Baseline Protocols

The Case of Yam Improvement for Income and Food Security in West Africa (YIIFSWA) Project

Djana B. Mignouna, Tahirou Abdoulaye,
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Cover photo: Researcher conducting training among yam farmers

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The YIIFSWA baseline study is part of the YIIFSWA project which is funded by the Bill & Melinda Gates Foundation.

Preface

The YIIFSWA (Yam Improvement for Income and Food Security in West Africa) project is an R4D project of IITA. The project is funded by the Bill & Melinda Gates Foundation and executed in Nigeria and Ghana by IITA in partnership with a consortium of national and international R4D agencies and in collaboration with service provider organizations, the private sector, farmers, and yam traders.

The YIIFSWA project has the following broad objectives:

1. Strengthen small-scale farmer and trader market linkages, particularly in less accessible producing areas, to realize benefits from improved ware yam productivity and market demand.
2. Strengthen capacities and empower small-holder farmers in the yam value chain.
3. Establish sustainable availability of high quality seed yam on a commercially viable and price competitive bases in targeted areas.
4. Reduce postharvest losses and improve product quality.
5. Develop technologies for high ratio propagation of high quality breeder and foundation seed yam.
6. Evaluate and scale out yam production technologies with improved and local popular varieties.
7. Identify more effective prevention and management tools and strategies for pests and diseases.

Each objective is addressed by a team of researchers supported by other researchers working on two cross-cutting components, namely impact monitoring, evaluation and learning; and communication and information dissemination.

The YIIFSWA Working Paper Series is published informally by YIIFSWA to disseminate its intermediate outputs. Publications in the series include methodologies for, as well as preliminary results of the various objective teams of the YIIFSWA project. The series is aimed at scientists and researchers working with national agricultural research systems in West Africa, the international research community, policy makers, donors, and members of international development agencies that are interested in yam. As these papers are not in their final form, comments are welcome. Such comments should be addressed to the respective authors or to the YIIFSWA Project Manager.

Individuals and institutions may obtain copies by writing to:

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Ibadan, Nigeria

1. Introduction

Importance of yam

In West Africa yam (*Dioscorea* spp.) is a food and cash crop; it plays an important role in food security and in the livelihoods of 60 million people in the region. The crop is cultivated mostly in the derived, humid and southern Guinea savanna agroecologies. About 48 million tons of yams (95 percent of global supply) are produced on 4 million hectares annually in the region, mainly in five countries: Benin, Côte d'Ivoire, Ghana, Nigeria, and Togo; Nigeria alone accounts for 70 percent of global yam supply. In Ghana, 26.2% of the population depends on yam for food income and food security (IITA 2012).

Yam ranks as one of the most important sources of calories in Benin, Côte d'Ivoire, and Ghana. The crop also makes a substantial contribution to protein in the diet, ranking as the third most important source of supply after maize and rice. Additionally, yam plays a significant role in social rites of passage, thanksgiving, etc. giving it prominence over other food crops in the region. Demand for the commodity is increasing; as incomes increase consumers shift from substitutes to yam especially when the price of yam relative to prices of its substitutes declines (Maroya 2014).

Yam is a vegetatively propagated crop cultivated for its underground edible tubers, and a very important source of food and income for millions of producers, processors, and consumers in West Africa. Farmers participate in yam production for three main reasons: household food supply; income generation through marketing ware yam; and production of planting material (seed yam) to meet their own needs with some income from the sale of the surplus.

Basis of Yam Improvement for Income and Food Security in West Africa (YIIFSWA) Project

Numerous problems which affect the yam food sector impede national policy program efforts aimed at promoting yam as a priority crop in the various countries in West Africa. High production costs arise from the high incidence of destructive yam pests and diseases such as nematodes, viruses, fungi, scale insects, beetles, etc. at both pre-harvest and postharvest stages; the high labor input associated with land preparation, planting, staking, weeding, and harvesting; and the increasing shortage of virgin land suitable for production of the crop. These problems are rooted in low production and post-production technologies in the yam food sector (Maroya 2014). These constraints have therefore formed the basis for Yam Improvement for Income and Food Security in West Africa (YIIFSWA) Project's interventions. The Project aims at doubling the productivity of yams that would stimulate a sustainable increase in incomes for smallholder yam producers and contribute to their food security and economic development.

The YIIFSWA Project is funded by the Bill & Melinda Gates Foundation, led by the International Institute of Tropical Agriculture (IITA), working with other partners including the Nigerian NRCRI (National Root Crops Research Institute), the Ghanaian CRI (Crops Research Institute), the NRI (Natural Resources Institute) of the UK, AGRA (Alliance for a Green Revolution in Africa), CRS (Catholic Relief Services), and DDS (Diocesan Development Services) in collaboration with service

provider organizations, the private sector, farmers, and yam traders (Maroya 2014). The project's vision is to increase yam productivity (yield and net output) by 40% for 200,000 smallholder yam farmers in Ghana and Nigeria, and deliver key global research products that will contribute to the longer term vision of improving yam productivity and livelihoods of yam-dependent farmers. There are seven objectives; the first objective addresses the need to strengthen small-scale farmer and trader market linkages, particularly in less accessible production areas, to realize benefits from increased ware yam productivity and market demand. The second led by AGRA, intends to strengthen capacities and empower smallholder farmers in the yam value chain. The third deals with yam seed system development. The fourth objective focuses on reduction of postharvest losses. The fifth axis focuses on technologies for seed propagation while the sixth targets yam production technologies. The last objective develops tools and strategies for pest and disease management.

YIIFSWA Project impact pathway

The impact pathway provides a useful way of conceptualizing the cause-and-effect relationship between different types of changes, with impact assessment focusing mainly on the changes occurring at the outcome and impact level (Maredia 2009).

Figure 1 illustrates a simplified impact pathway (or a results chain) of how actions related to the YIIFSWA Project affect the goal of enhancing income and food security. It also introduces the concept of "impact assessment," which is concerned with the evaluation of the final effects (long-term impacts on poverty, hunger, etc.) and intermediate effects (medium-term outcomes on production, income, consumption, and prices) caused by project activities (Baker 2000).

The Project's development hypothesis was premised on the following theoretical assumptions: (i) Use of appropriate technologies will stimulate increased productivity and production of yam in Nigeria and Ghana. (ii) Linkage of yield and production with the market "pull" along the value chain will reduce production and market transaction costs. (iii) The reduction in transaction costs will ultimately contribute to increased income and food security for smallholder farmers, especially women. In this regard, YIIFSWA will support key innovations through different inputs/activities across its seven objectives. These include: (a) Pest- and disease-free seed yam on a commercially viable basis capable of increasing yield by at least 50%; (b) Postharvest storage and handling technologies capable of reducing tuber losses at least by 30%; and (c) Access to yam markets will increase sales and generate needed cash incomes for smallholder farmers. It is envisaged that improved accessibility and the use of pest- and disease-free seed yam, coupled with postharvest and handling technologies with better access to markets, will be the key to stimulating production. On the other hand, it is also envisaged that increased access to markets will help reduce the transaction costs of smallholder farmers and in turn increase profitability and thus income.

The model explains how an intervention is expected to lead to intended or observed impact. A series of expectations and assumptions identifies the presumed relationships among the following:

- Inputs generating various activities.
- Activities and their immediate outputs/intermediate outcomes at various levels.
- The intended impact (such as families and communities that have become financially self-sufficient and food-secure from own production, fewer postharvest losses, etc.).

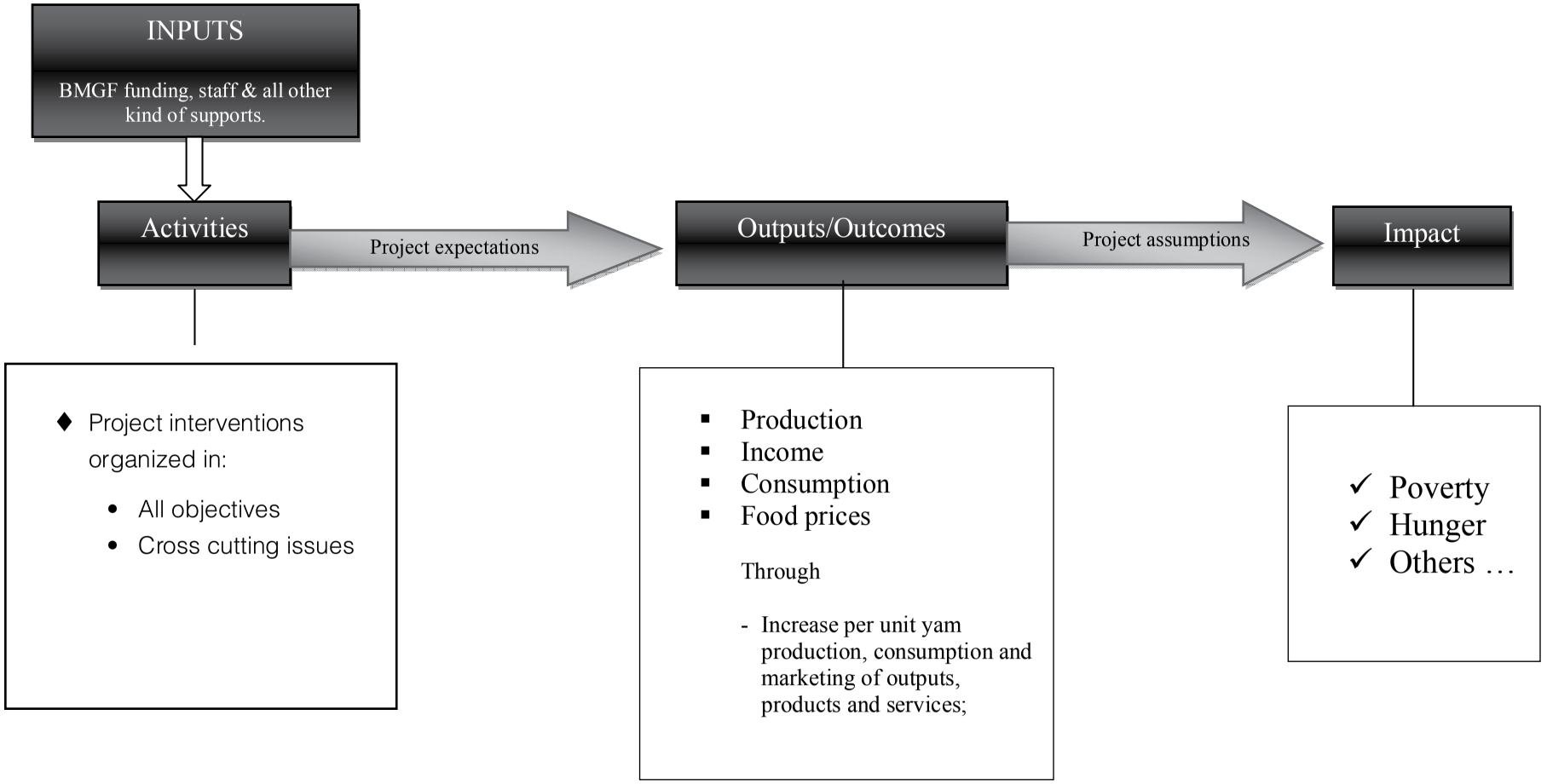

Figure 1. A generalized impact pathway of YIIFSWA focused on enhancing income and food security.

Objective of the baseline survey

The objective of the baseline survey is to collect primary data on a number of indicators to be used for measuring the progress in production, storage, and marketing which may be attributed to the implementation of the current YIIFSWA Project in the target yam-producing areas in Ghana. There is no updated information available for the different areas on what people know, do, and would like to do in relation to yam. However, this information is extremely important for monitoring progress as a result of the Project. Therefore, the baseline survey seeks to do the following:

- Establish baseline values of indicators of intended outcomes against which future measurements can be made of changes in behavior, systemic capacity, and impact on the conditions of households and individuals.
- Gather and analyze information that will assist YIIFSWA project stakeholders/partners in designing or modifying appropriate interventions or to generate information for further refining the project logframe and Monitoring and Evaluation (M&E) Plan.
- Validate the needs and priorities of communities identified in the Project document.

2. Methodology for the Substantive Baseline Study

This section provides the details of the baseline survey design in terms of collection methods, questionnaire design, and applied statistical analysis.

Survey design

The baseline study was designed after an extensive discussion during the planning week with all the project stakeholders/partners and the rapid yam value chain scoping study. The sample for the baseline survey was designed to provide estimates of the "before Project" measurements of selected indicators related to yam production.

One important objective in generating this baseline information is to measure the impact of the Project's activities on the income and food security of the target people. Therefore, baseline information will need to be compared with the information to be collected at the end of the Project. In this regard, to eliminate the effects of external intervention, before and after, with control design, has been adopted to assess at the next round the impact of the Project's activities on the target beneficiaries. For this purpose, many communities were targeted including the communities in the current geographic Project and those likely to be included as Project communities in future. In addition to the Project communities, non-intervention communities were considered as control communities with similar socioeconomic characteristics.

Study area

The intention of the survey was to sample households within the major yam-producing zones. The survey design was based on a multistage, random sampling procedure, drawing on the total households from yam-growing areas of Nigeria and Ghana.

Sample size determination

The need for quantitative and qualitative information about households requires a statistically plausible sample of the target population. Accurate sampling is important to minimize the risk of sampling bias and to allow inferences about the population to be drawn with a statistically estimable level of confidence. The Confidence Interval Approach was used to estimate the sample size.

Under simple random sampling, at the 95% confident level desired, the sample size n must satisfy the formula:

$$n \geq \frac{Z_{0.95}^2 NP(1-P)}{(N-1)e^2 + Z_{0.95}^2 P(1-P)} \qquad n \geq \frac{Z_{0.95}^2 P(1-P)}{e^2}$$, if N>10,000 ..... (1)

Where,

Z = value of the standard variate at a given confidence level and to be worked out from the table showing the area under normal curve, at 1.96 corresponding to 95% confidence level;

N = Total population

$$n \geq \frac{(1.96)^2 \times 0.45 \times 0.55}{0.05^2}$$

$n \geq 380$ Provided that response rate is 100%

n_{srs} = 380/r = 380/0.95 = 400 given 95% response rate.

Under cluster sampling, for the results to be useably reliable, we apply a default value of design effect1 of 2.0 and 1.5 in Nigeria and Ghana respectively as follows:

$$n_{cls} = \delta \times n_{srs} \quad \text{..... (2)}$$

Where,

n_{cls} = Sample size under cluster sampling;

∂ Design effect, given the default effect δ =2.0 for Nigeria and 1.5 for Ghana (United Nations 2005);

$$n_{cls}(Nigeria) = 2.0 \times 400 = 800 \quad \text{..... (3)}$$

$$n_{cls}(Ghana) = 1.5 \times 400 = 600 \quad \text{..... (4)}$$

Sampling procedure for Nigeria

In the first stage, several strata were considered subsequent to the Project's first planning meeting and identified in selecting purposively eight states in Nigeria: Niger, Nasarawa, Benue, Ebonyi, Enugu, Kogi, Edo, and Oyo (Table 1). These included administrative boundaries (states), areas with high yam production potential, representativeness in different production systems as in Table 2, and security.

The second stage involved the selection of 20 Local Government Areas (LGAs) based on probability proportional to the level of yam production in each LGA. Due to the security problem in Niger State, an adjustment was done by reducing its number of LGAs selected which was added to the states with lowest number.

The third stage retained for the study 200 communities based on probability proportional to size in each selected LGA. The communities selected (Annex 1) including the sample communities (Project clients) and control communities. The sample communities will be from the same geographical zoning but distant from the control communities so as to minimize "spillover" of the Project's benefits to non-participants. The selected control communities will be matched to sample villages selected on a limited set of variables including type of agricultural activity, size of landholding, gender of farmer, location, and (to the extent possible) poverty level, such that the treatment and control communities will have roughly comparable levels of yam production at the baseline.

Finally a total selection of 800 households was made from all communities with an equal probability of selection. The sampling frame including all households in the surveyed communities was developed by extension agents in collaboration with community heads as a source list. The last stage involved a random selection of farm households through a random number generator available in Microsoft Excel. The surveyed areas in Nigeria are shown in Figure 2.

1 A design effect represents the combined effect of a number of components such as stratification, clustering, unequal selection probabilities, and weighting adjustments for non-response and non-coverage. Specific design effect has been applied for Nigeria and Ghana due to the different form of complex sample design employed.

Table 1. Sampling structure in Nigeria.

States	Production for yam tuber ('000 t)	#LGAs selected and adjusted	#Communities selected	#Households selected
Niger	6236.2	9	45	180
Nasarawa	2057.1	4	20	80
Benue	2902.8	6	30	120
Ebonyi	1448.3	3	15	60
Enugu	3094.4	7	35	140
Kogi	1361.6	5	25	100
Edo	782.4	3	15	60
Oyo	698.6	3	15	60
Total	18581.4	40	200	800

LGAs = Local Government Areas
NB. The national figures for yam production used were from the 2009 agricultural production survey (NPAFS 2010).

Table 2. Localities with different production systems/environments.

Production system/Environment	State
Seed-based system	Edo Kogi Anambra
Ware and seed yam	Nasarawa Benue
Low fertility	Ebonyi
Drought	Kaduna

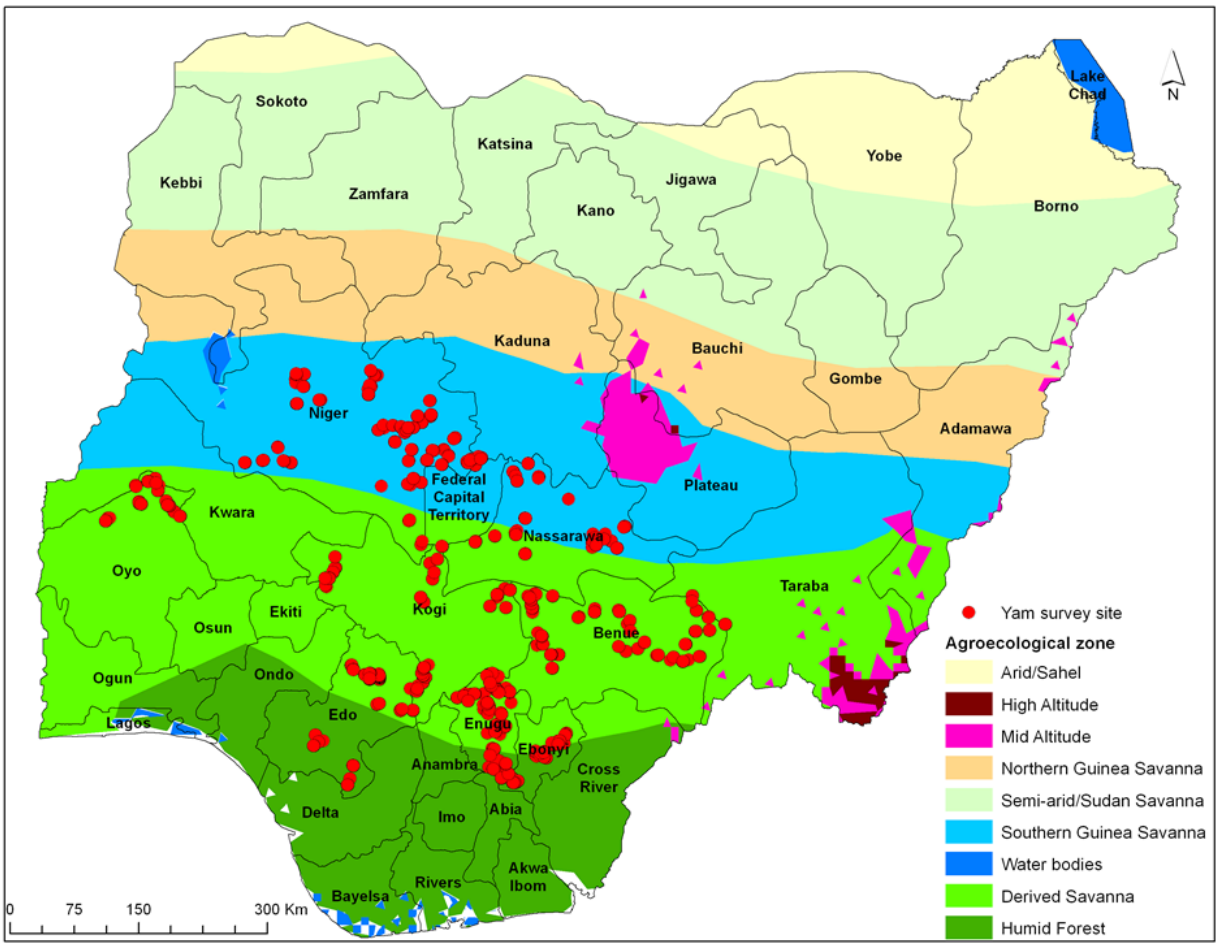

Figure 2. Map of surveyed areas in Nigeria, 2012.

Sampling procedure for Ghana

In the first stage, several strata were considered subsequent to the Project's first planning meeting, including administrative boundaries (districts), areas with high potential for yam production, representativeness in different production systems as in Table 3. During the Project planning, five districts were purposefully selected: Ejura-Seykedumase, Atebubu-Amantin, Kintampo, East-Gonja, and Mion (Table 4).

The second stage involved the selection of communities based on probability proportional to the existing communities in each district.

The third stage retained for the study 100 communities based on probability proportional to size in each selected district. The communities selected (Annex 2) included the sample communities (Project clients) and control communities. The sample communities will be from the same geographical zoning but distant from the control communities so as to minimize "spillover" of Project benefits to non-participants. The selected control communities will be matched to sample communities selected on a limited set of variables. These included type of agricultural activity, size of landholding, gender of farmer, location, and (to the extent possible) poverty level, in such a way that the treatment and comparison communities would have roughly comparable levels of yam production at the baseline.

Finally a total selection of 600 households was made from all communities with an equal probability of selection. The sampling frame including all households in the surveyed communities was developed by extension agents in collaboration with community heads as a source list. The last stage involved a random selection of farm households through a random number generator available in Microsoft Excel.

The surveyed areas in Ghana are in Figure 3.

Table 3. Localities with different production systems/environments.

Production system/Environment	Region/District
No staking system	Brong Ahafo Region (Forest savanna transition)
Staking system	Ashanti Region
Drought	Northern Region, Guinea savanna
Low fertility	

Table 4. Sampling structure.

Districts	#Communities	#Communities selected	#Households selected
Mion	30	10	60
East Gonja	71	23	138
Kintampo	93	30	180
Atebubu-Amantin	66	21	126
Ejura-Seykedumase	50	16	96
Total	310	100	600

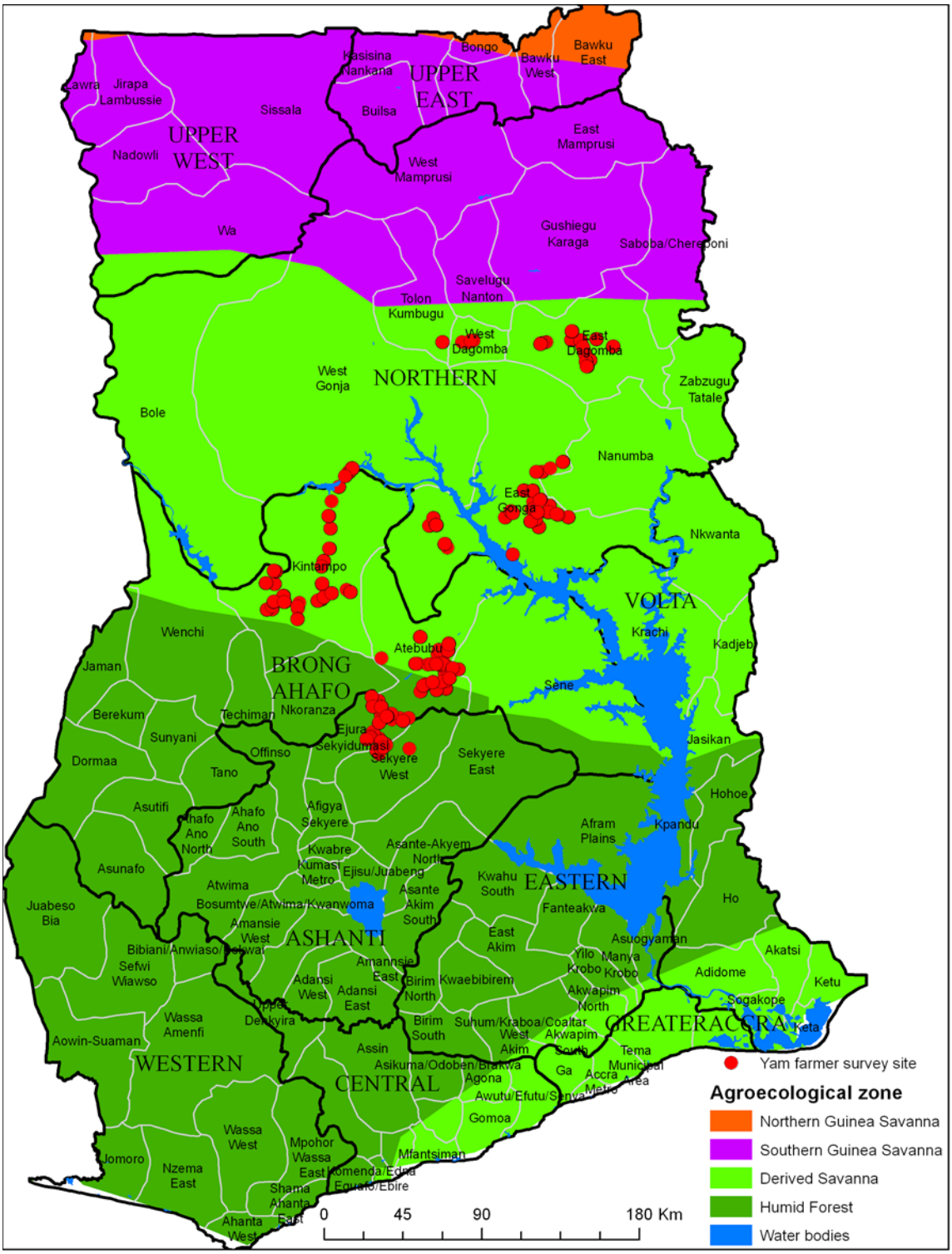

Figure 3. Map of surveyed areas in Ghana, 2012.

Baseline indicators

To assess and measure the impact of the YIIFSWA Project on producers' income and food security, a list of indicators (Table 5) related to income and food security, as well as to aspects associated with yam, was established through brainstorming for ideas, assessing each one and narrowing the list using the SMART technique. The technique summarizes key criteria and asks, "Is the indicator Specific, Measurable, Attainable, Relevant, and Trackable?"

Table 5. Key indicators used in the baseline.

Main areas	Indicators	Measurement technique
Livelihood status	Human, social, natural, physical, and financial capital (Composition and value)	Descriptive statistics and tabulation. An attempt made to measure individual and general livelihood capitals, useful to assess the change at the end of the Project.
Livelihood patterns and consumption expenditure	Economically active household members, types of rural households visited and frequencies, volume of harvested/ marketed yam/ household, household consumption expenditure	Household annual expenditure will be measured through disaggregated sources by individual expenditure and then expenditure from common sources such as agriculture will be added. Some alternative variables, such as proportion of main occupation of the household head and asset ownership, will also be measured.
Poverty and vulnerability	Households living below poverty line, food security status, coping ability from different shocks	Frequencies of shocks/crises households faced in the last year and then strategies used to manage loss and damage resulting. Anthropometric measurements. Poverty incidence, gap, and severity.
Competitiveness in agriculture and food sector	Age and gender structure in agriculture. Farm structure. Labor productivity in agriculture	Frequencies
	Harvested crop yields/ha	Output/area (kg/ha)
	Percentage of crop losses during storage	Loss rate per time period × amount stored (%)
	Number of hectares (or households) with improved yam varieties	None (Number)
Technology adoption and productivity	Number of farmers planting improved yam varieties. Area under improved yam varieties, Innovative farm technologies and adoption. Willingness to pay for new yam varieties. Agricultural diversity and cropping intensity, intensification Yield and net returns/ha	List of technologies adopted by the households (not so large). To calculate cropping intensity, first gross cropped area will be calculated and then divided by the net cropped area and multiplied by 100. The number and percentage of participating farmers that have adopted appropriate technologies will be measured. Diversity index. Yield and net return in terms of monetary value/unit of land will be calculated both full and cash cost basis for yam.
Infrastructure, linkage development and access to services	Distance to farms and markets, modes of transport to farms and markets, Access to services and inputs to improve food security	The number and percentage of farmers/farmers' groups that have access to services and inputs will be measured and also their linkages with sources of innovative technologies.
	Frequency of visits between farmers and service delivery agencies	The number and types of services received by the farmers through visits between farmers and service delivery agencies will be recorded.

These indicators form only a part of all the data collected for the study. Thus, it is possible to complement the indicators with additional data. Qualitative data were collected about the surveyed villages and village lives, and especially about the sources of vulnerability affecting them. The qualitative data were used to link the results to the local context and to provide more profound information about the interrelations between different aspects affecting local livelihoods and yam production.

Data collection instruments

Data were collected for both countries by means of existing information (studies, reports, etc.) a structured questionnaire, and a set of qualitative interview questions for focus group discussions to capture community-specific information. The household questionnaire (Annex 3) included sections on (i) Interview background; (ii) Household identification; (iii) Household composition and characteristics; (iv) Social capital and networking; (v) Household assets; (vi) Improved yam variety knowledge and adoption; (vii) Crop production for all crops grown by the household during last cropping season; (viii) Transfers and other sources of income last year; (ix) Household expenditure; and (x) Access to capital and support services.

Community focus group discussions in both countries were guided by the village profile form (Annex 4) and were carried out with groups in all the surveyed villages. The community survey teams mobilized 8–12 men and women representatives from the villages' community groups. The survey captured details on existing infrastructures and facilities; active community-based groups, local decision-making systems; new varieties of yam, major livelihood strategies and constraints, and gender issues. The surveys were facilitated by extension officers.

Training of enumerators and supervisors

Obtaining high quality data was the motto of the survey and, as recommended by Puetz (1993), this depends on enumerators who are motivated, well trained, and well supervised.

The structured questionnaires were administered by enumerators under supervisors, all trained in two different methodology workshops organized by IITA. The enumerator training was conducted for 2 full days and the training agenda included Project background, survey objectives, and a review of questionnaires, practice sessions, demonstrations, and logistics/scheduling. A number of simulation sessions were done to familiarize enumerators with questions in the household questionnaire for a successful collection of information. Also a complete review of the questionnaires was made on the same day in the vicinity of the sample households to permit revisits for errors to be corrected where necessary.

Enumerators for each State/District were identified after training and testing for the whole survey. The process was guided by factors such as (a) academic qualifications and minimum level of experience in data collection. (b) willingness to work for long periods of time, (c) ability to speak the local language fluently in each given area as well as the ability to interact with people of different ethnic groups in different environments, and (d) familiarity with the places where the field work would be conducted.

Supervisors were chosen based on extensive experience in data collection and familiarity with the survey areas. They were trained and confirmed after an interview to make a follow-up of the whole data collection process. They were associated with the whole data collection process and undertook the second quality check right in the field before the questionnaires were accepted.

Pre-testing questionnaires and guidelines were organized requiring each enumerator to complete three household questionnaires. Based on their experience, a feedback session on technique and methods was facilitated the following day. The questionnaires and guidelines were subsequently modified based on enumerators' feedback.

Field data collection, data entry, and database management

A field data collection schedule was developed with the assistance of Agricultural Development Project (ADP) agents to organize teams and assign villages according to geographic proximity. Geographic proximity in this case refers to the relative distance between the selected villages and a logical sequence for travelling without retracing routes, rather than simply those villages that were most conveniently close to the road. Regarding the number of communities and distances between them, often up to three supervised teams were deployed in separate vehicles to each of the targeted administrative states/districts to complete household interviews. After a preliminary tour of one week organized in surveyed areas to set in motion the potential enumerators' recruitment process, data collection was undertaken from 2 July to 16 August 2012 in Nigeria. In Ghana, data collection was organized into two phases, the first phase covered three districts: Ejura-Sekyedumase, Atebubu-Amantin, and Kintampo from 20 May to 9 July 2012 before the second phase from 7 to 21 September 2012 in the two remaining districts of Mion and East-Gonja.

Field teams participated in coordination and debriefing meetings which were held each evening following each day's data collection. This gave each team the opportunity to correct forms and review any questions or concerns. After the first day, survey teams had progressively fewer concerns about how to ask questions or code responses. The survey team leader had regular communication with all team supervisors to ensure progress and respond to questions generated during data collection, via phone or in person, depending on the limitations of communication technology.

IITA was responsible for quality control of the primary data on a daily basis. Every evening, the enumerators and the field supervisors checked each household questionnaire for inconsistencies and errors. Data was regularly assembled after a thorough checkup and sent to IITA-Ibadan for entering into the SPSS database. Data entry work was centralized in Ibadan and six data entry clerks including two females were employed for the task.

Data analysis

Scale of analysis

The scale of analysis or level of aggregation defines the extent of the proposed intervention and depends on the goals and availability of data and information. In general different levels of targeting could be distinguished and lower level scales could be aggregated or merged into a higher level scale, thus reducing precision but increasing the extent. Criteria to distinguish uniform clusters differ between targets from domain to domain and depend on the goals of targeting. Interventions could be relevant at the state/district level; recommended yam varieties are relevant at the level of the farming system and not at the AEZ level. Traditionally, the Farming Systems Approach has given strong emphasis to the targeting of recommendation domains. In practice, this has often led to agroecological zoning, which is relatively time and development neutral. Considering geography as a critical factor affecting the livelihoods of the poor, this study uses general geographical zoning, which combines geographic information with physical, biological, or socioeconomic data. Therefore data on agroecological zoning was considered by classifying communities in Nigeria/Ghana into southern Guinea savanna (SGS), derived savanna (DS), and humid forest (HF). The main characteristics of these AEZs are provided in Annex 5.

Analysis of household characteristics

Descriptive statistics and tabulation were used to summarize household characteristics, such as gender and years of schooling of the household head, household size, and dependency ratio. The dependency ratio was calculated by dividing the total number of able-bodied members by the number of dependents (children below 15 years, the elderly, and the permanently sick).

Analysis of livelihood capitals

Natural capital

Natural capital refers to the natural resource stock from which resource flows and services important to livelihoods are derived. The productivity of these resources may be degraded or improved by human management. In this study, natural capital consists of land. Land ownership is estimated using descriptive statistics of the number of hectares a household possesses. Land use shows the proportion of land allocated to yam and various other crops.

Physical capital

Physical capital is created by economic production. It includes basic infrastructure and producer goods needed to support livelihoods. Basic infrastructure refers to the physical environment that helps people to meet their basic needs and be more productive in livelihoods; producer goods refer to productive capital that enhances income and personal consumption. It comprises productive assets, household quality, and consumer durables. In this study, means of the productive assets were analyzed and descriptive statistics acquired.

Human capital

Human capital refers to the skills, knowledge, ability to labor, and good health that together enable people to pursue livelihoods. It is constituted by the quantity and quality of labor available which is a factor of the following: health and nutrition status, household size and composition, skill levels, and leadership potential. The quality of education of the household head indicates the quality of the human capital. Other elements of human capital include the dependency ratio, annual number of extension visits/household, and number of years of education of the household members.

Financial capital

Financial capital refers to the financial resources that people use to achieve their livelihood objectives and includes flows and stocks that can contribute to production and consumption. It includes savings (cash as well as liquid assets), income levels, variability over time, and distribution within society of financial savings, flows or stocks of capital, for example, livestock holdings, and access to credit (formal or informal). The financial capital enables people to adopt different livelihood strategies. These were analyzed using frequencies and cross-tabulation to show the proportion of households with access to a given source of capital. The value of non-working animals was also computed to reflect the financial endowment of the households using descriptive statistics.

Social capital

Social capital refers to the social resources upon which people draw in pursuit of their livelihoods. This includes any membership of a social group or network that increases trust, ability to work together, access to opportunities, reciprocity, and informal safety nets.

Physical productivity and profitability

The yield for yam enterprise means the total farm output/unit of land. The equation for calculating average yield is as follows:

$$Y_{ij} = \frac{1}{n}\sum_{i=1}^{n}\frac{O_{ij}}{P_{ij}} \quad \text{..... (5)}$$

Where,

Y_{ij} = average yield by ith household for jth yam enterprise in kg/ha,

O_{ij} = output for ith household from jth yam enterprise in kg,

P_{ij} = plot of land for ith household for jth yam enterprise in ha,

n = number of households involved in jth yam enterprise.

Profitability can be assessed using different methods including benefit–cost ratio, economic surplus models, economic efficiency estimation, and gross margin (GM) analysis. In this study, GM was used as a proxy for profitability. Profitability analysis allows the viability of yam enterprises to be verified across various zones and helps in the selection of the most efficient yam enterprise, having some influence in resource allocation. The merit of GM includes enabling the profitability of most economic activities to be assessed. An added advantage is that GM can be easily understood and has a logical interrelationship between economic and technological parameters. Fixed costs have not been included because for most poor, rural people fixed costs were not reliable. In most cases, farmers do not have permanent working tools. Tools such as hoes, machetes, buckets, and utensils that farmers possess and use in the production process are not properly recorded in terms of money value and purpose of purchase; GM was therefore done to establish whether the use is economically profitable. The basic equation for GM computation is presented in equation 6:

$$GM_{ij} = \frac{1}{n}\sum_{i=1}^{n}\left(P_{ij}Q_{ij} - TVC_{ij}\right) \quad \text{..... (6)}$$

Where,

GM_{ij} = average GM earned by ith household for jth yam enterprise in N or GH¢;

P_{ij} = unit output price received by ith household for jth yam enterprise in N or GH¢/kg;

Q_{ij} = quantity marketed/valued by ith household for jth yam enterprise in kg;

TVC_{ij} = total variable costs incurred by ith household for jth yam enterprise in N or GH¢;

n = number of households involved in jth yam enterprise.

Generally, GM is quoted per unit of the most limiting resource, which is usually land, on a per hectare basis (Malcolm et al. 2005).

Livelihood outcomes

Livelihood outcomes encompass many of the aspects of interest for the study of the impact of agricultural research on poverty. Potential outcomes include conventional indicators such as income and food security. Outcomes also include a strengthened asset base, reduced vulnerability, and improvements in other aspects of well-being.

Poverty measurements

The unit of analysis used in poverty measurement continues to receive critical scrutiny. The debate revolves around what is the most appropriate unit: the family, the household, or some other entity. The poverty estimates should be calculated for individuals and not households, even though the data are almost always related to households.

The most common practice in setting relative poverty lines is to use some proportion of the arithmetic mean or median of the distribution of consumption as in many studies. Consumption expenditure/ capita is then used to determine whether the household falls below the poverty line set as two-thirds of mean annual/capita expenditure. Legitimate comparisons of poverty rates between one country and another can be made only if the same absolute poverty line is used in both countries and to allow such cross-country comparisons of poverty rates is notoriously difficult. This study makes also use of the World Bank international poverty line of average daily consumption/capita equivalent to US$1.25/day. The monetary unit used in this study is the US$ at an exchange rate of N157 or GH¢1.85 according to the country for US$1.

The concept of poverty is applied in this study to situations at the household level and a recall period was used to capture information on the different subcomponents of household expenditure: expenditure on food, beverages, and tobacco, non-durable goods, and frequently purchased services; semi-durable and durable goods and services; and non-consumption expenditure.

All purchases by household members and items received as free gifts were valued and recorded at current prices. The items consumed out of home produce were valued at the current farm-gate/ producer prices; rent for an owner-occupied house was computed at current market prices. Food consumption includes food consumed from own production, purchases, and free collection/gifts.

Expenditure data were collected on an item-by-item basis. Expenditure was then aggregated according to the recall period used and by broader sub-components of expenditure to the household level. After which, all the different sub-components of expenditure were aggregated to derive the total expenditure at the household level. There is a distinction between consumption expenditure and total expenditure. The former refers to expenditure excluding non-consumption expenditure, whereas the latter includes the non-consumption expenditure sub-component.

Further adjustments were made in the construction of the consumption aggregate that was later used in the estimation of poverty estimates. These adjustments included accounting for inter-temporal and spatial price variations, the revaluation of foods derived from own consumption into market prices, and finally accounting for household composition.

There are a number of aggregate measures of poverty that can be computed. The formulas presented here are all based on the fact that the survey represents a simple random sample of the population, which makes them relatively easy to understand.

Head count index

By far the most widely-used measure is the head count index, which simply measures the proportion of the population that is counted as poor, often denoted by P_0. Formally,

$$P_0 = \frac{N_p}{N} \quad \text{..... (7)}$$

Where;

Np is the number of poor and N is the total population.

For reasons that will be clearer below, it is often helpful to rewrite (7) as (8):

$$P_0 = \frac{1}{N}\sum_{i=1}^{M} I(y_i < z) \quad \text{..... (8)}$$

Where;

I (.) is an indicator function that takes on a value of 1 if the bracketed expression is true, and 0 otherwise.

So if expenditure (y_i) is less than the poverty line (z), then I (.) is equal to 1 and the household would be counted as poor.

The greatest virtues of the head count index are that it is simple to construct and easy to understand. These are important qualities. However the measure has some weaknesses. First, it does not take the intensity of poverty into account. Secondly, it does not indicate how poor the poor are, and hence does not change if people below the poverty line become poorer. Moreover, the easiest way to reduce the head count index is to target benefits to people just below the poverty line, because it is cheapest to move them across the line. But by most normative standards, people just below the poverty line are the least deserving of the poor.

Poverty gap index

A moderately popular measure of poverty is the poverty gap index, which adds up the extent to which individuals on average fall below the poverty line, and expresses it as a percentage of the poverty line. More specifically, it defines the poverty gap (Gi) as the poverty line (z) less actual expenditure (yi) for poor individuals; the gap is considered to be zero for everyone else. Using the index function, we have:

$$G_i = (z - y_i)\, I(y_i < z) \quad \text{..... (9)}$$

Then the poverty gap index (P_1) may be written as:

$$P_1 = \frac{1}{N}\sum_{i=1}^{M} \frac{G_i}{z} \quad \text{..... (10)}$$

This measure is the mean proportionate poverty gap in the population (where the non-poor have a zero poverty gap). Some people find it helpful to think of this measure as the cost of eliminating poverty (relative to the poverty line), because it shows how much would have to be transferred to the poor to bring their expenditure up to the poverty line (as a proportion of the poverty line). The minimum cost of eliminating poverty using targeted transfers is simply the sum of all the poverty gaps in a population; every gap is filled up to the poverty line. However, this interpretation is reasonable only if the transfers could be made with perfect efficiency, for instance, with lump sum transfers, which is implausible. Clearly this assumes that the policymaker has a lot of information; one should not be surprised to find that a very “pro-poor” Government would need to spend far more than this in the name of poverty reduction. At the other extreme, one can consider the maximum cost of eliminating poverty, assuming that the policymaker knows nothing about who is poor and who is not. From the form of the index, it can be seen that the ratio of the minimum cost of eliminating

poverty with perfect targeting (i.e., Gi) to the maximum cost with no targeting (i.e., z, which would involve providing everyone with enough to ensure they are not below the poverty line) is simply the poverty gap index. Thus, this measure is an indicator of the potential saving to the poverty alleviation budget from targeting: the smaller the poverty gap index, the greater the potential economies for the poverty alleviation budget from identifying the characteristics of the poor—using surveys or other information—so as to target benefits and programs.

Squared poverty gap ("poverty severity") index

To construct a measure of poverty that takes into account inequality among the poor, some researchers use the squared poverty gap index. This is simply a weighted sum of poverty gaps (as a proportion of the poverty line), where the weights are the proportionate poverty gaps themselves; a poverty gap of (say) 10% of the poverty line is given a weight of 10% while one of 50% is given a weight of 50%; this is in contrast with the poverty gap index where they are weighted equally. Hence, by squaring the poverty gap index, the measure implicitly puts more weight on observations that fall well below the poverty line. Formally:

$$P_2 = \frac{1}{N}\sum_{i=1}^{M}\left(\frac{G_i}{z}\right)^2 \quad \text{..... (11)}$$

The measure lacks intuitive appeal, and because it is not easy to interpret it is not used very widely. It may be thought of as one of a family of measures proposed by Foster, Greer, and Thorbecke (1984), which may be written, quite generally, as

$$P_\alpha = \frac{1}{N}\sum_{i=1}^{M}\left(\frac{G_i}{z}\right)^\alpha, \quad (\alpha \geq 0) \quad \text{..... (12)}$$

Where;

α is a measure of the sensitivity of the index to poverty and the poverty line is z defined in this study as two-thirds of mean annual per capita expenditure, the value of expenditure per capita for the i-th person's household is x_i, and the poverty gap for individual i is Gi = z-x_i (with Gi = 0 when x_i>z)

When parameter α = 0, P_0 is simply the head count index. When α = 1, the index is the poverty gap index P_1, and when α is set equal to 2, P_2 is the poverty severity index. For all α > 0, the measure is strictly a decrease in the living standard of the poor (the lower your standard of living, the poorer you are deemed to be). Furthermore, for α > 1, it also has the property that the increase in measured poverty due to a fall in your standard of living will be deemed greater the poorer you are. The measure is then said to be "strictly convex" in incomes (and "weakly convex" for α = 1). Another convenient feature of the FGT class of poverty measures is that they can be disaggregated for population subgroups and the contribution of each subgroup to national poverty can be calculated.

Although the FGT measure provides an elegant unifying framework for measures of poverty, it leaves unanswered the question of what is the best value of α. Moreover, some of these measures also lack emotional appeal.

The measures of poverty depth and poverty severity provide complementary information on the incidence of poverty. It might be the case that some groups have a high poverty incidence but a low poverty gap (when numerous members are just below the poverty line), while other groups have a

low poverty incidence but a high poverty gap for those who are poor (when relatively few members are below the poverty line but with extremely low levels of consumption).

YIIFSWA in its global aim to improve crop yield data as key indicator that should be part of the core data set for future impact assessment organized complementary productivity data collection. Complementary baseline yield data are, unlike substantive baseline data, direct yam yield measures from farmers' fields for more accurate estimations. Accurately estimating crop yields is never easy (Fermont and Benson 2011) and will improve agricultural statistics for scientists and policymakers concerned with planning and evaluating agricultural investments (De Groote and Traoré 2005).

3. Complementary Baseline Survey and Yield Measurement

Within the same yam belt of Nigeria and Ghana, a complementary baseline survey was commissioned in addition to the substantive data collected.

Objective and Justification

This study aimed to directly measure yam yield from farmers' fields (Fig. 4) and also examine some related socioeconomic and community-level characteristics to get more accurate crop yield estimates.

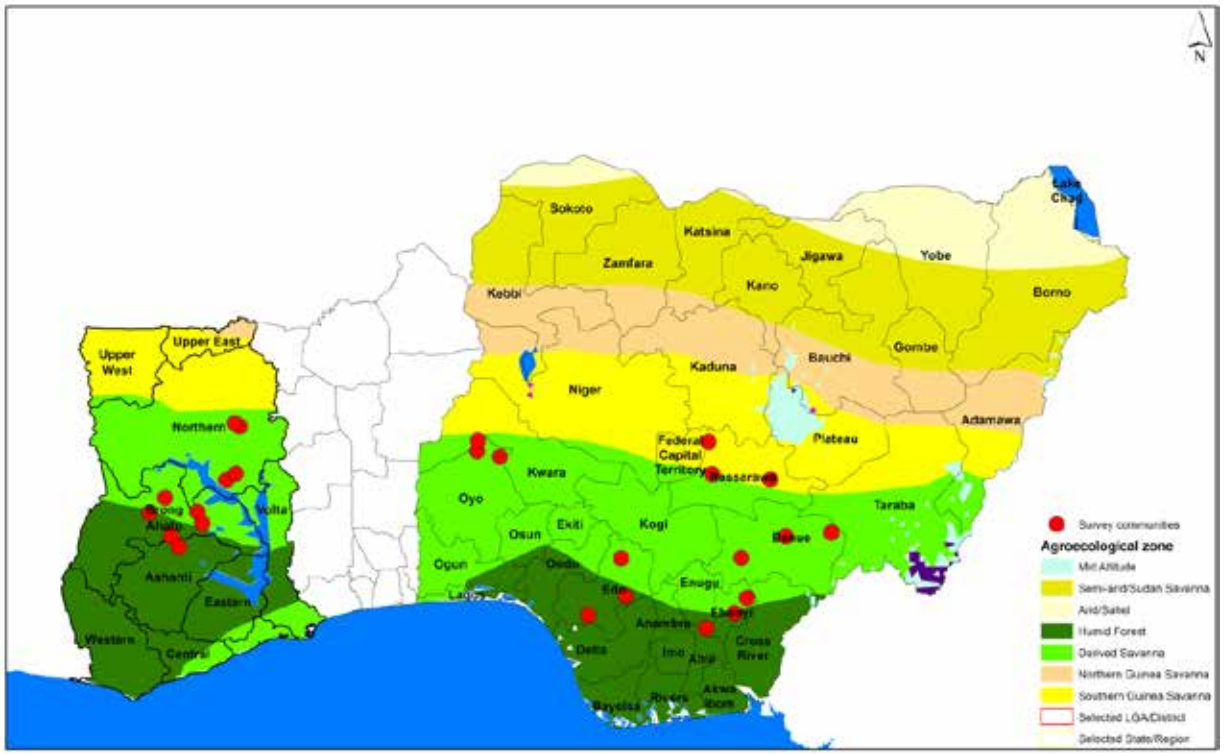

Figure 4. Survey areas in Ghana and Nigeria where field measurements were taken, 2013.

The time period when the survey was conducted was also an element of sampling. Yam planting dates vary depending on agroecology and in some cases on the yam variety, such as early or late maturing varieties. Each variety has a growing period at the end of which the variety must be harvested to avoid crop losses to damage. This means that the harvesting time for different varieties with differing growing periods and planting times was spread over several months in the year which could not be accommodated by the limited time frame and other resources available for the study. For this reason, the peak season of November and December when most mature yam was still in the field was purposely selected; most early maturing varieties had already been harvested and could not be represented in the yield sample taken.

Data collection

Data was collected through oral interviews of the selected farmers and through direct measurements in the yam fields. Oral interviews were conducted with structured questionnaires which were designed and pretested. There were three structured questionnaires, one administered at the

community level (Annex 6), one at the household level (Annex 7), and the last at field level (Annex 8). Respondents to the community level interviews were all yam producers, men and women in the community who were interviewed as a group. Information collected at this level was such as would not vary with farm household, such as availability of market and other rural infrastructure. The community level interview was conducted in the village square and on some occasions in the community hall depending on the wishes of the community leaders.

The head of the household and spouse, where applicable, were interviewed at the household level in their home for information that would vary across households such as characteristics of the household, available resources, yam production objectives, etc. At the field level, the field owner responded to the oral interview for information such as production methods, yam varieties grown, plans for sale and for home consumption of yams to be harvested, etc. The field level interviews were conducted in the various yam fields.

Yam yield and field area were measured with guidance from the owner of the field. Field area measurement was done with Global Positioning System (GPS). Yield measurement was based on a sample plot of about 50 square meters harvested close to the center of the field, weight and numbers of stands and tubers were counted. The yam was purchased from the farmer at the market rate; the initial plan was to leave the yam for the farmer after he was paid but extension guides and survey labor scrambled for it. Measurement was done regardless of yam variety and fields that had been milked for seed yam production were skipped in yield measurement.

Local farmers were used as labor for harvesting, they and the survey farmers were paid the wage rate obtained in the community. Enumerators who conducted the interviews and took the field area and yield measurements were in all cases experienced scientists from IITA and the national R&D institutions in the survey countries.

Data management

A few days after the field work for data collection which lasted 30 days between November and December 2013, (10 days in Ghana and 20 in Nigeria), the questionnaires were reviewed by the YIIFSWA scientists who led in the field data collection. The data were transcribed by data entry clerks who were university graduates. After the transcription, the YIIFSWA scientists went through the data in a verification exercise before analyses began. The verification was a continuous process because in spite of cross checking the questionnaire before transcription and the transcribed data, errors kept showing in the process of analyses. But none of the problems observed at the various stages of checking called for a revisit to survey sites. This is credited to the use of scientists as enumerators. Data was entered into Excel sheets.

Field data analysis

Data were analyzed using Stata and the bulk of the data analysis was based on economic models, including Ordinary Least Square (OLS), Logit, Probit, and Tobit models. Production/yield data for yam was reported in terms of clean weight, i.e., free of earth and mud.

Estimation of area

The GPS was used to measure area. This system is very accurate compared to previous methods used like farmers' estimation and P2/A methodology, based on the unique relationship and relatively stable relationship between a given field's perimeter squared (P2) and its area (A). The measurements of the sample plot and total area were recorded.

Estimation of production

Production is estimated using a weighing scale. As the field is harvested, all harvested yam from the field was weighed and recorded.

Determinants of use of the purchased inputs

An attempt is made in this section to identify the factors which motivate a smallholder to invest cash in the purchase of farmland, seed yam, hired labor, chemical fertilizer and herbicide, and in mechanical or mechanized field-to-home transportation of yam, i.e., to adopt these purchased inputs in yam production.

Theoretical model

The two most popular functional forms used in explaining farmers' adoption decisions are the Probit (the standard cumulative distribution function) and the Logit (the logistic distribution) models (Polson and Spencer 1991). The Probit model is:

$$T_i = F(W_i) = \int_{-\infty}^{W_i} \frac{1}{\sqrt{2\pi}} \exp(-S^2/2) ds \qquad \text{..... ..... (13)}$$

For $-\infty < w_i < \infty; w_i = X_i'\beta$

where:

T_i is the probability that the ith farmer chooses to use purchased input, zero otherwise.

X is the n by k matrix of the explanatory variables and Beta is a k by 1 vector of parameters to be estimated.

The logistic distribution function is closely associated with the standard normal cumulative function of the Probit model. For equation 13, the change in the probability that the farmer uses a purchased input given change in anyone of the explanatory variables can be computed as:

$$\frac{\partial T_i}{\partial x_i} = \left(\frac{\partial_F}{\partial w_i}\right)\left(\frac{\partial w_i}{\partial x_i}\right) = F(w_i)\beta \qquad \text{..... ..... (14)}$$

where:

$F(w_i)$ is the standard normal density (logistic density) function for the Probit (Logit) model.

Empirical model

Studies of smallholder technology adoption in parts of Africa are widely reported in literature (Polson and Spencer 1991; Adesina and Zinnah 1993; and Nweke et al. 1988).

Most of these studies are analyses of adoption processes for new technologies and are based on information collected from a relatively narrow area within a country. Here, analysis of adoption of purchased inputs in yam production is that of existing practices. The analysis is based on information at the field, household, and village levels collected in 25 villages in two countries, namely Nigeria and Ghana. The unit of analysis is the individual field; a farmer could apply a purchased input in one and not in another of his yam fields.

Hired labor was used in performing land clearing, seedbed preparation, sowing, weeding, and harvesting operations in the surveyed fields. In yam production, seedbed preparation (mounding) and weeding are the two most labor intensive farm operations (Tshiunza 1998).

Field size and production objective (for sale or for home consumption) are possible field level determinants of the probabilities of use of hired labor for seedbed preparation or for weeding in yam production. The percentage of yam harvest from the field designated for sale by the field owner is specified as proxy for production objective. In practice, the decision before planting for sale is a better determinant of adoption of purchased inputs than the percentage ultimately sold because once a farmer decides to plant for sale he or she makes an investment in purchased inputs, irrespective of how much he or she ultimately sells. After harvest, the amount ultimately sold is determined by crop performance, home consumption needs, and current market conditions. But farmers surveyed were unable to provide information on how much they planned to sell before planting.

Seed yam as a purchased input is a continuous variable which varied from zero to 100 and is defined as the percentage of total seed yam planted in the field that was purchased. As in the case of hired labor, field size and percentage of yam harvested in the field designated for sale are possible field level determinants of the probabilities of use of purchased seed yam.

Field-to-home transportation of yam as a purchased input is a binary variable defined as one if the yam is transported by a mechanical or mechanized means as defined above or zero if by head load. Location of the field in terms of whether the field is situated in a residential area or in distant fields could have been a likely determinant of the probability that field-to-home transportation is mechanized but yam fields are virtually all situated far from home, particularly in Ghana.

Despite the fact that a few farmers used fertilizer in Nigeria, usage of chemical fertilizer, herbicide, and mechanization of farm land clearing are uncommon in both Nigeria and Ghana and therefore analyses of determinants of their use are unproductive.

The household variables specified as determinants of the probability that any of the purchased inputs was used were household size and the age of the household head. Formal education of the head of the household is a possible determinant but it has low variability as the farmers usually did not have more than a few years of primary education. The few farmers who are better educated soon reason like the majority with whom they interact on a daily basis or if they show better ideas they are quickly copied by the rest. As a result, level of formal education does not make much difference to the adoption of farm technologies and practices in a village setting (Nweke 1996).

Population density and level of commercialization are some of the village-level factors which can influence the probability of use of purchased inputs in yam production. Periodic village market meetings and distance to nearest urban centers are used as proxies for population density and level of commercialization of the village community. The frequency of village markets, and the distance to the nearest urban center are specified as discrete variables.

Country dummies are specified as a binary variable, one if Nigeria and zero if Ghana. Similarly, agroecologies, namely the humid forest, derived savanna, and southern Guinea savanna zones are also specified as binary variables. The country and agroecology dummies are specified to remove their effects. The variables are defined in Table 6.

Four variations of the Probit model were estimated for each of the four purchased inputs: (1) field variables, (2) household variables, (3) village variables, and (4) a combination of all the variables.

Table 6. Definition of variables specified in the regression functions of use of purchased inputs in yam production, 2013.

Variable	Unit or Type	Explanation
Dependent variable		
PLABOR	Binary	If hired labor was used for seedbed preparation , else 0
P SEED	Percentage	Percentage of seed yam purchased
FMTRAN	Binary	1 if mechanized or mechanical, also 0
P LAND		1 if rented or purchased, else 0
Field variables		
F SIZE	Ha	Field size in ha
P SALE	Percentage	Percentage of yam harvest designated for sale
Household variables		
HHSIZE	Discrete	Household size in number
AGEHH	years	Age in years
Village variables		
VILMKT	Binary	1 if periodic market is in village, or else 0
DISTURB	Kilometer	Distance to center
Country dummies		
NIGERIA	Binary	1 if Nigeria, else 0
GHANA	Binary	1 if Ghana, else 0
Agroecology dummies		
HFREST	Binary	1 if humid forest ,else0
DSAVA	Binary	1 if derived savanna, else 0
SGSAVA	Binary	1 if southern Guinea savanna, else 0

Relationship between field area expansion and use of purchased inputs

The farmer groups interviewed in the survey villages were asked what had been the trend (increasing, no change, or decreasing) in yam production.

Empirical model

The relationships between land area expansion and uses of the relevant purchased inputs are determined through econometric analysis with the OLS model across the 76 fields. The yam field area in ha is the dependent variable; there are three groups of independent variables namely purchased inputs, household, and market factors. Relevant purchased inputs are hired labor for seedbed preparation, purchased seed yam, mechanical or mechanized transportation, and rented or purchased farmland. Household variables are age, gender of the household head, and household size; and market factors are percentage of yam harvested designated for sale, distance of the village to nearest urban center, and frequency of village market. Distance to nearest urban center and frequencies of village market are proxies for population pressure and commercialization. These explanatory variables are fitted in separate equations and combined in one equation. Agroecology and country dummies are specified in each equation to remove their effects. The variables are defined in Table 7.

Table 7. Definition of variables specified in the regression function of yam production response to use of purchased inputs in terms of field size and yield, 2013.

Variable	Unit or Type	Explanation
Dependent variables		
FSIZE	Ha	Field size in ha
YLDHA	Tons	Yam yield in t/ha
Purchased input variables		
HLABOR	Binary	1 if hired labor was used for seedbed preparation, else 0
PSEED	Percentage	Percentage of seed yam purchased
PLAND	Binary	1 if land was rented or purchased, else 0
FERT	Binary	1 if chemical fertilizer was applied, else 0
FMTRAN	Binary	1 if mechanical or mechanized, else 0
Market variables		
DISTURB	Kilometer	Distance to urban center
VILMKT	Binary	1 if periodic market is in the village, else 0
Field variables		
FSIZE	Ha	Field size in ha
PSALE	Percentage	Percentage of yam harvest designated for sale
STDHA	Discrete	Number of yam stands per ha
INTCRP	Binary	1 if intercropped, else 0
FERT	Binary	1 if fertilizer was applied, else 0
STAKE	Binary	1 if staked, else 0
Household variables		
HHSIZE	Discrete	Household size in number
AGEHH	Years	Age of head of household
Country dummies		
NIGERIA	Binary	1 if Nigeria, else 0
GHANA	Binary	1 if Ghana, else 0
Agroecology dummies		
HFREST	Binary	1 if humid forest, else 0
DSAVA	Binary	1 if derived savanna, else 0
SGSAVA	Binary	1 if southern Guinea savanna, else 0

Determinants of percentage of yam harvest designated for sale

The determinants of the proportion of yam harvest designated for sale are identified in a regression analysis, the procedure is as follows:

Theoretical models

The proportion of the yam per field planted for sale has an upper and lower limit of 100 percent and zero, respectively. The Tobit model is an appropriate framework for identifying, in a regression analysis, the determinants of a variable so distributed (Akinola 1987; Greene 2003). The Tobit model (Tobin 1958) has been widely used in analyses of farmer technology adoption decisions (Akinola and Young 1985; Kothari 2004; Greene 2003).

The theoretical framework of the Tobit model can be explained by the threshold concept. The decision to sell may be characterized as a dichotomous choice between two mutually exclusive alternatives. This implies that there is a "break point" in the dimension of the explanatory variables below which a stimulus elicits no observable response. Only when the strength of the stimulus exceeds the threshold level does a reaction occur and the second decision on the proportion to sell is taken.

Let Y denote a decision variable which is the dependent variable and X a vector of explanatory variables. Y takes on two values, Y = y* if the decision results in a sale, and Y = 0 if it results in home use. At values of X greater than the break point there is a probability of I for sale; the proportion sold, represented by y*, is continuous. At values of X below or equal to the break point, the probability of sale is zero and proportion sold is zero.

The stochastic model of the analysis is as follows:

$$Y_i = Y_i^* = X_i'\beta + \varepsilon_i \text{ if } X_i'\beta + \varepsilon_i > T \quad \text{..... (15)}$$

= 0 if $X_i'\beta + \varepsilon_i < T$

i = 1, 2, …, N

Where:

N is the number of fields, Y_i is the proportion sold variable, X_i is a vector of explanatory variables, β is a vector of' unknown coefficients, T is the threshold point, and β_i is an independently distributed error term assumed to be distributed N (0, σ2).

To interpret the dependent variable as the probability of making a choice, some notion of probability is used as the basis of the transformation. The process translates the values of the X_i into a probability which ranges in value from 0 to 1. For the transformation to maintain the property, increases in X_i are associated with increases (or decreases) in the dependent variable for all values of X_i, the standard cumulative normal distribution of $X'\beta$ is used. It is given by:

$$F(X'\beta) = \int_{-\infty}^{X_i'\beta} \frac{1}{\sqrt{2\pi}} e^{\frac{-s^2}{2}} ds \quad \text{..... (16)}$$

Where:

s is a random variable which is normally distributed with mean zero and unit variance.

To estimate the parameter, β a maximum likelihood method is applied.

To estimate the parameter "β" a maximum likelihood method is applied. To judge the appropriateness of the above specification, two alternative models are posited: the discrete choice (Probit) model and the continuous OLS model described earlier. For the discrete model, the proportion sold is assigned a value of one for all values above the break point.

Empirical model

The unit of analyses is the individual field; a smallholder household which grows a staple crop in multiple fields is unlikely to sell the crop from all its fields in equal proportions. The proportion of the crop from a field sold may depend on whether the field is owned by a male or a female household member; women are more often responsible for food expenditure in the households (IFPRI 2008). The proportion of the crop from a field sold could also depend on the use of purchased inputs in the field. Higher proportions would be sold from fields cultivated with purchased inputs than from fields cultivated with inputs generated internally from the household.

At the household level, the household size may influence the proportion of a crop sold. The characteristics of the household head such as level of formal education, age, and gender may

influence the level of commercialization of a crop. In a village where marketing facilities such as link roads to urban market centers are easily accessible, farmers will be more commercially oriented in crop production than farmers in villages with poor access to urban market centers. These variables are as defined in Table 8.

Four variations of the empirical model are estimated: field, household, and village levels and an estimate based on a combination of all the variables.

Table 8. Definition of variables specified in the regression function of percentage of yam harvest designated for sale, 2013.

Variable	Unit or type	Explanation
Dependent variable		
PSALE	Percentage	Percentage of yam harvest designated for sale
Field purchased input variables		
FSIZE	Ha	Field size
PLABOR	Binary	1 if hired labor was used for seedbed preparation, else 0
WLABOR	Binary	1 if hired labor was used for weeding, else 0.
PSEED	Percentage	Percentage of seed planted was purchased
PLAND	Binary	1 if land was rented or purchased, else 0
YIELD	T/ha	Yam yield
MMALE	Binary	1 if field is owned by men, else 0
FMALE	Binary	1 if field is owned by women, else 0
FAMILY	Binary	1 if field is jointly owned, else 0
Household variables		
HHSIZE	Discrete	Number of household members
AGEHH	Year	Age of head of the household
EDUC	Discrete	Number of years of formal education of household head
GENDA	Binary	1 if household head is male, else 0
Market variables		
DISTURB	Kilometer	Distance to urban center
VILMKT	Binary	1 if periodic market is in the village, else 0
HFREST	Binary	1 if humid forest, else 0
DSAVA	Binary	1 if derived savanna, else 0

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5. Annexes

1. YIIFSWA Project Communities in Nigeria

States	LGAs	Communities	AEZs
Benue	Agatu	Enumgba	Derived Savanna
Benue		Igoje	Derived Savanna
Benue		Obagaji	Derived Savanna
Benue		Okokolo	Derived Savanna
Benue		Oshigbudu	Derived Savanna
Benue	Gboko	Adzer-Nor	Derived Savanna
Benue		Akpager	Derived Savanna
Benue		Luga	Derived Savanna
Benue		Tchowanye	Derived Savanna
Benue		Yandev	Derived Savanna
Benue	Katsina-Ala	Abaji	Derived Savanna
Benue		Gbor	Derived Savanna
Benue		Ikowe	Derived Savanna
Benue		Sai	Derived Savanna
Benue		Tor-Donga	Derived Savanna
Benue	Otukpo	Adoka	Derived Savanna
Benue		Ogali	Derived Savanna
Benue		Otobi	Derived Savanna
Benue		Otukpo Nobi	Derived Savanna
Benue		Uwaba-Aokwu	Derived Savanna
Benue	Tarka	Agudu	Derived Savanna
Benue		Gwarche	Derived Savanna
Benue		Nyambee	Derived Savanna
Benue		Tyiotyu	Derived Savanna
Benue		Wannune	Derived Savanna
Benue	Ukum	Ayati	Derived Savanna
Benue		Chito	Derived Savanna
Benue		Kyado	Derived Savanna
Benue		Vaase	Derived Savanna
Benue		Zaki-Biam	Derived Savanna
Ebonyi	Ezza North	Ekka	Humid Forest
Ebonyi		Inyere	Humid Forest
Ebonyi		Nkomoro	Humid Forest
Ebonyi		Ogboji	Derived Savanna
Ebonyi		Umuoghara	Humid Forest

Ebonyi	Ivo	Akaeze-Ukwu	Humid Forest
Ebonyi		Ihenta	Humid Forest
Ebonyi		Iyuoji	Humid Forest
Ebonyi		Mgbede	Humid Forest
Ebonyi		Umobor	Humid Forest
Ebonyi	Izzi	Agbaja	Derived Savanna
Ebonyi		Agbanyim	Derived Savanna
Ebonyi		Igbeagu	Derived Savanna
Ebonyi		Ndieze	Derived Savanna
Ebonyi		Yimaegu	Derived Savanna
Edo	Esan	Illushi	Derived Savanna
Edo		Ivue	Derived Savanna
Edo		Obeidu	Derived Savanna
Edo		Onogholo	Derived Savanna
Edo		Oria	Derived Savanna
Edo	Orthioromwon	Iguemokhua	Humid Forest
Edo		Owuo	Humid Forest
Edo		Ugoniyekonhonma	Humid Forest
Edo		Umoghun-Nokhwa	Humid Forest
Edo		Uromehe	Humid Forest
Edo	Owan East	Arokho	Derived Savanna
Edo		Ihiebe	Derived Savanna
Edo		Irbiaro	Derived Savanna
Edo		Ohanmi	Derived Savanna
Edo		Warake	Derived Savanna
Enugu	Aninri	Mpu	Humid Forest
Enugu		Ndiaboh	Humid Forest
Enugu		Nenwe	Humid Forest
Enugu		Oduma	Humid Forest
Enugu		Opanku	Humid Forest
Enugu	Awgu	Agbogugu	Humid Forest
Enugu		Agwu	Humid Forest
Enugu		Amoli	Humid Forest
Enugu		Ifite	Humid Forest
Enugu		Maku	Derived Savanna
Enugu	Enugu East	Alulu	Derived Savanna
Enugu		Amorji	Derived Savanna
Enugu		Ibagwa	Derived Savanna
Enugu		Nkwugbo	Derived Savanna
Enugu		Ugwogo	Derived Savanna

Enugu	Igbo-Eze	Aguibeje	Derived Savanna
Enugu		Amube	Derived Savanna
Enugu		Okpo	Derived Savanna
Enugu		Onicha	Derived Savanna
Enugu		Umuopu	Derived Savanna
Enugu	Igbo Etiti	Ekwegbe	Derived Savanna
Enugu		Ohodo	Derived Savanna
Enugu		Ozalla	Derived Savanna
Enugu		Ukehe	Derived Savanna
Enugu		Umunko	Derived Savanna
Enugu	Udenu	Imilike	Derived Savanna
Enugu		Obollo Eke	Derived Savanna
Enugu		Obollo Etiti	Derived Savanna
Enugu		Ozalla-Ezimo	Derived Savanna
Enugu		Umundu	Derived Savanna
Enugu	Uzo-Uwani	Abbi	Derived Savanna
Enugu		Nimbo	Derived Savanna
Enugu		Nrobo	Derived Savanna
Enugu		Opanda	Derived Savanna
Enugu		Uvuru	Derived Savanna
Kogi	Ibaji	Odogwu	Derived Savanna
Kogi		Ogaine	Derived Savanna
Kogi		Ojuba	Derived Savanna
Kogi		Onyedega	Derived Savanna
Kogi		Ujeh	Derived Savanna
Kogi	Idah	Ajibaja	Derived Savanna
Kogi		Ekwokata	Derived Savanna
Kogi		Ichala	Derived Savanna
Kogi		Ijobe	Derived Savanna
Kogi		Ojigagala	Derived Savanna
Kogi	Kogi	Chikara	Derived Savanna
Kogi		Okpareke	Derived Savanna
Kogi		Orehi	Derived Savanna
Kogi		Osuku	Derived Savanna
Kogi		Tawari	Derived Savanna
Kogi	Omala	Abejukolo	Derived Savanna
Kogi		Ajiyolo	Derived Savanna
Kogi		Bagaji	Derived Savanna
Kogi		Icheke	Derived Savanna
Kogi		Odoh	Derived Savanna

Kogi	Yagba East	Ejuku	Derived Savanna
Kogi		Imela	Derived Savanna
Kogi		Jege	Derived Savanna
Kogi		Ponyan	Derived Savanna
Kogi		Takete-Isao	Derived Savanna
Nasarawa	Karu	Gbaradna	Southern Guinea Savanna
Nasarawa		Gitata	Southern Guinea Savanna
Nasarawa		Kugbaru	Southern Guinea Savanna
Nasarawa		Kuhipi	Southern Guinea Savanna
Nasarawa		Panda	Southern Guinea Savanna
Nasarawa	Lafia	Adogi	Southern Guinea Savanna
Nasarawa		Agudu	Derived Savanna
Nasarawa		Assakio	Southern Guinea Savanna
Nasarawa		Bukan Buzu	Southern Guinea Savanna
Nasarawa		Bukan Koto	Southern Guinea Savanna
Nasarawa	Nasarawa	Gadabuke	Derived Savanna
Nasarawa		Karmu	Derived Savanna
Nasarawa		Kwoho	Derived Savanna
Nasarawa		Laminga	Southern Guinea Savanna
Nasarawa		Mararaba Udege	Derived Savanna
Nasarawa	Obi	Agyaragu	Southern Guinea Savanna
Nasarawa		Daddere	Southern Guinea Savanna
Nasarawa		Kpangwa	Southern Guinea Savanna
Nasarawa		Obi	Southern Guinea Savanna
Nasarawa		Zherugba	Southern Guinea Savanna
Niger	Bosso	Beji	Southern Guinea Savanna
Niger		Garatu	Southern Guinea Savanna
Niger		Garusu	Southern Guinea Savanna
Niger		Gbaiko	Southern Guinea Savanna
Niger		Kampala	Southern Guinea Savanna
Niger	Gurara	Bonu	Southern Guinea Savanna
Niger		Diko	Southern Guinea Savanna
Niger		Lambata	Southern Guinea Savanna
Niger		Lefu	Southern Guinea Savanna
Niger		Tufa	Southern Guinea Savanna
Niger	Lapai	Birnin Maza	Southern Guinea Savanna
Niger		Gabi	Derived Savanna
Niger		Gulu	Derived Savanna
Niger		Gupa	Southern Guinea Savanna
Niger		Lapai	Southern Guinea Savanna
Niger	Mashegu	Babban Ramin	Southern Guinea Savanna
Niger		Makari	Southern Guinea Savanna
Niger		Mashegu	Southern Guinea Savanna
Niger		Masuchi	Southern Guinea Savanna
Niger		Sahorami	Southern Guinea Savanna

Niger	Mokwa	Bokani	Southern Guinea Savanna
Niger		Kpaki	Southern Guinea Savanna
Niger		Kudu	Southern Guinea Savanna
Niger		Mokwa	Southern Guinea Savanna
Niger		Muwo	Southern Guinea Savanna
Niger	Paikoro	Farin-Doki	Southern Guinea Savanna
Niger		Gbaita	Southern Guinea Savanna
Niger		Kafin Koro	Southern Guinea Savanna
Niger		Kawu Kuti	Southern Guinea Savanna
Niger		Tunga Mallam	Southern Guinea Savanna
Niger	Rafi	Karaya	Southern Guinea Savanna
Niger		Katako	Southern Guinea Savanna
Niger		Madaka	Southern Guinea Savanna
Niger		Sambuga	Southern Guinea Savanna
Niger		Tegina	Southern Guinea Savanna
Niger	Shiroro	Gwada	Southern Guinea Savanna
Niger		Kadna	Southern Guinea Savanna
Niger		Pina	Southern Guinea Savanna
Niger		She	Southern Guinea Savanna
Niger		Zumba	Southern Guinea Savanna
Niger	Tafa	Azhi	Southern Guinea Savanna
Niger		Garam	Southern Guinea Savanna
Niger		Gyedna	Southern Guinea Savanna
Niger		Ijagwari	Southern Guinea Savanna
Niger		Sabon Wuse	Derived Savanna
Oyo	Irepo	Adagbangba	Derived Savanna
Oyo		Gudu	Derived Savanna
Oyo		Nufe	Derived Savanna
Oyo		Sooro	Derived Savanna
Oyo		Welewele	Derived Savanna
Oyo	Olorunsogo	Alawa	Derived Savanna
Oyo		Bi-Alaso	Derived Savanna
Oyo		Dogo	Derived Savanna
Oyo		Igbeti	Derived Savanna
Oyo		Tesi Garubar	Derived Savanna
Oyo	Orelope	Bonni	Derived Savanna
Oyo		Igbope	Derived Savanna
Oyo		Kajola	Derived Savanna
Oyo		Oloko	Derived Savanna
Oyo		Sooro	Humid Forest

2. YIIFSWA Project Communities in Ghana

Regions	Districts	Communities	AEZs
Ashanti	Ejura-Sekyedumase	Bisiw 1	Humid Forest
Ashanti		Bisiw 2	Humid Forest
Ashanti		Bompa	Humid Forest
Ashanti		Ejura Nkwanta	Humid Forest
Ashanti		Hiawoanwu	Humid Forest
Ashanti		Kasei	Humid Forest
Ashanti		Kramokrum	Humid Forest
Ashanti		Krampong	Humid Forest
Ashanti		Kropong	Humid Forest
Ashanti		Leafu Kura	Humid Forest
Ashanti		Mesuo	Humid Forest
Ashanti		Nkrama	Humid Forest
Ashanti		Nokreasa	Humid Forest
Ashanti		Nyinasei	Humid Forest
Ashanti		Samari Nkwanta	Humid Forest
Ashanti		Sunkwae	Humid Forest
Brong-Ahafo	Atebubu-Amantin	Akyeremade	Humid Forest
Brong-Ahafo		Amanfrom	Derived Savanna
Brong-Ahafo		Asanteboa	Humid Forest
Brong-Ahafo		Badukrom	Derived Savanna
Brong-Ahafo		Boniafo	Derived Savanna
Brong-Ahafo		Densi	Derived Savanna
Brong-Ahafo		Duabone 1	Derived Savanna
Brong-Ahafo		Duabone 2	Derived Savanna
Brong-Ahafo		Kafaano	Derived Savanna
Brong-Ahafo		Kumkumso	Derived Savanna
Brong-Ahafo		Lailai	Humid Forest
Brong-Ahafo		Mem	Derived Savanna
Brong-Ahafo		Morochusu	Derived Savanna
Brong-Ahafo		Nwowam	Derived Savanna
Brong-Ahafo		Old Kronkrompe	Derived Savanna
Brong-Ahafo		Patuda	Humid Forest
Brong-Ahafo		Praprabon	Humid Forest
Brong-Ahafo		Primukyea	Humid Forest
Brong-Ahafo		Sampa	Derived Savanna
Brong-Ahafo		Tintare	Derived Savanna
Brong-Ahafo		Watro	Humid Forest

Brong-Ahafo	Kintampo	Aduma	Derived Savanna
Brong-Ahafo		Alassankura	Derived Savanna
Brong-Ahafo		Asantekwa	Derived Savanna
Brong-Ahafo		Asuma Kura	Derived Savanna
Brong-Ahafo		Attakura	Derived Savanna
Brong-Ahafo		Bablioduo-Kokom-ba	Derived Savanna
Brong-Ahafo		Badu Krom (Kofi)	Derived Savanna
Brong-Ahafo		Basabasa	Derived Savanna
Brong-Ahafo		Ben Krum	Derived Savanna
Brong-Ahafo		Busuama	Derived Savanna
Brong-Ahafo		Chiranda	Derived Savanna
Brong-Ahafo		Dawadawa	Derived Savanna
Brong-Ahafo		Gulumpe	Derived Savanna
Brong-Ahafo		Kadelso	Derived Savanna
Brong-Ahafo		Kaka	Derived Savanna
Brong-Ahafo		Kandige	Humid Forest
Brong-Ahafo		Kawampe	Derived Savanna
Brong-Ahafo		Kurawura Akura	Derived Savanna
Brong-Ahafo		Mansira	Derived Savanna
Brong-Ahafo		Miawani	Derived Savanna
Brong-Ahafo		Nante Zongo	Derived Savanna
Brong-Ahafo		Nyamebekyere 1	Derived Savanna
Brong-Ahafo		Nyamebekyere 2	Derived Savanna
Brong-Ahafo		Sogliboi	Derived Savanna
Brong-Ahafo		Suronuasi	Derived Savanna
Brong-Ahafo		Taidifufuo	Derived Savanna
Brong-Ahafo		Techira 1	Derived Savanna
Brong-Ahafo		Techira 2	Derived Savanna
Brong-Ahafo		Yaara	Derived Savanna
Brong-Ahafo		Yabraso	Derived Savanna

Northern	East Gonja	Abrumase	Derived Savanna
Northern		Adamupe	Derived Savanna
Northern		Bau	Derived Savanna
Northern		Bunjai	Derived Savanna
Northern		Dagbabia	Humid Forest
Northern		Grunshie Zongo	Derived Savanna
Northern		Jemitutu	Derived Savanna
Northern		Kakoshi	Derived Savanna
Northern		Kalande	Derived Savanna
Northern		Katanga 1	Derived Savanna
Northern		Katanga 2	Derived Savanna
Northern		Kigbatito	Derived Savanna
Northern		Kijewu	Derived Savanna
Northern		Kitoe	Derived Savanna
Northern		Kpolo	Derived Savanna
Northern		Kumburupe	Derived Savanna
Northern		Latinkpa	Derived Savanna
Northern		Masaka	Derived Savanna
Northern		Mbawudo	Derived Savanna
Northern		Nakpaye	Derived Savanna
Northern		Shishipe	Derived Savanna
Northern		Talkpa	Derived Savanna
Northern		Tunga	Derived Savanna
Northern	Mion	Gunsi	Derived Savanna
Northern		Kulunkpegu	Derived Savanna
Northern		Mahakpi	Southern Guinea Savanna
Northern		Mbatinga	Southern Guinea Savanna
Northern		Ndiyuriyili	Derived Savanna
Northern		Puriya	Derived Savanna
Northern		Salankpang	Derived Savanna
Northern		Sang	Derived Savanna
Northern		Sanze	Derived Savanna
Northern		Zakpalsi	Southern Guinea Savanna

3. YIIFSWA Household questionnaire

International Institute of Tropical Agriculture (IITA)
Yam Improvement for Income and Food Security in West Africa (YIIFSWA)

BASELINE HOUSEHOLD SURVEY QUESTIONNAIRE

Nigeria and Ghana

Part A. Interview background

1. Respondent's name: .....

2. Mobile phone no……..…… 3. Landline phone no.....

4. State/Region..... 5. LGA/District: .....

6. Community/Community: ….……..…….....

7. Interviewed by (Enumerator's name): ….....

8. Date of interview: Day: ….……Month: .....Year: ….…….

9. Checked by (Supervisor's name): .....

10. Date checked: Day: ……..…….. Month: .....Year: ……..

11. Entered by: ……..….....

12. Date entered: Day: ……..Month: .....Year: ……..……...

13. GPS readings of homestead: a) Waypoint ID: ……b) Latitude: ……

c) Longitude: ……; d) Altitude: ……

Part B. Household identification

1. Name of the household head: .....
2. Religion of the household head: .....

   (1. No religion/atheist/traditionalist; 2. Christian; 3. Muslim; 4. Other, specify…….....)
3. Total numbers of people in the household: .....
4. Type of toilet used: .....

   (1. Flash toilet private; 2. Flash toilet shared; 3. Ordinary pit latrine private; 4. Ordinary pit latrine shared;

5. No toilet/use open air)

   5 Main walling material of main residential house: ……..

   (1. Burned bricks; 2. Unburned bricks; 3. Mud bricks; 4. Concrete blocks; 5. Pole and mud; 6. Timber;

   7.Sticks and grass; 8. Iron sheet; 9. Other, specify…….....)
6. Main roofing material of main residential house: ……

   (1. Grass thatch; 2. Iron sheet; 3. Tiles; 4. Asbestos; 5. Other, specify…….……)
7. Experience in growing yam (years) ……
8. Taking into consideration ALL food sources (own food production + food purchase + help from different

   sources + food hunted from forest and lakes, etc.), how would you assess your family's food consumption in the past 12 months? .....

   (1. Food shortage through the year, 2. Occasional food shortage, 3. No food shortage but no surplus,

   4. Food surplus)
9. In case of food shortage from 8 above, what is the most important coping strategy used? .....

   1. Rely on less preferred foods; 2. Limit the variety of foods eaten; 3. Limit portion size at meal□times;

   4. Reduce number of meals eaten in a day; 5. Restrict consumption by adults for small children to eat;

   6. Borrow food, or rely on help from a friend or relative; 7. Have no food of any kind in your household;

   8. Go to sleep at night hungry because there is not enough food; 9. Go a whole day and night without eating anything;

   10. Seek jobs inside the community; 11. Migrate to urban centers in search of non-farm jobs;

   12. Other, specify: ……..).
10. What means of transport do you use most frequently to get to the local market? .....

    (1. Walking; 2. Bicycle; 3. Motorcycle; 4. Tractor; 5. Vehicle; 6. Cart; 7. Other, specify: …….....)
11. Using the mode of transport from 10 above, what is the distance to the local market from your residence?

    .....……..…..... (in minutes of walking time)

Part C. Household composition and characteristics

Family code	Name of household member (start with respondent)	Sex 1=Male;2=Female	Age (years) *	Marital status Codes A	Education (in years with 0= None/ Illiterate)	Relation to HH head Codes B	Occupation Codes C		Own farm labor contribution Codes D	For those under the age of 5 (see column 4)		
							Main	Secondary		Weight (kg)	Height (cm)	Any illness in the last one year? Codes E
1	2	3	4	5	6	7	8	9	10	11	12	13
01												
02												
03												
04												
05												
06												
07												
08												
09												
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												

* For those under 5 years, ask month, day and year born and then compute the age yourself (in 3 decimal places).

Codes A	Codes B	Codes C	Codes D	Codes E
1. Married living with spouse/s 2. Married but spouse away 3. Divorced/separated 4. Widow/widower 5. Never married 6. Other, specify…….	1. Household head 2. Spouse 3. Son/daughter 4. Parent 5. Son/daughter in-law 6. Grandchild 7. Other relative 8. Hired worker 9. Other, specify…….	0. None 1. Farming (crop + livestock) 2. Salaried employment 3. Self-employed off-farm 4. Casual laborer on-farm 5. Casual laborer off-farm 6. School/college child 7. Non-school child 8. Herding 9. Household chores. 10.Other specify, ...	1. 100% 2. 75% 3. 50% 4. 25% 5. 10% 6. Not a worker	0. No disease 1. Fever/malaria 2. Dysentery/ diarrhoea 3. Respiratory problems 4. Measles 5. Typhoid fever 6.Undernutrition 7. Tuberculosis 8. Lifetime disease/Disorder 9. Other specify, ...

Part D. Social capital and networking

D.1 Have you and/or your spouse been member/s of formal and informal institutions in the last 3 years?..... (1=Yes; 0=No).

D.2 If Yes from D.1 above, please ask the following questions and if No, go to Section 2 below.

Section 1. Membership in formal and informal institutions in the last 3 years (husband and wife/ wives only. One group membership per row.)

Family code	Type of group the husband/wife is/ was a member of: (codes A)	Three most important group functions: (codes B)			Year joined (YYYY)	Role in the group (codes C)	Still a member now? (codes D)
		1st	2nd	3rd			
1	2	3	4	5	6	7	8

Codes A 1. Input supply/farmer coops/union 2. Yam producer and marketing Group/coop 3. Other crop/seed producer & marketing group/coop 4. Local administration 5. Farmers' Association 6. Women's Association 7. Youth Association 8. Religious association	9. Saving & credit group 10. Funeral association 11. Government team 12. Water User's Association 13. Cooperative farming 14. Other, specify……	Codes B 1. Produce marketing 2. Input access/ marketing 3. Seed production 4.Cooperative farming 5. Farmer research and training group 6. Savings and credit 7. Funeral group 8. Tree planting and nurseries	9. Soil & water conservation 10.Church group /congregation 11.Input credit 12. Other, specify: ……	Codes C 1. Official 2. Ex-officio 3. Ordinary member Codes D 0. No 1. Yes

Section 2. Social networks

Number of years the respondent has been living in this community.....

Number of people that you can rely on for critical support in times of need within this community

Relatives .....Non-relatives.....

Number of people you can rely on for support in times of need outside this community

Relatives ……..……; Non-relatives .....

Are any of your friends or relatives in leadership positions in formal or informal institutions within and outside this community? ..... (1.Yes; 0. No)

Number of yam traders that you know in this community who could buy your:

Yam: ..... (Seed yams: .....; Ware yams: .....)

Number of yam traders that you know outside this community who could buy your:

Yam: ..... (Seed yams: .....; Ware yams: .....)

Do you think you can rely on Government support (subsidies, food aid etc) if your crop fails? ..... (1.Yes; 0. No)

Are you confident of the skills of Government officials including extension workers to do their job?... (1.Yes; 0. No)

Part E. Household assets

Section 1. Livestock ownership

Livestock owned			
Type	Number owned	Type	Number owned
1	2	1	2
1.Cattle		7.Poultry (Chicken, Guinea fowl, Ducks)	
2.Donkeys		8.Doves/pigeons	
3.Horses		9.Pigs	
4.Goats		10.Other (Specify1 ……)	
5.Rabbits		11. (Specify2 ……)	
6.Sheep		12. (Specify3 ……)	

Section 2. Ownership of productive and household assets

Asset	Number (if no equipment, put zero)	Estimated unit value in terms of how much you would receive from the sale. (Cedi) (if more than one item reported in column 2, take average price)
1	2	3
Cart		
Axe		
Machete/ cutlass		
Hoe		
Sprayer		
Grain mill		
Pump		
Spade or shovel		
Radio		
CD Player		
Television set		
Cell phone		
Stove		
Bicycle		
Motorbike		
Car		
Tractor		
Jewelry		
Wooden box		
Metal box		
Bed		
Chair		
Table		
Thatched house		
Corrugated iron sheet house		
Fish pond		
Sofa		
Panga knife		
Other, specify.....		

Section 3. Landholding during the last cropping year

Land category	Landholding (ha)	Land holding share for yam		Land holding share for women (%)
		Seed yam (%)	Ware yam (%)	
1	2	3	4	5
1. Own land used (A)				
2. Rented in land (B)				
3. Rented out land (C)				
4. Borrowed in land (D)				
5. Borrowed out land (E)				
6. Total owned land (A+C+E)				
7. Total operated land (A+B+D)				

Section 4: Yam storage during the last cropping year

Storage duration of your yam (in weeks)	Type of storage used (Use codes below)	Amount in % lost at the end of storage		
		Rotting (%)	Sprouting (%)	Other: ……
From ……. To …….. weeks				

Codes: 1=Room storage; 2=Under trees; 3=Raised sheds in the field; 4=Yam barns in the compound ; 5=Raised huts; 6=Left in the soil after maturity; 7= Other (specify: ……..)

Part F. Improved Yam Variety Knowledge and Adoption

Section 1. Yam variety knowledge, sources of information and seeds, adoption and disadoption

Improved crop varieties aware/heard of Codes from Annex 1	If you have a local name for this variety, what is it? If no local name, put 0	Year variety known or heard of YYYY	Main source of variety information Codes A	Ever planted? Codes B	If NO in Column 5, give main reason why? Codes C	If YES in column 5, year first planted YYYY	If Yes in column 5				Planted variety this season? Codes B	Will plant variety in future Codes B	If No in Column 13, main reason why, Codes C
							First seed yam						
							Main source of first seeds Codes D	Quantity of seeds (kg)	Main means of acquiring first seeds Codes E	No. of years variety has been planted			
1	2	3	4	5	6	7	8	9	10	11	12	13	14

Codes A
0. None other
1. Government extension
2. Farmers' Coop/ Union
3. Farmers' group
4. NGO/CBO
5. Research center (trials/demos/ days)
6. Seed/grain stockist
7. Relative/ Neighbor
8. Radio/ newspaper/TV
9.Other, specify…....

Codes B
0. No
1. Yes

Codes C
0. None other
1. Seeds not available
2. Lack of cash/ credit to buy seeds
3.Susceptible to diseases/ pests
4. Poor taste
5. Low yielding variety
6. Price too high
7. No market
8. Poor storability
9. Lack of enough land
10. Requires high skills
11.Content with current
12. Other, specify……

Codes D
1. On-farm trials
2. Extension demo fields
3. Farmers' groups/ coops
4. Local seed producers
5. Seed retailers
6. Private seed suppliers
7.MOFA
8.Club/association
9. Farmer to farmer seed exchange
10. Provided free by NGOs/govt
11. Other (specify)……

Codes E
0. None other
1. Gift/free
2. Borrowed seeds
3. Bought with cash
4. Payment in kind
5. Exchange with other seeds
6. Subsidy
7. Advance pay from coop
8. Other, specify……

1: crop variety codes

Yam – Nigeria		Yam – Ghana	General yam identification
0. Local varieties		0. Local varieties	0. Local varieties
11. TDr 89/02565	15. TDr 89/02475	21. CRI Pona	1. Agric/Improved varieties
12. TDr 89/02665	16. TDr 95/19158	22. Mankrong Pona	
13. TDr 89/02461	17. DRN 200/4/2	23. CRI Kukrupa	
14. TDr 89/02660	18. Other……..	24. Other……..	

Section 2. Yam variety characteristics [main local variety first - use Codes A below for characterization]

Characteristics (L=local; I=Improved)	Yam varieties (start with the 3 major local varieties, variety Codes in Annex 1)					
	1L……	2 L……	3L……	4I……	5I……	6I……
1	2	3	4	5	6	7
Agronomic						
1. 1. Tuber yield						
2. Drought tolerance						
3. Disease tolerance						
4. Early maturity						
5. Uniformity in maturity						
6. Tuber size						
7. Labor input requirement						
8. Stake requirement						
9. Other inputs requirement						
Market and economics						
10. Marketability (demand)						
11. Tuber flesh color						
12. Tuber price						
Cooking & utilization						
13. Storability						
14. Cooking time (boiling)						
15. Taste						
16. Nutritional value						
17. Overall variety score						

Codes A 1. Very poor, 2. Poor, 3. Average 4. Good, 5. Very Good

1. Crop variety codes

Yam – Nigeria		Yam – Ghana	Other crops
0. Local varieties		0. Local varieties	0. Local varieties
11. TDr 89/02565	15. TDr 89/02475	21. CRI Pona	1. Improved varieties
12. TDr 89/02665	16. TDr 95/19158	22. Mankrong Pona	
13. TDr 89/02461	17. DRN 200/4/2	23. CRI Kukrupa	
14. TDr 89/02660	18. Others …….	24. Others ……..	

Section 3: What is the maximum amount of money you would be willing to pay for a yam variety that has the desired qualities and is enough for planting one hectare? ..... (Naira/Cedi)

Section 4. What seedbed preparation method have you used? …….. (0=ridges; 1= mounds; 2=both; 3=other (specify…….)

Section 5. What is the number of stands planted/ha? ……

2. Crop codes

Roots/Tubers/Banana/ Plantain	Cereals	Grain legumes, oil seeds & spices	Industrial Tree crops
1 Yams	11 Maize	21 Cowpea	51 Cocoa
2 Cassava	12 Rice	22 Pigeon pea	52 Coffee
3 Cocoyam	13 Sorghum	23 Groundnut	53 Oil palm
4 Sweet potato	14 Millet	24 Bambara nut	54 Coconut
5 Irish potato	15 Wheat	25 Cotton seed	55 Rubber
6 Plantain	16 Beniseed	26 Soybean	56 Colanut
7 Cooking bananas	17 Guinea corn	27 Egusi/	57 Cashew
8 Frafra potatoes	18 Others……	28 Melon	58 Citrus
9 Others…….		29 Irvingia	59 Mango
		30 Sesame seeds	60 Other……
		31 Calabash	Other industrial crops
		32 Ginger	61 Sugarcane
		33 Green grain	62 Sisal
		39 Others ……..	63 Tobacco
		40 Vegetables	64 Kenaf
			65 Cotton
			66 Other: Shea

Part G. Crop Production for all Crops Grown by the Household During Last Cropping Season

Section 1. Characteristics, investment, and input use

Definitions: A field is a piece of land physically separated from others; a plot is a subunit of a field. If more than one crop is grown on a field (that is, on different plots), repeat the code in next row and use plot code. If the plot is intercropped, use same row and separate the different intercrops by commas. Consider only 3 main intercrops if you encounter more than 3 crops on a plot.

Serial number	Field code (start with one next to residence)	Field location name (as called by farmer)	Plot code	Plot size (hectares)	Intercrop? (0=No; 1=Yes)	Crop(s) grown (Use Annex 2 codes)	Crop variety (Use Annex 1codes) (e.g. 0, 1)	Percent of area under each intercrop (e.g. 50,50)	Transport used from residence to field Codes A	Field distance from residence (walking minutes)	Plot ownership Codes B	Plot manager Codes C	Soil fertility Codes D	Soil slope Codes E	Soil depth Codes F	Soil type/colour Codes G	Soil & water conservation method Codes H	Crop residue left on plot 1=Yes; 0=No	Purely irrigated (0=No; 1=Yes)
1	2	3	4	5	6	7	8	9		10	11	12	13	14	15	16	17	18	19

Codes A	Codes B	Codes C	Codes D	Codes E	Codes F	Codes G	Codes H		
1. Walking 5. Other	1. Owned 4. Borrowed in	0. Women	1. Good	1. Gente slope (flat)	1. Shallow	1. Black 4.Grey	0. None	3. Grass strips	6.Minimum till
2. Bicycle	2. Rented in 5.Borrowed out	1. Men	2.Medium	2. Medium slope	2.Medium	2. Brown 5. Other,	1.Terraces	4. Trees on boundaries	7.Soil bunds
3. Motorcycle	3. Rented out 6. Other,	2. Both equally	3. Poor	3. Steep slope	3. Deep	3. Red specify…	2. Mulching	5. No tillage	8.Stone bunds
4. Vehicle/ tractor	specify….								9. Box ridges
									10.Other, specify…

Section 2. Input use for all crops grown by the household during the last cropping season

(Serial number, field code, plot code, crop(s) and variety grown in this Section should be in exactly the same order as in Section 1 above) ---- N/C=Naira/Cedis

Serial number	Field code	Plot code	Crop(s) grown (As in Section 1 above)	Crop variety (As in Section 1 above)	Crop rotation (0=No; 1=Yes)	Previous season main crop grown (Annex 2 codes)	Fertilizer (If not used, put Zero)					Seed use (if intercropped, separate by comma)					Manure (dry equivalent)			Herbicides used	
							Basal fertilizer		Top dressing fertilizer- urea, etc		Main method of payment for fertilizer used (Codes A)	Non-bought seeds (own saved, farmer-to-farmer exchange, etc. (kg or no.)	No. of seasons own saved seed recycled	Bought seeds (including using credit & voucher)		Main method of payment for seeds used (Codes A)	own	Bought		Amount (Litres/kg)	Total cost (N/C)
							Amount (Kg/Lt)	Total cost (N/C)	Amount (Kg/Lt)	Total cost (N/C)				Amount (kg)	Total cost (N/C)		Amount (kg)	Amount (kg)	Total cost (N/C)		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22

Codes A

1.Own cash; 2. Government subsidy; 3. donor supported vouchers; 4. Money got as gift from relative & non-relatives; 5. Credit from savings and credit organizations; 6. Credit form bank;7. Credit money lender; 8. Credit from relative/neighbor/friend; 9. Credit micro-finance; 10. Credit from NGO; 11. Own saved seeds; 12. Other, specify .....

Section 3. When was the last time seed yam was obtained from other sources? …… From where …… And whom …… did you get it? What was the quantity acquired/obtained compared to your own? …… (1=Total; 2=More than half; 3=Half; 4=Less than half; 5=little; 6=Nothing)

Section 3. Input use and crop harvested

(Serial number, field code, plot code, crop(s) and variety grown in this Section should be in exactly the same order as in Section A and Section B above)

Serial number	Field code	Plot code	Crops grown (as in section 2 above)	Pesticides used		Total labor (family and hired) used in person-days Intercrops: record harvesting and threshing/shelling separately (by comma) FAMILY LABOR: PEOPLE (AE) ×EFFECTIVE DAYS × EFFECTIVE HOURS AE = Adult Equivalents (1 Adult = A person of 15 and above years of age; A child of 10- 14 years of age will be equated to 0.5 of an adult equivalent)											Total cost of oxen/tractor hire (Naira/ Cedi)	Total cost of hired labor (Naira/ Cedi)	Stress incidence on field Codes A	Perceived level of stress severity 0=Not a problem 1=Less severe 2=Severe 3=Highly severe	Total harvested per plot Intercrops: separate by comma	
				Amount (Litres/kg)	Total cost (Naira/ Cedi)	Land preparation & planting		Staking & roping		Weed control			Harvesting & transportation		Threshing or shelling							Fresh or green (kg)	Dry (kg)
						Male	Female	Male	Female	Weeding freq	Male	Female	Male	Female	Male	Female							
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23

Codes A: 0. No stress; 1. Insect pests; 2. Diseases; 3. Water logging; 4. Drought; 5. Rodents; 6. Low soil fertility; 7. Shortage of staking material; 8. Inadequate input supply; 9. Inadequate storage facilities; 10. Land shortage; 11. High cost of labor; 12. Lack of improved varieties; 13. Other, specify……

Section 4. Utilization of crop produced and household food security

Different from Sections 1, 2 and 3 above: i.e., record one row per crop (e.g. ,add production from all yam fields together)

Crop (from Section 3 above)	Form Codes A	Carryover stock from previous harvest (kg)	Production of last season (last columns of Section 3) (kg)	Total available stock for this season (kg)	From the total available stock (Column 5)…					Amount left in store before next harvest (kg)
					Quantity sold (kg)	In-kind payments (labor, land and others) paid during last cropping season (kg)	Seeds used during last cropping season (kg)	Gifts, donations given out during last cropping season (kg)	Consumption during last cropping season (kg)	
1	2	3	4	5=3+4	6	7	8	9	10	11=5-6-7-8-9-10

Codes A: 1. Fresh/green;
2. Dry

Section 5. Marketing of crops

Use one row for each transaction involving different buyers by crop (i.e. different from Sections 1, 2, 3 and 4)

Crop (Column 1 of Section 4 above)	Market type Codes A	Month sold Codes B	Quantity sold (kg) (sum should be equal to Column 6 of Section 4)	Who sold? Codes C	Price (Naira/Cedi/kg)	Buyer Codes D	Relation to buyer Codes E	Mode of transport Codes F	Time taken to get to the market (minutes)	Actual transport cost (Naira/Cedi)
1	3	4	5	6	7	8	9	10	11	12

Codes A	Codes B		Codes C	Codes D		Codes E	Codes F
1. Farmgate 2. Community market 3. Main/district market	1. January 2. February 3. March 4. April 5. May 6. June	7. July 8. August 9. September 10. October 11. November 12. December	0. Female 1. Male 2. Both	1. Farmers' group/union / coop/club 2. Consumer or other farmer 3. Rural assembler 4. Broker/middlemen 5. Rural grain trader/ wholesaler	6. Urban grain trader/ wholesaler 7. Exporter 8. Millers 9. FRA 10. Other, specify…….	1. No relation but not a long-time buyer 2. No relation but a long time buyer 3. Relative 4. Friend 5. Money lender 6. Other, specify……	1. Bicycle 2. Hired vehicle 3. Public transport 4. Donkey 5. Oxen/horse cart 6. Back/head load 7. Other, specify……..

Part H. Transfer and other sources of income last year

Who earned/received? Use family code from Part C: Household composition and characteristics	Sources of income Use Codes A	Total income (cash & in-kind)		Total income (Naira/ Cedi)
		Cash (Naira/Cedi)	Payment in kind Cash equivalent	
1	2	3	4	5= 3+4

Codes A
1. Rented/sharecropped out land
2. Rented out oxen for plowing
3. Salaried employment
4. Farm labor wages
5. Non-farm labor wages
6. Non-farm agribusiness income (e.g. grain milling/trading)
7. Other business NET income (shops, trade, tailor, sales of beverages, etc.)
8. Pension income
9. Drought/flood relief
10.Safety net or food for work
11. Remittances (sent from non-resident family and relatives living elsewhere)
12. Marriage gifts
13. Sales of firewood/charcoal
14. Brick making
15. Poles from own and communal forests
16. Sale of crop residues
17. Quarrying stones
18.Rental property (other than land and oxen)
19. Interest from deposits
20. Social cash transfer
21. Other, specify
……..……...

Part I. Household expenditure

(Here, the person involved in purchases should be the principal respondent/s)

Section 1. Food consumption

No.	Item	Unit (e.g. kg, liter, packet, bundle, number)	Bought in the last 12 months				
			Frequency of buying (e.g., once/year twice/ year etc.)	Average quantity each time (e.g. 2 kg; 4 bundles etc.)	Total quantity / year	Average price/ unit (Naira/ Cedi)	Total cost of purchase (Naira/ Cedi)
1	2	3	4	5	6=4x5	7	8=6x7
	Staple foods						
1	Seed yam						
2	Ware yam						
3	Dried yam products						
4	Maize						
5	Wheat						
6	Barley						
7	Rice						
8	Sorghum						
9	Millet						
10	Cassava						
11	Potatoes						
12	Sweet potato						
13	Beans						
14	Cowpea						
15	Groundnut						
16	Soybean						
17	Pigeon pea						
18	Banana						
19	Plantain						
20	Egusi/Melon						
21	Other, specify.....						
	Beverages and drinks						
22	Tea (leaves)						
23	Tea (liquid)						
24	Coffee (powder)						
25	Coffee (liquid)						
26	Soft drinks						
27	Juices						
28	Local beer						
29	Bottled/clear beer						
30	Wine						
31	Drinking water						
32	Coffee beans						
33	Opaque beer (chibuku)						

Section 1. Food consumption (cont'd)

No.	Item	Unit (e.g. kg, liter, packet, bundle, number)	Bought in the last 12 months				
			Frequency of buying (e.g., once/year twice/year	Average quantity each time	Total quantity/ year	Average price/unit (Naira/ Cedi)	Total cost of purchase (Naira/ Cedi)
1	2	3	4	5	6=4x5	7	8=6x7
	Fruits						
34	Oranges						
35	Mango						
36	Pawpaw						
37	Pineapple						
38	Banana (ripe)						
39	Apple						
40	Guava						
41	Coconut						
42	Sugar cane						
43	Other.						
	Meat &other products						
44	Beef						
45	Goat meat						
46	Mutton						
47	Pork						
48	Chicken						
49	Turkey						
50	Duck						
51	Bush meat						
52	Fish						
53	Eggs						
54	Milk						
55	Cheese/Ghee						
56	Butter						
57	Yoghurt						
58	Honey						
59	Other.						
	Vegetables						
60	Tomato						
61	Onion						
62	Cabbage						
63	Spinach						
64	Kale						
65	Carrot						
66	Okra						
67	Pumpkin						
68	Egg plant						
69	Cucumber						
70	Pepper						
71	Garlic						

Section 1. Food consumption (cont'd)

No.	Item	Unit (e.g. kg, liter, packet, bundle, number)	Bought in the last 12 months				
			Frequency of buying (e.g., once/year twice/year) etc.	Average quantity each time	Total quantity/ year	Average price/ unit (Naira/ Cedi)	Total cost of purchase (Naira/ Cedi)
1	2	3	4	5	6=4x5	7	8=6x7
Fats, oils, sweeteners, snacks and others							
72	Cooking fat						
73	Margarine						
74	Groundnut oil						
75	Coconut oil						
76	Bread						
77	Biscuits						
78	Popcorn						
79	Cashew nuts						
80	Sugar						
81	Salt						
82	Chocolate						
83	Curry						
84	Ginger						
85	Macadamia nuts						

Section 2. Expenditure on non-food items in the last 12 months

No.	Expense Item	Unit (e.g. kg, liter, packet, bundle, number)	Frequency of purchase (e.g., once/year twice/year,	Average quantity each time	Total quantity year	Average price/ unit (Naira/Cedi)	Total cost of purchase (Naira/Cedi)
1	2	3	4	5	6	7	8=6x7
1	Clothing						
2	Shoes						
3	Blankets						
4	Bed sheets						
5	Soap/washing products						
6	Electricity						
7	Fuelwood						
8	Charcoal						
9	Kerosene						
10	Batteries						
11	School fees						
12	School books and supplies						
13	Health care						
14	Grain milling						
15	Land tax						
16	Church contributions						
17	Dowry						
18	Membership fees						
19	House building/construction						
20	Guard/security						
21	Newspapers, magazines, etc.						
22	Travel expenses						
23	Mobile phone air time (voucher)						
24	Radio/TV service charge						
25	Payment for extension services						
26	Kitchen utensils						
27	Personal care (toothpaste, nail, etc)						
28	Furniture (tables, chairs, beds, etc)						
29	Home repairs						
30	Purchase of bicycle, motorcycle, etc						
31	Repairs for vehicles, bicycles, etc						
32	Petrol and engine oils for cars						
33	House rent						
34	Utility bills (water, telephone, etc)						
35	Cigarettes, tobacco, etc						
36	Remittances paid						
37	Boxes of matches						
38	Debt payments						
39	Payment for land rent in cash						
40	Other, specify.....						

Part J. Access to Capital and Support Services

Section 1. Household credit need and sources during last cropping season. If the credit is in non-cash form, indicate the cash equivalent or value.

Activity	Needed credit? Codes A	If No in column 2, then Why? Codes B	If Yes in column 2, then did you get it? Codes A	If NO in column 4, then what was the main reason? (codes C)	If Yes in column 4		
					Source of credit, Codes D	How much did you get? (Naira/Cedi)	Have you repaid the loan? Codes A
1	2	3	4	5	6	7	8
1.Buying local seeds							
2. Buying improved seeds							
3. Buying fertilizer							
4. Buying herbicide/ pesticides							
5. Buying farm implements							
6. Buying livestock							
7. Investing in irrigation system							
8. Non-farm business or trade							
9. Buying food							
10. Medical expenses							
11. School fees							

Codes A	Codes B	Codes C			Codes D	
0. No 1. Yes	1. Not cash constrained 2. Activity is not profitable 3. Never thought of this investment 4. Other, specify.....	0. No reason 1. Borrowing is risky 2. Interest rate is high 3. Too much paper work/ procedures	4. Expected to be rejected, so did not try it 5. I have no asset for collateral 6. No money lenders in this area for this purpose	7. Lenders don't provide the amount needed 8. No credit association available 9. Not available on time 10. Other, specify……	1. Money lender 2. Farmer group/ coop 3. Merry go round (chilimba) 4. Microfinance 5. Bank	6. Savings and Credit 7. Relative/friend /neighbor 8. Other, specify……..

Section 2. Access to extension/information services

Type of service	Did you receive training or information on [……] during the last cropping season? (Codes A)	If Yes in column 2, main source of information/training, (Codes B)	If Yes in column 2, number of contacts during the season (days/year)
1	2	3	4
1. New varieties of yam			
2. New varieties of other crops			
3. Pest and disease control - yam			
4. Pest and disease control – other crops			
5. Soil and water management			
6. Crop rotation			
7. Output markets and prices			
8. Input markets and prices			
9. Livestock production			
10. Family health/planning			
11. Sanitation			
12. Food processing			

Codes A	Codes B				
0. No 1. Yes	1. Government'sextension service 2. Farmers' coops or groups 3. Neighbor/relative farmers	4. NGOs 5. Private company 6. Research center	7. Farmers' field school 8. Radio/TV 9. Newspaper	10. Mobile phone 11. Town hall meetings 12. Farmers' training centere	13.Traders/ Agro-dealers 14. Other specify.....

4. Community Profile Form

YIIFSWA PROJECT: Community Profile Form

Community Interview Background & Identification

LGA Name:	Community:	Population	Number of households	Number of men	Number of women
		Discussion attendance			
GPS Readings					
Name and address of the head of the community					
Name and address of discussion leader					

1 Characteristics of the community

Description of the community and existing main crops (activities; production trends, constraints, gender, etc)

Community relationship with neighboring communities and markets

2 Basic public services

2.1 Distance to the nearest main (district) market from residence .....…….… minutes of walking time

2.2 Number of months the road to main (district) market is passable for vehicles in a year.....

2.3 Quality of road to the main market (district) … (1. Very poor; 2. Poor; 3. Average; 4. Good; 5. Very good)

2.4 Average one-way transport cost (/person) to the main market using a car (Naira/Cedi/ person).....

2.5 Distance to the nearest seed dealer from residence .....minutes of walking time

2.6 Distance to the nearest fertilizer dealer from residence ..... minutes of walking time

2.7 Distance to nearest herbicides/pesticides dealer from residence ……minutes of walking time

2.8 Distance to the nearest farmers' cooperative from residence ……..minutes of walking time

2.9 Distance to the nearest farmers' group/club from residence ……....minutes of walking time

2.10 Distance to the nearest agricultural extension office from residence .....minutes of walking time

2.11 Distance to the nearest health center from residence ……minutes of walking time

2.12 Main source of drinking water…….....(Codes A)

Codes A: 1. Piped/tap; 2. Deep well protected and covered; 3. Deep well unprotected & uncovered; 4. Stream; 5. River; 6. Dams; 7. Ponds or floods; 8. Borehole

Note: protected refers to water sources internally plastered and covered with a cap of wood, stone or concrete)

2.13 Do you boil water for drinking?.....(1=Yes; 2=No)

2.14 Do you treat water (chemical treatment) for drinking?..... (1=Yes; 2=No)

2.15 Distance to main water source for drinking ……..…minutes of walking time

2.16 What are the three common types of diseases experienced in the last six months?

2.17 Are there any projects that are starting in the community? If yes, what kind of projects are they:

a. Agriculture extension services

b. Microcredit

c. Community Health Volunteer Training

d. Water supply

e. NGO (Nongovernmental organization) starting new activities

f. Other projects, which _____

2.18 Is there an elementary school in the community? Y N _____ hours, min.

2.19- Is there a primary school in the community? Y N _____hours, min.

2.20- Number of teachers? _____

2.21- How many students in your community attend school? % girls _____ % boys_____

2.22- Where is the nearest secondary school? Place_____ Distance_____

Yam production and marketing

3.1 Importance of yam in the community (fresh and dried form, ware and seed, etc.)

3.2 Yam varieties existing (traditional, improved, demand, etc.)

3.3 Yam transport to market and cost of transporting

3.4 Yam cropping calendar and commercial flows (fluctuations in quantities traded and prices during different seasons, etc.)

4 Food security

4.1 Food shortage (when, how, why, etc.)

4.2 Coping strategies existing (by gender, socio-economic class)

5 Access to resources in your community

6 Access to media

Sources of information	Do you use these sources of information? 1=Yes; 0=No	Do you trust the information you get from the following sources? 1=Yes; 0=No	Rank them by importance (from 1=the most important,……, 9=the least important)	Time spent daily in getting information from different sources (in minutes/ day)	What type of information do you expect to get from different sources? 1= news; 2=Health & nutrition; 3 = Community; 4 = Agricultural info; 5 = Other (specify: ……..….)
1.Town criers					
2.Community head secretaries					
3.Religious leaders					
4.Town hall meetings					
5.Radio					
6.TV					
7.Newspaper					
8.Mobile phone					
9. Other (specify: ……)					

5. Characteristics of AEZ.

Parameters	SGS	DS	HF
LGP (days)	181–210	211–270	> 270
Soil types	Luvisol, Acrisol, Vertisol	Lixisol, Leptosol, Plinthosol, Nitisol, Luvisol	Nitosol, Ferrasols, Vertisol, Fluvisol
Annual rainfall (mm)	1200–1500	1300–2000	> 2000
Altitude (masl)	< 800	< 800	< 800
Rainy season	June–October	May–October	March–November
Solar radiation (MJ/m2/day)	15	15	12
Rainfall pattern	Bimodal	Bimodal	Bimodal
Main rainfed crop	Yam, Cowpea, Sorghum, Maize, Sweet potato, Cassava, Cocoyam	Yam, Maize, Sweet potato, Cassava, Cocoyam	Yam, Rice, Maize, Sweet potato, Cassava, Cocoyam

SGS = Southern Guinea Savanna; DS = Derived Savanna; HF = Humid Forest; LGP = Length of growing period.
Sources: IITA (1992); Jagtap (1995); FAO/IIASA/ISRIC/ISSCAS/JRC (2009)

6. Complementary community level questionnaire

International Institute of Tropical Agriculture (IITA)
Yam Improvement for Income and Food Security in West Africa (YIIFSWA)

COMMUNITY LEVEL QUESTIONNAIRE
Nigeria and Ghana

PART A. Interview background

1. Country No. _____ (1 = Nigeria ; 2 =Ghana)
2. State/Region: _____
3. LGA/District: _____
4. Community/village No _____ Name _____
   (*Community/village code: 01 = 1st village visited, ... , 10 =10th village visited*)

5. Survey date: Day _____; Mth _____ ; 20 _____

6. State of road from main city to community: _____ (Use Roads status codes below)

1 Tarmac, easily motorable in all seasons;
2 Tarmac, poorly motorable in all seasons;
3 Tarmac, not motorable in all seasons;
4 Path, easily passable in all seasons;
5 Path, barely passable in all seasons;
6 Path, not passable in all seasons;
7 Dirt road, easily motorable, all seasons;
8 Dirt road, barely motorable in all seasons;
9 Dirt road, not motorable;
10 River or stream.

7. No of people: _____ interviewed, comprising of _____ men and _____women

8. GPS readings of the Community: a) Waypoint ID: _____ b) Latitude: _____

c) Longitude: _____; d) Altitude: _____

Part B. Crops grown

1. What are the main crops grown in this community? (Rank 1st = most important)

Crop* ranked by Overall importance	Rank by land area	Rank by sales	Rank by quantity consumed
1 ……	1 …….	1 . …….	1……
2 ……	2 …….	2 ……	2 ……
3 ……	3 …….	3 ……	3 ……

*** Roots tubers and plantain**

1 Yam; 2 Cassava; 3 Cocoyams; 4 Sweet Potato; 5 Irish potato; 6 Plantain; 7 Cooking Banana; 8 Other roots/tubers

Cereals

11 Maize; 12 Rice; 13 Sorghum; 14 Millet; 15 Wheat; 16 Finger millet; 17 Other Cereals

Grain legumes, oil seeds and vegetables

21 Cowpea; 22 Pigeon pea; 23 Groundnut; 24 Bambara nut; 25 Cotton seeds; 26 Other Beans/peas; 27Egusi/melon; 29 Sesame seeds; 30 Calabash; 31 Ginger; 32 Sunflower; 33 Beniseed; 34 Tea; 35 Other legumes/Oils; 40 Vegetables

2. Do you know anyone producing only seed yam? ___ (1 = Yes; 2 = No)

2.a If YES, Are they many in this community? ___ (1 = Yes; 2 = No)
Number? ____men & ___ women

3. Any special way of producing yam in this community? _____
_____

4. Do you have in this village any variety with extraordinary qualities? ___ (1 = Yes; 2 = No)

4.a If Yes, what are they?

Variety1 Name _____; Qualities _____

Variety1 Name _____; Qualities _____

Variety1 Name _____; Qualities _____

6. What has been the trend in yam production in the last 20 years? ___ (1 = Decreasing? 2 = No change? 3 = Increasing?)

Why? Explain _____

7. Yam production objectives. What is the most important objective for growing yam in this community? ___ (1 = Sale; 2 = Food; 3 = Other, specify: _____)

8. Source of hired labor: Where do the hired labor in this community come mostly from? ___ (1=Within the community; 2=Neighboring community in the area; 3=Community far away (in other regions); 4=Nearest town; 5= Neighboring countries; 6=Not known?)

PART C. Risk sources & infrastructure

1. What are the major problems in the production of yam?

1. _____
2. _____
3. _____

2. Distance to: Kilometres, Walking distance in Minutes

	Kilometres	Minutes by foot
Health clinic	DIST_____	TIME_____
Hospital	DIST_____	TIME_____
Primary school	DIST_____	TIME_____
Secondary school	DIST_____	TIME_____
Farmers'cooperative/club	DIST_____	TIME_____
Agro-chemicals dealer	DIST_____	TIME_____
Agric extension office	DIST_____	TIME_____
Seed yam dealer	DIST_____	TIME_____

[IF FACILITY IS NOT IN COMMUNITY, MARK 0 Kilometer; 0 Minute]

3. Where do farmers sale yam mostly? ___ (1 = Farm-gate; 2 = Village market; 3 = Other market, specify: _____)

4. By what is (most common means) do you carry yam to market? ____ *(1 = Head load; 2 = Bicycle; 3 = Barrow/Cart, 4=Lorry/Pickup/tractor/trailer; 5= Animal; 6= Motorcycle; 7= Other, specify: _____)*

5. What is the frequency of market days in this village? Every _____ days?

5.1 Rank by volume traded, the people who buy ware yam in this market.

People who buy (Rank 1=highest)

Consumers from this or nearby community? ___

Consumers from far away? ___

Small traders from this and nearby villages? ___

Small traders from far away? ___

Big traders from far with lorries? ___

5.2 Rank by volume traded, the people who buy seed yam in this market.

People who buy (1=highest)

Consumers from this or nearby community? ___

Consumers from far away? ___

Small traders from this and nearby villages ___

Small traders from far away? ___

Big traders from far with lorries ___

5.3 Rank by volume traded, the people who sell ware yam in this market.

People who sell (Rank 1=highest)

Farmers themselves? ___

Traders from this and nearby community? ___

Traders from far away? ___

5.4 Rank by volume traded, the people who sell seed yam in this market.

People who sell (Rank 1=highest)

Farmers themselves? ___

Traders from this and nearby community? ___

Traders from far away? ___

6. How many vehicles (lorries) come into this community per market day? _____

7. Complementary Household Level Questionnaire

International Institute of Tropical Agriculture (IITA)
Yam Improvement for Income and Food Security in West Africa (YIIFSWA)
HOUSEHOLD LEVEL QUESTIONNAIRE

Nigeria and Ghana

Part A. Interview background

1. Household No _____
2. Respondent's name: _____
3. Mobile phone No _____
4. Country No. ____ (1 = Nigeria; 2 =Ghana)
5. State/Region Name _____
6. LGA/District:_____
7. Community/village No _____
   (*Community/village code: 01 = 1st village visited, ... , 10 =10th village visited*)

8. Date of interview: Day _____Month _____Year 20____
9. GPS readings of homestead: a) Waypoint ID _____ b) Latitude _____

c) Longitude _____d) Altitude _____

Part B. Household head information

1 Age of the household head: _____

2 Sex of the household head _____ (1=Male; 2=Female)

3 Marital status of the household head _____ (1. Married living with spouse/s; 2. Married but spouse away; 3. Divorced/separated; 4. Widow/widower; 5. Never married; 6. Other, specify_____)

4 Education of the household head _____ (in years with 0= None/Illiterate)

5 Experience in growing yams _____ (in years)

6 Main Occupation of the household head _____ (0. None; 1. Farming (crop + livestock); 2. Salaried employment; 3. Self-employed off-farm; 4. Casual labourer on-farm; 5. Casual labourer off-farm; 6. School/college child; 7. Non-school child ; 8. Herding; 9. Household chores.; 10.Other, specify, _____)

7 Secondary occupation of the household head _____ (0. None; 1. Farming (crop + livestock); 2. Salaried employment; 3. Self-employed off-farm; 4. Casual labourer on-farm; 5. Casual labourer off-farm; 6. School/ college child; 7. Non-school child ; 8. Herding; 9. Household chores.; 10.Other specify, _____)

8 Religion of the household head: ____ (1. No religion/atheist/traditionalist; 2. Christian; 3. Muslim; 4. Other, specify_____)

PART C. Household identification

1 Total number of people in the household:_____

2 Type of toilet used: _____ (1. Flash toilet private; 2. Flash toilet shared; 3. Ordinary pit latrine private; 4. Ordinary pit latrine shared; 5. No toilet/use open air)

3 Main walling material of main residential house: _____ (1. Burned bricks; 2. Unburned bricks; 3. Mud bricks; 4. Concrete block; 5. Pole & mud; 6. Timber; 7.Stick and grass; 8. Iron sheet; 9. Other, specify…….)

4 Main roofing material of main residential house ____ (1. Grass thatch; 2. Iron sheet; 3. Tiles; 4. Asbestos; 5. Other, specify_____)

5 Where and how do you store yam? _____

6 How long did you store yam last year? _____ months

7 What is the most important objective for growing yam for your household_(1 = Sale;2 =Food; 3 = Other, specify: _____)

8 For household owned yam, who takes the decisions to do the following?

8.1 To plant____ *(1=Man; 2=Woman; 3=Equally both)*
8.2 To harvest____ *(1=Man; 2=Woman; 3=Equally both)*
8.3 To use____ *(1=Man; 2=Woman; 3=Equally both)*
8.4 To market____ *(1=Man; 2=Woman; 3=Equally both)*
8.5 Crops at home ____ *(1=Man; 2=Woman; 3=Equally both)*

PART D: LAND TENURE & CROPS GROWN

1. What are the main crops grown by your household?
(Rank 1st = most important and fill using the codes mentioned below)

Crop* ranked by Overall importance	Rank by land area	Rank by sales	Rank by quantity consumed
1 ……	1 …….	1 ..……	1……
2 ……	2 …….	2 ……	2 ……
3 ……	3 …….	3 ……	3 ……

*** Roots tubers and plantain**

1 Yam; 2 Cassava; 3 Cocoyams; 4 Sweet Potato; 5 Irish potato; 6 Plantain; 7 Cooking Banana; 8 Other roots/tubers

Cereals

11 Maize; 12 Rice; 13 Sorghum; 14 Millet; 15 Wheat; 16 Finger millet; 17 Other Cereals

Grain legumes, oil seeds and vegetables

21 Cowpea; 22 Pigeon pea; 23 Groundnut; 24 Bambara nut; 25 Cotton seeds; 26 Other Beans/peas;

27Egusi/melon; 29 Sesame seeds; 30 Calabash; 31 Ginger; 32 Sunflower; 33 Beniseed; 34 Tea; 35 Other legumes/Oils; 40 Vegetables

2. For each crop ranked by overall importance above, how much did you earn last year?
2.a Crop 1, Amount earned last year: _____ Naira/Cedis
2.b Crop 2, Amount earned last year: _____ Naira/Cedis
2.c Crop 3, Amount earned last year: _____ Naira/Cedis

3. (a) Where did (would) you carry the yam harvested? ___ *(1 = Home; 2 = Market; 3=Store in the field; 4= Other, specify: _____)*

(b) What was the distance? _____ Km

Part E. Household and market

1 Do you take your yam to the market for sale? ___ (1 = Yes; 2 = No)
1.a. If Yes, Is the market located in your village? ___ (1 = Yes; 2 = No)
2 Do traders come to you to buy your yam? ___ (1 = Yes; 2 = No)
3 If you divide the entire yam you harvest into 10 parts, how many parts do you sell at harvest and and how many parts do you store?
Sell at harvest _____ Parts out of 10
Store _____ Parts out of 10; How long do you store? _____ months

Total 10

4 If you divide yam you sell into 10 parts, how many parts will you take to market and how many parts will traders come to you and buy?
To market _____ Parts out of 10
Traders come for _____ Parts out of 10

Total 10

5 What means of transport do you use most frequently to get to the village market? ____ (1. Walking; 2. Bicycle; 3. Motocycle; 4. Tractor; 5. Vehicle; 6. Cart; 7. Others, specify:_____)

6 What is the distance to the village market from your residence? _____(in minutes/hours' time)

7 What means of transport do you use most frequently to get to the urban market? ____ (1. Walking; 2. Bicycle; 3. Motocycle; 4. Tractor; 5. Vehicle; 6. Cart; 7. Others, specify:_____)

8 What is the distance to the urban market from your residence? _____ (in minutes/hours' time)

8. Complementary field level questionnaire

International Institute of Tropical Agriculture (IITA)
Yam Improvement for Income and Food Security in West Africa (YIIFSWA)

FIELD LEVEL QUESTIONNAIRE
Nigeria and Ghana

(Complete one copy of this questionnaire per field)

Part A: Interview background

1. Country No. ____ (1 = Nigeria ; 2 =Ghana)

2. Community/village No _____
(*Community/village code: 01 = 1st village visited, ... , 10 =10th village visited*)

3. Household questionnaire No. _____ *(1 = largest farmer; 2 = Medium; 3=Smallest)*

4. Field No. _____*(1 = First visited)*

5. Survey date: Day ____ ; Mth _____ ; 20_____

6. Field Location distance from residence: _____

7. GPS readings of field: a) Waypoint ID: _____ b) Latitude: _____

c) Longitude: _____; d) Altitude: _____

Part B. Yam & other crops grown

1 Three most important yam varietal identification & source

Yam identification/type		1	2	3
Variety Name				
Month Planted				
1st Harvesting Month				
Type of seed yam used: (1=Whole tuber; 2=Sliced tuber; 3=Milked tuber)				
Origin of the Variety*				
Seed yam Source	% Own produced			
	% Purchased			
	% Gift			
2nd Harvesting Month				

** 1=The village; 2=Neighboring village in the area; 3=Village far away (in other regions); 4=Nearest town; 5=Town farther away; 6= Neighboring countries; 7=Min of Agric; 9=Not known.*

2 How much did you spend on seed yam you purchased? _____ Naira/Cedis
3 How much would you sell the own produced seed yam? _____ Naira/Cedis
4 Other major crops in the field:

4.1 _____
4.2 _____
4.3 _____

Part C. Labor input use for yam grown

1 Land clearing

1.1 Who did most of the land clearing in this field? ___ *(M=Men mostly; W=Women mostly; B=Both equally; C=Children < 15; O=Other, specify: _____)*

1.2 If mostly by men:

1.2a How many men working full time would clear the entire field in one day? _____ men

1.2b What was the Wage rate/man/day for the land clearing? _____ Naira/Cedis

1.3 If mostly by women:

1.3a How many women working full time would clear the entire field in one day? ____women

1.3b What was the Wage rate/woman/day for the land clearing? _____ Naira/Cedis

1.4 If mostly by children < 15 years:

1.4a How many <15 working full time would clear the entire field in one day? _____children

1.4b What was the Wage rate/child/day for the land clearing? _____ Naira/Cedis

1.5 How much of the entire land clearing labor for this field was hired and how much was family? _____ *(AF= All family; MF= Mostly family; HF= Hired/family equally; MH= Mostly hired; AH= All hired)*

1.6 Was any of the land in this field mechanized? ___ *(1 = Yes; 2 = No)*

1.6a If mechanized, in full or in part: ____ *(F= Mechanized fully; P = Mechanized partly)*

Type of mechanization: _____

1.6b How much was paid for the mechanization? _____ Naira/Cedis

1.7 Did you apply herbicide? ___ *(1 = Yes; 2 = No)*; If Yes, Cost _____ Naira/Cedis

2 Seedbed Preparation

2.1 Who did most of the seedbed preparation in this field? ___ *(M=Men mostly; W=Women mostly; B=Both equally; C=Children < 15; O=Other, specify: _____)*

2.2a How much of the entire seedbed preparation labor for this field was hired and how much was family? _____ *(AF= All family; MF= Mostly family; HF= Hired/family equally; MH= Mostly hired; AH= All hired)*

2.2b Was any of the seedbed preparation in this field mechanized? ___ *(1 = Yes; 2 = No)*

2.2c If mechanized, in full or in part: ____ *(F= Mechanized fully; P = Mechanized partly)*

Type of mechanization: _____

2.3 If mostly by men:

2.3a How many men working full time would prep. the seedbed in the entire field in one day? _____ men

2.3b What was the Wage rate/man/day for the seedbed preparation? _____ Naira/Cedis

2.4 If mostly by women:

2.4a How many women working full time would prep. the seedbed in the entire field in one day? ____women

2.4b What was the Wage rate/woman/day for the seedbed preparation? _____ Naira/Cedis

2.5 If mostly by children < 15 years:

2.5a How many <15 working full time would the prep. the seedbed in the entire field in one day? _____ children

2.5b What was the Wage rate/child/day for the seedbed preparation? _____ Naira/Cedis

2.6 If mechanized, in full or in part:

2.6a How much was paid? _____ Naira/Cedis

3 Planting

3.1 Who did most of the planting in this field? ___ *(M=Men mostly; W=Women mostly; B=Both equally; C=Children < 15; O=Other, specify: _____)*

3.2a How much of the entire planting labor for this field was hired and how much was family? _____ *(AF= All family; MF= Mostly family; HF= Hired/family equally; MH= Mostly hired; AH= All hired)*

3.3 If mostly by men:

3.3a How many men working full time would plant yam in the entire field in one day? _____ men

3.3bWhat was the Wage rate/man/day for the planting? _____ Naira/Cedis

3.4 If mostly by women:

3.4a How many women working full time would plant yam in the entire field in one day? ____women

3.4bWhat was the Wage rate/woman/day for the planting? _____ Naira/Cedis

3.5 If mostly by children < 15 years:

3.5a How many <15 working full time would plant yam in the entire field in one day? _____children

3.5b What was the Wage rate/child/day for the planting? _____ Naira/Cedis

4 Weeding

4.1 Who did most of the different weedings done in this field?

4.1a For Weeding 1: ___ *(M=Men mostly; W=Women mostly; B=Both equally; C=Children < 15; O=Other, specify: _____)*

4.1b For Weeding 2: ___ *(M=Men mostly; W=Women mostly; B=Both equally; C=Children < 15; O=Other, specify: _____)*

4.1c For Weeding 3: ___ *(M=Men mostly; W=Women mostly; B=Both equally; C=Children < 15; O=Other, specify: _____)*

4.2 How much of the entire weeding labor for this field for each weeding was hired and how much was family?

4.2a For Weeding 1: _____ *(AF= All family; MF= Mostly family; HF= Hired/family equally; MH= Mostly hired; AH= All hired)*

4.2b For Weeding 2: _____ *(AF= All family; MF= Mostly family; HF= Hired/family equally; MH= Mostly hired; AH= All hired)*

4.2c For Weeding 3: _____ *(AF= All family; MF= Mostly family; HF= Hired/family equally; MH= Mostly hired; AH= All hired)*

4.3 Did you weed with herbicide? ___ *(1 = Yes; 2 = No); If Yes,* Cost _____ Naira/Cedis

4.4 For the weedings done mostly by men:

4.4a How many men working full time would weed the entire field in one day?

Weeding 1	Weeding 2	Weeding 3
_____ men	_____ men	_____ men

4.4b What was the wage rate/man/day for weeding?

Weeding 1	Weeding 2	Weeding 3
_____ Naira/Cedis	_____ Naira/Cedis	_____ Naira/Cedis

4.5 For the weedings done mostly by women:

4.5a How many women working full time would weed the entire field in one day?

Weeding 1	Weeding 2	Weeding 3
_____ women	_____ women	_____ women

4.5b What was the wage rate/woman/day for weeding?

Weeding 1	Weeding 2	Weeding 3
_____ Naira/Cedis	_____ Naira/Cedis	_____

4.6 For the weedings done mostly by children:
4.6a How many children working full time would weed the entire field in one day?

Weeding 1	Weeding 2	Weeding 3
_____ children	_____ children	_____ children

4.6b What was the wage rate/child/day for weeding?

Weeding 1	Weeding 2	Weeding 3
_____ Naira/Cedis	_____ Naira/Cedis	_____

5 Harvesting

5.1 Who did (would do) most of the harvesting in this field? ___ *(M=Men mostly; W=Women mostly; B=Both equally; C=Children < 15; O=Other, specify: _____)*

5.2 How much of the entire harvesting labor for this field was hired and how much was family? _____ *(AF= All family; MF= Mostly family; HF= Hired/family equally; MH= Mostly hired; AH= All hired)*

_____

5.3 If mostly by men:
5.3a How many men working full time would harvest yam in the entire field in one day? _____ men
5.3b What was the Wage rate/man/day for the harvesting? _____ Naira/Cedis
5.4 If mostly by women:
5.4a How many women working full time would harvest yam in the entire field in one day? ____women
5.4b What was the Wage rate/woman/day for the harvesting? _____ Naira/Cedis
5.5 If mostly by children < 15 years:
5.5a How many <15 working full time would harvest yam in the entire field in one day? _____children
5.5b What was the Wage rate/child/day for the harvesting? _____ Naira/Cedis

6 Transportation

6.1 Where did (would) you carry most of the yam harvested? ___ *(1 = Home; 2 = Market; 3= Other, specify: _____)*
6.1a What was the distance? _____ Km
6.2 By what most common means did (would) you carry the yam harvested? ____ *(1 = Head load; 2 = Bicycle; 3 = Barrow/Cart, 4=Lorry/Pickup/tractor/trailer; 5= Animal; 6=Motorcycle; 7= Other, specify: _____)*
6.3 If mostly by head load (H)
6.3(a) Who did most of the carrying for the yam harvested? ___ *(M=Men mostly; W=Women mostly; B=Both equally; C=Children < 15; O=Other, specify: _____)*
6.3(b) How many of the most people would carry the whole yam in one day? _____ people.

PART D: NON-LABOR INPUT USE FOR YAM GROWN

1 Have you used stakes? ___ (1 = Yes; 2 = No). If Yes How much did you spend on stakes? _____ Naira/Cedis
2 Have you used chemical fertilizer? ___ (1 = Yes; 2 = No). If Yes How much did you spend on it? _____ Naira/Cedis
3 Have you used other chemical 1 (specify: _____)? ___ (1 = Yes; 2 = No). If Yes How much did you spend on it? _____ Naira/Cedis
4 Have you used other chemical 2 (specify: _____)? ___ (1 = Yes; 2 = No). If Yes How much did you spend on it? _____ Naira/Cedis

Part E. Tenurial arrangements

1 Who owns the yam in this field? ___ *(F= Whole family; M= Man or husband; W= Woman or wife; S= Son; D= Daughter; O=Other, specify: _____)*

2 How was this land acquired for use in producing yam? ___ *(I= Inherited; L*= Loaned or Rented; B= Borrowed; P= Purchased; A= Allocated by; O=Other, specify: _____)*
* if L, circle mode of payment: ___ (1=Cash; 2=Kind; 3=Sharecrop; 4=Other _____)

3 If this field or land was inherited, from whom was it inherited? ___ *(F= Father's (Husband's) family; M= Mother's (wife's) family)*

PART F. Harvests & uses of yam output

1 Total field area _____ m^2.
2 Yam yield sample plot: Size _____ m^2.
3 Number of stands/plot _____stands
4 Yield, Number of tubers _____ ; and weigh: _____total kgs
5 Is the field milked? ___ *(1 = Yes; 2 = No)*
6 If you divide expected yam output from this field into 10 parts, how many parts will you sell and how many parts will you use at home?

Sell	_____	Parts out of 10
Home use	_____	Parts out of 10
Seed yam	_____	Parts out of 10
Total	10	

7 If you divide yam to sell from this field into 10 parts, how many parts will you sell now and how many parts will you store and sell later?

Sell now	_____	Parts out of 10
Store to sell later	_____	Parts out of 10; Store for how long? _____ months
Total	10	

Weighing records in Kg

							Total
Total							

8. Observation, if any special way of producing yam from this field_____

_____