for registration.
- Inspection of outlets and farm fields of applicant.
- Issuance of license and conduct of training.

Women are challenged with land acquisition and funding to allow them engage in seed business. Capacity of the women can be built through sensitization to improve their knowledge.

4.7.3 Department of Agriculture

The Departments of Agriculture (DoA) were aware of the Agro-Source project. Their responsibility as a Department is to regulate the agriculture industry through the implementation of government policies. They distribute seeds and fertilizers, ensure compliance by actors in the industry through routine monitoring and sanctioning offenders of the law. It was suggested that, a district level committee be established to oversee the activities of the agro-input industry. Capacity of the input dealers needed to be built. About 4 training sessions for the 51 recognized input dealers were indicated to have been organised but more capacity buildings were needed.

On the environmental challenges of agro-input use, they mention water and air pollution of improper agro-chemical usage. In setting up an input business, the Departments of Agriculture mentioned the following as the criteria;

- A business license/registration from RGD is required.
- A suitable store.
- Registration with the District Assembly.
- Registration with PPRSD of MoFA.

Women face challenges in engaging in agro-input business because of the following;

- handling of the input,
- spillage effect,
- capital and
- other requirements involved in registration.

However, it was noted that the capacity of the women can be built to improve their knowledge and to facilitate their registration.

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

Demographic Profile and Respondent Characteristics

A typical household size in the Upper East region was 6 with 7 persons in Upper West region. The average age of respondent farmers was also noted as 48 years. The survey results indicated a high level of no formal education amongst the farmers. Education of females have been observed to impact so much on their resource utilization and skills capacity in agricultural production activities.

Cereals, legumes and pulses, and vegetables were noted to be predominantly cultivated in the various communities of the survey.

Women Access to Land and Tillage Methods

66 % of the interviewed women in the Upper East region mentioned that they do not have access to land for agricultural production purposes whilst 37 % in the Upper West reported same thus indicating the challenging nature of access to productive lands. Land area allocated to women for agricultural purposes was characterized by hard-pans, water logging or with fertility challenges. To improve access to lands with good production characteristics such as high-level soil fertility, the following were suggested by the women respondents; education of chiefs, landlords/owners and men through community durbars and, increased access to credit to allow women rent fertile lands. It was also noted that migrant/settler farmers are very much challenged in terms of access to land/fertile lands.

Tillage methods commonly used in the various communities were identified as bullock/donkey ploughing, tractor ploughing, zero tillage and hand hoeing. Tractor use was noted to be associated with high cost and limited access.

Farm Plot Characteristics, Crops Grown, and Yield

Crops commonly grown in the survey communities include soya bean, maize, rice and millet. The cultivation of these crops was seen to be on a limited small scale or at the peasant farmer level normally on an average land size of 2.5 acres. Family labour is commonly used in crop cultivation activities. Low crop yields were however associated with poor rainfall, lack of fertilizer, floods/disaster, increase pests/diseases, no inputs/tools and decreasing soil fertility as causal factors. Other notable causes of decrease in crop yield in the various districts and communities were: limited land for cropping, late planting/cultivation due to limited access to inputs and variable rainfall, poor quality seeds, poor farm practices, high cost of inputs and poor soil fertility.

Increasing yields of crops as per farmers assessment for the various cultivated crops resulted from crop tolerance to drought and water logging conditions, early planting to avert future limited rains, use of compost/manure, improved practices and fertilizers.

Income Levels and Economic Status of Farmers

In the Upper East region, 64 % of the women and 44 % in the Upper West region have agricultural wage labour as their source of income. 8 % and 31 % men from the Upper East and Upper West regions respectively earn their income as agricultural wage labourers. 5 % and 8 % of women in the Upper East and West regions respectively engage in firewood/charcoal sales as a source of income for the household. The sources of agricultural income were noted as crop sales, livestock and livestock products sale e.g. meat and milk, nursery products e.g. vegetables, fruits and seedling sales. The lowest amount earned as income per month was noted to be from small business (GHS 5.00 = USD \$ 0.94) whilst the highest was from livestock sales (GHS 2,000.00 = USD \$ 376).

Depending on the source of income and the generators of the income, the decision on spending could be from men, women or both. It was however noted that, women could decide on what to expend their income on and therefore did not have decisions relating to expending their incomes handed-down to them by their male partners.

Farmer Access to Production Loans and Capital

Over 90 % of the farmer respondents in the Upper East region were not able to access credit for their production activities whilst in the Upper West region it was 70 %. There was better credit access in the Upper West region than the Upper East region and this was mainly from VSLAs.

The length of time before farmers could access loan facilities varied from 3 months to 36 months and this depended so much on the source and amount of credit/loan. Amounts that individuals accessed varied from GHS 50.00 (USD \$ 9.42) to GHS 8,000.00 (USD \$ 1506.59). Uses of credit included purchasing agro-inputs e.g. seeds, fertilizers, pesticides, etc.

Farmer Assets in Survey Districts

54 % and 56 % of the male and female respondents respectively indicated ownership of trailers whilst 19 % males and 11 % females own agro-chemical spray pumps. Farmers also owned mobile phones, radio and television sets which served as a medium of communication and the transmission of improved agricultural technologies or messages to a larger farmer population. These serve as a suitable platform for the introduction and communication of improved and scientific knowledge as well as updates especially weather and market information to support the activities of farmers. Mobility and transport of agro-inputs as well as farm produce was undertaken using bicycles, motor cycles and tri-cycles.

Food Security in Survey Districts

48 % of the respondents indicated the non-availability of food throughout the year in the survey districts. Farmers coped with non-availability of food by borrowing food/money to buy food, reliance on less preferred or less expensive foods, reduced number of meals or quantity eaten per day, skipping meals due to lack of food for entire day or lack of money, consumption of taboo/wild/famine foods which are normally not eaten, restricted consumption of some family members so that others could eat normally or more, eating of seed stock held for next season, begging or scavenging.

Availability and Access to Good Quality Agricultural Inputs

Farmers encountered difficulties in accessing agricultural inputs such as certified seeds, fertilizer, agro-chemicals, etc. A high percentage of the respondent farmers were satisfied with accessing agri-inputs with good quality services and competitive prices contributing greatly to their satisfaction levels whilst distance to source of input or service, price of inputs/service and lack of credit affected their satisfaction levels. Knowledge levels of women farmers on proper use of agro-chemicals was generally low and this will consequently have an effect on crop yield. Inorganic fertilizer and herbicides were widely used by farmers in the survey districts whilst the use of weather information and availability of crop threshers was limited.

Agri-inputs are mostly sourced from government program, agro-input dealers within 5 km distance, agro-input dealers farther than 5 km, local seed producers and agri-input fairs.

Farmers spent more time and resources in accessing agricultural inputs instead of engaging in other productive activities. The main problem relating to access to agri-inputs is the absence of agricultural input dealers or outlets in most communities at the time of the baseline survey.

VSLA groups, family and friends, and NGOs provided most of the information on agricultural inputs to farmers. Some farmers indicated that they were taught the proper use of weedicides/herbicides in the cultivation of crops.

Source of Knowledge on Proper Use of Agro-chemicals

Community development NGOs and Agricultural Extension Agents (AEAs) were mentioned as the main source of information on the proper use of agro-chemicals for agricultural production purposes. Agro-input fairs are currently serving the needs of farmers in all the districts except Nandom district in the Upper West region. It is evident that a high percentage of women accessed agri-inputs through agri-input fairs in the last 12 months. Farmers recommended the organization of more agricultural input fairs at the local or community level to allow most members to attend and maximize the benefits associated with them. Agri-inputs fairs served as sources of agri-inputs and information on the activities of input dealers and availability of services.

Challenges on the Use of Agro-Chemicals

Challenges of farmers in accessing and use of agri-inputs included; inadequate knowledge on the use/application of agro-inputs, limited access to fertilizer coupons, high cost of inputs and services, unavailability or limited supply of inputs and services, lack of financial resources, distance, timeliness in application of agri-inputs, lack of transportation, lack of credit and, absence of input dealers in farmers' communities.

It was observed that there were more challenges regarding the use of agro-chemicals in the Upper West region compared to the Upper East region. The improper use/application of agro-chemicals was said to have deleterious effects on farmers, crops and the environment and therefore there is the need to ensure farmers and environmental safety. Education of farmers on safety measures as well as the preparation and application of agro-chemicals will lead to increased crop yields, environmental safety and better lifestyles of farmers.

Farmers indicated the following as solutions to the challenges of farmers; unavailability of input dealers in communities, input subsidies especially targeted at women and widows and establishment of agricultural mechanization centers to provide traction services.

Community Agro-Input Dealers and Business Relationships

Twenty two agro-input dealers were operational in the survey districts and communities and have been operational for between a period of 2 to 19 years. Agri-inputs businesses traded in; fertilizer, seeds, weedicides/herbicides, protective clothing, cutlass, application equipment e.g. knapsack, etc. Some agro-input dealers were registered with the Registrar General's Department and Business Advisory Center (BAC) at the District Assembly in the Upper West region with no indication of registration with regulatory agencies. In the Upper East region however, they indicated they are registered with Registrar General's Department (RGD), Environmental Protection Agency (EPA), or Plant Protection and Regulatory Services Department (PPRSD).

Agro-input dealers have retailers or distributor networks for their goods and business partnership relationships with their suppliers. The benefits of business partnerships included access to credit, capacity building opportunity, and support to improve distribution network.

Agro-input dealers indicated that they undertake farmer and retailer training programmes to enhance their skills and knowledge in the use/sales of agro-chemicals. Trainings were noted to mainly focus on the recommended practices and use of agro-chemicals, the use of Personal Protective Equipment's (PPEs), etc and these are usually undertaken using field demonstrations, group meetings and posters. Some benefits noted from the participation in the agri-input fairs by agro input dealers include increased and improved business network with farmers and retailers, exposure of business to more farmers, establishment of more business linkages with smaller businesses/retailers, exposure to new products or tools, increase in sale of products and increased knowledge level in record keeping, sales, etc.

Identified challenges of agri-input fairs by agro-input dealers were; lack of transport, low prices at fairs because of competition from distributors at the fairs, long and unproductive time spent at the fairs with little sales.

Availability of Certified Seed and Establishment of Seed Out-grower Partnerships

Farmers selected and used their own seed and as well as bought seed from agro-input dealers. A high percentage of male farmers in the two regions had knowledge on the proper use of seed compared to the female farmers. In the performance of germination tests of seeds, more males had knowledge in this area than female farmers. Four (4) qualities of good seed were noted by farmers as big grains, absence of cracks, insect holes, etc, absence of discoloration and matured seeds with cotyledon.

Access to certified seed was very difficult coupled with high prices as 56 farmers indicated they use certified seed in the Upper West region whilst 88 farmers in the Upper East region also indicated the use of certified seed in their crop production activities.

Community Seed Out-growers and Established Partnerships

All (100 %) seed producers or companies were registered and are engaged in the production and sales of soya bean, groundnut, maize (both OPV and hybrid), rice, cowpea, sorghum and cowpea seeds. Requirements for registration as seed grower were said to include availability of land, knowledge in crop production, application and passing of interview. A registration certificate from the regulatory bodies such as MoFA, PPRSD, GSID indicates that one is a certified seed producer. Seed companies had between 40 to 275 men and 30 to 245 women as seed out-growers across the various districts of the survey.

Seed producers also indicated that they organise technology transfer sessions such as demonstrations with their out-growers in the various locations and these focused on new production technologies/GAPS for improved yield, climate smart agriculture, use of high yielding varieties, etc. Challenges faced by seed growers/companies were: women do not have access to large parcels of fertile lands although they are majority of the out-growers, supply of poor-quality foundation seed by some companies, high price of foundation seeds thus affecting profit margins of seed out-growers, availability of several varieties and limited knowledge on varietal purity, high initial cost of investment, unpredictable weather affecting the agricultural activities and pests and diseases prevalence.

Also, seed out-growers faced some challenges and these were: little understanding of the operations of seed companies thus affecting seed out-grower activities, delay in release of agro-inputs to seed out-growers, limited access to fertile lands, delays in accessing traction services and climate change thus affecting weather and cultivation activities of seed out-growers.

Some identified strategies for engaging smallholder women farmers were; linking with women farmers as priority, identification and establishment of working links with VSLAs and FBOs, provision of free seed and agri-input credit support, education of smallholder women farmers on GAPs and, early traction services support.

Challenges of women seed out-growers were also mention as limited access to tractor services for farmland cultivation, lack of funds to procure needed agri-inputs and lack of capital to start/expand business, limited access to fertile and productive lands, limited credit facilities available to support women out-growers and marketing challenges of produce/seeds for women.

Good Agricultural Practices and Farmer Practices

Women indicated they have been trained on GAPS and have gained knowledge in the area of site selection, row planting, timely planting, use of improved seed, tillage and fertilizer/manure use, timely weed control, use of cover crops, proper application and use of agro-chemicals, use of PPEs, proper and safe storage of agro-chemicals as well as safe disposal of used/empty cans, etc. Members of the VSLAs noted that GAPS contributed greatly to improved crop yield.

Women in Agri-input Systems and Gender Responsiveness

VSLAs existed in all survey communities and respondents indicated that they were active members. Agro-Source Project leveraging on the existence of these Associations and the activeness of the members to introduce interventions was therefore recommended. In the area of decision making, more women decided on the type of crops to grow for home consumption. 55 % of the women

indicated that they could decide on the type of cash crop to cultivate whilst 44 % noted that they can raise livestock of their choice without any difficulty or problems in the family. Joint decisions were noted to promoted family unity and co-existence.

56 % of the females interviewed during the survey indicated that they can decide on the type of non-farm business activity to engage in without consulting or requiring approval from their male counterparts or husbands whilst 41 % indicated that the decision must be a joint decision. Decision on the type of agri-input to purchase and apply could be taken by 55 % of the women in all the districts without requiring approval/clearance from their husbands whilst only 6 % men decided on this for women whilst 39 % noted that it was a joint decision.

41 % and 57 % of the women can take decisions on major and minor expenditures respectively whilst 66 % of the women can decide on the type of clothing to buy without requiring approval from their husbands. Some gender barriers to women participation in project activities were noted during FGDS as inadequate financial resources, limited fertile agricultural land, lack of collaterals, limited or non-existent input credit, etc. Long distances to the source of agro-chemical/agro-inputs was also noted as a major barrier to the access whilst ability of women to carry a sprayer pump during a spraying activity due to the weight was also a major challenge.

Role of Regulatory Agencies of Agri-Inputs

The Environmental Protection Agency (EPA) indicated it provides essential service to agro-input dealers and has a mandate according to the EPA Act (490), to regulate, inspect and license agro-chemical dealers. They ensured compliance in the provisions of the registration and any contra-indication on the violation, a notice of non-compliance is issued based on the Act. Regular sensitization workshops through training to improve the knowledge of the input dealers to ensure compliance was recommended. In setting up an agro-chemical dealership, the EPA demands that a person should have been registered with the Registrar Generals Department (RGD), Plant Protection and Regulatory Services Division (PPRSD) of the Ministry of Food and Agriculture (MoFA) and an EPA license to operate.

It was however noted that few women were engaged in agri-input business and this is because of their low-income levels which will not be able to finance the business.

Ghana Seed Inspection Division (GSID) of the Ministry of Food and Agriculture provides services to the Seed industry and which include; registration of seed growers, training of seed growers, field inspection and monitoring of seed growers, laboratory seed testing and certification. Regular field monitoring of seed growers' fields are conducted to ensure adherence/compliance to standard practices. Registration of seed production business requires the following; a business license from Registrar Generals Department, an application to GSID for registration, inspection of outlets and farm plots/fields of applicant and issuance of license and conduct of training. Women who are into seed production business were said to be challenged with fertile land acquisition and limited financial support to engage in seed business.

The Departments of Agriculture (DoA) has a responsibility to regulate the agriculture industry through the implementation of government policies. They are also engaged in seed and fertilizers distribution, capacity building, etc. In setting up an agri-input business, the Departments of Agriculture mentioned

the following as the criteria; a business license/registration from RGD is required, a suitable store, registration with the District Assembly, registration with PPRSD of MoFA. Women engaged in agro-input businesses were said to be faced with the following challenges; difficulty in handling of the agro-chemicals/inputs, agro-chemical spillage effect, limited capital and other requirements involved in registration.

5.2 Suggested Recommendations

Following the field survey and findings, the following are suggested recommendations:

1. The Agro-source project should as part of its activities organize agri-input fairs/agriculture knowledge festivals at the zonal/community level to help improve the access of farmers especially women to agro-inputs.
2. Widows and resource poor women in the project communities should be identified and supported in the form of input credit through partnerships established with agro-input dealers on the project.
3. Farmer education on proper handling, use of agro-chemicals and PPEs is very necessary in the various communities to promote environmental security and enhance productivity.
4. Access to productive/fertile land is a challenge especially by women seed out-growers in the project communities and it is suggested that the project should facilitate access of women to fertile parcels of land especially seed out-growers.
5. The project should support in nurturing individual community seed growers through the provision of logistics, capacity building and financial support for seed out-growers/seed companies as well as agro-input dealerships into major distributors in the implementation districts.
6. There is the need to organize a advocacy/campaign on input subsidies especially targeted at supporting women and especially widows targeted at the inclusion of agro-chemicals and seed in the government subsidy programme.
7. There is the need to organize a capacity building programme as part of the project activities for agro-input dealers and seed companies especially in the area of business development, networking and sensitivity or perception towards women farmers in communities.
8. Support in the establishment of partnerships between service providers e.g. traction service and farmers/seed out-growers (VSLAs) to promote their activities especially to support early planting.
9. The Agro-Source Project should leverage on the existence of VSLAs, Seed Companies and Agro-input dealers in the various locations for the implementation of its activities.

APPENDICES

A: Income Characteristics of Respondents

A.1: Non-Farm Income Sources of Respondents

Region	District	Source of Income								
		Agricultural Wage Labour	Non-Agricultural Wage Labour	Skilled Labour	Small Business Activities e.g. Shop keeping	Formal Employee of Govt, NGO, Private	Handicrafts	Remittances (Domestic)	Remittances (Foreign)	Firewood/ Charcoal Sales
% Male Respondents										
Upper East	Garu	18	2	4	58	7	4	4	0	2
	Tempene	14	2	9	70	2	2	0	0	2
	Bawku West	6	4	4	83	2	0	0	0	2
Upper West	Lambussie-Karni	16	8	5	54	3	0	2	0	11
	Nandom	2	14	11	56	5	2	5	0	5
% Female Respondents										
Upper East	Garu	29	10	5	39	2	0	5	0	10
	Tempene	35	3	3	52	0	0	6	0	0
	Bawku West	21	18	3	39	3	0	12	0	3
Upper West	Lambussie-Karni	33	17	0	44	0	0	0	0	6
	Nandom	6	12	0	53	12	0	6	6	6

A.2: Who Earned the Income in the Past 12 Months

Agricultural Wage Labour						
	Men	Women	Both Men and Women	Children (6-15 years)	All HH Members	No one
Garu	3 (15 %)	11 (55 %)	5 (25 %)	0 (0 %)	1 (5 %)	0 (0 %)
Tempane	0 (0 %)	13 (68 %)	3 (16 %)	0 (0 %)	2 (11 %)	1 (5 %)
Bawku West	1 (10 %)	7 (70 %)	1 (10 %)	1 (10 %)	0 (0 %)	0 (0 %)
Lambussie-Karni	2 (13 %)	6 (38 %)	2 (13 %)	0 (0 %)	6 (38 %)	0 (0 %)
Nandom	1 (50 %)	1 (50 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)
Non-Agricultural Wage Labour						
Garu	0 (0 %)	5 (100 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)
Tempane	0 (0 %)	2 (100 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)
Bawku West	1 (12 %)	7 (88 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)
Lambussie-Karni	1 (12.5 %)	4 (50 %)	1 (12.5 %)	0 (0 %)	2 (25 %)	0 (0 %)
Nandom	4 (40 %)	4 (40 %)	2 (20 %)	0 (0 %)	0 (0 %)	0 (0 %)
Skilled Labour						
Bawku West	1 (33 %)	2 (67 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)
Lambussie-Karni	1 (33 %)	2 (67 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)
Nandom	6 (100 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)
Small Business Activities						
Garu	0 (0 %)	39 (93 %)	3 (7 %)	0 (0 %)	0 (0 %)	0 (0 %)
Tempane	0 (0 %)	50 (89 %)	5 (9 %)	0 (0 %)	0 (0 %)	1 (2 %)
Bawku West	2 (3 %)	49 (85 %)	7 (12 %)	0 (0 %)	0 (0 %)	0 (0 %)
Lambussie-Karni	0 (0 %)	34 (87 %)	7 (17 %)	0 (0 %)	0 (0 %)	0 (0 %)
Nandom	0 (0 %)	41 (98 %)	1 (2 %)	0 (0 %)	0 (0 %)	0 (0 %)
Formal Sector Employee						
Bawku West	0 (0 %)	2 (100 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)
Lambussie-Karni	2 (100 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)
Nandom	2 (40 %)	3 (60 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)
Handicrafts						
Garu	2 (100 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)
Tempane	1 (100 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)
Nandom	1 (100 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)
Remittances (Domestic)						
Lambussie-Karni	0 (0 %)	1 (100 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)
Nandom	0 (0 %)	2 (50 %)	2 (50 %)	0 (0 %)	0 (0 %)	0 (0 %)
Firewood/Charcoal Sales						
Garu	0 (0 %)	5 (100 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)
Tempane	0 (0 %)	1 (100 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)
Bawku West	0 (0 %)	2 (100 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)
Lambussie-Karni	1 (9 %)	9 (82 %)	1 (9 %)	0 (0 %)	0 (0 %)	0 (0 %)
Nandom	0 (0 %)	4 (100 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)
Crop Sales						
Garu	3 (5 %)	22 (44 %)	34 (52 %)	0 (0 %)	0 (0 %)	0 (0 %)
Tempane	2 (3 %)	39 (53 %)	33 (45 %)	0 (0 %)	0 (0 %)	0 (0 %)
Bawku West	2 (2 %)	33 (46 %)	36 (50 %)	0 (0 %)	0 (0 %)	1 (1 %)
Lambussie-Karni	1 (2 %)	20 (31 %)	42 (66 %)	0 (0 %)	0 (0 %)	1 (2 %)
Nandom	0 (0 %)	5 (17 %)	24 (80 %)	2 (3 %)	0 (0 %)	0 (0 %)
Sales of Livestock and Livestock Products						
Garu	10 (77 %)	0 (0 %)	3 (23 %)	0 (0 %)	0 (0 %)	0 (0 %)
Tempane	5 (71 %)	1 (14 %)	1 (14 %)	0 (0 %)	0 (0 %)	0 (0 %)
Bawku West	5 (83 %)	0 (0 %)	1 (17 %)	0 (0 %)	0 (0 %)	0 (0 %)
Lambussie-Karni	9 (75 %)	2 (17 %)	1 (8 %)	0 (0 %)	0 (0 %)	0 (0 %)
Nandom	5 (56 %)	0 (0 %)	4 (44 %)	0 (0 %)	0 (0 %)	0 (0 %)
Nursery Products (Vegetables, Fruits/Forest Products)						
Tempane	0 (0 %)	4 (100 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)
Bawku West	1 (100 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)
Seed Selling (Cereals, Vegetables, herbs)						
Garu	0 (0 %)	1 (100 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)
Tempane	0 (0 %)	1 (100 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)

A.3: Lowest and Highest Amount Earned Per Month

Income Source	Lowest (GHS)	Highest (GHS)
Agricultural Wage	10	750
Non-Agricultural Wage	15	700
Skilled Labour	30	1600
Small Business	5	2800
Formal Employee	200	3600
Handicrafts	80	300
Remittance (Domestic)	40	1000
Firewood/Charcoal Sales	15	500
Crop Sales	115	4000
Livestock Sales	100	2000
Nursery Products	100	900
Seedling Selling	150	900

Exchange Rate: 1 USD (\$) = GHS 5.31

A.4.: Number of Months Income Was Generated in the Last 12 Months

Region	District	Number of Months Income is Generated											
		1	2	3	4	5	6	7	8	9	10	11	12
Agricultural Wage Labour													
Upper East	Garu	5% (1)	5% (1)	20 % (4)	25 % (5)	10% (2)	10% (2)	0 % (0)	0 % (0)	0 % (0)	0 % (0)	0 % (0)	25 % (5)
	Tempane	11 % (2)	6 % (1)	17 % (3)	50 % (9)	6 % (1)	6 % (1)	6 % (1)	0% (0)	0% (0)	0% (0)	0% (0)	0% (0)
	Bawku West	0 % (0)	10 % (1)	60 % (6)	20 % (2)	10% (1)	0 % (0)	0 % (0)	0% (0)	0% (0)	0% (0)	0% (0)	0% (0)
Upper West	Lambussie-Karni	0% (0)	0 % (0)	25 % (4)	31 % (5)	25% (4)	19 % (3)	0 % (0)	0 % (0)	0 % (0)	0 % (0)	0 % (0)	0 % (0)
	Nandom	0% (0)	0 % (0)	50 % (1)	0 % (0)	0 % (0)	0 % (0)	0 % (0)	0% (0)	0% (0)	0% (0)	0% (0)	50 % (1)
Non-Agricultural Wage Labour													
Upper East	Garu	0 % (0)	0 % (0)	20% (1)	0 % (0)	0 % (0)	0 % (0)	20 % (1)	0 % (0)	0%	0 % (0)	0 % (0)	60 % (3)
	Tempane	0% (0)	0% (0)	0 % (0)	0% (0)	0 % (0)	0 % (0)	50 % (1)	0% (0)	0%	0% (0)	0% (0)	50 % (1)
	Bawku West	0% (0)	0% (0)	0% (0)	13 % (1)	0 % (0)	0 % (0)	0 % (0)	0% (0)	0% (0)	13 % (1)	0% (0)	75 % (7)
Upper West	Lambussie-Karni	0 % (0)	13 % (1)	13 % (1)	0 % (0)	0 % (0)	25 % (2)	25 % (2)	0 % (0)	0%	0 % (0)	0 % (0)	25 % (6)
	Nandom	0% (0)	10 % (1)	0 % (0)	0% (0)	10 % (1)	30% (3)	0 % (0)	0% (0)	0%	0% (0)	0% (0)	50 % (5)
Skilled Labour													
Upper East	Garu	0 % (0)	0 % (0)	0 % (0)	0 % (0)	0 % (0)	25 % (1)	0 % (0)	0 % (0)	0 % (0)	0 % (0)	0 % (0)	75 % (3)
	Tempane	0% (0)	0% (0)	0% (0)	0% (0)	0% (0)	17 % (1)	0% (0)	0% (0)	0% (0)	0% (0)	0% (0)	50 % (3)
	Bawku West	0% (0)	0% (0)	0% (0)	0% (0)	0% (0)	0 % (0)	0% (0)	0% (0)	0% (0)	0% (0)	0% (0)	100 % (1)
Upper West	Lambussie-Karni	0 % (0)	0 % (0)	0 % (0)	0 % (0)	0 % (0)	0 % (0)	33 % (1)	33 % (1)	0% (0)	0% (0)	0% (0)	33 % (1)
	Nandom	0% (0)	0% (0)	0% (0)	0% (0)	0% (0)	17 % (1)	0 % (0)	17 % (1)	0% (0)	0% (0)	0% (0)	67 % (4)
Small Business Activities													
Upper East	Garu	0 % (0)	2 % (1)	0 % (0)	0 % (0)	10 % (4)	10 % (4)	7 % (3)	19 % (8)	0% (0)	0% (0)	0% (0)	52 % (22)
	Tempane	0% (0)	0 % (0)	2 % (1)	2 % (1)	5 % (3)	7 % (4)	4 % (2)	20 % (11)	4 % (2)	5 % (3)	0% (0)	51 % (28)
	Bawku West	0% (0)	0 % (0)	2 % (1)	2 % (1)	2 % (1)	10 % (6)	2 % (1)	7 % (4)	3 % (2)	5 % (3)	0% (0)	67 % (39)
Upper West	Lambussie-Karni	0 % (0)	0 % (0)	0 % (0)	5 % (2)	5 % (2)	24 % (10)	7 % (3)	10 % (4)	0% (0)	15 % (6)	0% (0)	34 % (14)
	Nandom	0% (0)	0 % (0)	0 % (0)	2 % (1)	0 % (0)	14 % (6)	0 % (0)	14 % (6)	0% (0)	0% (0)	0% (0)	69 % (29)
Formal Sector Employee													
Upper East	Garu	0 % (0)	0 % (0)	0 % (0)	0 % (0)	0 % (0)	0 % (0)	0 % (0)	0 % (0)	0 % (0)	0 % (0)	0 % (0)	100 % (4)
	Tempane	0% (0)	0% (0)	0% (0)	0% (0)	0% (0)	0 % (0)	0% (0)	0% (0)	0% (0)	0% (0)	0% (0)	100 % (1)
	Bawku West	0% (0)	0% (0)	0% (0)	0% (0)	0% (0)	50%	0% (0)	0% (0)	0% (0)	0% (0)	0% (0)	50 % (1)
Upper West	Lambussie-Karni	0 % (0)	0 % (0)	0 % (0)	0 % (0)	0 % (0)	0%	0 % (0)	0 % (0)	0 % (0)	0 % (0)	0 % (0)	100 % (2)
	Nandom	0% (0)	0% (0)	0% (0)	0% (0)	0% (0)	0%	0% (0)	0% (0)	0% (0)	0% (0)	0% (0)	100 % (5)
Handicrafts													
Upper East	Garu	0 % (0)	0 % (0)	0 % (0)	0 % (0)	0 % (0)	0 % (0)	0 % (0)	100 % (2)	0 % (0)	0 % (0)	0 % (0)	0 % (0)
	Tempane	0% (0)	0% (0)	0% (0)	0% (0)	0% (0)	0% (0)	0% (0)	100 % (1)	0% (0)	0% (0)	0% (0)	0% (0)
Upper West	Nandom	0% (0)	0% (0)	0% (0)	0% (0)	0% (0)	0% (0)	0% (0)	100 % (1)	0% (0)	0% (0)	0% (0)	0% (0)
Remittance (Domestic)													
Upper East	Garu	0 % (0)	25 % (1)	25 % (1)	0 % (0)	0 % (0)	25 % (1)	0 % (0)	0 % (0)	0 % (0)	0 % (0)	0 % (0)	25 % (1)
	Tempane	50 % (1)	0 % (0)	50 % (1)	0% (0)	0% (0)	0% (0)	0% (0)	0% (0)	0% (0)	0% (0)	0% (0)	0% (0)
	Bawku West	75 % (3)	0 % (0)	0 % (0)	25 % (1)	0% (0)	0% (0)	0% (0)	0% (0)	0% (0)	0% (0)	0% (0)	0% (0)
Upper West	Lambussie-Karni	0 % (0)	0 % (0)	100 % (1)	0 % (0)	0% (0)	0 % (0)	0 % (0)	0 % (0)	0 % (0)	0 % (0)	0 % (0)	0 % (0)
	Nandom	0% (0)	25 % (1)	25 % (1)	0% (0)	25 % (1)	0% (0)	0% (0)	0% (0)	0% (0)	0% (0)	0% (0)	25 % (1)
Firewood/Charcoal Sales													
Upper East	Garu	0 % (0)	0 % (0)	0 % (0)	20 % (1)	0% (0)	40 % (2)	0 % (0)	0 % (0)	0 % (0)	0 % (0)	0 % (0)	40 % (2)
	Tempane	0% (0)	0% (0)	0% (0)	0 % (0)	100 % (1)	0 % (0)	0 % (0)	0 % (0)	0 % (0)	0 % (0)	0 % (0)	0 % (0)
	Bawku West	0% (0)	0% (0)	0% (0)	0 % (0)	0 % (0)	0 % (0)	0 % (0)	50 % (1)	0 % (0)	0 % (0)	0 % (0)	50 % (1)
Upper West	Lambussie-Karni	0 % (0)	18 % (2)	27 % (3)	0% (0)	9 % (1)	18 % (2)	18 % (2)	0 % (0)	9 % (1)	0 % (0)	0 % (0)	0 % (0)
	Nandom	0% (0)	0% (0)	0% (0)	0% (0)	25 % (1)	25 % (1)	0 % (0)	0 % (0)	25 % (1)	0 % (0)	0 % (0)	25 % (1)

A.5: Decision on the Spending of Income

Region	District	Agricultural Wage			Non-Agricultural Wage			Small Business			Firewood/Charcoal		
		Men	Women	Both Men and Women	Men	Women	Both Men and Women	Men	Women	Both Men and Women	Men	Women	Both Men and Women
Upper East	Garu	15 % (3)	65 % (13)	20 % (4)	0% (0)	80 % (4)	20 % (1)	0% (0)	90 % (38)	10 % (4)	0% (0)	100 % (5)	0% (0)
	Tempene	0% (0)	78% (14)	22 % (4)	0% (0)	100 % (2)	0% (0)	0% (0)	91 % (50)	9 % (5)	0% (0)	100 % (1)	0% (0)
	Bawku West	10 % (1)	80 % (8)	10 % (1)	13 % (1)	88 % (7)	0% (0)	3 % (2)	86 % (50)	10 % (6)	0% (0)	100 % (2)	0% (0)
Upper West	Lambussie-Karni	31 % (5)	38 % (6)	31 % (5)	13 % (1)	38 % (3)	50 % (4)	0% (0)	78 % (32)	22 % (9)	9 % (1)	73 % (8)	18 % (2)
	Nandom	50 % (1)	50 % (1)	0% (0)	40 % (4)	40 % (4)	20 % (2)	0% (0)	93 % (39)	7 % (3)	0% (0)	75 % (3)	25 % (1)
		Skilled Labour			Formal Sector Employee			Remittance (Domestic)			Handcrafts		
Upper East	Garu	0% (0)	0% (0)	0% (0)	25 % (1)	50 % (2)	25 % (1)	75 % (3)	25 % (1)	0% (0)	0% (0)	100 % (2)	0% (0)
	Tempene	83 % (5)	17%	0% (0)	100 % (1)	0% (0)	0% (0)	100 % (2)	0% (0)	0% (0)	0% (0)	100 % (1)	0% (0)
	Bawku West	33 % (1)	33 % (1)	33 % (1)	50 % (1)	50 % (1)	0% (0)	100 % (4)	0% (0)	0% (0)	0% (0)	0% (0)	0% (0)
Upper West	Lambussie-Karni	33 % (1)	67 % (2)	0% (0)	100 % (2)	0% (0)	0% (0)	100 % (1)	0% (0)	0% (0)	0% (0)	0% (0)	0% (0)
	Nandom	100 % (6)	0% (0)	0% (0)	40 % (2)	60 % (3)	0% (0)	25 % (1)	75 % (3)	0% (0)	100 % (1)	0 % (0)	0% (0)
		Crop Sales			Livestock Sales			Nursery Product Sales			Seed Selling		
Upper East	Garu	5 (8 %)	32 (48 %)	29 (44 %)	12 (92 %)	0 (0 %)	1 (8 %)	0 (0 %)	0 (0 %)	0 (0 %)	1 (100 %)	0 (0 %)	0 (0 %)
	Tempene	1 (1 %)	34 (46 %)	39 (53 %)	5 (71 %)	1 (14 %)	1 (14 %)	0 (0 %)	4 (100 %)	0 (0 %)	0 (0 %)	1 (100 %)	0 (0 %)
	Bawku West	3 (4 %)	31 (44 %)	37 (52 %)	4 (67 %)	0 (0 %)	2 (33 %)	1 (100 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)
Upper West	Lambussie-Karni	6 (10 %)	22 (35 %)	35 (56 %)	10 (83 %)	1 (8 %)	1 (8 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)
	Nandom	5 (17 %)	3 (10 %)	22 (73 %)	5 (56 %)	0 (0 %)	4 (44 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)

B: Food Security Characteristics of Respondents

B.1: Coping Strategies of Households for the Past 3 Months

Region	District	Pledge or sell labour/crops/livestock in advance	Receive remittances (food or cash) from relatives, friends	Take a loan with interest	Slaughter more animals than normal	Request local government for assistance	Lower school attendance or drop out from school	Reduce expenditures (e.g., health care, education)	Reduce expenditure on livestock and agricultural inputs	Sell a higher number of livestock than usual	Unusual sales (e.g., household assets, firewood, charcoal, etc.)	Migrate	Send children away to better-off relatives and friends	Rely on own savings	Participate in food for work/cash for work programs	Sell Seed stock held for next season
Upper East	Garu	27 (16 %)	18 (11 %)	45 (26 %)	0 (0 %)	1 (1 %)	1 (1 %)	4 (6 %)	4 (2 %)	2%	7 (4 %)	3 (2 %)	0 (0 %)	31 (18 %)	7 (4 %)	14 (8 %)
	Tempne	30 (20 %)	13 (9 %)	44 (29 %)	1 (1 %)	0 (0 %)	6 (4 %)	2 (2 %)	2 (1 %)	0 (0 %)	1 (1 %)	4 (3 %)	0 (0 %)	37 (25 %)	2 (1 %)	8 (5 %)
	Bawku West	17 (12 %)	21 (15 %)	41 (29 %)	0 (0 %)	0 (0 %)	1 (1 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	2 (1 %)	1 (1 %)	39 (27 %)	9 (6 %)	12 (8 %)
Upper West	Lambussie-Karni	18 (15 %)	22 (18 %)	18 (15 %)	0 (0 %)	0 (0 %)	2 (2 %)	2 (3 %)	2 (2 %)	0 (0 %)	3 (3 %)	4 (3 %)	2 (2 %)	26 (22 %)	12 (10 %)	7 (6 %)
	Nandom	5 (5 %)	27 (26 %)	17 (16 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	4 (4 %)	0 (0 %)	2 (2 %)	32 (31 %)	5 (5 %)	12 (12 %)

C. Crop Cultivation Characteristics

C.1: Crop Cultivation by Gender/Family Status

Region	District	Men	Women	Both Men and Women	Children	Men	Women	Both Men and Women	Children	Men	Women	Both Men and Women	Children
		Groundnuts				Maize				Bambara Beans			
Upper East	Garu	1 (17 %)	3 (50 %)	2 (33 %)	0 (0 %)	3 (5 %)	30 (46 %)	32 (49 %)	0 (0 %)	0 (0 %)	20 (80 %)	5 (20 %)	0 (0 %)
	Tempane	0 (0 %)	1 (100 %)	0 (0 %)	0 (0 %)	7 (10 %)	30 (44 %)	31 (46 %)	0 (0 %)	0 (0 %)	7 (100 %)	0 (0 %)	0 (0 %)
	Bawku West	0 (0 %)	11 (61 %)	7 (39 %)	0 (0 %)	4 (6 %)	22 (34 %)	38 (59 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)
Upper West	Lambussie-Karni	1 (2 %)	26 (52 %)	22 (44 %)	1 (2 %)	0 (0 %)	24 (39 %)	37 (60 %)	1 (2 %)	0 (0 %)	6 (55 %)	5 (45 %)	0 (0 %)
	Nandom	0 (0 %)	5 (24 %)	16 (76 %)	0 (0 %)	0 (0 %)	17 (30 %)	39 (68 %)	1 (2 %)	0 (0 %)	7 (70 %)	3 (30 %)	0 (0 %)
		Cowpea				Rice				Sorghum			
Upper East	Garu	0 (0 %)	4 (80 %)	1 (20 %)	0 (0 %)	0 (0 %)	33 (83 %)	6 (15 %)	1 (3 %)	0 (0 %)	1 (17 %)	5 (83 %)	0 (0 %)
	Tempane	0 (0 %)	4 (67 %)	2 (33 %)	0 (0 %)	0 (0 %)	62 (91 %)	6 (9 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)
	Bawku West	1 (9 %)	7 (64 %)	3 (27 %)	0 (0 %)	0 (0 %)	44 (73 %)	16 (27 %)	0 (0 %)	0 (0 %)	1 (100 %)	0 (0 %)	0 (0 %)
Upper West	Lambussie-Karni	0 (0 %)	8 (47 %)	9 (53 %)	0 (0 %)	0 (0 %)	11 (42 %)	15 (58 %)	0 (0 %)	0 (0 %)	2 (50 %)	2 (50 %)	0 (0 %)
	Nandom	0 (0 %)	2 (25 %)	5 (63 %)	1 (13 %)	0 (0 %)	2 (25 %)	6 (75 %)	0 (0 %)	0 (0 %)	2 (17 %)	10 (83 %)	0 (0 %)
		Tomato				Common Beans				Millet			
Upper East	Garu	1 (20 %)	3 (60 %)	1 (20 %)	0 (0 %)	2 (14 %)	6 (43 %)	6 (43 %)	0 (0 %)	2 (5 %)	13 (32 %)	26 (63 %)	0 (0 %)
	Tempane	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	1 (14 %)	6 (86 %)	0 (0 %)	0 (0 %)	5 (19 %)	9 (33 %)	13 (48 %)	0 (0 %)
	Bawku West	2 (40 %)	2 (40 %)	1 (20 %)	0 (0 %)	0 (0 %)	5 (83 %)	1 (17 %)	0 (0 %)	2 (13 %)	5 (31 %)	9 (56 %)	0 (0 %)
Upper West	Lambussie-Karni	0 (0 %)	2 (50 %)	2 (50 %)	0 (0 %)	0 (0 %)	5 (42 %)	7 (58 %)	0 (0 %)	0 (0 %)	5 (20 %)	20 (80 %)	0 (0 %)
	Nandom	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	1 (25 %)	1 (25 %)	2 (50 %)	0 (0 %)	0 (0 %)	9 (26 %)	26 (74 %)	0 (0 %)
		Sweet Potato				Onion				Pepper			
Upper East	Garu	0 (0 %)	0 (0 %)	1 (100 %)	0 (0 %)	0 (0 %)	0 (0 %)	1 (100 %)	0 (0 %)	0 (0 %)	6 (86 %)	1 (14 %)	0 (0 %)
	Tempane	1 (50 %)	0 (0 %)	0 (0 %)	1 (50 %)	1 (7 %)	12 (80 %)	1 (7 %)	1 (7 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)
	Bawku West	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	3 (18 %)	9 (53 %)	5 (29 %)	0 (0 %)	0 (0 %)	2 (67 %)	1 (33 %)	0 (0 %)
Upper West	Lambussie-Karni	0 (0 %)	0 (0 %)	1 (100 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	2 (50 %)	2 (50 %)	0 (0 %)
	Nandom	0 (0 %)	1 (50 %)	1 (50 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)

C.2: Causes of Reduction in Crop Yield

Region	District	Increased Pests/Disease	No Inputs/Tools	Less Labour	No/Bad Rains	Floods/Disaster	Cultivated Less Land	Decreasing Soil Fertility	No Fertilizer	No Tractor Services	No Seeds	No Herbicides
Soya												
Upper East	Garu	5(13 %)	2 (5 %)	1 (3 %)	10 (26 %)	2 (5 %)	3 (8 %)	5 (13 %)	9 (23 %)	1 (3 %)	1 (3 %)	0 (0 %)
	Tempane	6 (14 %)	2 (5 %)	5 (12 %)	11 (26 %)	0 (0 %)	0 (0 %)	4 (10 %)	8 (19 %)	2 (5 %)	2 (5 %)	2 (5 %)
	Bawku West	0 (0 %)	0 (0 %)	1 (13 %)	1 (13 %)	2 (25 %)	1 (13 %)	2 (25 %)	0 (0 %)	1 (13 %)	0 (0 %)	0 (0 %)
Upper West	Lambussie-Karni	4 (15 %)	1 (4 %)	4 (15 %)	2 (8 %)	1 (4 %)	0 (0 %)	6 (23 %)	4 (15 %)	1 (4 %)	1 (4 %)	2 (8 %)
	Nandom	0 (0 %)	0 (0 %)	0 (0 %)	1 (50 %)	0 (0 %)	1 (50 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)
Groundnut												
Upper East	Garu	0 (0 %)	0 (0 %)	0 (0 %)	1 (33 %)	0 (0 %)	0 (0 %)	2 (67 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)
	Tempane	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	1 (100 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)
	Bawku West	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)
Upper West	Lambussie-Karni	1 (4 %)	0 (0 %)	3 (11 %)	8 (30 %)	2 (7 %)	0 (0 %)	5 (19 %)	5 (19 %)	1 (4 %)	1 (4 %)	1 (4 %)
	Nandom	1 (11 %)	0 (0 %)	2 (22 %)	2 (22 %)	0 (0 %)	0 (0 %)	1 (11 %)	1 (11 %)	0	1 (11 %)	1 (11 %)
Maize												
Upper East	Garu	3 (7 %)	4 (10 %)	2 (5 %)	8 (19 %)	6 (14 %)	1 (2 %)	5 (12 %)	9 (21 %)	1 (2 %)	1 (2 %)	2 (5 %)
	Tempane	7 (19 %)	0 (0 %)	3 (8 %)	6 (16 %)	1 (3 %)	2 (5 %)	6 (16 %)	8 (22 %)	2 (5 %)	1 (3 %)	1 (3 %)
	Bawku West	4 (16 %)	0 (0 %)	3 (12 %)	4 (16 %)	2 (8 %)	0 (0 %)	3 (12 %)	6 (24 %)	1 (4 %)	1 (4 %)	1 (4 %)
Upper West	Lambussie-Karni	5 (9 %)	4 (8 %)	4 (8 %)	5 (9 %)	1 (2 %)	0 (0 %)	13 (25 %)	9 (17 %)	2 (4 %)	4 (8 %)	6 (11 %)
	Nandom	5 (17 %)	0 (0 %)	1 (3 %)	8 (27 %)	1 (3 %)	2 (7 %)	8 (27 %)	3 (10 %)	0 (0 %)	1 (3 %)	1 (3 %)
Rice												
Upper East	Garu	3 (11 %)	3 (11 %)	2 (7 %)	6 (21 %)	2 (7 %)	2 (7 %)	3 (11 %)	7 (25 %)	0 (0 %)	0 (0 %)	0 (0 %)
	Tempane	3 (10 %)	2 (7 %)	4 (13 %)	7 (23 %)	1 (3 %)	0 (0 %)	4 (13 %)	6 (20 %)	0 (0 %)	0 (0 %)	3 (10 %)
	Bawku West	3 (12 %)	2 (8 %)	3 (12 %)	2 (8 %)	2 (8 %)	0 (0 %)	4 (15 %)	7 (27 %)	0 (0 %)	0 (0 %)	3 (12 %)
Upper West	Lambussie-Karni	2 (7 %)	2 (7 %)	3 (11 %)	3 (11 %)	1 (4 %)	1 (4 %)	4 (15 %)	4 (15 %)	2 (7 %)	2 (7 %)	3 (11 %)
	Nandom	1 (7 %)	1 (7 %)	1 (7 %)	4 (29 %)	2 (14 %)	0 (0 %)	2 (14 %)	2 (14 %)	1 (7 %)	0 (0 %)	0 (0 %)
cowpea												
Upper East	Garu	1 (33 %)	0 (0 %)	0 (0 %)	0 (0 %)	1 (33 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	1 (33 %)
	Tempane	0 (0 %)	0 (0 %)	0 (0 %)	2 (50 %)	1 (25 %)	0 (0 %)	0 (0 %)	1 (25 %)	0 (0 %)	0 (0 %)	0 (0 %)
	Bawku West	0 (0 %)	1 (25 %)	0 (0 %)	3 (75 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)
Upper West	Lambussie-Karni	0 (0 %)	1 (5 %)	3 (15 %)	3 (15 %)	0 (0 %)	4 (20 %)	1 (5 %)	5 (25 %)	1 (5 %)	1 (5 %)	1 (5 %)
	Nandom	0 (0 %)	0 (0 %)	0 (0 %)	1 (50 %)	0 (0 %)	0 (0 %)	1 (50 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)
Tomato												
Upper East	Garu	1(17 %)	1 (17 %)	1 (17 %)	1 (17 %)	0 (0 %)	0 (0 %)	0 (0 %)	1 (17 %)	0 (0 %)	0 (0 %)	1 (17 %)
	Tempane	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)
	Bawku West	0 (0 %)	0 (0 %)	0 (0 %)	1 (100 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)
Upper West	Lambussie-Karni	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	1 (100 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)
	Nandom	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)
Common Beans												
Upper East	Garu	5 (26 %)	1 (5 %)	2 (11 %)	2 (11 %)	2 (11 %)	0 (0 %)	3 (16 %)	2 (11 %)	0 (0 %)	0 (0 %)	2 (11 %)
	Tempane	3 (50 %)	1 (17 %)	1 (17 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	1 (17 %)	0 (0 %)	0 (0 %)	0 (0 %)
	Bawku West	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)
Upper West	Lambussie-Karni	3 (17 %)	1 (6 %)	3 (17 %)	2 (11 %)	0 (0 %)	0 (0 %)	3 (17 %)	3 (17 %)	0 (0 %)	1 (6 %)	2 (11 %)
	Nandom	1 (25 %)	0 (0 %)	0 (0 %)	0 (0 %)	1 (25 %)	0 (0 %)	1 (25 %)	1 (25 %)	0 (0 %)	0 (0 %)	0 (0 %)
Onion												
Upper East	Garu	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)
	Tempane	1 (17 %)	0	1 (17 %)	0 (0 %)	0 (0 %)	0 (0 %)	1 (17 %)	3 (50 %)	0 (0 %)	0 (0 %)	0 (0 %)
	Bawku West	0 (0 %)	0 (0 %)	0 (0 %)	1 (14 %)	1 (14 %)	2 (29 %)	0	3 (43 %)	0 (0 %)	0 (0 %)	0 (0 %)
Upper West	Lambussie-Karni	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)
	Nandom	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)

Pepper												
Upper East	Garu	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	1 (50 %)	0 (0 %)	0 (0 %)	1 (50 %)	0 (0 %)	0 (0 %)	0 (0 %)
	Tempene	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)
	Bawku West	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)
Upper West	Lambussie-Karni	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	1 (100 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)
	Nandom	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)
Millet												
Upper East	Garu	4 (11 %)	6 (17 %)	2 (6 %)	3 (8 %)	1 (3 %)	1 (3 %)	2 (6 %)	10 (28 %)	1 (3 %)	2 (6 %)	4 (11 %)
	Tempene	1 (7 %)	0 (0 %)	2 (14 %)	0 (0 %)	1 (7 %)	0 (0 %)	5 (36 %)	4 (29 %)	0 (0 %)	0 (0 %)	1 (7 %)
	Bawku West	1 (7 %)	1 (7 %)	1 (7 %)	2 (14 %)	2 (14 %)	1 (7 %)	2 (14 %)	1 (7 %)	1 (7 %)	0 (0 %)	2 (14 %)
Upper West	Lambussie-Karni	3 (13 %)	1 (4 %)	3 (13 %)	4 (17 %)	0 (0 %)	0 (0 %)	4 (17 %)	3 (13 %)	0 (0 %)	3 (13 %)	2 (9 %)
	Nandom	1 (6 %)	0 (0 %)	1 (6 %)	5 (28 %)	2 (11 %)	1 (6 %)	5 (28 %)	2 (11 %)	0 (0 %)	1 (6 %)	0 (0 %)
Sorghum												
Upper East	Garu	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)
	Tempene	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)
	Bawku West	0 (0 %)	0 (0 %)	0 (0 %)	1 (100 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)
Upper West	Lambussie-Karni	0 (0 %)	0 (0 %)	0 (0 %)	1 (100 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)
	Nandom	1 (14 %)	0	1 (14 %)	4 (57 %)	0 (0 %)	0 (0 %)	0 (0 %)	1 (14 %)	0 (0 %)	0 (0 %)	0 (0 %)
Bambara Beans												
Upper East	Garu	2 (12 %)	2 (12 %)	0 (0 %)	6 (35 %)	4 (24 %)	0 (0 %)	0 (0 %)	2 (12 %)	0 (0 %)	1 (6 %)	0 (0 %)
	Tempene	0 (0 %)	1 (100 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)
	Bawku West	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)
Upper West	Lambussie-Karni	0 (0 %)	0 (0 %)	1 (50 %)	1 (50 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)
	Nandom	0 (0 %)	0 (0 %)	1 (17 %)	2 (33 %)	0 (0 %)	0 (0 %)	3 (50 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)

C.3: Causes of Increase in Crop Yield

Region	District	Fewer Pests and/or Diseases	Improved Tools (Farm Implements)	More Labour	Good Rains	No Floods/Disaster	Cultivated More Land	Increased Use of Fertilizers	Use of Pesticides	Improved Seeds	Use of improved Practices	Improved Irrigation	Improved Access to Extension Education	Use of Herbicides	Improved Soil Fertility
Upper East	Garu	2 (6 %)	0 (0 %)	1 (3 %)	7 (20 %)	0 (0 %)	2 (96 %)	5 (14 %)	3 (9 %)	1 (3 %)	4 (11 %)	0 (0 %)	3 (9 %)	5 (14 %)	2 (6 %)
	Tempane	3 (3 %)	0 (0 %)	4 (4 %)	23 (26 %)	1 (1 %)	1 (1 %)	18 (20 %)	3 (3 %)	2 (2 %)	14 (16 %)	0 (0 %)	10 (11 %)	8 (9 %)	2 (2 %)
	Bawku West	3 (6 %)	0 (0 %)	3 (6 %)	13 (25 %)	0 (0 %)	2 (4 %)	9 (17 %)	2 (4 %)	4 (8 %)	5 (9 %)	2 (4 %)	6 (11 %)	4 (8 %)	0 (0 %)
Upper West	Lambussie-Karni	3 (7 %)	5 (11 %)	5 (11 %)	10 (23 %)	2 (5 %)	1 (2 %)	3 (7 %)	3 (7 %)	2 (5 %)	2 (5 %)	1 (2 %)	2 (5 %)	3 (7 %)	2 (5 %)
	Nandom	1 (20 %)	0 (0 %)	0 (0 %)	1 (20 %)	0 (0 %)	0 (0 %)	1 (20 %)	0 (0 %)	0 (0 %)	1 (20 %)	0 (0 %)	1 (50 %)	0 (0 %)	0 (0 %)
Groundnut															
Upper East	Garu	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	1 (50 %)	0 (0 %)	0 (0 %)	0 (0 %)	1 (50 %)
	Tempane	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)
	Bawku West	1 (7 %)	0 (0 %)	1 (7 %)	5 (36 %)	0 (0 %)	1 (7 %)	2 (14 %)	0 (0 %)	1 (7 %)	1 (7 %)	0 (0 %)	2 (14 %)	1 (7 %)	1 (7 %)
Upper West	Lambussie-Karni	5 (12 %)	2 (5 %)	2 (5 %)	16 (39 %)	2 (5 %)	2 (5 %)	1 (2 %)	3 (7 %)	2 (5 %)	3 (7 %)	0 (0 %)	1 (2 %)	2 (5 %)	0 (0 %)
	Nandom	2 (11 %)	0 (0 %)	2 (11 %)	7 (39 %)	1 (6 %)	0 (0 %)	1 (6 %)	0 (0 %)	1 (6 %)	2 (11 %)	0 (0 %)	1 (6 %)	0 (0 %)	1 (6 %)
Maize															
Upper East	Garu	6 (7 %)	0 (0 %)	6 (7 %)	18 (20 %)	0 (0 %)	20 (23 %)	3 (3 %)	5 (6 %)	3 (3 %)	5 (6 %)	1 (1 %)	7 (8 %)	11 (13 %)	3 (3 %)
	Tempane	10 (6 %)	1 (1 %)	7 (5 %)	29 (19 %)	3 (2 %)	37 (24 %)	1 (1 %)	8 (5 %)	9 (6 %)	16 (10 %)	0 (0 %)	13 (8 %)	17 (11 %)	4 (3 %)
	Bawku West	8 (7 %)	1 (1 %)	4 (4 %)	27 (24 %)	0 (0 %)	29 (25 %)	0 (0 %)	4 (4 %)	5 (4 %)	10 (9 %)	0 (0 %)	9 (8 %)	17 (15 %)	0 (0 %)
Upper West	Lambussie-Karni	6 (7 %)	2 (2 %)	5 (6 %)	21 (24 %)	3 (3 %)	18 (21 %)	2 (2 %)	7 (8 %)	6 (7 %)	3 (3 %)	0 (0 %)	2 (2 %)	7 (8 %)	5 (6 %)
	Nandom	4 (6 %)	0 (0 %)	5 (8 %)	15 (24 %)	0 (0 %)	17 (27 %)	0 (0 %)	6 (10 %)	1 (2 %)	5 (8 %)	0 (0 %)	2 (3 %)	4 (6 %)	3 (5 %)
Rice															
Upper East	Garu	3 (6 %)	0 (0 %)	3 (6 %)	12 (25 %)	1 (2 %)	0 (0 %)	8 (17 %)	3 (6 %)	2 (4 %)	5 (10 %)	0 (0 %)	5 (10 %)	1 (10 %)	1 (2 %)
	Tempane	7 (6 %)	0 (0 %)	2 (2 %)	24 (21 %)	3 (3 %)	1 (1 %)	28 (24 %)	9 (8 %)	5 (4 %)	13 (11 %)	0 (0 %)	11 (9 %)	12 (10 %)	2 (2 %)
	Bawku West	5 (6 %)	1 (1 %)	4 (5 %)	17 (22 %)	0 (0 %)	0 (0 %)	18 (23 %)	6 (8 %)	3 (4 %)	6 (8 %)	3 (4 %)	7 (9 %)	8 (10 %)	0 (0 %)
Upper West	Lambussie-Karni	1 (5 %)	1 (5 %)	1 (5 %)	5 (24 %)	3 (14 %)	0 (0 %)	1 (5 %)	2 (10 %)	2 (10 %)	2 (10 %)	0 (0 %)	1 (5 %)	1 (5 %)	1 (5 %)
	Nandom	0 (0 %)	0 (0 %)	1 (50 %)	1 (50 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)
cowpea															
Upper East	Garu	1 (25 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	1 (25 %)	0 (0 %)	1 (25 %)	0 (0 %)	1 (25 %)	0 (0 %)	0 (0 %)
	Tempane	0 (0 %)	0 (0 %)	1 (20 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	1 (20 %)	0 (0 %)	1 (20 %)	0 (0 %)	1 (20 %)	1 (20 %)	0 (0 %)
	Bawku West	0 (0 %)	0 (0 %)	0 (0 %)	2 (100 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)
Upper West	Lambussie-Karni	1 (10 %)	0 (0 %)	1 (10 %)	2 (20 %)	0 (0 %)	1 (10 %)	0 (0 %)	1 (10 %)	1 (10 %)	1 (10 %)	0 (0 %)	1 (10 %)	1 (10 %)	0 (0 %)
	Nandom	1 (50 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	1 (50 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)
Tomato															
Upper East	Garu	1 (14 %)	0 (0 %)	1 (14 %)	1 (14 %)	0 (0 %)	1 (14 %)	0 (0 %)	1 (14 %)	0 (0 %)	0 (0 %)	0 (0 %)	1 (14 %)	1 (14 %)	0 (0 %)
	Tempane	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)
	Bawku West	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	1	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)
Upper West	Lambussie-Karni	1 (33 %)	0 (0 %)	0 (0 %)	1 (33 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	1 (33 %)
	Nandom	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)

Common Beans															
Upper East	Garu	0 (0 %)	0 (0 %)	0 (0 %)	1 (50 %)	0 (0 %)	1 (50 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)
	Tempane	1 (11 %)	0 (0 %)	1 (11 %)	1 (11 %)	0 (0 %)	1 (11 %)	0 (0 %)	1 (11 %)	1 (11 %)	0 (0 %)	0 (0 %)	1 (11 %)	1 (11 %)	0 (0 %)
	Bawku West	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	2 (25 %)	0 (0 %)	2 (25 %)	0 (0 %)	2 (25 %)	2 (25 %)
Upper West	Lambussie-Karni	1 (14 %)	0 (0 %)	0 (0 %)	2 (29 %)	0 (0 %)	0 (0 %)	0 (0 %)	1 (14 %)	1 (14 %)	0 (0 %)	0 (0 %)	1 (14 %)	1 (14 %)	0 (0 %)
	Nandom	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)
Onion															
Upper East	Garu	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	1 (100 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)
	Tempane	2 (6 %)	0 (0 %)	2 (6 %)	4 (12 %)	0 (0 %)	7 (21 %)	1 (3 %)	2 (6 %)	1 (3 %)	3 (9 %)	2 (6 %)	5 (15 %)	5 (15 %)	0 (0 %)
	Bawku West	1 (8 %)	0 (0 %)	1 (8 %)	0 (0 %)	1 (8 %)	2 (17 %)	0 (0 %)	1 (8 %)	1 (8 %)	2 (17 %)	1 (8 %)	0 (0 %)	1 (8 %)	1 (8 %)
Upper West	Lambussie-Karni	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)
	Nandom	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)
Pepper															
Upper East	Garu	1 (9 %)	0 (0 %)	1 (9 %)	2 (18 %)	0 (0 %)	0 (0 %)	0 (0 %)	1 (9 %)	0 (0 %)	2 (18 %)	1 (9 %)	1 (9 %)	2 (18 %)	0 (0 %)
	Tempane	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)
	Bawku West	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	1 (100 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)
Upper West	Lambussie-Karni	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)
	Nandom	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)
Millet															
Upper East	Garu	4 (12 %)	0 (0 %)	5 (15 %)	8 (24 %)	1 (3 %)	6 (18 %)	0 (0 %)	1 (3 %)	0 (0 %)	2 (6 %)	0 (0 %)	3 (9 %)	2 (6 %)	1 (3 %)
	Tempane	5 (14 %)	1 (3 %)	4 (11 %)	5 (14 %)	2 (6 %)	6 (17 %)	0 (0 %)	2 (6 %)	1 (3 %)	3 (9 %)	0 (0 %)	3 (9 %)	3 (9 %)	0 (0 %)
	Bawku West	0 (0 %)	0 (0 %)	0 (0 %)	2 (67 %)	0 (0 %)	1 (33 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)
Upper West	Lambussie-Karni	4 (12 %)	2 (6 %)	5 (15 %)	6 (18 %)	2 (6 %)	2 (6 %)	0 (0 %)	2 (6 %)	1 (3 %)	3 (9 %)	0 (0 %)	2 (6 %)	3 (9 %)	2 (6 %)
	Nandom	2 (9 %)	0 (0 %)	2 (9 %)	6 (26 %)	0 (0 %)	6 (26 %)	0 (0 %)	1 (4 %)	1 (4 %)	2 (9 %)	0 (0 %)	2 (9 %)	1 (4 %)	0 (0 %)
Sorghum															
Upper East	Garu	0 (0 %)	0 (0 %)	0 (0 %)	2 (33 %)	0 (0 %)	1 (17 %)	0 (0 %)	0 (0 %)	0 (0 %)	1 (17 %)	1 (17 %)	1 (17 %)	0 (0 %)	0 (0 %)
	Tempane	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)
	Bawku West	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)
Upper West	Lambussie-Karni	0 (0 %)	1 (25 %)	1 (25 %)	1 (25 %)	1 (25 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)
	Nandom	0 (0 %)	1 (11 %)	2 (22 %)	4 (44 %)	0 (0 %)	1 (11 %)	0 (0 %)	1 (11 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)
Bambara Beans															
Upper East	Garu	0 (0 %)	0 (0 %)	0 (0 %)	2 (67 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	1 (33 %)	0 (0 %)	0 (0 %)
	Tempane	2 (29 %)	0 (0 %)	1 (14 %)	2 (29 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	1 (14 %)	0 (0 %)	1 (14 %)	0 (0 %)	0 (0 %)
	Bawku West	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)
Upper West	Lambussie-Karni	0 (0 %)	0 (0 %)	0 (0 %)	2 (67 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	1 (33 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)
	Nandom	0 (0 %)	0 (0 %)	0 (0 %)	2 (100 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)

C.4: Cropping System Used By Farmers

Region	District	Soya Bean		Groundnut		Cowpea		Common Beans		Bambara Beans	
		Mixed cropping	Mono cropping	Mixed cropping	Mono cropping	Mixed cropping	Mono cropping	Mixed cropping	Mono cropping	Mixed cropping	Mono cropping
Upper East	Garu	32 (63 %)	19 (37 %)	1 (17 %)	5 (83 %)	1 (20 %)	4 (80 %)	6 (43 %)	8 (57 %)	2 (8 %)	24 (92 %)
	Tempane	49 (73 %)	18 (27 %)	0 (0 %)	1 (100 %)	2 (33 %)	4 (67 %)	4 (57 %)	3 (43 %)	0 (0 %)	0 (0 %)
	Bawku West	21 (53 %)	19 (48 %)	0 (0 %)	19 (100 %)	1 (9 %)	10 (91 %)	0 (0 %)	9 (100 %)	0 (0 %)	7 (100 %)
Upper West	Lambussie-Karni	6 (16 %)	31 (84 %)	4 (7 %)	56 (93 %)	7 (29 %)	17 (71 %)	3 (21 %)	11 (79 %)	6 (46 %)	7 (54 %)
	Nandom	3 (43 %)	4 (57 %)	1 (3 %)	30 (97 %)	6 (60 %)	4 (40 %)	1 (17 %)	5 (83 %)	1 (7 %)	13 (93 %)
		Tomato		Maize		Rice		Millet		Sorghum	
Upper East	Garu	1 (20 %)	4 (80 %)	43 (63 %)	25 (37 %)	1 (3 %)	39 (97 %)	21 (50 %)	21 (50 %)	1 (17 %)	5 (83 %)
	Tempane	0 (0 %)	0 (0 %)	51 (71 %)	21 (29 %)	1 (1 %)	68 (99 %)	10 (36 %)	18 (64 %)	0 (0 %)	0 (0 %)
	Bawku West	0 (0 %)	9 (100 %)	24 (35 %)	44 (65 %)	0 (0 %)	65 (100 %)	3 (13 %)	20 (87 %)	0 (0 %)	1 (100 %)
Upper West	Lambussie-Karni	1 (25 %)	3 (75 %)	10 (14 %)	63 (86 %)	0 (0 %)	33 (100 %)	4 (12 %)	30 (88 %)	2 (22 %)	7 (78 %)
	Nandom	0 (0 %)	0 (0 %)	6 (8 %)	70 (92 %)	1 (8 %)	12 (92 %)	3 (8 %)	37 (93 %)	5 (28 %)	13 (72 %)
		Onion		Pepper		Sweet Potato					
Upper East	Garu	0 (0 %)	1 (100 %)	1 (14 %)	6 (86 %)	0 (0 %)	1 (100 %)				
	Tempane	0 (0 %)	16 (100 %)	0 (0 %)	0 (0 %)	0 (0 %)	2 (100 %)				
	Bawku West	0 (0 %)	18 (100 %)	0 (0 %)	3 (100 %)	0 (0 %)	0 (0 %)				
Upper West	Lambussie-Karni	0 (0 %)	0 (0 %)	1 (25 %)	3 (75 %)	0 (0 %)	1 (100 %)				
	Nandom	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	1 (50 %)	1 (50 %)				

C.5: Access to Production Seed

Region	District	Farmer Saved Seed	Purchased from a Seed Dealer in the Community	Purchased from Seed Dealer in the District	Purchased from a Seed Dealer in the City	From Friends/Relatives	Purchased from Open Market	Farmer Saved Seed	Purchased from a Seed Dealer in the Community	Purchased from Seed Dealer in the District	Purchased from a Seed Dealer in the City	From Friends/Relatives	Purchased from Open Market	Farmer Saved Seed	Purchased from a Seed Dealer in the Community	Purchased from Seed Dealer in the District	Purchased from a Seed Dealer in the City	From Friends/Relatives	Purchased from Open Market
Upper East	Garu	31 (62 %)	1 (2 %)	8 (16 %)	0 (0 %)	2 (4 %)	8 (16 %)	6 (67 %)	0 (0 %)	2 (22 %)	0 (0 %)	0 (0 %)	1 (11 %)	4 (67 %)	0 (0 %)	1 (17 %)	0 (0 %)	1 (17 %)	0 (0 %)
	Tempone	40 (59 %)	1 (1 %)	14 (21 %)	0 (0 %)	2 (3 %)	11 (16 %)	1 (50 %)	1 (50 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	2 (33 %)	1 (17 %)	1 (17 %)	0 (0 %)	2 (33 %)	0 (0 %)
	Bawku West	17 (40 %)	1 (2 %)	6 (14 %)	0 (0 %)	1 (2 %)	17 (40 %)	8 (40 %)	2 (10 %)	2 (10 %)	0 (0 %)	0 (0 %)	8 (40 %)	2 (18 %)	0 (0 %)	1 (9 %)	1 (9 %)	7 (64 %)	0 (0 %)
Upper West	Lambussie-Karni	17 (45 %)	4 (11 %)	4 (11 %)	3 (8 %)	2 (5 %)	8 (21 %)	47 (73 %)	2 (3 %)	2 (3 %)	3 (5 %)	1 (2 %)	9 (14 %)	15 (65 %)	1 (4 %)	1 (4 %)	2 (9 %)	4 (17 %)	0 (0 %)
	Nandom	6 (86 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	1 (14 %)	25 (81 %)	0 (0 %)	2 (6 %)	0 (0 %)	2 (6 %)	2 (6 %)	8 (100 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)
Maize																			
Upper East	Garu	31 (61 %)	2 (4 %)	16 (31 %)	0 (0 %)	2 (4 %)	0 (0 %)	21 (78 %)	1 (4 %)	2 (7 %)	0 (0 %)	3 (11 %)	0 (0 %)	2 (67 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	1 (33 %)
	Tempone	41 (67 %)	3 (5 %)	17 (28 %)	0 (0 %)	0 (0 %)	0 (0 %)	45 (82 %)	2 (4 %)	7 (13 %)	0 (0 %)	1 (2 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)
	Bawku West	32 (62 %)	4 (8 %)	15 (29 %)	0 (0 %)	1 (2 %)	0 (0 %)	30 (77 %)	0 (0 %)	8 (21 %)	0 (0 %)	1 (3 %)	0 (0 %)	0 (0 %)	0 (0 %)	5	0 (0 %)	0 (0 %)	1 (17 %)
Upper West	Lambussie-Karni	52 (83 %)	3 (5 %)	4 (6 %)	3 (5 %)	1 (2 %)	0 (0 %)	19 (76 %)	0 (0 %)	1 (4 %)	4 (16 %)	1 (4 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	1 (33 %)
	Nandom	63 (86 %)	0 (0 %)	6 (8 %)	0 (0 %)	4 (5 %)	0 (0 %)	10 (91 %)	0 (0 %)	0 (0 %)	0 (0 %)	1 (9 %)	0 (0 %)	1 (100 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)
Common Beans																			
Upper East	Garu	4 (36 %)	0 (0 %)	1 (9 %)	0 (0 %)	0 (0 %)	6 (55 %)	1 (100 %)	0 (0 %)	0	0 (0 %)	0 (0 %)	0 (0 %)	25 (86 %)	1 (3 %)	2 (7 %)	0 (0 %)	1 (3 %)	0 (0 %)
	Tempone	3 (43 %)	0 (0 %)	2 (29 %)	0 (0 %)	0 (0 %)	2 (29 %)	0 (0 %)	0 (0 %)	2	0 (0 %)	0 (0 %)	0 (0 %)	19 (79 %)	0 (0 %)	5 (21 %)	0 (0 %)	0 (0 %)	0 (0 %)
	Bawku West	3 (38 %)	0 (0 %)	2 (25 %)	0 (0 %)	0 (0 %)	3 (38 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	12 (63 %)	0 (0 %)	6 (32 %)	0 (0 %)	1 (5 %)	0 (0 %)
Upper West	Lambussie-Karni	7 (58 %)	0 (0 %)	2 (17 %)	0 (0 %)	0 (0 %)	3 (25 %)	1 (100 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	26 (93 %)	0 (0 %)	2 (7 %)	0 (0 %)	0 (0 %)	0 (0 %)
	Nandom	3 (50 %)	0 (0 %)	1 (17 %)	0 (0 %)	0 (0 %)	2 (33 %)	1 (50 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	1 (50 %)	34 (87 %)	0 (0 %)	3 (8 %)	0 (0 %)	2 (5 %)	0 (0 %)
Onion																			
Upper East	Garu	0 (0 %)	0 (0 %)	1 (100 %)	0 (0 %)	0 (0 %)	0 (0 %)	5 (100 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	3 (60 %)	0 (0 %)	1 (20 %)	0 (0 %)	0 (0 %)	1 (20 %)
	Tempone	10 (56 %)	0 (0 %)	2 (11 %)	0 (0 %)	0 (0 %)	6 (33 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)
	Bawku West	9 (53 %)	0 (0 %)	3 (18 %)	0 (0 %)	0 (0 %)	5 (29 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	2 (100 %)	1 (100 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)
Upper West	Lambussie-Karni	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	1 (25 %)	0 (0 %)	1 (25 %)	0 (0 %)	0 (0 %)	2 (50 %)	8 (89 %)	0 (0 %)	1 (11 %)	0 (0 %)	0 (0 %)	0 (0 %)
	Nandom	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	15 (94 %)	0 (0 %)	0 (0 %)	0 (0 %)	1 (6 %)	0 (0 %)
Bambara Beans																			
Upper East	Garu	12 (55 %)	0 (0 %)	2 (9 %)	0 (0 %)	2 (9 %)	6 (27 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)
	Tempone	3 (43 %)	0 (0 %)	1 (14 %)	0 (0 %)	0 (0 %)	3 (43 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)
	Bawku West	10 (77 %)	0 (0 %)	1 (8 %)	0 (0 %)	0 (0 %)	2 (15 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)
Upper West	Lambussie-Karni	13 (100 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)
	Nandom	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)	0 (0 %)

D. Physical and Technical Capacity of Seed Producer Companies/Outgrowers

D.1: Seed Company Characteristics

Region	District	Name of Company	Registration Status	Years of Business Experience (Years)	Products/Services	No. of Out-Growers	Knowledge on Registration Requirements
Northern	Tamale Metro/Sagnarigu	Heritage Seeds Company Ltd	Registered	Nine (9)	- Soya Bean - Groundnut - Maize (OPV & Hybrid) - Rice - Cowpea - Sorghum	Men: 1,000 Women: 700 (30 Women & 1 man in Lambussie-Karni)	Yes
Upper East	Bawku West	Akundi Farms	Registered	Five (5)	- Maize - Soya Beans - Cowpea - Rice	Men: 52 Women: 34	Yes
Upper East	Bawku West	Yelsumde Ghana Ltd	Registered	Twenty-Three (23)	- Maize - Soya Beans - Cowpea - Rice	Men: 60 Women: 40	Yes
Upper East	Garu	Layiri Agribusiness	Registered	Four (4)	- Maize - Soya Beans - Cowpea	Men: 40 Women: 68	Yes
Upper East	Bawku West	Agholisi Farms	Registered	Fifteen (15)	- Maize - Soya Beans	Men: 275 Women: 245	Yes

D.2: Seed Company Training Services

Region	District	Name of Company	Organisation of Technology Transfer Sessions	Farmer Demonstration		Organisation of Field Days in Last Season	Frequency of Seed Out-grower Trainings/Year
				Organisation of Farmer Demonstration Fields	Area of Farmer Demonstration		
Northern	Tamale Metro/Sagnarigu	Heritage Seeds Company Ltd	Yes	Yes	<ul style="list-style-type: none"> - Good Agricultural Practices - Army Worm Control - Post-Harvest Loss Management 	Yes	Twice
Upper East	Bawku West	Akundi Farms	Yes	Yes	Good Agricultural Practices (GAPS)	Yes	Thrice
Upper East	Bawku West	Yelsumde Ghana Ltd	Yes	Yes	Good Agricultural Practices (GAPS)	Yes	Twice
Upper East	Garu	Layiri Abribusiness	Yes	Yes	<ul style="list-style-type: none"> - Good Agricultural Practices (GAPS) - Use of micro-bunds 	Yes	Twice
Upper East	Bawku West	Agholisi Farms	Yes	Yes	<ul style="list-style-type: none"> - Good Agricultural Practices (GAPS) - Pests and Diseases - Record Keeping 	Yes	Twice

D.3a: Challenges and Suggested Solutions of Seed Companies/Out-growers

Name of Company	Challenges			Suggested Solutions		
	Seed Growers/Companies	Seed Out-growers	Women Seed Out-growers	Seed Growers/Companies	Seed Out-growers	Women Seed Out-growers
Heritage Seeds Company Ltd	<ul style="list-style-type: none"> - Limited access to fertile and vast lands by women although they are majority - Diversion of agro-inputs from intended purposes by men - High cost of seed - Limited knowledge of farmers on seeds and varietal differences - Over reliance on rainfall - Lack of storage facilities 	<ul style="list-style-type: none"> - Limited education on business operations - Accessibility of tractor services - Timely payment of farm produce - Lack of funds to buy farm inputs 	<ul style="list-style-type: none"> - Limited access to fertile lands - Limited access to tractor services - Lack of capital/finance to procure agro-inputs - 	<ul style="list-style-type: none"> - Establishment of demonstration plots for farmer education - Collaborate with land owners and tradition authorities - Farmer education on seed/varietal differences - Introduction of credit facility with low interest rates - Construction of ware houses - Development of irrigation systems to reduce over-reliance on rainfall 	<ul style="list-style-type: none"> - Demonstration on practical field processes - Linking farmers to tractor services - Support farmers with tractor and threshing services - Supply farmers with foundation seed and fertilizer on credit basis 	<ul style="list-style-type: none"> - Organisation of gender dialogues in communities - Linking farmers to tractor services - Link to financial institutions with low interest - Education of out-growers and community opinion leaders
Akundi Farms	<ul style="list-style-type: none"> - Unpredictable and rapidly changing weather - Slow adoption rate of especially new seed varieties 	<ul style="list-style-type: none"> - Limited access to fertile land - Difficulty in accessing agro-inputs - Delay access to tractor services 	<ul style="list-style-type: none"> - Limited access to tractor services - Limited access to fertile lands - Inadequate funds for start-ups or business expansion 	<ul style="list-style-type: none"> - Education and sensitisation of smallholder farmers on seed varieties - Setting-up of modern weather equipment for reporting 	<ul style="list-style-type: none"> - Farmer support with tractor services - Support farmers on timely basis with agro-inputs on credit basis 	<ul style="list-style-type: none"> - Link to financial institutions with low interest. - Government policies on agriculture should support more women.
Yelumde Ghana Ltd	<ul style="list-style-type: none"> - Unpredictable and rapidly changing weather - Limited financial base/financial constraints - Slow adoption rate of especially new seed varieties 	<ul style="list-style-type: none"> - Limited access to agro-inputs - Delay access to tractor services 	<ul style="list-style-type: none"> - Limited access to fertile land - Limited access to credit facilities - Challenges with marketing and sales of produce - Delays in accessing tractor services 	<ul style="list-style-type: none"> - Financial support from government, NGOs, Banks, etc - Education of smallholder farmers on the adoption and use of new seed varieties. - Setting-up of modern weather equipment for reporting 	<ul style="list-style-type: none"> - Farmer support with tractor services - Support farmers on timely basis with agro-inputs on credit basis 	<ul style="list-style-type: none"> - Farmer support with tractor services - Assist with sale/marketing of produce - Support women out-growers with credit facilities/agro-inputs - Lobby community leaders/landlords for more land to be given to women

D.3b: Challenges and Suggested Solutions of Seed Companies/Out-growers

Name of Company	Challenges			Suggested Solutions		
	Seed Growers/Companies	Seed Out-growers	Women Seed Out-growers	Seed Growers/Companies	Seed Out-growers	Women Seed Out-growers
Layiri Agribusiness	<ul style="list-style-type: none"> - High business investment costs - Unpredictable and rapidly changing weather - Slow adoption rate of especially new seed varieties 	<ul style="list-style-type: none"> - Limited access to fertile land - Difficulty in accessing agro-inputs - Delay access to tractor services 	<ul style="list-style-type: none"> - Limited access to fertile land - Delays in accessing traction services - Poor access to agro-inputs 	<ul style="list-style-type: none"> - Establishment of financial links between seed growers and financial institutions - Education of smallholder farmers on the adoption and use of new seed varieties. 	<ul style="list-style-type: none"> - Farmer support with early tractor services - Lobby for release of more fertile lands to women seed out-growers 	<ul style="list-style-type: none"> - Seed companies and government should support women seed out-growers - Support women out-growers in the release of fertile land banks to women and smallholder farmers.
Agholisi Farms	<ul style="list-style-type: none"> - Slow adoption rate of especially new seed varieties - Financial challenges 	<ul style="list-style-type: none"> - Delay in the release of agro-inputs - Limited access to modern technologies e.g. weather 	<ul style="list-style-type: none"> - Limited credit facilities - Delays in accessing agro-inputs - Difficulty in sale/marketing of agricultural produce 	<ul style="list-style-type: none"> - Education of smallholder farmers on the adoption and use of new seed varieties. - Timely release of agri-inputs from government - Establishment of financial links between seed growers and government/financial institutions - Setting-up of modern weather equipment for reporting 	<ul style="list-style-type: none"> - Timely release of agro-inputs to seed out-growers - Education on and use of modern production technologies e.g. weather forecasting 	<ul style="list-style-type: none"> - Support women out-growers with credit facilities and agro-input credit systems - Provision of traction services - Support in the sale/marketing of produce

D.4: Seed Companies Experiences, Partnerships and Collaborations

Region	District	Name of Company	Registration Requirements	Sources of Foundation Seed	Collaborators	Strategies for Working with Women Seed Out-growers	Experiences Working with Women Seed Out-growers
Northern	Tamale Metro/Sagnarigu	Heritage Seeds Company Ltd	- Availability of land - Knowledge in crop production - Application and interview process	- CRI - SARI - GLDB - LCIC	CARE International in Ghana, PRUDA, AGRA, NASTAG, IITA, SARI, CRI, Seed Inspection Unit (MoFA), SEED PAG, Ganorma Agro-chemicals, Inter-Continental Agro-chemicals.	Serious females are identified from VSLAs and FBO	- They use agro-inputs for intended purposes leading to increased yield - Easily adopt new technologies
Upper East	Bawku West	Akundi Farms	Register with GSID and PPRSD	SARI in Manga/Tamale	NGOs, Seed Out-growers, Smallholder farmers, MoFA	- Provision of seed packs for farming - Provision of agro-inputs on credit basis	Women seed out-growers are dedicated, honest and hardworking
Upper East	Bawku West	Yelsumde Ghana Ltd	Register with GSID and PPRSD	SARI in Manga/Tamale	Seed out-growers, smallholder farmers, MoFA, NGOs, SARI	- Provision of agro-inputs on credit basis - Provision of early traction services	Women seed out-growers are honest and hardworking
Upper East	Garu	Layiri Agribusiness	Register with GSID and PPRSD	SARI in Manga/Tamale	PAS-Garu, Smallholder farmers, MoFA, Seed out-growers, NGOs e.g. CARE	Education and provision of agro-inputs for seed out-growers	Women seed out-growers are honest, dedicated and hardworking
Upper East	Bawku West	Agholisi Farms	Register with MoFA at district level, PPRSD and GSID	SARI	Smallholder farmers/out-growers, MoFA, SARI, NGOs	- Provision of free seed packs - Provision of agro-inputs on credit basis	Women seed out-growers are hardworking and honest

E: Characteristics and Capacity of Agro-Inputs

E.1a: Technical Characteristics and Capacity of Agro-Input Dealers – Upper East Region

Region	District	Name of Community	Name of Company	Registration Status	Institutions Registered	Years of Business Experience	Products/ Services	No. of Business Outlets	Technical Capacity	Strategies in Serving Clients/Farmers	Products Source
Upper East	Tempane	Basyonde	Ali Karim Ayimanga Enterprise	Registered	RG EPA PPRSD	Sixteen (16)	- Agro Chemicals - Fertilizer - Certified Seeds	One (1)	Workshops organised by MoFA & NGOs	- Provision of discount in sale of products - Display of products in market shop	- Garu - Kumasi - Tamale - Bolga - Basyonde - Woriyanga
Upper East	Tempane	Basyonde	Tahiru Issah Enterprise	Registered	RG EPA PPRSD	Nine (9)	- Agro-chemicals - Fertilizer - Knapsacks	One (1)	Workshops organised by MoFA	- Provision of discount in sale of products	- Bolga - Tamale - Kumasi - Basyonde - Kongo
Upper East	Garu	Garu	Asonkpat Enterprise	Registered	RG EPA PPRSD	Thirteen (13)	- Agro-chemicals - Fertilizer - Knapsacks - Certified Seeds	Four (4)	No Training	- Provision of discount in sale of products - Radio advertisement	- Bolga - Kumasi - Garu - Bawku - Pusiga - Binduri - Tempane
Upper East	Garu	Garu	Grande Enterprise	Registered	RG EPA PPRSD	Sixteen (16)	- Agro-chemicals - Fertilizer - Certified Seeds	Six (6)	No Training	Free delivery service for more than 10 bags of fertilizer - Provision of limited credit sales	- Bolga - Kumasi
Upper East	Garu	Garu	T9 Ventures	Registered	RG EPA PPRSD	Ten (10)	- Agro-chemicals - Fertilizer - Certified Seeds - Knapsacks	Ten (10)	No Training	- Provision of discount in sale of products - Radio advertisement	- Kumasi - Tamale - Bolga
Upper East	Garu	Garu	Yaalah Enterprise	Registered	RG EPA PPRSD	-	- Agro-chemicals - Fertilizer	Three (3)	No Training	Free delivery service for more than 10 bags of fertilizer - Provision of discount in sale of products	

E.1b: Technical Characteristics and Capacity of Agro-Input Dealers – Upper East Region

Region	District	Name of Community	Name of Company	Registration Status	Institutions Registered	Years of Business Experience	Products/ Services	No. of Business Outlets	Technical Capacity	Strategies in Serving Clients/Farmers	Products Source
Upper East	Bawku West	Zebilla	Abare's Enterprise	Registered	RG EPA PPRSD	Nineteen (19)	- Agro Chemicals - Fertilizer - Certified Seeds - Knapsacks	Two (2)	Workshops organised by MoFA, EPA & NGOs	- Provision of discount in sale of products - Education on product use	- Kumasi - Tamale - Bolga
Upper East	Bawku West	Zebilla	Abdala First Enterprise	Registered	RG EPA PPRSD	Eight (8)	- Agro Chemicals - Fertilizer - Certified Seeds - Knapsacks	Two (2)	Workshops organised by MoFA, EPA & NGOs	- Provision of discount in sale of products - Education on product use - Free delivery service for more than 10 bags of fertilizer	- Tamale - Kumasi - Bolga
Upper East	Bawku West	Sapelliga	Ayeltokolog Enterprise	Registered	RG EPA PPRSD	Two (2)	- Agro Chemicals - Fertilizer - Certified Seeds	One (1)	Workshops organised by MoFA, EPA & NGOs	- Provision of discount in sale of products - Education on product use	- Bolga - Zebilla
Upper East	Bawku West	Zebilla	Salamatu Sani Enterprise	Registered	RG EPA PPRSD	Nine (9)	- Agro Chemicals - Fertilizer - Certified Seeds - Knapsacks	Two (20)	Workshops organised by MoFA & EPA	- Provision of discount in sale of products - Free delivery service for more than 10 bags of fertilizer	- Bolga - Tamale - Kumasi

E.2a: Technical Characteristics and Capacity of Agro-Input Dealers – Upper West Region

Region	District	Name of Community	Name of Company	Registration Status	Institutions Registered	Years of Business Experience	Products/ Services	No. of Business Outlets	Technical Capacity	Strategies in Serving Clients/Farmers	Products Source
Upper West	Nandom	Nandom	Tieme Ndo	Registered	RG	Two (2)	- Agro Chemicals - Fertilizer - Cutlass - Wallington Boots - Knapsacks	Three (3)	No Training	- Organises training and extension	- Kumasi - Tamale - Bolga
Upper West	Nandom	Nandom	Luke Yaasan	Registered	DA	Nine (9)	Agro-chemicals	-	No Training	- Provision of credit sales - Establishes good communication with clients	- Techiman - Kumasi
Upper West	Nandom	Nandom	Mahmud Mashud Ventures	Registered	RG	Sixteen (16)	- Agro Chemicals - Fertilizer - Certified Seeds - Knapsacks	Two (2)	No Training	- Farmer education on GAPS - Promotion sales	- Kumasi - Techiman
Upper West	Nandom	Nandom	Maalyel Enterprise	Registered	RG	Two (2)	- Agro Chemicals - Fertilizer	-	No Training	- Provision of credit sales - Education of farmers in input application	- Techiman
Upper West	Nandom	Ko	Kyolusanyuur Enterprise	Registered	DA	Five (5)	- Agro-chemicals	-	No Training	- Good and competitive pricing	- Wa
Upper West	Nandom	Ko	Eric Maaboryele Enterprise	Registered	DA	Four (4)	- Agro-chemicals	-	No Training	- Establishment of good customer relation	-
Upper West	Nandom	Brutu	Gegera So Tuo	Registered	DA	Three (3)	- Agro-chemicals	-	No Training	- Establishment of good customer relations - Provision of credit sales	- Techiman

E.2b: Technical Characteristics and Capacity of Agro-Input Dealers – Upper West Region

Region	District	Name of Community	Name of Company	Registration Status	Institutions Registered	Years of Business Experience	Products/ Services	No. of Business Outlets	Technical Capacity	Strategies in Serving Clients/Farmers	Products Source
Upper West	Lambussie	Billaw	Lawrance Bayuo Enterprise	Registered	DA	Six (6)	- Agro Chemicals - Fertilizer - Certified Seeds - Knapsacks	-	No Training	- Regular meeting with farmers and education on proper use of agro-chemicals	Wa
Upper West	Lambussie	Ul-Tampoe	Saana Musah Enterprise	Registered	DA	-	- Agro-chemicals - Fertilizer	-	No Training	- Provision of discount in sale of products	Wa
Upper West	Lambussie	Kpanagan	Yiire Emma Enterprise	Registered	DA	Four (4)	- Agro-chemicals - Certified Seeds	-	No Training	Provision of farmer education on proper preparation and application of agro-chemicals	Wa
Upper West	Lambussie	Lambussie	Anady Enterprise	Registered	DA	Two (2)	- Agro-chemical - Fertilizer	-	No Training	- Provision of farmer education on proper preparation and application of agro-chemicals - Provision of credit sales	Wa
Upper West	Lambussie	Lambussie	Big Joe Agro-Chemical Enterprise	Registered	DA	Eight (8)	- Agro-chemical - Fertilizer	-	No Training	- Provision of farmer education on proper preparation and application of agro-chemicals	Wa

E.3a: Business Partnership Development of Agro-Input Dealers – Upper East Region

Region	District	Name of Community	Name of Company	No. of Customers Served Per Week	No. of Women Customers Served Out of 10 Per Week	Average Weekly Sales (GHS)	Record Keeping	Availability of Workplace Manuals	Means of Delivery Best Education Services to Women	Participation in Agri-input Fairs	Organiser of Agri-Input Fairs	Benefits of Agri-input Fairs	Challenges of Agri-input Fairs
Upper East	Tempene	Basyonde	Ali Karim Ayimanga Enterprise	80	2	6,000.00	Yes	No	Education on recommended quantities and product use	Yes	MoFA	Establishment of business linkages	No
Upper East	Tempene	Basyonde	Tahiru Issah Enterprise	50	2	4,000	Yes	No	Education on recommended quantities and product use	Yes	MoFA, IFDC	- Exposure to new products and tools - Improved knowledge on new farming techniques	No
Upper East	Garu	Garu	Asonkpat Enterprise	300	4	11,000	Yes	No	Education of farmers on recommended practices	Yes	MoFA, CARE, PAS-Garu, IDE, MADE	-Improved knowledge on agro-input use - Record keeping	No
Upper East	Garu	Garu	Grande Enterprise	250	3	15,000	Yes	No	Demonstration of proper agro-chemical application	Yes	MoFA, CARE, IFDC, USAID-ADVANCE	- Improved knowledge about agro-chemical usage - Establishment of business links	Long hours are spent at the fairs
Upper East	Garu	Garu	T9 Ventures	200	4	15,000	Yes	No	Education on proper use of agro-chemicals	- Yes	MoFA, CARE	- Improved knowledge on agro-chemical use - Establishment of business linkages	- No
Upper East	Garu	Garu	Yaalah Enterprise	90	3	7,000	Yes	No	Education of proper use of agro-chemicals	- Yes	MoFA	Improved record keeping	Long hours are spent at the fairs

E.3b: Business Partnership Development of Agro-Input Dealers – Upper East Region

Region	District	Name of Community	Name of Company	No. of Customers Served Per Week	No. of Women Customers Served Out of 10 Per Week	Average Weekly Sales (GHS)	Record Keeping	Availability of Workplace Manuals	Means of Delivery Best Education Services to Women	Participation in Agri-input Fairs	Organiser of Agri-Input Fairs	Benefits of Input Fairs	Challenges of Agri-input Fairs
Upper East	Bawku West	Zebilla	Abare's Enterprise	70	3	6,000.00	Yes	No	Education of clients on proper use of agro-chemicals	Yes	MoFA/DA	Improved knowledge on modern farming practices	No
Upper East	Bawku West	Zebilla	Abdala First Enterprise	60	4	7,000.00	Yes	No	Farmer education of agro-chemical use	Yes	MoFA/DA, MADE	Improved capacity of existing business opportunities and establishment of more business linkages	No
Upper East	Bawku West	Sapelliga	Ayeltokolog Enterprise	15	2	2,000.00	Yes	No	Education of farmers on recommended use of agro-chemicals	Yes	MoFA	support in business links establishment	Delays in programmes and long periods of time spent at fairs
Upper East	Bawku West	Zebilla	Salamatu Sani Enterprise	50	3	3,000.00	Yes	No	Farmer education	Yes	MoFA/DA	Acquisition of knowledge on record keeping and new knowledge on farming techniques	

E.4: Business Partnership Development of Agro-Input Dealers – Upper West Region

Region	District	Name of Community	Name of Company	No. of Customers Served Per Week	No. of Women Customers Served Out of 10 Per Week	Average Weekly Sales (GHS)	Record Keeping	Availability of Workplace Manuals	Means of Delivery Best Education Services to Women	Participation in Agri-input Fairs	Organiser of Agri-Input Fairs	Benefits of Input Fairs	Challenges of Agri-input Fairs
Upper West	Nandom	Nandom	Tieme Ndo	15	3	500	Yes	No	Using group meeting to disseminate information	No	-	-	-
Upper West	Nandom	Nandom	Luke Yaasan	45	4	200	No	No	-	No	-	-	-
Upper West	Nandom	Nandom	Mahmud Mashud Ventures	70	4	500	No	No	Education of farmers through FBOs	No	-	-	-
Upper West	Nandom	Nandom	Maalyel Enterprise	30	7	350	Yes	No	-	No	-	-	-
Upper West	Nandom	Ko	Kyolusanyuur Enterprise	23	5	300	No	No	Education of farmers on proper use of agro-chemicals through VSLA	No	-	-	-
Upper West	Nandom	Ko	Eric Maaboryele Enterprise	12	5	100	No	No	-	-	-	-	-
Upper West	Nandom	Brutu	Gegera So Tuo	10	6	100	No	No	Through education on agro-chemical use	Yes	CARE, MEDA	Acquisition of knowledge on GAPS and efficient use of agro-chemicals	No
Upper West	Lambussie	Billaw	Lawrance Bayuo Enterprise	100	9	800	Yes	No	Undertaking of practical demonstration and equipment handling and use.	Yes	PRUDA CARE	Capacity building on handling and storage of agro-chemicals	Lack of transport, timely delivery of products to suppliers
Upper West	Lambussie	Ul-Tampoe	Saana Musah Enterprise	20	8	300	Yes	Yes	Conduct of demonstrations and posters	Yes	PRUDA CARE	Fairs exposes farmers to input dealers	No
Upper West	Lambussie	Kpanagan	Yiire Emma Enterprise	24	5	200	Yes	No	-	Yes	PRUDA CARE	-	-
Upper West	Lambussie	Lambussie	Anady Enterprise	35	6	630	Yes	No	-	Yes	PRUDA	-	-
Upper West	Lambussie	Lambussie	Big Joe Agro-Chemical Enterprise	25	8	450	Yes	No	-	Yes	PRUDA CARE	Reduced distance to sale of product	-

F: List of Respondents and Their Contact Details of the Field Survey in Five (5) Regions

F.1: Respondent List and Contact Details for Nandom District – Upper West Region

REDACTED FOR PRIVACY

F.2: Respondent List and Contact Details for Lambussie-Karni District – Upper West Region

REDACTED FOR PRIVACY

F.3: Respondent List and Contact Details for Bawku West District – Upper West Region

REDACTED FOR PRIVACY

F.4: Respondent List and Contact Details for Garu District – Upper West Region

REDACTED FOR PRIVACY

F.5: Respondent List and Contact Details for Tempene District – Upper West Region

REDACTED FOR PRIVACY