INITIATIVE ON
West and Central African Food Systems Transformation

Transforming Agrifood Systems in West and Central Africa Initiative

(TAFS-WCA)

VALUE CHAIN AND MULTICROP BASELINE OF TAFS-WCA:

Case of Nigeria

Africa Rice Center

Acknowledgements

This work is part of the CGIAR Research Initiative on Transforming Agri-Food Systems in West and Central Africa (TAFS-WCA). The TAFS-WCA initiative is a collaborative effort of nine centers including six CGIAR centers, namely the Africa Rice Center (AfricaRice), the International Institute of Tropical Agriculture (IITA), the Alliance of Bioversity International and the International Center for Tropical Agriculture (Alliance Bioversity-CIAT), The International Water Management Institute (IWMI), the International Center for Potato (CIP) and the WorldFish and three international centers namely the West and Central African Council for Agricultural Research (CORAF), The World Vegetable Center (WorldVeg) and The International Centre of Insect Physiology and Ecology (icipe). The initiative further collaborates with national partners in different countries.

The Initiative's leadership thanks all funders for supporting this research through their contributions to the CGIAR Trust Fund, and in particular the Governments of the Belgium and the Netherlands for their financial support. We also thank the national partners and enumerators for their contribution.

Citation

Arouna, A., Yergo, W. G., Aboudou, R., Ouedraogo, M., and Abdoulaye, T. (2023). Value chain and multi-crop baseline of the Transforming Agrifood Systems in West and Central Africa Initiative (TAFS-WCA): a case study of Nigeria. AfricaRice, Bouake, Cote d'Ivoire, 24 pages.

Abstract

This report presents the baseline survey of the Transforming Agrifood Systems in West and Central Africa (TAFS-WCA) initiative in Nigeria. Three regions of Nigeria were surveyed. Data were collected with smart tablets using the CSPro application. A total of 1200 actors in agricultural production and value chain were surveyed during the baseline data collection in in Rwanda. These are mainly rice, maize, soybean, beans, cassava, sweet potato, banana, African vegetables, inputs dealers, traders, processors and service providers. All data analyses were carried out with the STATA 16 software.

Among the population of producers, 16.33% (196) are rice producers, 8.25% (99) are maize producers, 8.42% (101) are soybean producers, 8.83% (106) are bean producers, 8.58% (103) are yams producers, 8.00% (96) are cassava producers, 8.67% (104) are sweet potato producers, 8.25% (99) are banana producers, 8.33% (100) are African vegetables producers, 0.08% (1) are inputs dealer, 15.33% (184) are traders, 0.33% (4) are processors and 0.58% (7) are service providers. The average age of rice farmers is 40 years old and ranges from 15 to 80 years old, and their mean household size is 7 people. About 74% of actors are male and 93% are married. In addition, 87% of the respondents have received formal education and 82% have crop production as their main activity. Moreover, 97 % of producers grow crops during the rainy season, 2.29% during both seasons while 0.49% in dry season.

It should also be noted that in the face of climate change, less than 30% and 22% of producers have access to forecasts of extreme events (drought, flood, strong wind, etc.) and information on seasonal forecasts (weather for the following 2-3 months) respectively.

In relation to food security and the poverty index, preliminary results show that the vast majority of farmers' households have an acceptable level of dietary diversity, meal frequency and nutritional importance of the food groups consumed; and the poverty index of the population is 49%.

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Major abbreviations and acronyms

AfricaRice	:	Africa Rice Center
CGIAR	:	Consortium of International Agricultural Research Centers
FAOSTAT	:	Food and Agriculture Organization Corporate Statistical Database
GDP	:	Gross Domestic Product
IPCC	:	Intergovernmental Panel on Climate Change
SDG	:	Sustainable Development Goals
TAFS-WCA		Transforming Agri-Food Systems in West and Central Africa
WFP	:	World Food Program

1. Introduction

1.1. Context

In West and Central African, agriculture contributes 30-50% to GDP and provides income and livelihoods to 70-80% of the population[1]. Out of the 65% of the labor force in the rural areas, 42% of the women practice smallholder farming. Agriculture can contribute towards major continental priorities, such as eradicating poverty and hunger, boosting intra-Africa trade and investments, rapid industrialization and economic diversification, jobs creation and shared prosperity. It provides employment for about two-thirds of the African working population and for each country contributes an average of 30 to 60% of GDP and about 30% of the value of exports[2]. Agriculture, food and nutrition security, and the livelihoods of millions of people are affected by climate change (Yadav *et al.*, 2019). Climate Change is likely to trigger food insecurity, human migration, economic, and social depression, environmental and political crisis, thereby affecting development (IPCC 2007; World Bank 2010). Innovations, practices, or services that i) increase or sustain productivity over time, ii) boost farmers' climate resilience, and iii) reduce greenhouse gas emissions are considered climate-smart (Andrieu *et al.*, 2017). About 552 million people live in West and Central Africa (WCA), the majority in rural areas[1], but with some of the highest growth rates of urbanization in the world (>4% annually). Economic activity in 2020 contracted by 2.1%, due to a weaker external environment and measures to contain the COVID-19 pandemic and the climate crisis resulting in, high unemployment rates (AfDB, 2021).

To reduce the importation bills and to achieve Sustainable Development Goals (SDG) in West and Central Africa, improved technologies including high yielding and climate smart varieties, good agronomic and postharvest practices were developed and disseminated by CGIAR centers and other research and development center. The objective of the One CGIAR focused mainly on three action areas, namely: (i) Genetic Innovation, (ii) Resilient Agri-Food Systems, and (iii) Systems Transformation. Each of these action areas houses is home for a number of global theme-based Initiatives. There are six regional integrated initiatives, which are affiliated with the Resilient Agri-Food Systems action area. Among the six initiatives, we have the One CGIAR Regional Integrated Initiative for West and Central Africa (WCA). By focusing primarily on food and nutrition security and making agrifood systems more climate adapted,

[1] https://www.ifad.org/nl/web/operations/regions/wca
[2] https://www.britannica.com/place/Africa/Fruits-and-vegetables

the Initiative will make contributions to the five Impact Areas of the One CGIAR. Access to quality, nutrient-dense seed and climate-smart good agricultural practices (GAP) and reduced post-harvest losses will have a positive impact on food and nutrition and health security.

The objectives of the TAFS-WCA initiatives are: to develop a sustainable agro-food system; to overcome social barriers to accessing innovations; and to scaling of innovations. The five axes of the program were: (i) Making food systems more nutritious, safe and resilient to climate change; (ii) Promoting digitalized information systems in bundling innovations at landscape level; (iii) Develop a set of participatory tools for inclusive landscape management and citizen science for one health; (iv) Addressing social barriers to create equality for women and youth doing business in value chains; (v) Scale Innovations with proven impact in the region. The TAFS-WCA initiative is regional and aims to eventually benefit the 22 countries of the region. The start-up phase includes six countries, three of which are from Central Africa (DRC, Rwanda and Burundi) and three others from West Africa (Côte d'Ivoire, Ghana and Nigeria). Before the implementation of projects in West and Central Africa, a baseline survey is important in all target countries. Indeed, after the stakeholder's engagement and launch workshop in Abidjan (21-22 June, 2022), the baseline survey will aim to collect reference values on the impact indicators of the project. This document presents the methodology of the baseline survey of the TAFS-WCA initiative that will be conducted in Burundi.

1.2.Objectives of baseline survey

The baseline study aims to collect reliable, accurate and sufficient reference values on the impact indicators that can be drawn upon to undertake impact studies with the view to evaluating the changes induced by the One CGIAR regional integrated. Specifically, the baseline study aims:

1. To collect robust socio-economic and geographic data on producers and post-harvest actors in Rwanda;
2. To estimate the baseline values of outcomes and impact indicators;
3. To contribute to the monitoring and evaluation of the outcome; and
4. To contribute to ex-post impact assessment of the TAFS-WCA initiative.

2. Methodology

2.1. Study area and sample size

The study was carried out in Nigeria. In this country, the TAFS-WCA initiative's baseline survey was conducted during the period of December 2022 to January 2023. The baseline data were collected in Benue and Nassarawa States in Nigeria (Figure 1).

Prior to the data collection, design and automation of the questionnaire on tablets were done. A total of 20 enumerators (09 women and 11 men) were trained and used for the survey data collection (Figure 1).

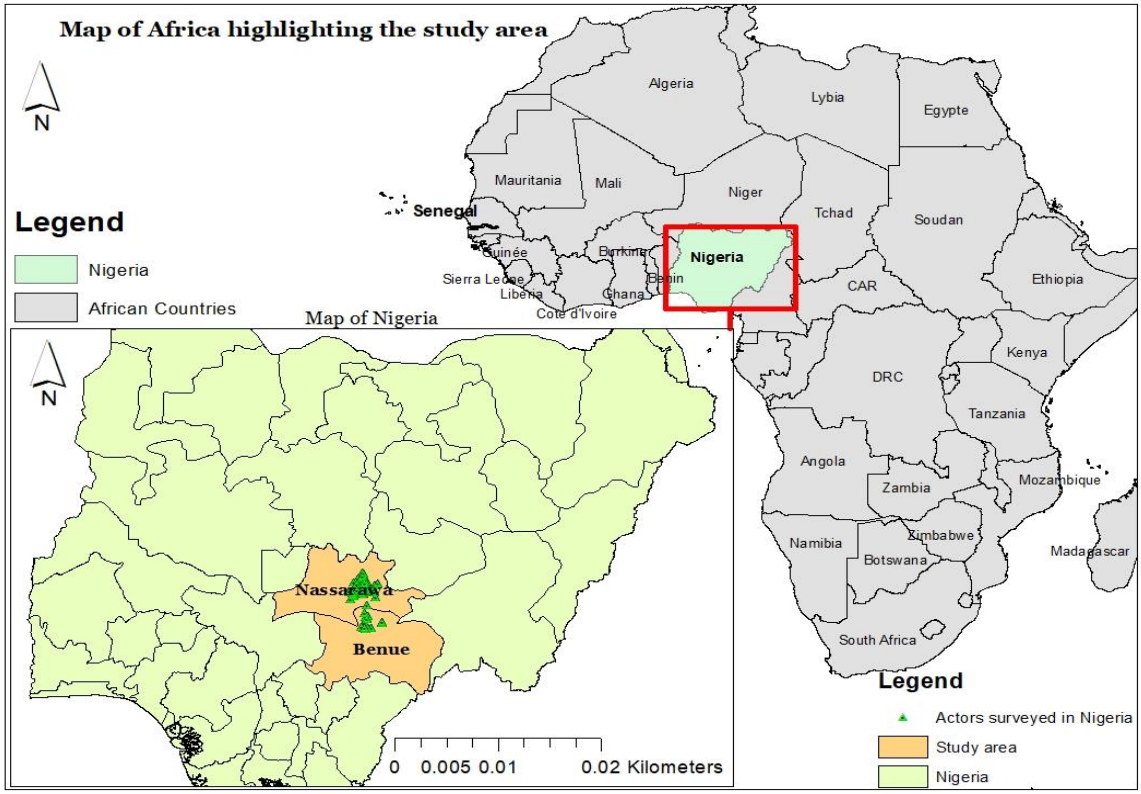

Figure 1: Map of survey

To carry out the baseline survey, an e-registration of farmers was first conducted, and the registered farmers were then used as the sampling frame for the baseline study. The e-registration in Nigeria mainly focused on 10 crops namely: rice, maize, cassava, sweet potato, yams, banana, cocoa, soybean, bean and traditional African vegetables.

Initially, 5,202 actors were registered during the e-registration in Nigeria. Then, 1,200 actors were randomly selected to be interviewed, including 20 farmers and 4 other actors per village.

2.2.Data collection and quality assurance procedure

Data were collected from sampled households with the help of tablets using the CSPro application. Data collected for this study included: (i) socio-economic and household characteristics; (ii) plots information; (iii) varieties information; (iv) information on agricultural equipment and methods; (v) household food security and welfare information, and (vi) climate change information.

To ensure the quality of data, a supervision team, closely monitored field data collection and provided support to enumerators in the field. Supervisors could therefore quickly address any challenge faced by enumerators. Any mistakes were reported to enumerators for immediate action and correction while still on the field. The field arrangement, in addition to different "filter and skip" rules implemented in the questionnaire, helped ensure a high degree of quality for the primary data collected. The data used were collected from actors' households during 2023.

2.3.Data analysis

Both descriptive statistics and econometric methods were used for data analysis. Descriptive statistics (i.e., average, minimum, maximum and standard deviation) were computed for socioeconomic characteristics of producer in the hubs.

The knowledge rates of agricultural technologies and methods were estimated as the percentage of the sample that reported being aware of the technologies, while the use or adoption rates are the percentage of those that accessed the technologies among the total sample.

The food-security analysis was performed by using food consumption score (FCS) developed by the World Food Programme (WFP, 2009). It is an indicator reflecting on food availability, food accessibility and food consumption at the household level. The FCS is therefore a good indicator to evaluate the food security situation of a household. According to the World Food Programme (WFP, 2009), a household has an acceptable, a middle and a poor level of consumption if FCS>35, 21<FCS<35 and FCS<21 respectively.

Additionally, we used the Household Food Insecurity Access Scale (HFIAS) developed by Coates et al. (2007). HFIAS score is a continuous measure of the degree of food insecurity by evaluating responses to a set of standard questions representative of three universal domains of food access in terms of a household's anxiety and uncertainty about (i) inadequate food supply;

(ii) insufficient quality; and (iii) insufficient food intake within a 30-day recall period during the lean period (Coates et al., 2007). The HFIAS score was calculated for each household by adding the coded frequency for each of the 9 occurrence questions relating to household-level food access. Each of the 9 questions has a maximum score of 3 and when summed have and a maximum of 27 and a minimum score of 0. The higher the score of the household, the more food insecurity is experienced, and the lower the score, the household is more food secure.

3. Results

The TAFS-WCA baseline data collection were collected from 1,200 actors in in Benue and Nasarawa States in Nigeria. Actors involved in the baseline data collection are producers of rice, maize, soybean, bean, yams, cassava, sweet potato, banana, African vegetables, inputs dealer, traders, processors and service providers.

Among the population of producers, 16.33% (196) are rice producers, 8.25% (99) maize producers, 8.42% (101) soybean producers, 8.83% (106) bean producers, 8.58% (103) yams producers, 8.00% (96) cassava producers, 8.67% (104) sweet potato producers, 8.25% (99) banana producers, 8.33% (100) African vegetables producers, 0.08% (1) inputs dealer, 15.33% (184) traders, 0.33% (4) processors and 0.58% (7) service providers (Table 1).

Table 1: Distribution of sampled actors

Actors	Actors	Frequency
Producers	Rice	196 (16.33)
	Maize	99 (8.25)
	Soybean	101 (8.42)
	Bean	106 (8.83)
	Yam	103 (8.58)
	Cassava	96 (8.00)
	Sweet potato	104 (8.67)
	Banana	99 (8.25)
	Vegetable	100 (8.33)
Postharvest actors	Input dealer	1 (0.08)
	Trader	184 (15.33)
	Processors	4 (0.33)
	Service provider	7 (0.58)
Total		**1,200**

() percentage

3.1. Socio-economic characteristics of actors

3.1.1. Gender, marital status, educational level, household size and age of actors

Majority of the study respondents are men (with 307 women as compared to 893 men). The average age of farmers is 40 years. This shows that the household's heads are relatively young. In addition, the difference between the average age of male and female is statistically significant (Table 2). The mean household size is 7 members and the average number of years of experience in the activity is 12 years in the population as a whole and there is a statistical difference of approximately 3 years between men and women.

The distribution of the educational status of the respondents shows that the majority of actors (87.25%) have formal education; with 8.33% have attended university education, 33.00% senior secondary education, 20.00% junior secondary education and 25.92% primary education (Table 2). Most of the actors are married (93.06%), with less women married as against men. The majority of male actors (82.37%) have agriculture as their main activity, while only 69.38% of female actors have agriculture as the main activity.

Table 2: Household characteristics of farmers by actors and gender

Variables		Producers (1004)			Postharvest (196)			Overall (1200)		
		Female (n=224)	Male (n=780)	Overall (n= 1004)	Female (n=83)	Male (n=113)	Overall (n= 196)	Female (n=307)	Male (n=893)	Overall (n= 1200)
Age	Mean	37.56	40.09	39.53	39.61	41.32	40.60	38.11	40.25	39.70
	Median	37.00	39.00	38.00	38.00	40.00	40.00	37.00	40.00	39.00
	Std. Dev	8.20	9.50	9.28	9.30	8.79	9.02	8.55	9.41	9.24
Number of years of experience (year)	Mean	9.78	12.90	12.21	8.96	9.92	9.52	9.56	12.53	11.77
	Median	10.00	10.50	10.00	8.00	10.00	9.50	10.00	10.00	10.00
	Std. Dev	7.80	8.43	8.39	7.82	9.07	8.55	7.80	8.56	8.47
Household size	Mean	6.48	6.89	6.80	6.31	6.78	6.58	6.44	6.87	6.76
	Median	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00
	Std. Dev	2.94	3.67	3.52	2.86	3.33	3.14	2.92	3.63	3.46
Formal education (%)	None	18.30	9.23	11.25	25.30	14.16	18.88	20.20	9.85	12.50
	Primary	26.34	25.26	25.50	31.33	25.66	28.06	27.69	25.31	25.92
	Junior high school	23.21	20.00	20.72	16.87	15.93	16.33	21.50	19.48	20.00
	Senior high school	28.13	35.38	33.76	22.89	33.63	29.08	26.71	35.16	33.00
	University	4.02	9.74	8.47	3.61	10.62	7.65	3.91	9.85	8.33
	Other	0.00	0.38	0.30	-	-	-	0.00	0.34	0.25
Marital status (%)	Married	86.16	95.13	93.13	92.77	92.92	92.86	87.95	94.85	93.08
	Single	3.13	4.62	4.28	1.20	7.08	4.59	2.61	4.93	4.33
	Widow	9.82	0.26	2.39	6.02	0.00	2.55	8.79	0.22	2.42
	Divorced	0.89	0.00	0.20				0.65	0.00	0.17
Agriculture as main activity (%)		92.86	97.31	96.31	6.02	10.62	8.67	69.38	86.34	82.00
Growing season (%)	Rainy season	98.66	96.92	97.31	98.66	96.92	97.31	98.66	96.92	97.31
	Dry season	0.45	0.38	0.40	0.45	0.38	0.40	0.45	0.38	0.40
	Both season	0.89	2.69	2.29	0.89	2.69	2.29	0.89	2.69	2.29

3.1.2. Institutional characteristics of actors

- **Access to credit, extension service and market information**

Table 3 indicates that a majority of the actors have access to the selling price of crop on the market (78.50% for female as compared to 72.68% for male). The results further show that a low proportion (17.59% for female and 14.89% for Male) of actors have access to agricultural credit. However, women have greater access to credit than men. In addition, only 3.67% of farmers have access to extension services. This could be explained by the fact that the villages surveyed in Nigeria are not too close to extension services (on average 10.51 km). It should also be noted that more than half of farmers have new information about the technologies developed (57.88%). However, many of them (74.17%) participate in training on these new technologies developed to increase the production. On the other hand, 52.83% of the respondents have information on new rice varieties.

Table 3: Institutional characterizes of farmers by country and gender

		Producers (1004)			Other actors (196)			Overall (1200)		
		Female (n=224)	Male (n=780)	Overall (n= 1004)	Female (n=224)	Male (n=780)	Overall (n= 1004)	Female (n=224)	Male (n=780)	Overall (n= 1004)
Access to credit for production (%)		19.20	16.03	16.73	13.25	7.08	9.69	17.59	14.89	15.58
Information on new crop varieties (%)		60.27	51.79	53.69	44.58	51.33	48.47	56.03	51.74	52.83
Information on new technologies developed (%)		41.96	38.97	39.64	30.12	35.40	33.16	38.76	38.52	38.58
Participation in training on new technologies developed (%)		58.51	60.86	60.30	44.00	42.50	43.08	55.46	58.72	57.88
Access to the selling price of crops on the market (%)		79.02	71.79	73.41	77.11	78.76	78.06	78.50	72.68	74.17
Contact with structure or organization (%)		25.00	26.03	25.80	18.07	18.58	18.37	23.13	25.08	24.58
Contact with extension service (%)		3.13	4.74	4.38	-	-	-	2.28	4.14	3.67
Distance between the village and the extension service (Km)	Mean	10.33	10.73	10.64	10.17	9.59	9.84	10.29	10.59	10.51
	Median	7.00	8.00	8.00	8.00	8.00	8.00	7.00	8.00	8.00
	Std. Dev	10.24	9.11	9.37	8.03	7.50	7.71	9.68	8.92	9.12
Distance between the village and the nearest input dealer (Km)	Mean	8.27	8.74	8.64	9.05	8.27	8.60	8.48	8.68	8.63
	Median	5.00	7.00	7.00	7.00	7.00	7.00	5.00	7.00	7.00
	Std. Dev	9.38	7.91	8.26	8.04	6.39	7.12	9.03	7.74	8.08
Distance between the village and the nearest mechanical service provider (Km)	Mean	9.70	10.24	10.12	9.40	10.28	9.91	9.62	10.24	10.08
	Median	6.00	8.00	8.00	7.00	8.00	8.00	7.00	8.00	8.00
	Std. Dev	10.14	9.75	9.84	7.76	10.00	9.11	9.54	9.78	9.72
Distance between the village and the nearest periodical market (Km)	Mean	6.08	6.86	6.68	6.84	6.92	6.88	6.28	6.86	6.72
	Median	4.00	5.00	5.00	5.00	6.00	5.00	5.00	5.00	5.00
	Std. Dev	6.61	5.38	5.69	5.89	5.92	5.89	6.42	5.45	5.72

3.1.3. Gender and decision-making in the household

In terms of decision-making in the household, Figure 2 shows that decisions in the household rest with the husband. Indeed, 49% of decisions in the household are taken jointly but the husband dominates the decision-making. This shows that women did not have a large responsibility in decision-making within the household.

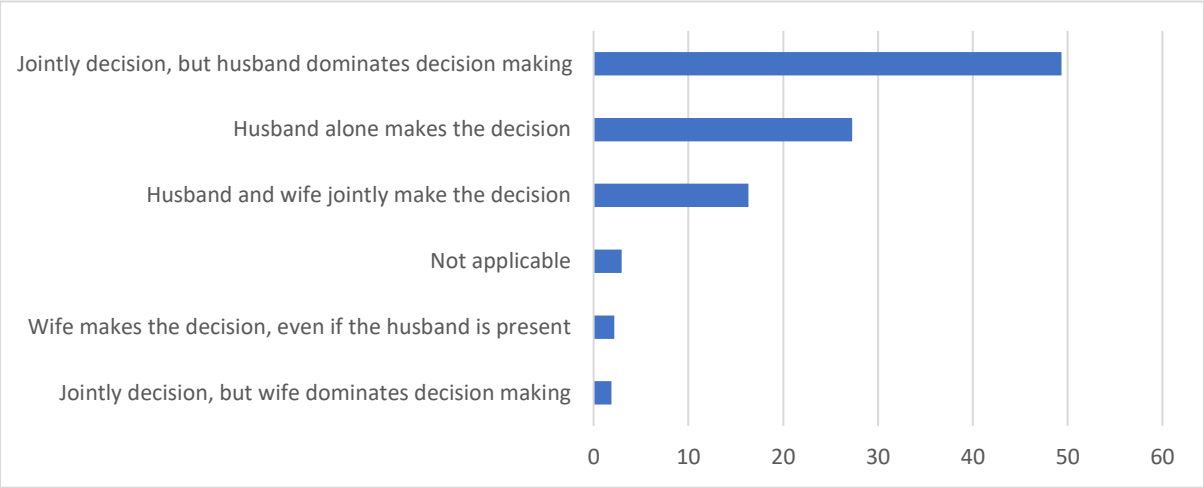

Figure 2: Decision-making in the household

3.2. Knowledge, use of agricultural equipment and methods

3.2.1. Knowledge and use of agricultural equipment

This subsection presents information on agricultural equipment and methods. The information covered knowledge and use of equipment and methods in production systems. In Nigeria, the main equipment known by respondents is the tractor (88.45%) but still with a low (28.27%) rate of use (Table 4). In addition to the tractor, the improved storage bag (double) seeds are one of the best known and use technologies in Nigeria, with about 26.29% of awareness and 87.50% of use. It should also be noted that the ASI thresher is also use by farmers. Indeed, 34.54% of producers who have known the filet use it.

Table 4: Knowledge and use of agricultural equipment for production activities by gender

Equipment	Knowledge (%)			Use at least once (%)		
	Female	Male	Overall	Female	Male	Overall
Tractor	87.05	88.85	88.45	23.59	29.58	28.27
Motorcycle	18.30	21.67	20.92	17.58	31.76	29.12
Mechanical transplant	1.34	4.10	3.49	0.00	0.00	0.00
Mechanical weeders	1.79	5.00	4.28	0.00	10.26	9.30
Mechanical seeders	0.45	2.56	2.09	0.00	0.00	0.00
Mechanical Salmer (Circular Binette)	0.00	0.00	0.00	0.00	0.00	0.00
Filet (bird struggle)	10.27	10.38	10.36	43.48	35.80	37.50
Mini combine harvester	9.38	16.28	14.74	0.00	1.57	1.35
ASI thresher	20.98	25.90	24.80	36.17	34.16	34.54
RiceAdvice	10.27	22.56	19.82	69.57	56.25	57.79
GEM equipment	16.96	19.10	18.63	52.63	27.52	32.62
Video on the control of the striga	0.00	0.00	0.00	0.00	0.00	0.00
Rice-other crop integration system	1.95	1.12	1.33	50.00	30.00	37.50
Improved storage bag (double) seeds	29.46	25.38	26.29	92.42	85.86	87.50

3.2.2. Knowledge and use of agricultural methods

In terms of knowledge and use of agricultural methods, the main method known and practiced by respondents in Nigeria is the use of fertilizers, with 80.48% and 95.17% respectively for knowledge and utilization (Table 5). The other methods observed are transplantation (70.42%) and crop rotation (80.24%) methods.

Table 5: Knowledge and use of agricultural methods for production activities by gender

Equipment	Knowledge (%)			Use at least once (%)		
	Female	Male	Overall	Female	Male	Overall
Cropping calendar construction	25.89	31.15	29.98	70.69	72.02	71.76
Alternate wetting and drying	5.36	7.05	6.67	33.33	40.00	38.81
Mulching in the field	47.32	46.67	46.81	80.19	82.42	81.91
Smart Valley / Sawah (Small and Great Dams)	2.23	3.85	3.49	0.00	63.33	54.29
Alternation of dry and wet irrigation phases	2.23	5.00	4.38	20.00	41.03	38.64
Drip irrigation	2.23	3.97	3.59	60.00	16.13	22.22
Mechanical levelling	3.13	4.62	4.28	57.14	25.00	30.23
Row sowing	38.39	43.72	42.53	91.86	86.22	87.35
Transplant	52.23	46.54	47.81	67.52	71.35	70.42
Use of fertilizers	77.68	81.28	80.48	94.25	95.43	95.17
System of Rice Intensification	0.45	1.28	1.10	0.00	40.00	36.36
Livestock diversity	8.04	10.77	10.16	61.11	72.62	70.59
Agroforestry	9.38	15.26	13.94	19.05	13.45	14.29
Cover crop	36.16	37.95	37.55	93.83	84.46	86.47
Crop rotation	48.66	50.90	50.40	81.65	79.85	80.24
Other improved method	0.00	0.26	0.20	50.00	50.00	50.00

3.3.Perception of climate change

This section presents producers' perceptions about climate change. Figure 3 shows that less than 30% of producers in Nigeria have access to climate information. With respect to access to climate information services, Figure 3 shows that about 26% of producers have access forecasts of extreme events (drought, flood, strong wind, etc.) and 22% have access information on seasonal forecasts (weather for the following 2-3 months). The results also indicate that the producers perceive the indicators on climate change (Figure 4). The main known indicators are: early rains (30%), decrease in soil fertility (27%), and late rains (24%).

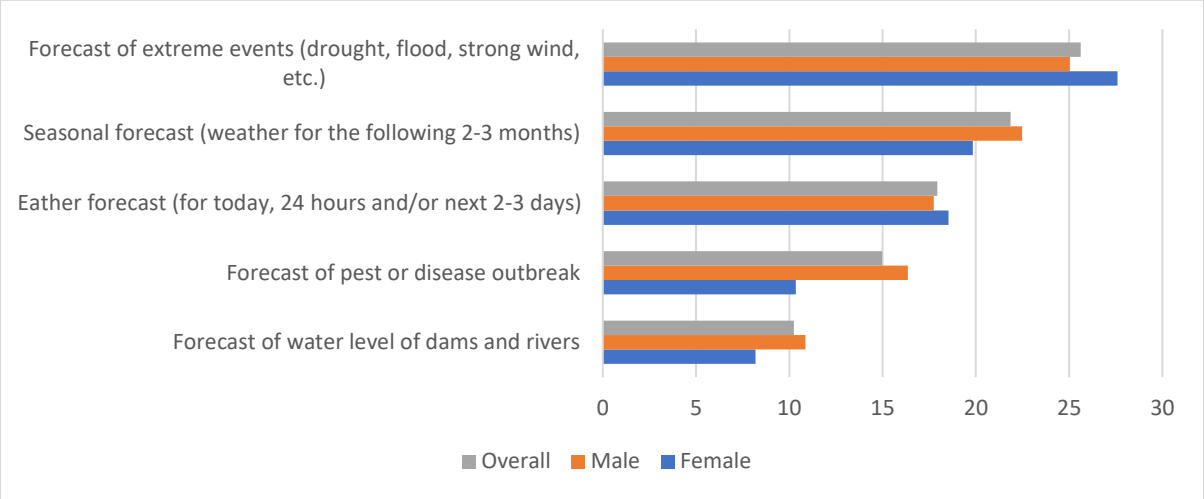

Figure 3: Access of producers to climate information services

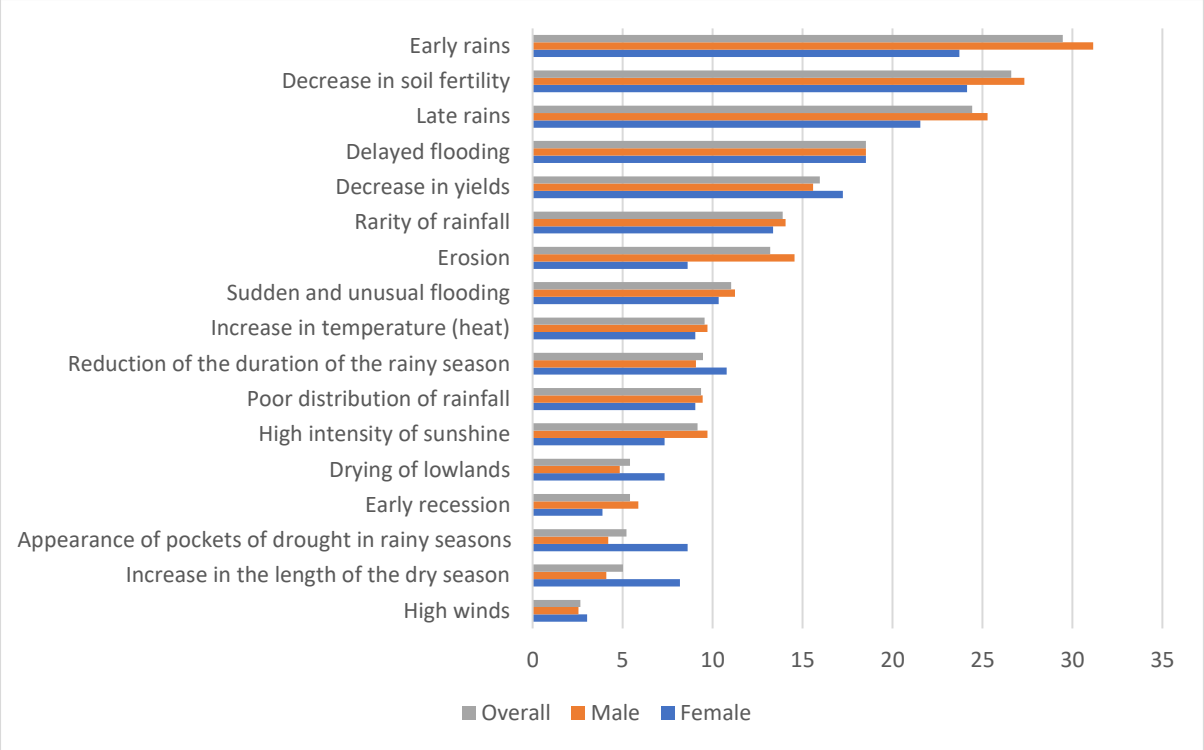

Figure 4: Knowledge of producers on climate change indicators

3.4. Yield gap

The average crop yield ranges from 0.99 $t.ha^{-1}$ to 4.88 $t.ha^{-1}$ for African vegetables and cassava, respectively in the surveyed population (Table 6). In addition, the highest and lowest yield gaps are observed for maize (80%) and for cassava (46%), respectively. This implied that producers are not reaching their yield potential yet.

Table 6: Sample mean, attainable (top decile) mean and gaps in yield

		Rice	Maize	Soybean	Bean	Yam	Cassava	Banana	African vegetables
Yield (t/ha)	Mean	2.18	1.52	1.03	1.18	3.50	4.88	3.61	0.99
	Median	1.36	1.00	0.99	1.05	3.00	5.00	3.00	1.00
	Std. Dev	3.72	2.46	0.89	0.87	2.62	2.80	2.84	0.76
Attainable yield (Top decile)		9.21	7.48	3.39	2.74	9.15	9.05	10.97	3.02
Yield gap		7.03	5.96	2.36	1.56	5.65	4.17	7.36	2.03
Gap (%)		76.34	79.68	69.58	56.93	61.73	46.05	67.09	67.21

3.5. Income, expenses, poverty ratio and food security

3.5.1. Income, expense and poverty rate

This section presents income and expenditure estimates of the surveyed actors.

In terms of income, the analysis show that men's total annual income per capita is higher than women's in the two groups of actors (Table 7). In fact, women earn about US$629 and US$213 less than men did among producers and other actors, respectively, and these differences are statistically significant.

Concerning total expenditure per capita, the findings indicate that, inside the same group of actors, men spend less than women did (Table 7) and the difference in expenses was around US$48 for women.

As for poverty rates, the poverty index of the population remains relatively low (48.75%) as shown in Table 7. In the producer group, 60.56% of women is poor as compared to 47.84% for men. The same trend is observed among the other actors, where the poverty rate for women is higher than the average. However, other actors have the lowest poverty rates (28%).

Table 7: Income and expenses by country and gender

Variables		Producers (1004)			Other actors (196)			Overall (1200)		
		Female (n=224)	Male (n=780)	Overall (n= 1004)	Female (n=224)	Male (n=780)	Overall (n= 1004)	Female (n=224)	Male (n=780)	Overall (n= 1004)
Annual agricultural income per capita ($US)	Mean	1551.53	2173.37	1958.21	24.81	80.87	61.86	1333.95	1867.22	1683.24
	Median	761.90	1135.31	998.15	0.00	0.00	0.00	580.82	877.80	764.61
	Std. Dev	3194.83	4047.64	3784.42	117.08	309.31	261.43	3006.04	3813.76	3563.64
Annual non-agricultural income per capita ($US)	Mean	21.82	29.02	26.53	148.78	305.76	252.53	39.92	69.51	59.30
	Median	0.00	0.00	0.00	39.31	4.34	20.89	0.00	0.00	0.00
	Std. Dev	59.94	114.29	98.95	249.61	1691.69	1382.84	117.49	660.55	539.09
Total annual income per capita ($US)	Mean	1573.35	2202.39	1984.74	173.59	386.63	314.39	1373.87	1936.73	1742.54
	Median	799.20	1157.57	1007.73	73.84	84.34	83.20	610.22	924.78	803.21
	Std. Dev	3194.53	4067.20	3798.29	263.79	1723.23	1410.80	2999.49	3868.11	3600.93
Per capita food expenditure ($US)	Mean	62.97	51.47	54.04	50.23	50.12	50.17	59.53	51.30	53.41
	Median	34.12	32.10	32.88	40.23	33.19	34.16	34.93	32.18	33.19
	Std. Dev	134.99	66.82	86.85	39.08	49.99	45.58	117.14	64.91	81.54
Per capita non-food Expenditure ($US)	Mean	149.92	131.93	135.95	279.73	236.76	254.96	185.02	145.20	155.38
	Median	105.79	99.17	99.80	179.51	171.57	178.25	121.44	102.40	104.89
	Std. Dev	132.20	140.18	138.58	283.31	223.83	250.96	193.86	157.06	168.06
Per capita total expenditure ($US)	Mean	212.90	183.40	189.98	329.96	286.88	305.13	244.55	196.50	208.79
	Median	147.42	138.20	140.12	248.15	222.59	227.18	168.14	144.25	147.93
	Std. Dev	214.87	174.58	184.63	291.51	244.81	265.73	243.17	187.96	204.48
Poverty headcount ratio (%)		60.56	47.84	52.24	33.90	25.22	28.16	56.76	44.53	48.75

3.5.2. *Food security analysis*

About food security, Table 8 shows that the food consumption score is relatively high in the sample. The mean score is 64.84 and 68.70 respectively for females and males, which could mean that households are in acceptable food situations (>35 acceptable levels). This reveal that the large majority of farmers' households in the country have an acceptable level of dietary diversity, meal frequency, and nutritional importance of the food groups consumed.

Interpreting sample statistics of the HFIAS is founded on observing the proportion of households that responded ‘never’ to all sub-domains (Coates et al., 2007). Table 9 shows that in our case the proportion of ‘never’ responses in the first sub-domain is about 37% of producers and other actors, implying that at least 63% of producers and other actors are worried about fulfilling their food needs. Similarly, at least 64% of producers and other actors have insufficient food quality (unweighted mean of three sub-domains in domain II). In addition, for the sub-domains III, Table 9 shows that 53% of the actors have insufficient food quantity intake due to physical unavailability (domain III). However, the average HFIAS score for the sample is 6.5 which indicates that the majority of the households are food secure because the higher the score, the more food insecure a household becomes.

Table 8: Food consumption score by actor and gender

Variables		Producer (1026)			Other actors (174)			Overall (1200)		
		Female (n=355)	Male (n=671)	Overall (n=1026)	Female (n=355)	Male (n=671)	Overall (n=1026)	Female (n=355)	Male (n=671)	Overall (n=1026)
Food consomption score	Mean	64.41	69.00	67.41	67.47	66.92	67.10	64.84	68.70	67.37
	Median	63.00	67.50	66.00	70.00	65.00	66.50	64.00	67.00	66.00
	Std. Dev	20.97	19.76	20.29	15.03	20.95	19.10	20.24	19.94	20.12

Table 9: Household Food Insecurity Access Scale (HFIAS) by actor and gender

		Producer (1026)			Other actors (174)			Overall (1200)		
		Female (n=355)	Male (n=671)	Overall (n=1026)	Female (n=355)	Male (n=671)	Overall (n=1026)	Female (n=355)	Male (n=671)	Overall (n=1026)
I. Anxiety and uncertainty about household food supply										
Did you worry that your household would not have enough food?		41.52	35.51	36.85	37.35	36.28	36.73	40.39	35.61	36.83
II. Insufficient quality (includes food variety and preferences)										
Were you or any household member not able to eat the kind of foods you preferred because of lack of resources?		41.07	35.9	37.05	32.53	34.51	33.67	38.76	35.72	36.5
Did you or any household member eat just a few kinds of food day after day due to lack of resources?		38.39	37.05	37.35	34.94	33.63	34.18	37.46	36.62	36.83
Did you or any household member eat food that you preferred not to eat because of a lack of resources to obtain other types of food?		39.29	36.79	37.35	36.14	41.59	39.29	38.44	37.4	37.67
III. Insufficient food intake and physical consequences										
Did you or any household member eat a smaller meal than you felt you needed because there was not enough food?		39.29	35.77	36.55	36.14	33.63	34.69	38.44	35.5	36.25
Did you or any household member eat fewer meals in a day because there was not enough food?		35.71	34.87	35.06	32.53	34.51	33.67	34.85	34.83	34.83
Did you or any household member go to sleep at night hungry because there was not enough food?		56.7	53.59	54.28	51.81	56.64	54.59	55.37	53.98	54.33
Did you or any household member go a whole day without eating anything because there was not enough food?		58.48	56.67	57.07	51.81	56.64	54.59	56.68	56.66	56.67
Did you or anyone in your household go a whole day and night without eating because there was not enough food?		58.48	56.79	57.17	53.01	58.41	56.12	57	57	57
Household Food Insecurity Access Score (HFIAS)	Mean	5.92	6.64	6.48	6.92	6.35	6.59	6.19	6.6	6.5
	Median	6	8	8	8	7	8	7	8	8
	Std. Dev	4.76	5.11	5.04	5.37	4.74	5.01	4.94	5.06	5.03

4. Conclusion

The purpose of the Transforming Agrifood Systems in West and Central Africa (TAFS-WCA) initiative's baseline survey was to collect reliable, accurate and sufficient reference values on the impact indicators that can be drawn upon to undertake impact studies with the view of evaluating the changes induced by the One CGIAR regional integrated initiative in target countries.

Preliminary analysis of the study data shows that the majority of respondents are men and have received a formal education. The surveyed population are relatively young. However, access to agricultural credit is very low in both groups of actors.

In terms of food security, the results revealed that more than half of farmers' households in the country had an acceptable level of dietary diversity, meal frequency and nutritional importance of the food groups consumed. The scientific report will analyze the data with more details.

References

AfDB, 2021. *African Economic Outlook 2021. From Debt Resolution to Growth: The Road Ahead for Africa.* African Development Bank Group, Abidjan. https://www.afdb.org/sites/default/files/documents/publications/afdb21-01_aeo_main_english_complete_0223.pdf

Andrieu, N., Sogoba, B., Zougmore, R., Howland, F., Samake, O., Bonilla-Findji, O., ... & Corner-Dolloff, C. (2017). Prioritizing investments for climate-smart agriculture: Lessons learned from Mali. Agricultural Systems, 154, 13-24.

IPCC, 2007: Climate Change 2007: The Physical Science Basis. In Solomon S, Qin D, Manning
M, Chen Z, Marquis M, Averyt KB, Tignor M & Miller HL, (eds.), Fourth Assessment 18 Report of the Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

World Bank, 2010. The World Bank Annual Report 2010: Year in Review. World Bank Annual Report. Washington, DC. World Bank.

Yadav, S. S., Hegde, V. S., Habibi, A. B., Dia, M., & Verma, S. (2019). Climate change, agriculture and food security. Yadav SS, Redden RJ, Hatfield JL, et al., DH (ed) Food security and climate change, First Edit. John Wiley & Sons Ltd.