Baseline Report of the Humidtropics Program for Nigeria and Cameroon

By

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1. INTRODUCTION

Background information

Humidtropics, a research program led by IITA, aims to transform the lives of the rural poor in tropical Americas, Asia and Africa. Humidtropics, aims to help poor farm families in tropical Africa, Asia and Americas to boost their income from integrated agricultural systems' intensification while also preserving their land for future generations (IITA, 2012).

The humid tropics is inhabited by 2.9 billion people, most of which are poor farmers, on about 3 billion hectares of land. Over time, agricultural productivity of the Humidtropics farming system remains poor, natural resources degraded, and markets and institutions to weak to tap into the potential that exists in the wider system. Access to and benefit from the limited resources has also been noted to differ among gender and age groups, with the women and youth left more vulnerable (IITA, 2013).

Humidtropics is implemented through five Flagship projects, one cross cutting and four others are place or location based. The place-based Flagship projects cover East and Central Africa highlands, West Africa lowlands, Central Mekong, and Central America and the Caribbean regions. The area-based Flagship Projects aims to improve livelihoods for their immediate smallholder farming communities, based on sustainable productivity improvements and innovative institutional and natural resources management reforms. Expected stakeholders in this effort are farmer organizations, advisory service providers, research and development partners, the private sector, and policy makers (IITA, 2012).

The humid tropics in West Africa occupy an area of 206 million ha and are home to 145 million people. The clear issues requiring intervention are that about 28% of the population lives on less than US$1.25/day, the average market access is 3 hours and 58% of land area is estimated to be degraded (IITA, 2015a). The West Africa Flagship Project has Action Sites in the humid and sub-humid regions of Nigeria, Cameroon, Ghana and Ivory Coast. In the Nigeria and Cameroon Action Sites, the initial entry points of intervention include (i) intensification and diversification of the tree-crop systems, (ii) intensification of food crop systems, (iii) involvement of youth in agriculture, (iv) improvement of market access and (v) strengthening of institutions for innovation (IITA, 2012).

Over the next 15 years, Humidtropics aims at quantifiable outcomes within the Action Areas in tropical Africa, Asia, and Americas that includes increasing staple food yields by 60%, increasing average farm income by 50%, lifting 25% of poor households above the poverty line, reducing the number of malnourished children by 30%, and restoring 40% of these farms to sustainable resource management (IITA, 2015b).

HT Project outcomes

Humidtropics is an initiative of the CGIAR aimed at helping poor farm families in tropical Africa, Asia and Americas to boost their income and livelihoods through agriculture, within a systems context. It addresses the particular livelihood challenges and bottlenecks that farm families, in particular women and vulnerable groups, face in the region, using participatory and collaborative approaches with full involvement of stakeholders as partners in research for development (R4D). Agriculture is a major livelihood and economic enterprise in the region and it has a huge potential in addressing the challenges of poverty and food and nutrition security in the zone, and beyond. Humidtropics is aimed at unleashing this potential in a way that enhances productivity of agriculture and reduces environmental degradation arising from agriculture. It also aims at contributing to the provision of ecosystem services, particularly in light of climate change. The HT program is part of a family of 15 CGIAR Research Programs (CRPs) designed to address major global development challenges, and aimed at accomplishing the CGIAR System Level Outcomes, namely Reducing rural poverty, Increasing food security, Improving nutrition and health and Sustainable management of natural resources (IITA, 2012).

HT baseline study objectives

The objective of this HT baseline study is to establish the current situation at the household level and establish the base upon which the program will be evaluated. . The report should quantify and analyze the current production systems and natural resource management for their contribution to rural livelihoods as well as addressing the situation of system research and gender issues in the Humidtropics field sites of Cameroon and Nigeria.

2. Methodological Framework

Sampling considerations

The West Africa flagship for the HT program covers Ivory Coast, Ghana, Cameroon and Nigeria. A sample of 1,369 was planned for the two countries, allocated as 670 households for Nigeria and 699 households for Cameroon. Details of households' allocation to the action sites and field sites in Nigeria and Cameroon are provided in Table xxx . Figs xxx and xxx are the maps of Nigeria and Cameroon showing the Action sites, respectively.

Table: Distribution of households by Action site/State/Province and Field site/LGA, Nigeria

Country	State /Province	Fieldsite /LGA/ zone	Total
Nigeria	Osun	Iwo	100
		Aiyedire	40
		Ife East	100
		Atakumasa West	40
		Atakumasa East	26
	Oyo	Ori-Ile	109
		Ogo Oluwa	43
		Ibarapa East	94
		Ido	118
Total			670
Cameroon	Central	Lekie	131
		Mefou et Afamba	30
		Mefou et Akono	24
		Nyong et So	53
	West	Bamboutos	54
		Haut-Nkam	12
		Menoua	59
	Southwest	Meme	107
	Littoral	Moungo	229
Total			699

Fig xxx: Map of Nigeria showing Action sites

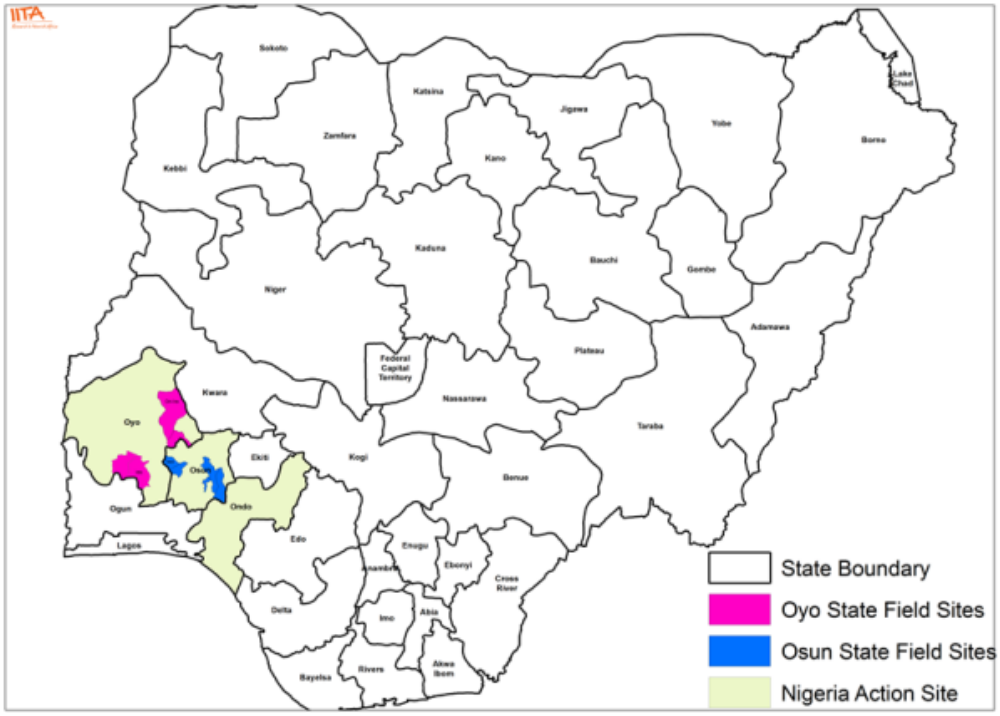
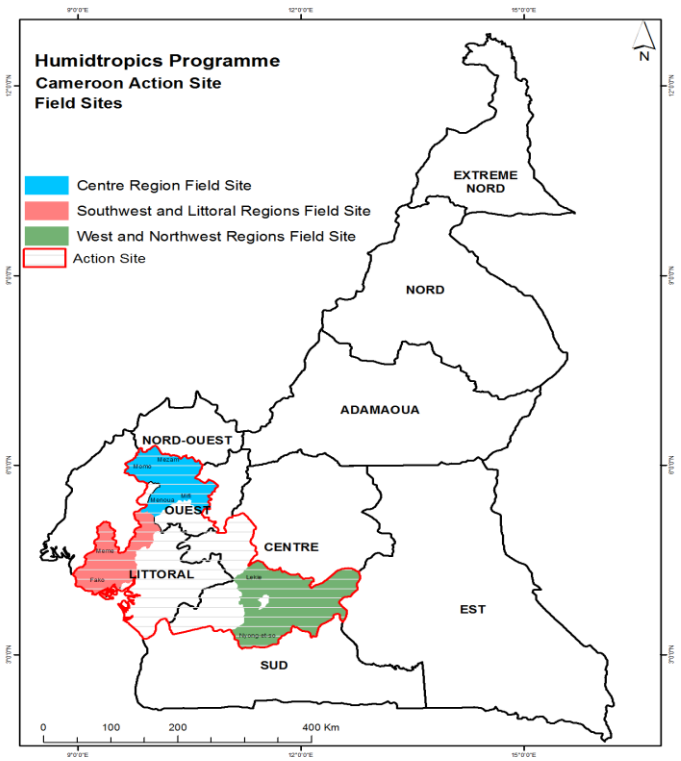


Fig xxx: Map of Cameroon showing Action sites



Analysis of data

The analysis of the HT baseline data for Nigeria and Cameroon was undertaken with a combination of descriptive and inferential statistical tools. The descriptive tools include point estimates of arithmetic means of selected quantitative variables, one-way frequency tables, crosstab analysis, charts and graphs. In few instances, inferential analysis involving independent sample t-tests was undertaken to compare the means of selected variables between Cameroon and Nigeria.

Analysis was conducted at country-, state/provincial and LGA/zonal levels. The choice among these levels of data analysis was intuitively decided in each instance based on the available data and nature of inquiry. For example, inquiries relating to cropping and livestock activities were initially analyzed at field site levels, to obtain state-level pictures of key issues. However, where results became unduly scanty and dispersed over few cases (mainly because of missing values or fewness of respondents), analysis was reverted to country level (action site).

Data management challenges

There was high prevalence of missing values across different data files. Thus, point estimates for the arithmetic means of some variables were computed with ‘’small’’ samples. Similarly, some variables were cross-tabulated with small samples, leaving (empty) cells with no frequencies. However, with flexible choice among country-, state- and LGA- level analysis, the available data produced largely credible and statistically robust results across the various livelihood systems surveyed.

3. RESULTS AND DISCUSSION

3.1 HOUSEHOLD CHARACTERISTICS

This section presents the results on households’ socio-economic and demographic characteristics. These include households’ gender, educational level, age, farming experience and headship status.

Gender of respondents

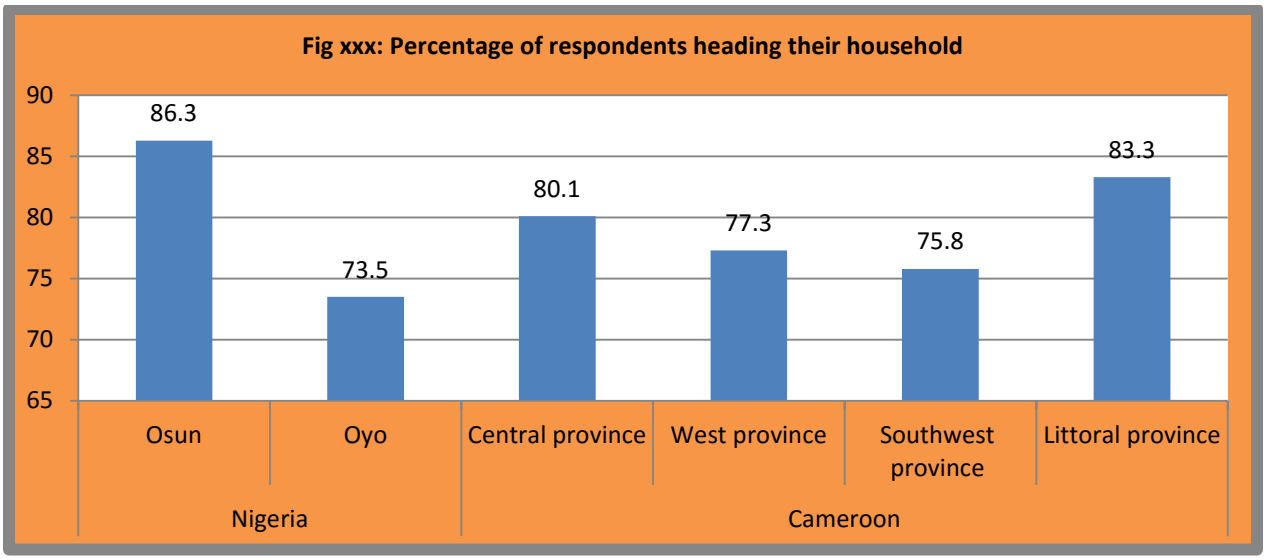
Table xxx shows state-level distribution of respondents by their gender class for Nigeria and Cameroon, respectively. Among the Nigerian households, at least 65% of the respondents in each state are males, while about 71% are males, nationally. Among the Cameroon households, the percentage of males among the respondents varies from 52% in the west province to 70% in the littoral province, and settling at 76% nationally. The term 'nationally' is used here and subsequently to mean the full data comprising Osun and Oyo states (in Nigeria), and the full data comprising the 4 provinces of Cameroon (Central, West, Southwest and Littoral).

Gender of household heads

Table xxx shows the gender of the household heads, who were not necessarily the respondents in the HT survey. Among the Nigerian households, at least 99% of the household heads are male in both Oyo and Osun, and 99% nationally. Among the Cameroon households, the percentage of males among the household heads varies from 68% in the west province to 81% in the south west and littoral provinces, and 76% nationally.

Headship of the household

Table xxx shows the distribution of the respondents by the headship of the households. Among the Nigerian households, at least 74% of the respondents are household heads in the two states, with a national average of 80%. In the Cameroon, the percentage of respondents who are household heads varies from 76% in the southwest province to 83% in the littoral province and 80% nationally. The national average percentage (80%) in both countries is a rare and interesting coincidence. Fig xxx further illustrate the percentage heading the household at the state/provincial level in both countries



Respondent's age

Table xxx shows the distributions of the respondents by age classes. Among the Nigerian households, the modal age class is 50 or higher years, specifically for 59% of Osun and 32% of Oyo respondents, and 47% nationally. Among the Cameroon households, 50 or higher years is the modal age class for 26% in the central province, 35% in the south west and 31% in the littoral provinces. In the west province, the modal age class is 30-39 years for 34%, and 40-49 years nationally for 28% of all households.

Respondent's formal schooling

Table xxx shows the distributions of the respondents by the number of years of formal schooling. The national data for Nigeria shows that the modal class of schooling is 1-6 years (34.1%). Among the Cameroon households, the national modal class for schooling is 7-9 years (28.7%) . In addition, 22.1% of the respondents nationally have 1-6 years and 13 or more years of schooling, respectively. On the whole, the percentage of respondents with formal schooling years appears to be higer for Cameroon than Nigeria. An inferential test on this and other numerical variables are presented in Table xxx.

Respondent's farming experience

Table xxx shows the distributions of the respondents by the number of years of farming experience. The results have been presented at both state and national levels, but we will discuss only the national results. Among the Nigerian households, the modal class of farming experience is 40 or more years for 32.9% of the respondents. The national result for Cameroon shows the modal farming experience class as 0-19 years for 59% of all respondents. . An inferential test on this and other household numerical variables are presented in Table xxx.

Table xxx: Selected socio-economic characteristics of households

			Nigeria			Cameroon				
Variable	Category	Unit	Osun	oyo	Total	Central	West	Southwest	Littoral	Total
Gender, respondent	Female	%	24.6	34.6	29.4	45.8	48.5	30.8	30.4	39.5
	Male		75.4	65.4	70.6	54.2	51.5	69.2	69.6	60.5
	Total		285	260	545	192	97	65	168	522
Gender, hhh	Female	%	0.0	1.7	1.3	25.0	32.0	19.0	18.9	23.6
	Male		100.0	98.3	98.7	75.0	68.0	81.0	81.1	76.4
	Total		32	121	153	44	25	21	37	127
Headship of household	No	%	13.7	26.5	19.8	19.9	22.7	24.2	16.7	19.9
	Yes		86.3	73.5	80.2	80.1	77.3	75.8	83.3	80.1
	Total		285	260	545	196	97	66	168	527
Age	20 or less	Years	0.9	0.0	0.2	6.9	2.9	3.5	0.0	3.8
	21-29		4.4	14.0	8.7	24.4	17.6	7.0	9.5	16.7
	30-39		14.5	28.5	20.8	20.0	33.8	26.3	22.9	24.1
	40-49		21.1	25.3	23.0	22.5	27.9	28.1	37.1	28.2
	50 or higher		59.0	32.3	47.0	26.3	17.6	35.1	30.5	27.2
	Total		227	186	413	160	68	57	105	390
Formal schooling	None	Years	32.6	28.0	30.5	3.1		3.5	4.8	3.1
	1-6		35.2	32.8	34.1	20.0	47.1	7.0	17.1	22.1
	7-9		10.1	4.3	7.5	25.6	11.8	49.1	33.3	28.7
	10-12		19.4	28.5	23.5	27.5	17.6	10.5	30.5	24.1
	13 or higher		2.6	6.5	4.4	23.8	23.5	29.8	14.3	22.1
	Total		227(100.0)	186(100.0)	413(100.0)	160(100.0)	68(100.0)	57(100.0)	105(100.0)	390(100
Farming experience	0-19	Years	19.8	38.7	28.3	65.0	63.2	52.6	50.5	59.0
	20-29		19.4	22.0	20.6	13.1	17.6	28.1	27.6	20.0
	30-39		15.9	21.0	18.2	10.6	14.7	8.8	13.3	11.8
	40 or higher		(44.9	18.3	32.9	11.3	4.4	10.5	8.6	9.2
	Total		227(100.0)	186(100.0)	413(100.0)	160(100.0)	68(100.0)	57(100.0)	105(100.0)	390(100

T-tests of mean values of selected household characteristics

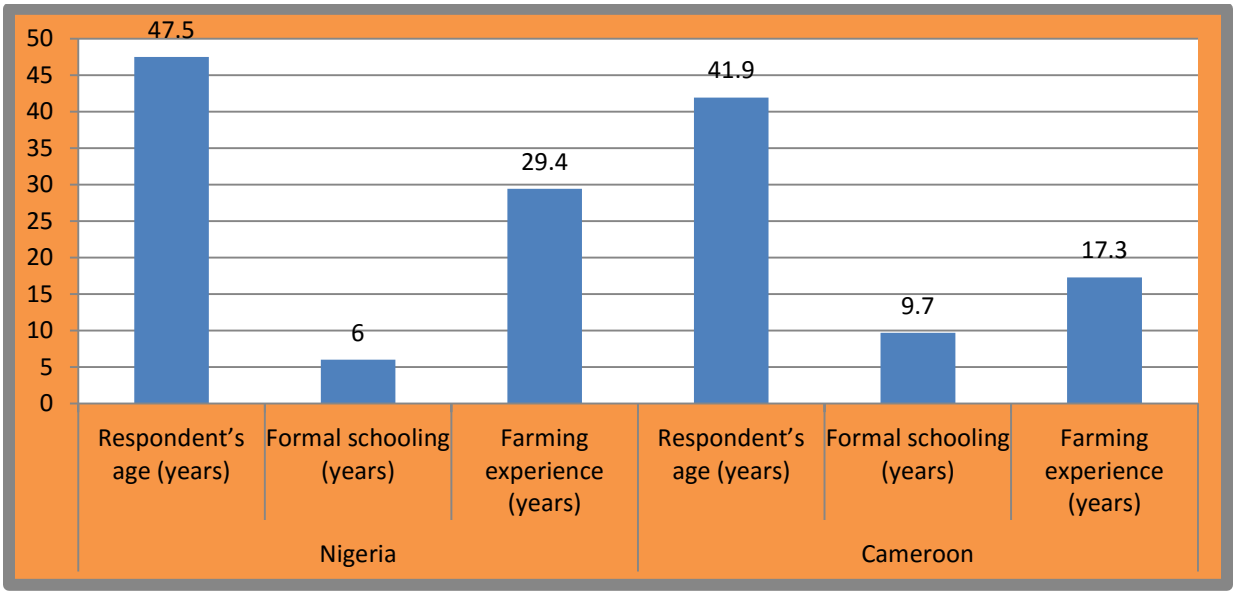
Country-level independent t-tests were conducted to compare the means of the respondents' age, formal schooling years and years of farming experience. The results are presented in Table xxx. Consistent with the descriptive already presented in this section, the mean age and farming experience are significantly higher among the Nigerian respondents, while the mean years of formal schooling is significantly higher among the Cameroon respondents, at the 1% level.

Table xxx: Country-level independent sample t-tests of mean values of selected household characteristics

variable	Country	n	mean	t-value	Df.	Sig.(2-tailed)
Respondent's age (years	Nigeria Cameroon	412 387	47.5 41.9	5.67	797	.000
Formal schooling (years)	Nigeria Cameroon	413 390	6.0 9.7	-8.88	801	.000
Farming experience (years)	Nigeria Cameroon	413 390	29.4 17.3	10.75	801	.000

Fig xxx further compares the averages for age, farming experience and years of formal schooling for Nigeria and Cameroon.

Fig xxx: Average values of selected household characteristics (country level



Ownership of assets

Table xxx shows the distribution of households by ownership of the assets in the survey, for Nigeria and Cameroon. Only 84 households in Nigeria, and 93 households in the Cameroon responded to this inquiry. Thus, inevitably, only country-level analysis was considered. Among the responding households in Nigeria , the assets with most ownership are Radio (23.8%), hoes (22.6%), mobile phone (13.1%), and traditional stoves (10.7%), in decreasing order. Among the Cameroon respondents , the top owned assets are mobile phone (18.3%), radio (17.2%), television (11.8%) and DVD player (11.8%), respectively.

Number of assets owned

The study also estimated the average number of assets owned per household. Table xxx shows the results for the responding households. The number of respondents per asset is low, so the mean values are taken as merely indicative. To cite a few values, the average number owned among Nigerian households include 2 radios, 2 mobile phones 3 hoes and 2 traditional stoves . Among the Cameroon households, the average number of the main assets per household is 2 radios, 2 television sets, 2 DVD players and 2 mosquito nets.

Table xxx: Distribution of households by ownership of assets

Name of asset	Nigeria				Cameroon			
	Frequency	% that own this asset	average number of asset owned	(n)	Frequency	% that own this asset	average number of asset owned	(n) ++
Cooker or gas stove	1	100.0			2	100.0	1.0	2
Refrigerator					6	100.0	1.7	6
Radio	20	95.0	1.9	20	16	93.8	1.5	16
Television	8	100.0	1.4	8	11	100.0	1.6	11
DVD player	3	100.0	1.3	3	11	100.0	1.6	11
Mobile phone	11	90.9	1.6	11	17	88.2	1.6	11
Sofa set	1	100.0			1	100.0		
Mosquito net					7	85.7	2.0	7
Computer					2	50.0	1.5	2
Sewing machine	1	100.0			1			
Generator	2	100.0	2.0	2	1	100.0		

Traditional stoves	9	100.0	2.2	9	2	50.0	1.5	2
Motorcycle	3	100.0	1.3	3				
Bicycle	1	100.0						
Cart-animal drawn	1	100.0						
Hoes	19	100.0	3.4	19	6	83.3	1.7	6
Spade or shovel	1	100.0			4	75.0	1.5	4
Plough					2	100.0	2.0	2
Sprayer pump	3	100.0	2.7	3	2	100.0	1.0	2
Water pump					1			
Wheel barrow					1	100.0		
Total	84				93			

++ n= number of responding households

3.2. Characterization of Household Plots and Cropping Systems

This section gives extensive characterization of households' plots and cropping systems, specifically classifying the plots by size, types, and mode of acquisition, plot manager, cropping systems, crops grown, crop varieties, and other practices.

Size of plots

Table xxx shows the distribution of the households by the size of plots. Going by global definition, a farmland that is less than 10 ha in perimeter is described as 'small' (Apata et al, 2011). Thus, there is no large or medium farm size class in Table xxx. Farms in Nigeria and Cameroon are much smaller than the 10-ha global benchmark for a small farm. Among the Nigerian households, 79-84% of the farms in Osun and Oyo, and 81% of the households across both states have less than 5 ha of farmland. Similarly, 73-100% of the farms across the provinces surveyed in Cameroon have less than 5 ha of farmland.

Number of plots managed

Table xxx shows the distribution of the households by the number of plots or farmlands managed. Again, we have presented the results at both state and country levels, because of the importance of this resource in cropping decisions. Among the Nigerian households, the modal number of plots owned is 1-3 among 92% in Osun, 59% in Oyo and 76% nationally. Among the Cameroon households, the modal number of plots is also 1-3 among 95-100% of the respondents across the provinces and 98% nationally.

Number of different crops on plot

Table xxx shows the distribution of the households by the number of crops grown on a plot. Among the Nigerian households, the incidence of monocropping is 4.9% in osun, 18.5% in Oyo and 12.4% across both states. Among the Cameroon households, the incidence of monocropping varies across the provinces from 36.5% in the south west to 69.2% in the Littoral, and 60% nationally. On the flip side, the practice of mixed cropping in percentages is the sum of all other cropping systems in each state or province, and nationally.

T-tests of mean values of selected plot characteristics

Independent sample t-tests were done to compare the means of the foregoing plot characteristics at country level. The results, which are shown in Table xxx, indicates that the average farm size, number of farms owned and number of crops grown per plot, are significantly higher among Nigerian households, at the 1% level.

Table xxx: Country-level independent sample t-tests of mean values of selected plot characteristics

variable	country	n	mean	t-value	df	Sig.(2-tailed)
Area cultivated by household(ha)	Nigeria Cameroon	521 519	4.09 1.54	7.45	1038	.000
Number of farms managed	Nigeria Cameroon	480 511	2.6 1.1	11.42	989	.000
Number of different crops grown	Nigeria Cameroon	533 520	3.2 1.6	19.19	1051	.000

Mode of acquisition of farm plot

Table xxx shows the distributions of the households by the mode of land acquisition. The options presented to the households are community/ family, used free, purchased, rented (cash/ in-kind), and other. This inquiry is analyzed at state level because there might be cultural differences in the means of land acquisition. For example, among the Nigerian households , the top modes of land acquisition in Osun are community and purchase, which together account for 72% of the options given, while 62% of the Oyo households together indicates 'used free' and 'other' as the top options for land acquisition.

Among the Cameroon households, community and ‘used free’ are the top two options among 74% in the central province households and 52% in the west province. However, community and purchase are the top sources of land among 78% of households in the littoral province, while purchase and renting are indicated by 80% of households in the southwest province as the top two options for land sourcing. Thus, disaggregating the results of this inquiry by state is justified since the means of acquisition differed across states or provinces in Nigeria and Cameroon.

Main managers of farm plot

Table xxx shows the distributions of the households by who manages the household plot. The options presented to the households are Husband, Wife, Joint wife/husband and other member. In both Oyo and Osun states of Nigeria, at least 92% of all the respondents indicate the husband as the main manager of the farmland. And, across the provinces of Cameroon, 91-100% of the respondents indicate that the manager of the plots is the husbands.

Table xxx: Selected characteristics of household plots, Nigeria and Cameroon

		Nigeria			Cameroon				
Variable	Category	Osun	oyo	Total	Central	West	Southwest	Littoral	Total
Total size of land (ha)	0-1.99	31.3	37.5	34.3	88.7	99.0	29.0	55.7	72.9
	2.00-4.99	52.6	41.1	47.0	10.3	1.0	43.5	38.9	21.7
	5.00-6.99	5.9	7.1	6.5	0.5		8.1	2.4	1.9
	7 or more	10.3	14.2	12.2	0.5		19.4	3.0	3.5
	Total	272	253	525	195	96	62	167	520
Total number of plots managed	1-3	91.6	59.1	75.9	95.4	97.9	100.0	100.0	97.9
	4-6	8.0	9.3	8.6	0.5				0.2
	7 or more	0.4	31.5	15.4	4.1	2.1			1.9
	Total	275	257	532	195	96	62	168	521
Number of crops per plot	1	4.9	18.5	12.4	60.7	58.0	36.5	69.2	59.6
	2	12.5	42.0	28.7	23.0	32.0	44.6	19.2	26.4
	3 or more	82.5	39.5	58.9	16.2	10.0	18.9	11.6	14.0
	Total	263	319	582	191	100	74	172	537
Mode of plot acquisition	Community/ family	46.0	7.0	30.0	41.3	23.7	11.1	45.8	34.7
	Used free	4.9	28.9	14.7	32.8	32.3	6.2	13.5	22.8
	Purchased	26.2	15.9	22.0	5.8	11.8	60.5	32.3	23.4
	Rented (cash/ in-kind)	9.0	15.2	11.5	4.8	19.4	19.8	7.7	10.6
	Other	13.9	33.0	21.7	15.3	12.9	2.5	0.6	8.5
	Total	389	270	659	189	93	81	155	518
Main manager of plot	Husband	92.0	92.6	92.3	91.0	92.6	96.3	99.4	94.6
	Wife	7.5	6.3	7.0	7.9	5.3	2.5	0.6	4.4
	Joint wife/husband	0.3	1.1	0.6	1.1	1.1	1.2	0.0	0.8
	Other member	0.3	0.0	0.2	0.0	1.1	0.0	0.0	0.2
	Total	388	272	660	189	95	81	155	520

Crops grown by household

Table xxx shows the distribution of the households by the crops grown. A total of 18 crops were present at survey time in both Nigeria and Cameroon. Among the Nigerian households, the crops which at least 10% of the households grow in osun state include cassava, maize, yam, cocoa and kolanut. In Oyo state, cassava, maize and pepper are planted by at least 10% of the respondents. Nationally, cassava and maize are the only crops that are grown by 10% or more of the respondents.

In the Cameroon, the crops planted by at least 10% of the central and west province households include cassava, groundnuts and maize. In the southwest province, we have plantain and cocoa as the only crops planted by 10% or more of the households, while cassava, maize and coffee are the crops grown in the littoral province by 10% or more households. Nationally, cassava, groundnuts, maize, and cocoa are grown by at least 10% of all the Cameroon households in the survey.

Table xxx: Distribution of households by the crops grown on plot

Crops	Nigeria			Cameroon				
	Osun	Oyo	Total	Central	West	Southwest	Littoral	Total
Beans/cowpea	0.3	0.3	0.3	0.4	26.7	0.0	3.8	6.5
Cassava	16.9	35.2	25.1	32.6	1.5	7.3	18.1	17.8
Cocoyam	2.7	0.0	1.5	3.1	3.1	7.3	0.5	3.2
Groundnuts	0.0	0.3	0.2	19.4	10.7	0.0	2.7	9.5
Maize	6.5	25.2	14.9	15.9	35.1	0.8	35.2	22.1
Yam	9.8	7.0	8.6	0.4	0.0	0.8	0.0	0.3
Banana	2.2	0.7	1.5	1.3	5.7	1.6	1.1	2.1
Okro	0.0	2.3	1.1	0.9	0.8	0.0	0.0	0.5
Pepper	2.5	7.7	4.8	0.4	0.0	0.8	0.0	0.3
Pineapple	0.5	0.3	0.5	2.6	0.0	0.0	1.6	1.4
Plantain	6.5	0.0	3.6	8.8	6.9	17.7	3.3	8.6
Green veggie	1.1	3.4	2.1	0.0	0.0	0.0	1.1	0.3
Tomato	1.6	6.4	3.8	3.5	0.8	0.0	0.0	1.4
Cocoa	17.7	4.4	11.7	8.4	0.0	43.5	8.8	13.4
Coffee				0.0	0.0	1.6	17.6	5.1
Kolanut	11.7	1.0	6.9	0.0	0.0	0.8	0.0	0.2
Orange	8.4	0.7	5.0	0.4	0.0	0.8	0.0	0.3
Oil palm	6.8	0.0	3.8	0.0	0.0	8.1	3.3	2.4
Total	367	298	665	227	131	124	182	664

Practice of intercropping

Table xxx shows the distribution of households on the practice of intercropping of the crops indicated. Intercropping is being suggested as not a popular practice among households in both countries. Specifically, intercropping is practiced with most of the listed crops by less than 10% of the responding households in Nigeria. And, across all the crops, only 14% of the households practice intercropping in Cameroon. We should note at this point that the results in Table xxx relate more to data problems, since we already saw in Table xxx that intercropping / mixed cropping is the dominant cropping system among households in both Nigeria and Cameroon.

Table xxx: Distribution of households by who intercrops the indicated crop

	Intercropping of the indicated crop			
	Nigeria		Cameroon	
Crop	Total frequency	% Yes	Total frequency	% Yes
Beans/ cowpea	2	0.0	1	100.0
Cassava	139	6.5	89	19.1
Cocoyam	6	0.0	4	0.0
Groundnut	1	0.0	40	12.5
Maize	86	7.0	35	2.9
Yam	49	4.1	1	0.0
Banana	10	0.0	1	0.0
Okro	14	0.0	3	100.0
Pepper	36	8.3	1	0.0
Pineapple	4	0.0	8	0.0
Plantain	22	9.1	19	5.3
Green veggie	10	0.0		0.0
Tomato	23	0.0	4	0.0
Cocoa	50	6.0	18	22.2
Coffee	0	0.0	1	0.0
Kolanut	47	8.5		0.0
Orange	30	3.3		0.0
Oil palm	17	0.0		0.0
Total	545	35.5	225	14.2

Primary and secondary crops in intercrops

Table xxx shows the matrices of primary and secondary intercrops indicated by the households in both countries. The results in this table are very scanty, even at country level. Thus, the few intercrops in Table xxx are presented only as indications of what exists.

Table xxx: Distribution of households by primary and secondary crops in the intercrop, Nigeria (matrix)

Primary crop in intercrop	Secondary crop in intercrop						
	Cotton	Maize	Yam	Pepper	Cocoa	Kolanut	Total
Cassava		100.0					2
Cocoyam	100.0						1
Maize				100.0			3
Yam						100.0	1
Cocoa			80.0			20.0	5
Kolanut			50.0		50.0		2
Total	7.1	14.3	35.7	21.4	7.1	14.3	14

Table xxx: Distribution of households by primary and secondary intercrops, Cameroon (matrix)

Primary crop in the intercrop	**Secondary crop in the intercrop**								
	Cassava	Cocoyam	Maize	Banana	Okro	Pepper	Plantain	Sugar cane	Total
Cassava		22.2	22.2	11.1	11.1		33.3		9
Cocoyam	55.6					11.1	33.3		9
Groundnuts		50.0	50.0						2
Okro						50.0	50.0		2
Pineapple								100.0	1
Plantain	100.0								1
Total	30.8	11.5	11.5	3.8	11.8	7.7	26.9	3.8	26

Varieties of primary and secondary intercrops

Table xxx shows the varieties of the crops in the primary and secondary intercrops indicated by the households in both countries. The results in these Table are again scanty, especially for Nigeria. For both countries, the local varieties of crops are dominant over high yielding and hybrid varieties among primary and secondary intercrops. Among the Nigerian households, only the local varieties are indicated against both primary and secondary intercrops. Almost the same pattern is observed among the Cameroon households, except for pockets of high yielding varieties for cassava, cocoyam, pineapple and cocoa, and hybrid for banana in the primary intercrops. Across all the Cameroon primary intercrops , 88.1%, 10.4% and 1.5% of the responding 67 households used local, high yielding and hybrid varieties, respectively.

Table xxx: Distribution of households by varieties of primary and secondary intercrops

	Crop	Variety of primary crop in intercrop				Variety of secondary crop in intercrop			
Country		% growing local	% growing high yielding	% growing hybrid	Total	% growing local	% growing high yielding	% growing hybrid	Total
Nigeria	Beans/cowpea								
	Cassava	100.0			6				
	Cocoyam	100.0			2				
	Groundnuts	100.0			1				
	Cotton					100.0			1
	Maize	100.0			8	100.0			2
	Yam	100.0			2	100.0			5
	Carrot					100.0			1
	Banana								
	Okro								
	Pepper					100.0			3
	Pineapple								
	Plantain								
	Sugar cane								
	Green veggie								
	Tomato								
	Cocoa	100.0			7	100.0			1
	Coffee								
	Kolanut	100.0			3	100.0			2
	Orange								

	Oil palm								
	Total	100.0			29	100.0			15
Cameroon	Beans/cowpea	100.0			6				
	Cassava	89.5	10.5		19	100.0			8
	Cocoyam	87.5	12.5		16	100.0			3
	Groundnuts	100.0			7				
	Cotton								
	Maize	100.0			3	100.0			3
	Yam								
	Carrot								
	Banana	75.0		25.0	4	100.0			1
	Okro	100.0			3	100.0			1
	Pepper					100.0			2
	Pineapple		100.0		1				
	Plantain	100.0			5	100.0			8
	Sugar cane					100.0			1
	Green veggie								
	Tomato								
	Cocoa	33.3	66.7		3				
	Coffee								
	Kolanut								
	Orange								
	Oil palm								
	Total	88.1	10.4	1.5	67	100.0			27

Season crop is grown

Table xxx shows the seasons the crops in the survey are planted in both countries. In Nigeria , the responses are mainly distributed between both seasons and rainy season, and rarely was any crop grown exclusively in the dry season. Crops which at least 50% of the households grow only in the rainy season include cocoyam, yam, pepper, green vegetables, tomato and cocoa. Cocoa is a perennial crop. So, including it among the crops grown in the rainy season is more of analytical response to the survey data. The crops which at least 50% of the households indicate to grow in both seasons are cassava, maize, banana, okro, plantain, kolanut, orange and oil palm.

Among the Cameroon households, the responses are mainly distributed between both seasons and rainy season, and with dry season farming indicated for more crops than found in the Nigeria data. Crops which at least 50% of the households grow only in the rainy season include

groundnuts, yam, okro, pepper, green vegetables, and orange. The crops which at least 50% of the households indicate to grow in both seasons are cassava, banana, pineapple, plantain, cocoa and oil palm. Across all the crops, rainy season, dry season and both-season cropping are practiced by 47.8%, 0.5% and 51.6% of the Nigeria households. Among the Cameroon households, 35.1%, 16.4% and 48.5% of the households nationally practice rainy season, dry season and both-season cropping.

Table xxx: Distribution of households by growing season of crop

	Growing season of crop							
	Nigeria				Cameroon			
Crop	Rainy	Dry	Both	Total	Rainy	Dry	Both	Total
Beans/cowpea			100.0	2	41.0	12.8	46.2	39
Cassava	41.0		59.0	139	39.7	8.7	51.6	126
Cocoyam	100.0			6	23.5	29.4	47.1	17
Groundnuts					50.0	12.1	37.9	66
Maize	47.3		52.7	91	35.3	24.0	40.7	150
Yam	51.0	6.1	42.9	49	100.0			2
Banana	45.5		54.5	11	30.0		70.0	10
Okro	42.9		51.7	14	100.0			3
Pepper	54.1		45.9	37	50.0	50.0		2
Pineapple	75.0		25.0	4	36.4	9.1	54.5	11
Plantain	47.8		52.2	23	.3	16.7	74.1	54
Green veggie	54.5		45.5	11	100.0			2
Tomato	60.9		39.1	23	40.0	20.0	40.0	5
Cocoa	58.0		42.0	50	33.7	11.6	54.7	95
Coffee					18.2	45.5	36.4	33
Kolanut	48.9		51.1	47			100.0	1
Orange	48.4		51.6	31	100.0			1
Oil palm	16.7		83.3	18	33.3		66.7	12
Total	47.8	0.5	51.6	556	35.1	16.4	48.5	629

Month land usage starts and ends for the indicated crops

Table xxx shows the distribution of the households by the month land usage startsand ends for each crop in Nigeria. . Among the Nigerian households, land usage starts between March and June, while land usage ends for most crops between October and December, with few exceptions in the months of March, April, July and September.

Table xxx shows the shows the corresponding results for the Cameroon. The startup of land usage is concentrated over longer number of months, i.e., from December to July. Land use ends mainly in the months of April to September, and then December to January, but with pockets of other months indicated.

Table xxx: Month land usage starts and ends for the indicated crops (Nigeria)

	Start month of land usage													End month of land usage									
Crop	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Total	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Beans/ cowpea																							
Cassava	44.4	33.3	22.2										9	22.2	22.2	11.1			33.3				11.
Cocoyam																							
Groundnut																							
Maize	33.3	16.7	33.3	16.7									6	16.7			33.3	16.7		16.7	16.7		
Yam			50.0				50.0						2								50.0	50.0	
Banana																							
Okro																							
Pepper		33.3	33.3					33.3					3		33.3						33.3		33.
Pineapple																							
Plantain			100.0										2								50.0	50.0	
Green veggie																							
Tomato																							
Cocoa			66.7	33.3									3					33.3			33.3		33.
Coffee																							
Kolanut	25.0		75.0										4							50.0	25.0	25.0	
Orange			100.0										1									100.0	
Oil palm																							
Total	23.3	16.7	46.7	6.7			3.3	3.3					30	10.0	10.0	3.3	6.7	6.7	10.0	10.0	20.0	13.3	10.

Table xxx: Month land usage starts and ends for the indicated crops (Cameroon)

	Start month of land usage													End month of land usage								
Crop	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Total	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	
Beans/ cowpea	100.0												1				100.0					
Cassava	35.3	41.2	5.9								17.6		17		11.8	11.8		11.8	29.4	17.6		5
Cocoyam					33.3						66.7		3	33.3		33.3						
Groundnut	50.0	16.7									16.7	16.7	6				16.7	33.3		33.3		
Maize	25.0		25.0							25.0	25.0		4		25.0	25.0				25.0		
Yam																						
Banana																						
Okro	100.0												3		66.7	33.3						
Pepper																						
Pineapple																						
Plantain		14.3								14.3	71.4		7		14.3	14.3			14.3			
Green veggie																						
Tomato																						
Cocoa	17.2	3.4	3.4	3.4		3.4					65.5	3.4	29	3.4	10.3	3.4	3.4	3.4		6.9		3
Coffee																						
Kolanut					100.0																	
Orange																						
Oil palm					100.0								1									
Total	26.8	14.1	4.2	1.4	2.8	1.4				2.8	43.7	2.8	71	2.8	12.7	11.3	4.2	7.0	8.5	11.3		2

Crop yield changes perception on farm plot

Farmers were asked to describe the perceived changes in crop yield, without reference to any particular crop. Table xxx shows the results at both state / provincial and LGA / zonal levels. +In Osun state, 3 of the 5 LGAs assessed crop yield as having gone down, while Iwo LGA assessed yield as remaining the same. The response from Ife East is bi-modal with 40% each assessing crop yield as gone down and remain the same, respectively. Among Oyo state households, 3 LGAs reported crop yield as gone down, while 1 LGA (Ibarapa East) reported yield as remaining the same.

Among the 4 zones in the central province of Cameroon, 2 zones (Lekie and Mefou et Afamba) reported yield as remaining the same. The modal response from the other 2 zones is yield decrease. In the west province, 2 of the zones (Bamfoutos and Menoua) reported yield as gone down, the 3rd LGA assessed yield as remaining the same. The modal response of the households in Meme (South west) and Moungo (Littoral) is that yield has gone down.

Table xxx: Distribution of households by crop yield changes perception on farm plot

			Crop yield changes perception on farm plot			
Country	State /Province	LGA/zone	Yield gone down	Not sure	Yield same	Total frequency
Nigeria	Osun	Iwo	31.7	31.7	36.6	101
		Aiyedire	38.5	33.3	28.2	39
		Ife East	40.0	20.0	40.0	130
		Atakumasa West	47.3	29.1	23.6	55
		Atakumasa East	36.6	36.6	26.8	41
		Total	38.3	27.9	33.9	366
	Oyo	Ori-Ile	90.0	4.3	5.7	70
		Ogo Oluwa	100.0	0.0	0.0	27
		Ibarapa East	47.2	48.6	4.2	72
		Ido	51.6	32.6	15.8	95
		Total	65.5	26.1	8.3	264
Cameroon	Central	Lekie	35.9	19.2	44.9	78
		Mefou et Afamba	24.0	36.0	40.0	25

		Mefou et Akono	59.1	9.1	31.8	22
		Nyong et So	92.9	12.5	14.6	48
		Total	47.4	18.5	34.1	173
	West	Bamboutos	62.2	13.5	24.3	37
		Haut-Nkam	25.0	8.3	66.7	12
		Menoua	42.6	40.4	17.0	47
		Total	47.9	26.0	26.0	96
	Southwest	Meme	56.8	21.0	22.2	81
	Littoral	Moungo	67.7	7.2	25.1	167

Current cropping system on farm plot

Table xxx show the household distribution by cropping pattern under practice at survey time. The options presented were “Traditional”, "I don’t know” and “new pattern/system".

In osun state, Nigeria, the modal cropping system among 4 of the 5 LGAs is the traditional system, while Atakumasa LGA is the exception with new pattern indicated as the modal cropping system. In Oyo state, the modal cropping system is the new system in Ori-ile and Ogo oluwa; traditional and unspecified cropping systems are bi-modal in Ibarapa East LGA; and traditional system in Ido LGA.

In the Cameroon, all the 4 zones in the central province expressed traditional as the modal response. In the west province, the modal responses are traditional among the Bamboutos zone and ‘’I don’t know’’ among the Menoua zone households. In the Haut-Nkam zone, the response is bi-modal between traditional and ‘’I don’t know’’ . The meme zone in the South west and Moungo zone in the Littoral indicates trational as the modal cropping system.

Overall, the results presents a further opportunity for a package of yield-increasing interventions, since the dominant response is the traditional cropping system across the LGAs/zones in both countries.

Table xxx: Distribution of households by current cropping system on farm plot,

			Current cropping system on farm plot			
Country	State /Province	LGA/zone	Traditional	I don't know	New pattern/system	Total frequency
Nigeria	Osun	Iwo	66.7	21.9	11.4	105
		Aiyedire	67.5	25.0	7.5	40
		Ife East	74.8	8.9	16.3	135
		Atakumasa West	57.1	7.9	34.9	63
		Atakumasa East	48.9	0.0	51.1	45
		Total	66.0	12.9	21.1	388
	Oyo	Ori-Ile	42.3	0.0	57.7	71
		Ogo Oluwa	34.5	0.0	65.5	29
		Ibarapa East	45.9	45.9	8.1	74
		Ido	50.0	31.3	18.8	96
		Total	45.2	23.7	31.1	270
Cameroon	Central	Lekie	84.8	8.7	6.5	92
		Mefou et Afamba	50.0	50.0	0.0	26
		Mefou et Akono	72.7	27.3	0.0	22
		Nyong et So	79.6	20.4	0.0	49
		Total	77.2	19.6	3.2	189
	West	Bamboutos	54.1	45.9	0.0	37
		Haut-Nkam	50.0	50.0	0.0	12
		Menoua	40.4	53.2	6.4	47
		Total	46.9	50.0	3.1	96
	Southwest	Meme	66.7	17.3	16.0	81
	Littoral	Moungo	67.7	32.3	0.0	155

Types of farmland

Table xxx shows the household distribution by types of farmland. The options presented are flooded, regularly, irrigated, not irrigated (flat), not irrigated (slope), shaded by trees and other

land types. In Osun and Oyo states, Nigeria, the modal type of land is ‘’not irrigated, flat’’ among all the LGAs in the study. Among the Cameroon households, 3 of the 4 zones in the central province indicates ‘’not irrigated, flat’’ as the modal farmland type, while households in the Mefou et Afamba zone select ‘’not irrigated, slope’’ as their modal farmland.

In the west province, the modal farmland in the Haut-Nkam zone is ‘’irrigated’’ , while ‘’not irrigated, slope’’ is the dominant farmland among households in Menoua zone. We obtained a bi-modal response for ‘’not irrigated, flat’’ and ‘’not irrigated, slope’’ among households in Bamboutos zone of the west province. In the meme zone of the southwest and Moungo zone of the Littoral, the modal farmland type is ‘’not irrigated, flat’’.

Table xxx: Distribution of households by types of farmland

			Types of farmland					
Country	State /Province	LGA/zone	Flooded, regularly	Irrigated	Not irrigated, flat	Not irrigated, slope	Shaded by trees	Other land
Nigeria	Osun	Iwo	18.4	0.0	70.9	10.7	0.0	0.0
		Aiyedire	22.5	0.0	72.5	5.0	0.0	0.0
		Ife East	15.8	0.7	60.4	23.0	0.0	0.0
		Atakumasa West	8.2	1.6	70.5	19.7	0.0	0.0
		Atakumasa East	0.0	2.2	80.0	17.8	0.0	0.0
		Total	14.2	0.8	68.3	16.8	0.0	0.0
	Oyo	Ori-Ile	4.2	43.7	50.7	1.4	0.0	0.0
		Ogo Oluwa	10.3	27.6	62.1	0.0	0.0	0.0
		Ibarapa East	1.4	44.6	54.1	0.0	0.0	0.0
		Ido	3.1	38.5	47.9	10.4	0.0	0.0
		Total	3.7	40.4	51.9	4.1	0.0	0.0
Cameroon	Central	Lekie	2.2	16.3	45.7	17.4	16.3	2.2
		Mefou et Afamba	0.0	15.4	26.9	53.8	3.8	0.0
		Mefou et Akono	0.0	27.3	40.9	27.3	4.5	0.0
		Nyong et So	0.0	12.2	44.9	28.6	10.2	4.1
		Total	1.1	16.4	42.3	26.5	11.6	2.1
	West	Bamboutos	0.0	24.3	37.8	37.8	0.0	0.0
		Haut-Nkam	8.3	41.7	25.0	8.3	16.7	0.0
		Menoua	6.3	22.9	22.9	47.9	0.0	0.0
		Total	4.1	25.8	28.9	39.2	2.1	0.0
	Southwest	Meme	0.0	8.6	71.6	11.1	3.7	4.9
	Littoral	Moungo	4.5	20.0	62.6	12.9	0.0	0.0

Disaggregated point estimates on selected plot characteristics

In the early part of this section, point estimates were presented on average plot size and number of crops per plot without linkage to any plot characteristic. In the next few tables, we again present these and other point estimates relating to household plots, but now disaggregated by land type and cropping pattern. These new computations are not averaged over the country sample size, but over the number of households fulfilling the disaggregation conditions

Average area of plot

Country-level analysis was done for this inquiry, to keep the number of point estimates manageable. In the Nigerian results, average plot size irrespective of the cropping systems practiced is 1.1-1.4 ha on ‘’flooded, regluarly’’ farmlands, 1.6-2.0 ha on ‘’irrigated’’ farmlands, 1.4-1.9 ha on ‘’not irrigated, flat’’ and 1.6-1.9 ha on ‘’not irrigated, slope’’ plots. .

Among the Cameroon households, average plot size irrespective of the cropping systems practiced is 0.5-1.7 ha on ‘’flooded, regluarly’’ farmlands, 1.1-2.3 ha on ‘’not irrigated, flat’’ and 0.8-1.1 ha on ‘’not irrigated, slope’’ plots. On the ‘’irrigated’’ plots, farm size varies from 0.6 ha under new cropping system to 8.1 ha under traditional cropping system. On the ‘’shaded by trees’’ plots, farm size varies from 0.8 ha under the unknown cropping system to 1.5 ha under the traditional system. On ‘’other type of lands’’, farm size averages 1.9 ha under the traditional farming system.

The estimates of the plot size in this table are mostly less than 3 ha, consistent with our earlier results in Table xxx. Indeed, none of the valid estimates in the present table exceed 10 ha, our benchmark maximum value for a small farm size.

Table xxx: Average size of plots, by farmland type and cropping pattern

		Nigeria		Cameroon	
Land type	Current cropping pattern	Average area of plot (ha)	(n)	Average area of plot (ha)	(n)
Flooded, regularly	Traditional	1.24	11	1.70	7
	I don’t know	1.36	42	0.47	6
	New pattern/system	1.08	9		

Irrigated	Traditional	1.59	71	8.06	70
	I don't know	2.00	12	0.89	19
	New pattern/system	1.96	28	0.64	4
Not irrigated, flat	Traditional	1.90	227	1.45	161
	I don't know	1.38	60	1.08	84
	New pattern/system	1.82	111	2.29	16
Not irrigated, slope	Traditional	1.89	61	1.06	80
	I don't know			1.13	34
	New pattern/system	1.60	14	0.80	1
Shaded by trees	Traditional			1.48	22
	I don't know			0.76	4
	New pattern/system			8.00	1
Other land type	Traditional			1.87	7
	I don't know			1.00	1
	New pattern/system				

Number of crops, by farmland type and cropping pattern

Table xxx shows the average number of crops, by farmland type and cropping pattern. Among the Nigerian households, the average number of crops per plot irrespective of the cropping pattern, is 2-3 on ''flooded, regularly'' plots , ''irrigated'' plots, and ''not irrigated, flat'' plots. The average is 2 crops on ''not irrigated, slope'' lands.

Among the Cameroon households, the average number of crops per plot irrespective of the cropping pattern, is 1 on ''flooded, regularly'' plots , 2 on ''irrigated'' plots, 1-2 on ''not irrigated, flat'' plots, and 2 on ''not irrigated, slope'' plots. Under the traditional system, the average number of crops is 1 on the ''shaded by trees'' plots and 2 on the ''other'' farmlands.

Table xxx: Average number of crops, by farmland type and cropping pattern

		Nigeria		Cameroon	
Land type	Current cropping pattern	Average number of crops	(n)	Average number of crops	(n)
Flooded, regularly	Traditional	2.5	12	1.3	7
	I don't know	3.1	42	1.0	6
	New pattern/system	2.0	11		

Irrigated	Traditional	3.0	72	1.5	71
	I don't know	2.3	12	2.1	19
	New pattern/system	1.5	28	1.5	4
Not irrigated, flat	Traditional	2.4	228	1.7	162
	I don't know	2.5	60	1.6	85
	New pattern/system	2.4	111	1.2	16
Not irrigated, slope	Traditional	2.1	61	1.7	81
	I don't know			1.9	34
	New pattern/system	2.2	14	2.0	1
Shaded by trees	Traditional			1.4	22
	I don't know			2.0	4
	New pattern/system			1.0	1
Other land type	Traditional			2.0	7
	I don't know			1.0	1
	New pattern/system				

Years since practicing cropping system

Table xxx shows the average number of years of practicing current cropping system. In Osun state, the average under the traditional system varies from 7 years on the ''irrigated'' plots to 26 years on the ''not irrigated, flat''. Still in Osun, the average under the new system varies from 11 years on the '' not irrigated, slope '' plots to 25years on the 'flooded, regularly'' plots. In Oyo state, the average under the traditional system varies from 10 years on the ''not irrigated, slope'' plots to 32 years on the 'flooded, regularly'' plots. Under the new cropping system, the average varies from 4 years on the '' not irrigated, slope '' plots to 13 years on the 'irrigated'' plots.

In the central province of the Cameroon, the average under the traditional system varies from 4 years on the ''flooded, regularly'' plots to 10 years on the '' irrigated'' plots. Under the new cropping system, the average is 7 years on the '' not irrigated, slope ''. In the west province of the Cameroon, the average under the traditional system varies from 10 years on the ''shaded by trees'' plots to 19 years on the '' not irrigated, slope'' plots. In the south west province, the average under the traditional system varies from 10 years on the ''not irrigated, slope'' plots to 20 years on the '' not irrigated, flat'' plots. And, in the littoral province, the average under the

traditional system varies from 9 years on the ‘’not irrigated, slope’’ plots to 14 years on the ‘’ not irrigated, flat’’ plots.

Table xxx: Average years of practicing indicated cropping pattern

		Nigeria				Cameroon							
		Osun		Oyo		Central		West		South West		Littoral	
		Ave.	(n)	Ave.	(n)	Ave.	(n)	Ave.	(n)	Ave.	(n)	Ave.	(n)
Flooded, regularly	Traditional	24.2	9	31.7	3	3.5	2	3.5	2			10.7	3
	I don’t kmow	40.4	42					8.0	2			17.0	4
	New pattern / system	24.5	4	8.0	7								
Irrigated	Traditional	7.0	2	13.3	66	9.6	27	5.3	10	19.9	7	10.0	26
	I don’t kmow			11.7	12	5.0	2	4.2	11			4.6	5
	New pattern / system	1.0	1	13.4	27			16.7	3				
Not irrigated, flat	Traditional	25.9	175	10.3	41	5.8	44	9.0	11	20.0	35	13.6	62
	I don’t kmow	41.1	8	11.5	51	3.4	20	9.5	17	6.3	12	9.8	35
	New pattern / system	15.3	59	11.9	46	7.3	3			10.8	11		
Not irrigated, slope	Traditional	17.4	51	9.8	8	4.4	40	18.5	20	9.9	7	8.7	13
	I don’t kmow					1.4	10	8.2	17	15.0	1	10.3	6
	New pattern / system	10.9	10	3.7	3					4.0	1		
Shaded by trees	Traditional					5.9	16	2.0	1	11.0	2		
	I don’t kmow					10.3	3	1.0	1				
	New pattern / system									24.0	1		
Other land types	Traditional					6.0	4			17.7	3		
	I don’t kmow									4.0	1		
	New pattern / system												

Trek time from home to farm

Table xxx shows the average time to trek from home to the farm, measured in minutes. The trek time averages 36-41 minutes in Osun and 42-81 minutes in Oyo state, across all farm types.

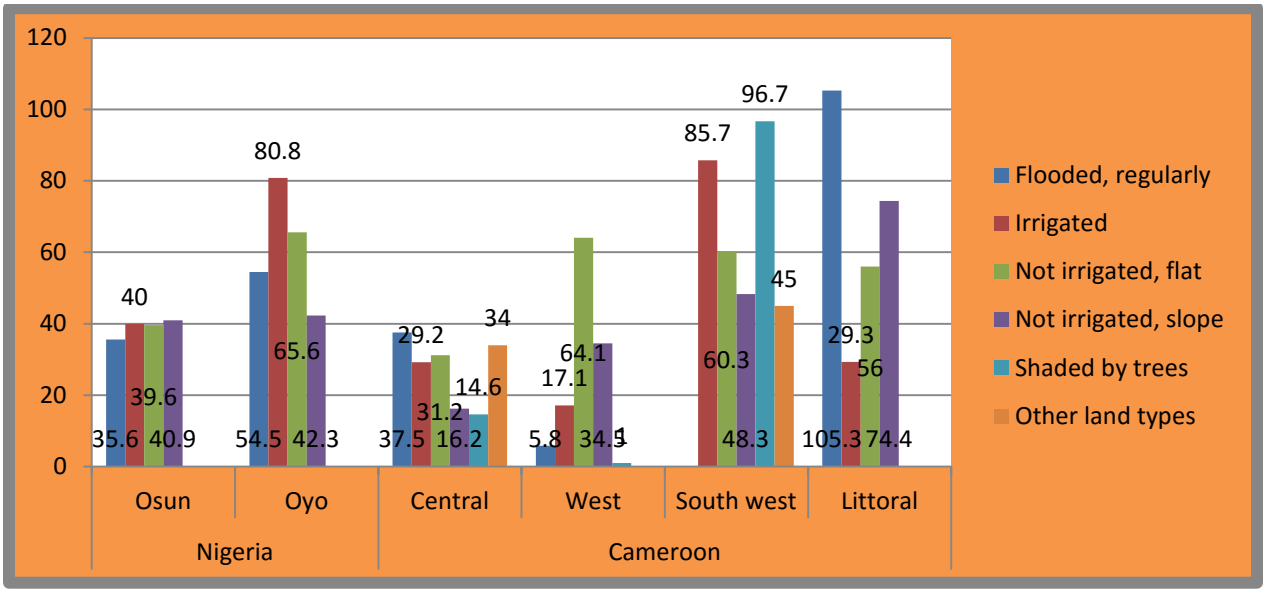
Across all farm types, the trek time averages 15-38 minutes in the central province, 6-64 minutes in the west province, 45-86 minutes in the south west province and 29-105 minutes in the littoral province.

Fig xxx illustrates the results in Table xxx. No consistent pattern is indicated in this graph. But, if trek time is proportional to distance of farm from home, then irrigated farms are the farthest from home in Oyo state, farms shaded by trees are the farthest in south west province and regularly flooded farms are the farthest in the littoral province.

Table xxx: Average trek time from home to farm (minutes)

Farmland type	Nigeria				Cameroon							
	Osun		Oyo		Central		West		South West		Littoral	
	Ave.	(n)	Ave.	(n)	Ave.	(n)	Ave.	(n)	Ave.	(n)	Ave.	(n)
Flooded, regularly	35.6	55	54.5	10	37.5	2	5.8	4			105.3	7
Irrigated	40.0	3	80.8	109	29.2	31	17.1	25	85.7	7	29.3	31
Not irrigated, flat	39.6	264	65.6	140	31.2	80	64.1	28	60.3	58	56.0	94
Not irrigated, slope	40.9	65	42.3	11	16.2	50	34.5	38	48.3	9	74.4	20
Shaded by trees					14.6	22	1.0	2	96.7	3		
Other land types					34.0	4			45.0	4		

Fig xxx: Average trek time from home to farm (minutes)



Analysis of fallow systems among households

This section presents estimates of fallow periods on different farmlands. In principle, the easiest way to determine the fallow period is to ask a farmer how long a plot has been left uncropped. In the present study, however, this direct question was not asked. So, we have relied on two other survey questions to indirectly estimate fallow periods. One of the survey questions sought to know the year a plot was acquired. The second question sought to know the year cropping began on the plot. We define the following symbols:

Y_t = current survey year

Y_{t-k} = year plot was acquired, t-k<t

Yt-m= year cropping began on plot, t-m<t

$N_{a,i}$ = number of years since access to the plot by household i, i=1,2,…….,n

$N_{c,i}$ = number of years since cropping started on plot by household i,

$N_{f,i}$= number of fallow years by household i

$N_a = Y_t - Y_{t-k}$

$N_c = Y_t - Y_{t-m}$

$N_{f,i} = N_{a,i} - N_{c,i}$

Panel A of Table xxx shows average number of years since plot acquisition, while Panel B shows the average number of years since cropping began. Panel C is the fallow period estimates by directly subtracting panel B from Panel A. Procedure produced 3 negative fallow estimates in Panel C. So, the households producing negative fallow periods were removed, towards re-estimation of the fallow periods. Panel D, which is no longer the simple difference between panels A and B, presents the adjusted fallow periods for the different farmlands. Panel D, estimated using the Record program in SPSS, is now discussed.

Among the Nigerian households, the fallow periods, across the different farmland types, averages 3-6 years in Osun state, and 0.2-3 years in Oyo state. Among the households in Cameroon, the fallow periods averages 12-38 years in the central province, 2-16 years in the

west province, 0-9 years in the south west province and 14-21 years in the littoral province, depending on the farmland type.

Table xxx: Estimation of fallow periods for different plot types

Panel A	Average number of years land was acquired											
	Nigeria				Cameroon							
	Osun		Oyo		Central		West		South West		Littoral	
Type of land	Ave.	(n)++	Ave.	(n)	Ave.	(n)	Ave.	(n)	Ave.	(n)	Ave.	(n)
Flooded, regularly	38.0	55	18.2	10	44.0	2	4.3	4			16.3	6
Irrigated	17.0	3	19.3	100	12.1	26	11.5	22	22.1	7	21.6	31
Not irrigated, flat	25.1	260	15.4	135	23.0	71	16.6	27	18.5	58	18.4	96
Not irrigated, slope	17.2	65	11.2	11	21.9	50	21.7	37	14.0	9	20.4	19
Shaded by trees					28.6	17	1.5	2	21.3	3		
Other land types					17.5	4			14.0	4		
Panel B	Average number of years land since cropping began											
	Ave.	(n)	Ave.	(n)	Ave.	(n)	Ave.	(n)	Ave.	(n)	Ave.	(n)
Flooded, regularly	32.5	55	18.0	10	6.5	2	0.0	4			1.7	7
Irrigated	11.3	3	17.2	109	2.6	31	0.0	22	18.6	7	1.1	31
Not irrigated, flat	23.5	261	18.8	140	5.0	80	1.1	28	19.2	58	5.0	97
Not irrigated, slope	15.1	64	9.1	11	4.2	50	12.0	37	13.8	9	5.8	20
Shaded by trees					2.5	22	0.0	2	16.7	3		
Other land types					0.0	4			14.3	4		
Panel C	Average number of fallow years (direct subtraction of tables above)											
	Ave.		Ave.		Ave.		Ave.		Ave.		Ave.	
Flooded, regularly	5.5		0.2		37.5		4.3		0		14.6	
Irrigated	5.7		2.1		9.5		11.5		3.5		20.5	
Not irrigated, flat	1.6		-3.4		18		15.5		-0.7		13.4	
Not irrigated, slope	2.1		2.1		17.7		9.7		0.2		14.6	
Shaded by trees	0		0		26.1		1.5		4.6		0	
Other land types	0		0		17.5		0		-0.3		0	
Panel D	Average number of fallow years (adjusted to remove negative years)											
	Ave.	(n)	Ave.	(n)	Ave.	(n)	Ave.	(n)	Ave.	(n)	Ave.	(n)
Flooded, regularly	3.6	29	0.2	10	37.5	2	4.3	4			14.3	6
Irrigated	5.7	3	2.9	90	12.1	24	11.5	22	8.8	5	20.5	31
Not irrigated, flat	2.7	227	2.9	126	19.9	69	15.5	27	2.3	37	14.1	92
Not irrigated, slope	2.7	55	2.2	11	21.3	42	10.9	34	0.9	8	14.3	19
Shaded by trees					28.1	16	1.5	2	4.7	3		
Other land types					17.5	4			0.0	3		

++n=number of households used for computation

To give another perspective to the fallow period interpretation, the estimates for the households were cross-tabulated and presented as Table xxx. In Osun state, the modal fallow period is 4-6 years on 'flooded regularly' plots, 0 year (no fallow) on 'not irrigated, flat' and 'not irrigated, slope' plots. In Oyo state, the modal fallow periods are 1-3 years on 'not irrigated, slope', 0 year (no fallow) on 'flooded, regularly' , 'irrigated' and 'not irrigated, flat' plots. In the central, west and littoral provinces of Cameroon, the modal fallow period is 7 or more years across all plots, but the result is bi-modal at 1-3 years and 7 or more years on 'irrigated' plot in the central province. In the south west province, the modal fallow period is 0 year on the 'not irrigated, flat' plots.

Table xxx: Distribution of households by the estimated fallow period, by land type

			Fallow period				
Country	State	Land type	No fallow	1-3 years	4-6 years	7 or more years	Total
Nigeria	Osun	Flooded, regularly	20.7	27.6	34.5	17.2	29
		Irrigated	0.0	33.3	33.3	33.3	3
		Not irrigated, flat	60.8	11.9	13.2	14.1	227
		Not irrigated, slope	47.3	20.0	23.6	9.1	55
		Shaded by trees					
		Other land types					
	Total		54.1	15.0	17.2	13.7	314
	Oyo	Flooded, regularly	90.0	10.0	0.0	0.0	10
		Irrigated	70.0	7.8	5.6	16.7	90
		Not irrigated, flat	54.0	15.1	11.9	19.0	129
		Not irrigated, slope	27.3	45.5	27.3	0.0	11
		Shaded by trees					
		Other land types					
	Total		60.3	13.5	9.7	16.5	237
Cameroon	Central	Flooded, regularly	0.0	0.0	0.0	100.0	2
		Irrigated	0.0	45.8	8.3	45.8	24
		Not irrigated, flat	4.3	7.2	17.4	71.0	69

		Not irrigated, slope	11.9	21.4	7.1	59.5	42
		Shaded by trees	12.5	12.5	18.8	56.3	16
		Other land types	0.0	25.0	0.0	75.0	4
	Total		6.4	17.8	12.7	63.1	157
	West	Flooded, regularly	50.0	25.0	0.0	25.0	4
		Irrigated	4.5	4.5	22.7	68.2	22
		Not irrigated, flat	0.0	18.5	7.4	74.1	27
		Not irrigated, slope	2.9	38.2	11.8	47.1	34
		Shaded by trees	0.0	100.0	0.0	0.0	2
		Other land types					
	Total		4.5	24.7	12.4	58.4	89
	South west	Flooded, regularly					
		Irrigated	20.0	40.0	0.0	40.0	5
		Not irrigated, flat	67.6	13.5	8.1	10.8	37
		Not irrigated, slope	75.0	12.5	12.5	0.0	8
		Shaded by trees	33.3	0.0	33.3	33.3	3
		Other land types	100.0	0.0	0.0	0.0	3
	Total		64.3	14.3	8.9	12.5	56
	Littoral	Flooded, regularly	0.0	0.0	16.7	83.3	6
		Irrigated	3.2	3.2	3.2	90.3	31
		Not irrigated, flat	6.5	10.9	10.9	71.7	92
		Not irrigated, slope	15.8	15.8	5.3	63.2	19
		Shaded by trees					
		Other land types					
	Total		6.8	9.5	8.8	75.0	148

Number of crops in intercrops

Table xxx shows the average number of crops intercropped with each crop. Among the Nigerian households, the average number of crops in the intercrop is 1-2 among the crops responded to. The same result holds, with the exception of cocoa, in the Cameroon data .

Table xxx: Average number of crops intercropped with indicated crop, Nigeria

	Nigeria		Cameroon	
Crop	average number of crops intercropped with indicated crop	(n)	average number of crops intercropped with indicated crop	(n)
Beans/cowpea				
Cassava	2	9	1	17
Cocoyam			2	3
Groundnuts			1	6
Maize	1	6	2	4
Yam	2	2		
Banana				
Okro			1	3
Pepper				
Pineapple				
Plantain	2	2	2	7
Green veggie				
Tomato				
Cocoa	2	3	3	29
Coffee				
Kolanut	2	4		
Orange				
Oil palm				

Area under intercrop

Table xxx shows the average total area under intercrop with each of the indicated crop. Among the Nigerian households, with the exception of maize with 4.5ha under intercrop, all other crops having data are in the order of 0.4-1.5 ha. Among Cameroon households, the average areas under intercrop are relatively much smaller, specifically 0.01-2.0 ha, with the exception of cassava with 10.9 ha and cocoa with 9.92 ha , respectively under intercrop.

Table xxx: Average total area under intercrop, Nigeria

	Nigeria	Cameroon

Crop	average total area under intercrop (ha)	(n)	average total area under intercrop (ha)	(n)
Beans/cowpea	1.2	7		
Cassava			10.9	17
Cocoyam			0.01	2
Groundnuts			0.05	5
Maize	4.5	6	0.02	3
Yam				
Banana				
Okro			0.05	3
Pepper	0.4	2		
Pineapple				
Plantain	1.5	2	2.0	3
Green veggie				
Tomato				
Cocoa	1.2	2	9.92	29
Coffee				
Kolanut				
Orange				
Oil palm				

On-farm labour employment

In this section we present results relating to households' on-farm activities. In the data for Nigeria and Cameroon, only four of the previously seen crops have data for this analysis, namely, Beans, Cassava, Cocoyam and Cotton. Also, because data was relatively scanty, only country level analysis was undertaken in respect of on-farm labour employment.

Types of farm activities performed

Table xxx show the distribution of households by the types of farm activities performed on the listed crops. Among the Nigerian households, the activities which at least 40% of the households performed on beans are bird scaring, fertilizer application , gathering , harvesting and land preparation. For cassava, the activities which at least 40% of the households performed are harvesting and weeding. Among the Cameroon households, the activities which at least 40% of the households performed on beans are fertilizer application , gathering , harvesting, land preparation, planting and weeding.

Table xxx: Distribution of households by the labour activity performed on indicated crop, Nigeria

	Nigeria					Cameroon				
	Beans/ Cowpea	Cassava	Cocoyam	Cotton	Total	Beans/ Cowpea	Cassava	Cocoyam	Cotton	Tot
Bird scaring	80.0	20.0	0	0	5					
Fertilizer appl	66.7	16.7	16.7	0	6	75.0	25.0			8
Gathering	48.1	29.6	18.5		26	63.6	27.3	9.1		11
Harvesting	50.0	40.0	10.0		30	75.0	21.4	3.6		28
Land prep	48.3	37.9	10.3		28	73.3	26.7			15
Manuring	33.3	66.7			3					
Marketing	35.0	32.5	25.0	2.5	38	100.0				2
Other										
Planting	27.3	27.3	36.4	9.1	22	71.4	14.3	14.3		7
Preparing drainage										
Storage	33.3	38.9	16.7	5.6	17	33.3	16.7	33.3		5
Threshing		50.0			1					
Weeding	29.7	45.9	16.2	5.4	36	65.5	17.2	6.9		26
Total	40.2	36.1	17.8	2.7	212	67.6	20.4	6.5		102

Seasonality and gender in crop labour activities

In this section, labour activities are examined according to seasons and gender. Each of Tables xxx to xxx are constructed to reflect only those who answered ‘’yes’’ to employing labour for the activities during any of the seasons indicated.

Use of male labour

Table xxx shows the distribution of households by male labour activity and season. Among the Nigerian households, it is shown that 50% or more engage male labour for virtually all the activities listed mainly under both seasons. The same pattern is shown among Cameroon households, ignoring activities with less than 5 observations.

Table xxx: Distribution of households by who used male labour for indicated farm activity and season, Nigeria

	Nigeria				Cameroon			
	Season activity performed with male labour							
Farm activity	Dry	Rainy	Both	Total	Dry	Rainy	Both	Total
Bird scaring			100.0	7		100.0		1
Fertilizer appl	11.1	22.2	66.7	9	12.5	75.0	12.5	8
Gathering	2.6	15.8	81.6	38	22.2	11.1	66.7	9
Harvesting	9.1	31.8	59.1	44	25.0	29.2	45.8	24
Land prep	15.6	34.4	50.0	32	33.3	13.3	53.3	15
Manuring			100.0	3		100.0		1
Marketing	8.1	11.3	80.6	62			100.0	2
Other								
Planting	2.8	47.2	50.0	36	16.7	16.7	66.7	6
Preparing drainage								
Storage	13.6	13.6	72.7	22	16.7		83.3	6
Threshing			100.0	2				
Weeding		11.4	88.6	44	13.0	26.1	60.9	23
Total	6.7	21.7	71.6	299	20.0	26.3	53.7	95

Use of female labour

Table xxx shows the distribution of households by female labour activity and season. Among the Nigerian households, it is shown that 50% or more engage female labour for virtually all the activities listed mainly under both seasons. The same pattern holds for Cameroon.

Table xxx: Distribution of households by who used female labour for indicated farm activity and season, Nigeria

	Nigeria				Cameroon			
	Season activity performed with female labour							
Farm activity	Dry	Rainy	Both	Total	Dry	Rainy	Both	Total
Bird scaring			100.0	7		100.0		1
Fertilizer appl	14.3		85.7	7	25.0	75.00		4
Gathering	3.3	13.3	83.3	30		25.0	75.0	8
Harvesting	10.3	31.0	58.6	29	29.2	25.0	45.8	24
Land prep	13.0	26.1	60.9	23	45.5	27.3	27.3	11
Manuring			100.0	3		100.0		1
Marketing	7.7	9.6	82.7	52			100.0	1
Other								
Planting	3.4	37.9	58.6	29	28.6	28.6	42.9	7
Preparing drainage								
Storage	15.0	10.0	75.0	20	28.6		71.4	7
Threshing			100.0	2				
Weeding		11.8	88.2	34	17.4	21.7	60.9	23
Total	6.8	17.4	75.8	236	24.1	26.4	49.4	87

Use of child labour

Table xxx shows the distribution of households by child labour activity and season. Like in the male and female labour distributions, 50% or more of the Nigerian and Cameroon households engage child labour for virtually all the activities listed mainly under both seasons.

Table xxx: Distribution of households by who used child labour for indicated farm activity and season, Nigeria

	Nigeria				Cameroon			
	Season activity performed with child labour							
Farm activity	Dry	Rainy	Both	Total	Dry	Rainy	Both	Total
Bird scaring			100.0	4		100.0		1
Fertilizer appl	16.7		83.3	6	33.3	66.7		3
Gathering		11.1	88.9	9			100.0	5
Harvesting		11.1	88.9	9	20.8	37.5	41.7	24
Land prep	16.7	33.3	50.0	12	50.0	12.5	37.5	8
Manuring			100.0	2		100.0		1
Marketing		8.3	91.7	12				
Other								
Planting		60.0	40.0	10	40.0	40.0	20.0	5
Preparing drainage								
Storage	22.2	11.1	66.7	9	20.0		80.0	5
Threshing			100.0	1				
Weeding		6.3	93.8	16	16.7	11.1	72.2	18
Total	5.6	16.7	77.8	90	22.9	25.7	51.4	70

Use of hired labour

Table xxx shows the distribution of households by hired labour activity and season. Focusing on activity rows with 5 or more observations, 50% or more of the Nigerian and Cameroon households engage hired labour for virtually all the activities listed mainly under both seasons.

Table xxx: Distribution of households by who used hired labour for indicated farm activity and season, Nigeria

	Nigeria				Cameroon			
	Season activity performed with hired labour							
Farm activity	Dry	Rainy	Both	Total	Dry	Rainy	Both	Total
Bird scaring			100.0	3				
Fertilizer appl		16.7	83.3	6				

Gathering	6.7	6.7	86.7	15				
Harvesting	6.3	37.5	56.3	16			100.0	1
Land prep	4.0	32.0	64.0	25		28.6	71.4	7
Manuring					33.3	16.7	50.0	6
Marketing	14.3		85.7	7				
Other								
Planting		40.0	60.0	5				
Preparing drainage								
Storage			100.0	4				
Threshing			100.0	1				
Weeding		16.7	83.3	12		66.7	33.3	3
Total	4.3	21.3	74.5	94	11.8	29.4	58.8	17

Prevalence and usage of non-labour inputs

In this section we present the distribution of households by input use, input type, crops and seasons. Only four of the previously seen crops have data for this analysis, namely, Beans, cassava, cocoyam and cotton. Also, because data was relatively scanty, country level analysis was undertaken in respect of non-labour input employment. Table xxx shows the percentage distribution of households by input usage for indicated crops for Nigeria and Cameroon. If we loosely interpret the percentage of households answering 'yes' as a measure of adoption rates, then none of the inputs listed (fertilizer, herbicide, pesticide, seed and water) is adopted/used by more than 25% of the households in Nigeria and 40% of the households in Cameroon . Indeed, adoption rates for the inputs listed are mostly less than 15%, across both countries. As previously emphasized, this low input adoption status presents a good opportunity for interventions, aimed at productivity improvement for the listed and other crops in the survey.

Table xxx: Distribution of respondents by input usage for indicated crops

		Nigeria			Cameroon		
		Use input			Use input		
Crops	Input type	No	Yes	Total	No	Yes	Total
Beans /Cowpea	Fertilizer	85.7	14.3	56	77.2	22.8	92
	Herbicide	84.0	16.0	50	89.2	10.8	102
	Pesticide	82.1	17.9	56	93.3	6.7	90
	Seed	81.3	18.8	48	67.1	32.9	85
	Water	83.0	17.0	53	95.5	4.5	88

	Total	83.3	16.7	263	84.7	15.3	457
Cassava	Fertilizer	91.9	8.1	37	81.6	18.4	38
	Herbicide	87.5	12.5	48	93.9	6.1	33
	Pesticide	79.5	20.5	44	97.0	3.0	33
	Seed	87.5	12.5	40	64.3	35.7	28
	Water	97.6	2.4	42	96.9	3.1	32
	Total	88.6	11.4	211	87.2	12.8	164
Cocoyam	Fertilizer	94.4	5.6	18	85.7	14.3	7
	Herbicide	100.0	0.0	30	100.0	0.0	14
	Pesticide	94.7	5.3	19	88.9	11.1	9
	Seed	94.1	5.9	17	60.0	40.0	5
	Water	95.8	4.2	24	100.0	0.0	12
	Total	96.3	3.7	108	91.5	8.5	47
Cotton	Fertilizer	93.3	6.7	15	100.0	0.0	2
	Herbicide	100.0	0.0	12	100.0	0.0	4
	Pesticide	92.9	7.1	14	100.0	0.0	5
	Seed	100.0	0.0	11	60.0	40.0	5
	Water	100.0	0.0	12	100.0	0.0	3
	Total	96.9	3.1	64	89.5	10.5	19

Seasonal aspects of non-labour input usage

Table xxx shows the percentage distribution of households by input usage and season for indicated crops for Nigeria and Cameroon. Data for cotton was scanty for both countries. Taking all the listed inputs together, the percentage distribution of usage by season for beans in Nigeria is 3.4% (dry season), 37.3% (rainy season) and 59.3% (both seasons). For cassava, the percentage distribution of usage of all inputs by season is 5.9% (dry season), 35.3% (rainy season) and 58.8% (both seasons). Still with Nigeria data, the percentage distribution of all-input usage by season for cocoyam is 5.3% (dry season), 31.6% (rainy season) and 63.2% (both seasons). Clearly, most households in Nigeria indicated the use of the listed inputs in both seasons.

The percentage distribution of input usage by season for beans among Cameroon households is 24.7% (dry season), 36.4% (rainy season) and 39.0% (both seasons). The percentage distribution

of input usage for cassava by season is 33.3% (dry season), 37.0% (rainy season) and 29.6% (both seasons). The indication from the available data is that usage of inputs is not skewed towards the ‘’both seasons’’ response among the Cameroon households, as was the case among the Nigerian households.

Table xxx: Distribution of respondents by input usage for indicated crops and seasons

Crop		Nigeria				Cameroon			
Beans /Cowpea		Dry	Rainy	Both	Total	Dry	Rainy	Both	Total
	Fertilizer		57.1	42.9	7	23.1	38.5	38.5	26
	Herbicide		45.5	54.5	11	42.9		57.1	7
	Pesticide	5.9	11.8	82.4	17	33.3	8.3	58.3	12
	Seed		68.8	31.3	16	20.0	50.0	30.0	30
	Water	12.5		87.5	8		100.0		2
	Total	3.4	37.3	59.3	59	24.7	36.4	39.0	77
Cassava	Fertilizer		40.0	60.0	5	25.0	50.0	25.0	4
	Herbicide	14.3	28.6	57.1	7	50.0		50.0	4
	Pesticide		25.0	75.0	8			100.0	
	Seed		44.4	55.6	9	40.0	46.7	13.3	15
	Water	20.0	40.0	40.0	5		50.0	50.0	2
	Total	5.9	35.3	58.8	34	33.3	37.0	29.6	27
Cocoyam	Fertilizer		50.0	50.0	2		100.0		1
	Herbicide		33.3	66.7	3				
	Pesticide			100.0	5	100.0			1
	Seed	16.7	66.7	16.7	6	50.0	50.0		2
	Water			100.0	3				
	Total	5.3	31.6	63.2	19	50.0	50.0		4
Cotton	Fertilizer								
	Herbicide								
	Pesticide								
	Seed		100.0		3				
	Water								
	Total		100.0		3				
	Water								
	Total		100.0		1				

Labour hiring costs

Table xxx shows the average cost of hired labour for different activities and crops. Strictly speaking, all the results are ‘’small’’ sample estimates. We will interpret aspects of the table. Among the Nigerian households, cost of hiring labour for land preparation averages N39,285.7 in beans production and N30,875.00 in cassava production. For harvesting, labour hiring cost averages N45,933.3 for beans and N21,100.0 for cassava. Among the Cameroon households, labour hiring for harvesting and land preparation in bean production averages CFA25,600 and CFA61,000 , respectively.

Table xxx: Average costs of hired labour, by crop and activity

		Nigeria						Cameroon			
		Beans / cowpea		Cassava		Cocoyam		Beans / cowpea		Cassava	
Country	Activity	Estimated hired labour cost (Naira)	(n)	Estimated hired labour cost (Naira)	(n)	Estimated hired labour cost (Naira)	(n)	Estimated hired labour cost (CFA)	(n)	Estimated hired labour cost (CFA)	(n)
Nigeria	Bird scaring	115,000.00	2	180,000.00	1						
	Fertilizer appl	97,500.00	4	180,000.00	1						
	Gathering	25,444.44	9	11,240.00	5						
	Harvesting	45,933.33	6	21,100.00	10			25,600.00	5	1,000.00	1
	Land prep	39,285.71	14	30,875.00	8	10,000.00	2	61,000.00	5	25,000.00	1
	Manuring										
	Marketing	29,000.00	2	27,500.00	2	20,000.00	3				
	Other										
	Planting	50,000.00	1	35,000.00	3	25,000.00	1				
	Preparing drainage										
	Storage	12,600.00	3	10,000.00	1						
	Processing (threshing, grating, etc)			12,000.00	1						
	Weeding	13,875.00	4	10,333.33	6	20,000.00	1	40,000.00	3		

Other costs related to hiring onfarm labour

Table xxx shows the average costs of other services related to hiring labour for different activities and crops in Nigeria and Cameroon. An example of such costs is the provision of food for the hired labourers before, during or after working on the farmon each day they are hired. Among the Nigerian households, costs related hiring labour for harvesting land preparation in beans production averages N15,000.00 and N11,178.57. In cassava production, costs related hiring labour for harvesting land preparation averages N3,610.00 and N8,775.00. Among the Cameroon households, labour hiring for harvesting and land preparation in bean production averages CFA9,400 and CFA7,000 , respectively.

Table xxx: Average value of other costs related to hired labour, by crop and activity

		Nigeria						Cameroon			
		Beans / cowpea		Cassava		Cocoyam		Beans / cowpea		Cassava	
Country	Activity	Estimated hired labour cost (Naira)	(n)	Estimated hired labour cost (Naira)	(n)	Estimated hired labour cost (CFA)	(n)	Estimated hired labour cost (CFA)	(n)	Estimated hired labour cost (CFA)	(n)
Nigeria	Bird scaring	1,000.00	2	1,000.00	1						
	Fertilizer appl	13,125.00	4	1,000.00	1	2,000.00	1				
	Gathering	1,644.44	9	5,240.00	5						
	Harvesting	15,000.00	6	3,610.00	10			9,400.00	5	500.00	1
	Land prep	11,178.57	14	8,775.00	8	1,500.00	2	7,000.00	5		
	Manuring										
	Marketing	750.00	2	5,000.00	2	10,000.00	3				
	Other										
	Planting	40,000.00	1	5,000.00	3	10,000.00					
	Preparing drainage										
	Storage	5,133.33	3	5,000.00	1						
	Processing (threshing, grating, etc)			500.00	1						
	Weeding	600.00	4	1,083.33	6	10,100.00	2	10,000.00	3		

Quantities of non-labour inputs applied

Table xxx shows the average quantities of non- labour inputs, which we already listed as fertilizer, herbicide, pesticide, seed and water. Most of the results are ‘’small’’ sample estimates. However, some of the estimates can be safely interpreted. Among the Nigerian households, for example, the average quantities of pesticide and seed used for beans production are 14.96 litres and 22.92 kg, respectively. And, among the Cameroon households, the average quantities of fertilizers and seed used for beans production are 58.29 kg and 23.4 kg, respectively.

Table xxx: Average quantities of indicated input

		Nigeria		Cameroon	
Crop	Input	Estimated quantity used	(n)	Estimated quantity used	(n)
Cowpea/Beans	Fertilizer	30.0 kg	7	58.29 kg	24
	Herbicide	22.5 kg 2.57 lit	4 7	3.50 kg 8.20 lit	2 5
	Pesticide	14.96 lit	16	18.00 kg 12.60 lit	4 5
	Seed	22.92 kg	13	23.28 kg	18
	Water	2,000 lit	5		
Cassava	Fertilizer	41.25 kg	4	36.67 kg	3
	Herbicide	1.83 lit	6	25.50 kg	2
	Pesticide	10.83 lit	6		
	Seed			9.71 kg	7
	Water	17.50 lit	4		
Cocoyam	Fertilizer	30.00 kg	2		
	Herbicide	17.50 kg	2		
	Pesticide	17.60 lit	5		
	Seed	14.25 kg	4		
	Water	136.67 lit	3		

Cross-sectional costs of non-labour inputs

The data in Table xxx shows highly heterogeneous units of measurement for the range of inputs used and the different crops. Thus, to make better sense of the physical units of the inputs in

Table xxx , the various input units are converted into monetary units. Table xxx shows the average monetary values of the inputs used by type for each of the listed crops. Among the Nigerian households, the average costs of pesticide , seed and herbicide used in beans production are N9,588.24, N5,962.50, and N3,481.82respectively. And, among the Cameroon households, the costs of fertilizers, seed and pesticide used in beans production are CFA30,712.69, CFA7,216.67 and CFA32,583.33, respectively. In cassava production, the average cost of seed among the responding Cameroon households is CFA31,321.43.

Table xxx: Average total costs of indicated input (LCU)

		Nigeria		Cameroon	
Crop	Input	Estimated total cost (Naira)	(n)	Estimated total cost (CFA)	(n)
Cowpea/Beans	Fertilizer	6,742.86	7	30,712.69	26
	Herbicide	3,481.82	11	17,142.86	7
	Pesticide	9,588.24	17	32,583.33	12
	Seed	5,962.50	16	7,216.67	30
	Water	13,756.25	8	7,500.00	2
Cassava	Fertilizer	11,310.00	5	12,250.00	4
	Herbicide	1,757.14	7	97,000.00	4
	Pesticide	4,187.63	8	12,500.00	2
	Seed	8,411.11	9	31,321.43	14
	Water			10,000.00	2
Cocoyam	Fertilizer	3,000.00	2		
	Herbicide	1,733.33	3		
	Pesticide	8,420.00	5		
	Seed	8,584.33	6		
	Water				

Characterization of the Main Products of Crops

Number of products from indicated crops

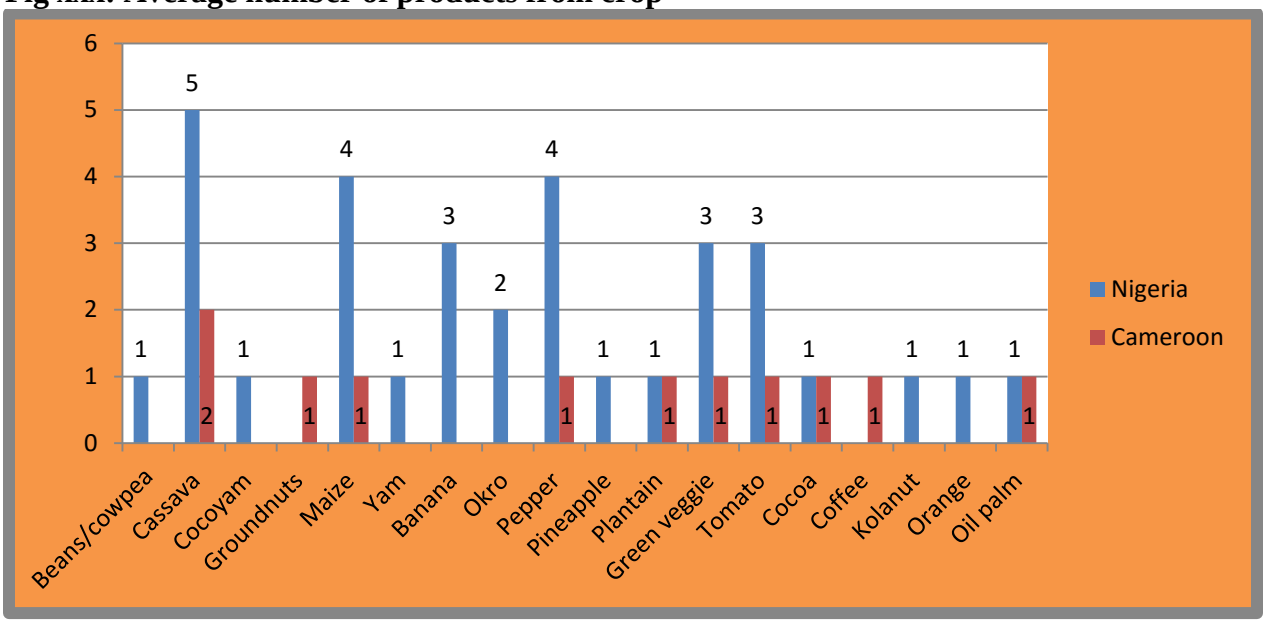
Table xxx shows the average number of products obtainable from each indicated crop. In both countries, one (1) product per crop appears to be the most common. A few exceptions in Nigeria, clearly illustrated in Fig xxx are cassava (5 products), maize (4 products), banana and tomato (3 products each). Differences in the number of products may arise from cultural

differences and/or differential exposures to post-harvest extension training of households. These factors were however not investigated in this study.

Table xxx: Average number of products from indicated crop, Nigeria

	Nigeria		Cameroon	
Crop	Average number of products	Computing subsample	Average number of products	Computing subsample
Beans/cowpea	1	2		
Cassava	5	139	2	125
Cocoyam	1	6		
Groundnuts			1	62
Maize	4	86	1	148
Yam	1	49		
Banana	3	10		
Okro	2	14		
Pepper	4	36	1	2
Pineapple	1	4		
Plantain	1	21	1	53
Green veggie	3	10	1	2
Tomato	3	23	1	4
Cocoa	1	49	1	92
Coffee			1	33
Kolanut	1	46		
Orange	1	29		
Oil palm	1	17	1	12

Fig xxx: Average number of products from crop



Main product of crop

Table xxx show the distribution of households by main product of the crops indicated. Among the Nigerian households, the main products for cassava, maize, yam and cocoa are tuber (67.6%), maize cob (47.7%), tuber (85.7%) and seed (67.3%), respectively. And, among the Cameroon households, the main product of bean, cassava, maize and plantain are grains (97.6%), tuber (78.4%), grains (65.5%) and fruit (68.0%), respectively.

Table xxx: Distribution of households by main product of main crop

		main product of main crop								
Country	Crop	Grain	Fruit	Leaves	Maize cob	Seed	Tuber	Vegetable	Whole plant	Other
	Beans/cowpea					100.0				
	Cassava			7.2		2.9	67.6		0.7	15.1
	Cocoyam						66.7			33.3
	Groundnuts									
	Maize	12.8		2.3	47.7	15.1				20.9
	Yam			2.0		2.0	85.7			10.2
	Banana		30.0	20.0						50.0
	Okro		7.1	42.9		21.4				
	Pepper		2.8	5.6		47.2				19.4
	Pineapple		2(50.0							50.0
	Plantain		81.0							14.3
	Green veggie			10.0		30.0		30.0		30.0
	Tomato		4.3	13.0		52.2		17.4		13.0
	Cocoa		4.1	2.0		67.3				26.5
	Coffee									
	Kolanut		17.4	4.3		34.8				
	Orange		58.6			10.3				
	Oil palm		35.3			11.8				
	Total	3.9	10.7	5.4	8.1	20.1	26.4	3.1	0.4	21.8
Cameroon	Beans/cowpea	97.6						2.4		
	Cassava			0.8		4.0	78.4	1.6		
	Cocoyam						100.0			
	Groundnuts	100.0								6.5
	Maize	65.5			28.4	0.7	4.1			1.4
	Yam						100.0			
	Banana			60.0						40.0

	Okro		100.0							
	Pepper		100.0							
	Pineapple		100.0							
	Plantain		68.0					1.9	7.5	22.6
	Green veggie			100.0						
	Tomato		100.0							
	Cocoa	22.00	36.3			33.0				
	Coffee	78.8	9.1	3.0		6.1				
	Kolanut					100.0				
	Orange		100.0							
	Oil palm		66.7			8.3				25.0
	Total	40.6	12.1	0.8	6.0	6.3	26.1	0.6	0.6	4.0

Sale product(s) from indicated crops

Table xxx shows the distribution of households by crop product sale of at least one product. The crops for which at least 50% of the Nigerian households sell are cassava, maize, yam, okro, pepper, plantain, tomato, cocoa, kolanut, orange, oil palm. And, the crops which at least 50% of the Cameroon households sell are Pineapple, cocoa, coffee and oil palm.

Table xxx: Distribution of households by who sell at least a product from indicated crop

	Nigeria			Cameroon		
Crop	Yes	No	Total	Yes	No	Total
Beans/cowpea	100.0		2	39.0	61.0	41
Cassava	55.4	44.6	139	48.0	52.0	125
Cocoyam	33.3	66.7	6	47.1	52.9	17
Groundnuts				9.7	90.3	62
Maize	59.3	40.7	86	32.4	67.6	148
Yam	69.4	30.6	49		100.0	2
Banana	40.0	60.0	10	30.0	70.0	10
Okro	71.4	28.6	14	100.0		3
Pepper	55.6	44.4	36	50.0	50.0	2
Pineapple	50.0	50.0	4	81.8	18.2	11
Plantain	76.2	23.8	21	43.4	56.6	53
Green veggie	30.0	70.0	10		100.0	2
Tomato	60.9	39.1	23	75.0	25.0	4
Cocoa	71.4	28.6	49	91.2	8.8	91
Coffee				66.7	33.3	33
Kolanut	58.7	41.3	46	100.0		1
Orange	55.2	44.8	29		100.0	1
Oil palm	56.3	43.8	16	50.0	50.0	12

Total	59.6	40.4	540	47.2	52.8	618

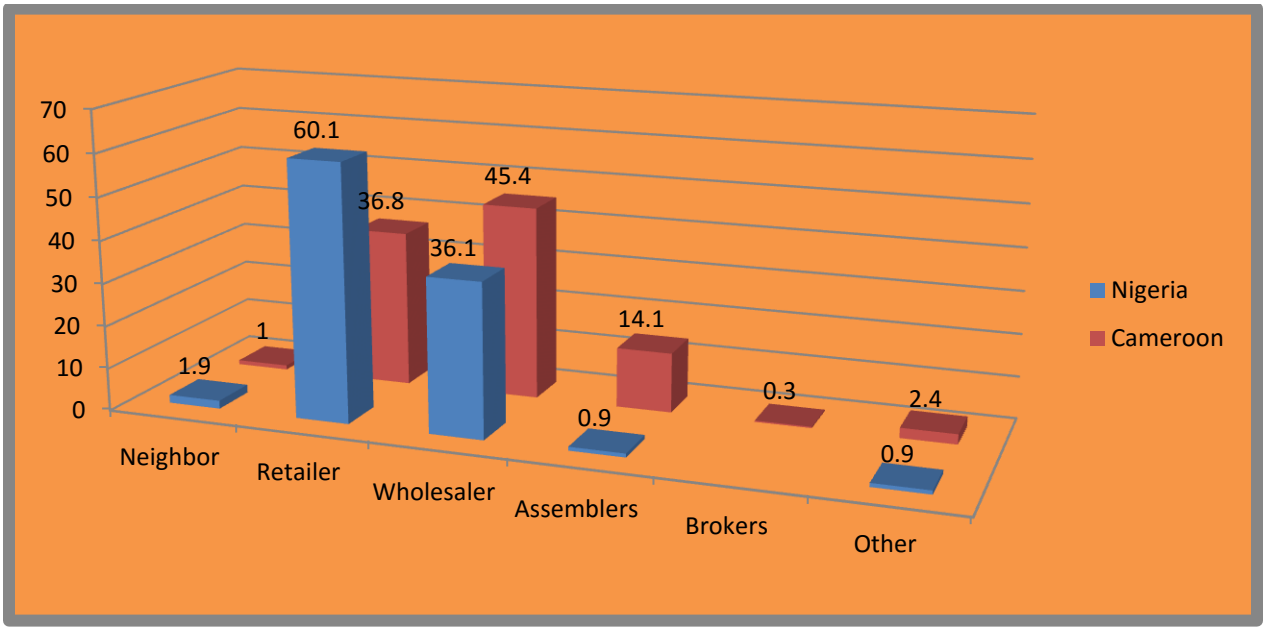
Main buyer of the main crop

Table xxx shows the distribution of the households by the main buyer of the main crop. We will summarize the table using the last or total row. Among the Nigerian households, the most important buyers of the products of the crops are retailers (60.1%) and wholesalers (36.1%). Among the Cameroon households, the main crop buyers are wholesalers (45.4%) and retailers (36.8%). This summary is illustrated in Fig xxx.

Table xxx: Distribution of households by main buyer of main crop

	Nigeria							Cameroon				
Crop	Neighbor	Retailer	Wholesaler	Assemblers	Brokers	Other	Total	Neighbor	Retailer	Wholesaler	Assemblers	Brokers
Beans/cowpea		50.0	50.0				2		56.3	43.7		
Cassava		54.5	40.3	2.6			77	1.7	72.9	18.6	1.7	
Cocoyam		100.0					2	12.5	62.5	25.0		
Groundnuts								16.7	50.0	16.7	16.7	
Maize	2.0	49.0	49.0				51		25.0	58.3	12.5	
Yam	2.9	82.4	14.7				34					
Banana		50.0	50.0				4		33.3	66.7		
Okro		60.0	40.0				10		100.0			
Pepper		60.0	35.0			5.0	20			100.0		
Pineapple		50.0	50.0				2		66.7	22.2	11.1	
Plantain		75.0	25.0				16		56.5	26.1	13.0	
Green veggie		100.0					3					
Tomato		64.3	35.7				14		33.3		33.3	33.3
Cocoa	2.9	61.8	32.4	2.9			34		10.8	74.7	13.3	
Coffee										22.7	77.3	
Kolanut	3.7	66.7	29.6				27			100.0		
Orange	12.5	50.0	37.5				16					
Oil palm		33.3	66.7				9		33.3	66.7		
Total	1.9	60.1	36.1	0.9		0.9	321	1.0	36.8	45.4	14.1	0.3

Fig xxx: Distribution of households by main buyer of crop



Main controller of income from crop

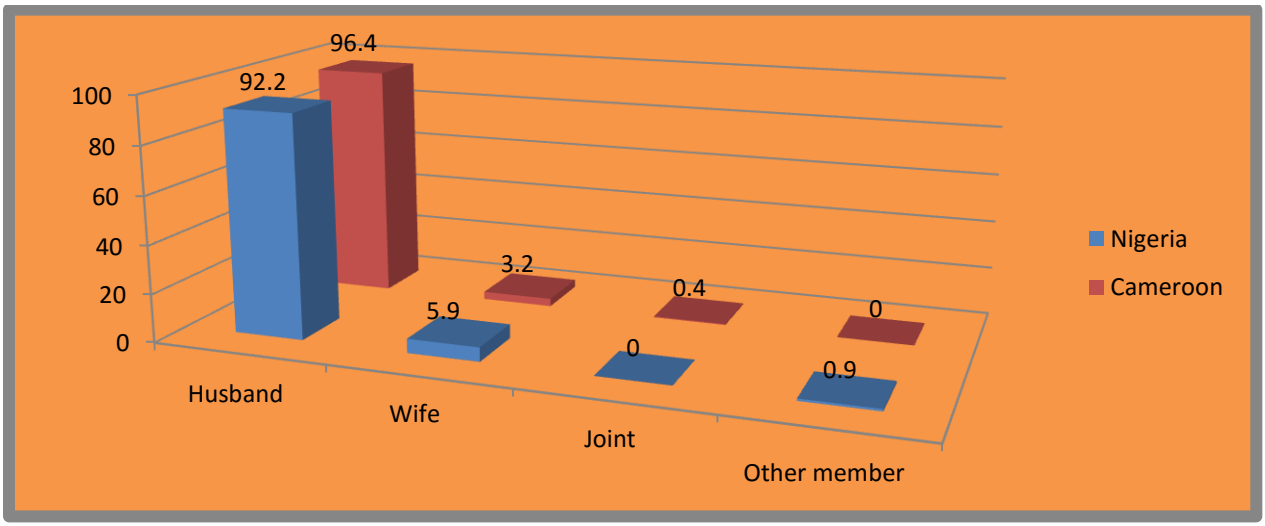
Table xxx shows the distribution of the households by the main controller of sales income from each reported crop. We will summarize the table using the last or total row. Among the Nigerian households, the main controller of the crop sales income within the household is the husband (92.2%). Among the Cameroon households, the main controller of the crop sales income within the household is also the husband (96.4%). These summaries are further illustrated in Fig xxx.

Table xxx: Distribution of households by who controls income from crop

	Nigeria					Cameroon				
Crop	Husband	Wife	Joint	Other household member	Total	Husband	Wife	Joint	Other household member	Total
Beans/cowpea	100.0				2	100.0				15
Cassava	96.1	3.9			77	94.5	5.5			55
Cocoyam	100.0				2	100.0				8
Groundnuts						100.0				6
Maize	94.1	5.9			51	100.0				
Yam	97.1	2.9			34					
Banana	75.0	25.0			4	100.0				2
Okro	60.0	30.0	10.0		10	100.0				3
Pepper	85.0	10.0	5.0		20	100.0				1

Pineapple	100.0				2	100.0				9
Plantain	75.0	18.8		6.3	16	100.0				22
Green veggie	100.0				3					
Tomato	92.9	7.1			14	66.7	33.3			3
Cocoa	94.1		2.9	2.9	34	96.1	2.6	1.3		77
Coffee						95.5	4.5			22
Kolanut	100.0				27	100.0				1
Orange	93.8	6.3			16					
Oil palm	77.8	11.1		11.1	9	66.7	33.3			6
Total	92.2	5.9	0.0	0.9	321	96.4	3.2	0.4		278

Fig xxx: Distribution of households by main controller of crop sales income



Post-Harvest value addition among households

Inquiries about post-harvest activities were made during the baseline survey, but only for cassava. Despite the scanty data on this aspect of the survey, state level analysis was done because of the importance of this inquiry.

The form of cassava sold

Households were asked to indicate the forms of cassava sold. The options are fresh root, processed product and both. Table xxx shows the results. Both forms are sold by 50% of the households in Osun and 82.8% of the responding households in Oyo . Combined, 80.6% of the

households in both Nigerian states sell both forms of cassava. Only 6 households responded in the Cameroon data, and 66.7% of them sell cassava in both forms.

Table xxx: Distribution of households by the form of cassava sold

Country	State/ province	form of cassava sold			
		Fresh root	Processed product	Both	Total
Nigeria	Osun	50.0		50.0	2
	Oyo	13.8	3.4	82.8	29
	Total	16.1	3.2	80.6	31
Cameroon	Central				
	West				
	Southwest	40.0		60.0	5
	Littoral			100.0	1
	Total	33.3		66.7	6

Utilization of cassava

Households were asked to indicate how cassava is utilized, with options being home consumption, sale and both. Table xxxx shows the results. In Osun state, 88.9% of the households consume their cassava at home, while 82.9% of the households in Oyo selected both sale and consumption as options. . Only 11 households responded in the Cameroon data, and responses are distributed between 'consume at home' (45.5%) and 'both' sale and consumption (54.5%).

Table xxx: Distribution of households by utilization of cassava

Country	State/ province	Cassava utilization			
		Consume at home	Sell	Both	Total
Nigeria	Osun	88.9		11.1	18
	Oyo	17.1		82.9	35
	Total	41.5		58.5	53
Cameroon	Central	100.0			1
	West				
	Southwest	16.7		83.3	6
	Littoral	75.0		25.0	4
	Total	45.5		54.5	11

Cassava processing and location

Table xxx presents the results of the joint inquiry on whether the household process cassava or not, and where processing takes place. Among the Nigerian households, all process cassava, 94.4% process at home in osun state and 85.7% process at home in Oyo state. Among the Cameroon households, data was not sufficient to do tangible analysis across all provinces. So, only the results for southwest, with 6 observations are interpreted. This shows that the 6 households process cassava and at home.

Table xxx: Distribution of households by who process cassava and processing location, Nigeria

Country	State / province	Processing location	process cassava		
			Yes	No	Total
Nigeria	Osun	At home	94.4		17
		Processing center	5.6		1
		Total	100.0		18
	Oyo	At home	85.7		30
		Processing center	14.3		5
		Total	100.0		35
Cameroon	Central	At home	100.0		1
		Processing center			
		Total	100.0		1
	West	At home			
		Processing center			
		Total			
	Southwest	At home	100.0		6
		Processing center			
		Total	100.0		6
	Littoral	At home	75.0		3
		Processing center	25.0		1
		Total	100.0		4

Allocation of crops among uses

Each of the crops in the survey was analyzed for the total physical production and product allocation among home consumption, sale, feed and other uses. The physical quantities were terribly heterogeneous in terms of measurement units and number of respondents. So, they are only presented as Appendix materials, while in-text attention is focused on the homogeneous market values of the allocations, as available.

Sales value of crops

Table xxx shows the average total value of sales for the crops in the survey, in Naira for Nigeria, and CFA for Cameroon. Sales value of mainly food crop items are mostly under LCU100,000 for both countries, perhaps because their outputs are largely allocated to home consumption. On the other handmainly cash crops such as oil palm, coffee and cocoa fetches in excess of LCU600,000 per household. Indeed, cocoa specifically earned over LCU1,000,000 in each of Nigeria and Cameroon.

Table xxx: Average total value of sales of crop, LCU

	Nigeria		Cameroon	
Crop	average total value of sales of crop (Naira)	(n)	average total value of sales of crop (CFA)	(n)
Beans/cowpea	28,500.00	2	156,406.00	16
Cassava	69,561.00	77	119,203.00	59
Cocoyam	45,000.00	2	75,625.00	8
Groundnuts			64,500.00	6
Maize	59,304.00	51	196,688.00	48
Yam	99,788.00	34		
Banana	211,000.00	4	148,333.00	3
Okro	15,830.00	10	69,667.00	3
Pepper	49,200.00	20		
Pineapple	69,250.00	2	438,889.00	9
Plantain	62,469.00	16	163,480.00	23
Green veggie	20,667.00	3		
Tomato	29,750.00	14	184,167.00	3
Cocoa	1,751,529.00	34	1,310,573.00	82
Coffee			962,955.00	22
Kolanut	101,741.00	27		
Orange	21,650.00	16		
Oil palm	143,333.00	9	693,533.00	6

Economic importance / ranking of indicated crops

Households were asked to rank their crops in terms of sales income, home consumption, labour requirement and land requirement, on a scale of 0-100. Table xxx shows the average ranking for the 4 criteria and for the few crops responded to in this aspect of the survey. State or provincial level analysis is presented in order to detect if there are differences at that level among the households.

Among the Nigerian households, crops for which sales income is ranked at least 50/100 are beans, cassava and cocoyam but only among the Osun households. Only cocoyam is ranked at least 50/100 for home consumption, still by the Osun households. Crops which are ranked at least 50/100 for their labour or land requirement are beans, cassava and cocoyam, and by the Osun households. All these criteria are ranked 40/100 or less among the Oyo households.

Among the Cameroon households, crops for which sales income is ranked at least 50/100 are beans and cassava among the southwest households, cocoyam among the southwest and littoral province households. Only cocoyam is ranked at least 50/100 for home consumption, by the littoral province households. Crops which are ranked at least 50/100 for their labour or land requirement are beans and cocoyam, and only by the southwest households. All these criteria are ranked 40/100 or less among the central and west province households.

Table xxx: Average ranking of crop/product by end-use and resource requirements

Country	State/ province	Crop/ product	Importance of crop/product in:							
			Sales income (0-100)	Computing subsample	Home consumption (0-100)	Computing subsample	Labour requirement (0-100)	Computing subsample	Land requirement (0-100)	Computing subsample
Nigeria	Osun	Beans/Cowpea	55.7	187	32.8	184	56.6	183	55.7	183
		Cassava	53.8	180	43.2	176	53.2	175	53.4	176
		Cocoyam	54.0	160	57.4	152	49.7	156	50.4	157
	Oyo	Beans/Cowpea	14.8	174	12.0	174	13.9	174	13.9	174
		Cassava	23.4	86	26.7	85	21.9	86	21.7	86
		Cocoyam	35.4	57	29.7	56	31.9	57	33.5	57
Cameroon	Central	Beans/Cowpea	24.5	149	20.1	149	24.2	149	25.2	149
		Cassava	23.2	31	19.9	31	24.0	31	21.4	31
		Cocoyam	16.1	8	16.9	8	13.4	8	13.4	8
	West	Beans/Cowpea	15.0	77	11.7	76	12.7	76	12.8	76
		Cassava	16.4	16	17.3	16	17.3	16	17.3	16
		Cocoyam								
	Southwest	Beans/Cowpea	66.6	64	32.8	64	61.4	64	62.4	64
		Cassava	51.3	17	34.9	17	36.0	17	35.8	17
		Cocoyam	75.5	4	40.8	4	75.6	4	51.0	4
	Littoral	Beans/Cowpea	35.9	139	29.4	139	33.9	139	34.6	139
		Cassava	12.3	7	32.1	7	26.0	7	25.0	7
		Cocoyam	49.3	4	65.3	4	37.8	4	21.5	4

3.3 CHARACTERIZATION OF LIVESTOCK ACTIVITIES

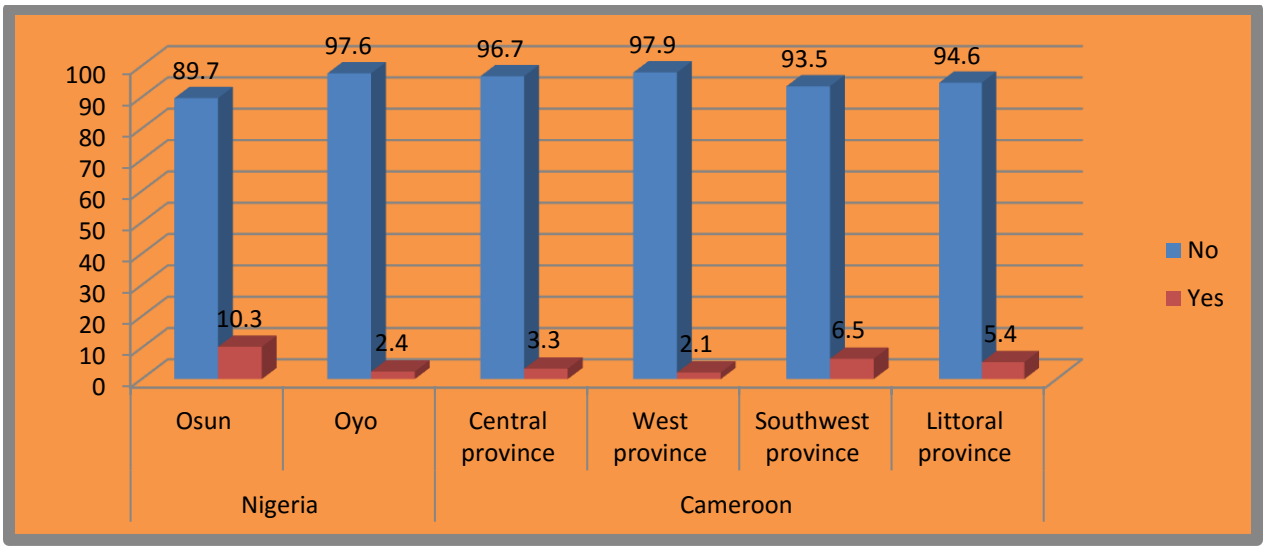
Ownership of livestock

Table xxx shows the percentages of livestock ownership at state/provincial and country levels. The percentage of livestock ownership among the Nigerian households varies from a low of 2.4% in Oyo to 10.3% in Osun; it is 6.4% across both states. Among the Cameroon households, the percentage ownership of livestock varies from 2.1% in the west province to 5.4% in the littoral province, with a national average of 4.2%. These results perhaps explain why only 33 households responded to the livestock activities section of the survey. Table xxx is illustrated in Fig xxx.

Table xxx: Distribution of the respondents by ownership of livestock

Country	State/province	ownership of livestock		
		No	Yes	Total
Nigeria	Osun	89.7	10.3	261
	Oyo	97.6	2.4	252
	Total	93.6	6.4	513
Cameroon	Central province	96.7	3.3	181
	West province	97.9	2.1	96
	Southwest province	93.5	6.5	62
	Littoral province	94.6	5.4	167
	Total	95.8	4.2	506

Fig xxx: Distribution of the respondents by ownership of livestock



Ownership of ruminants and /or pigs

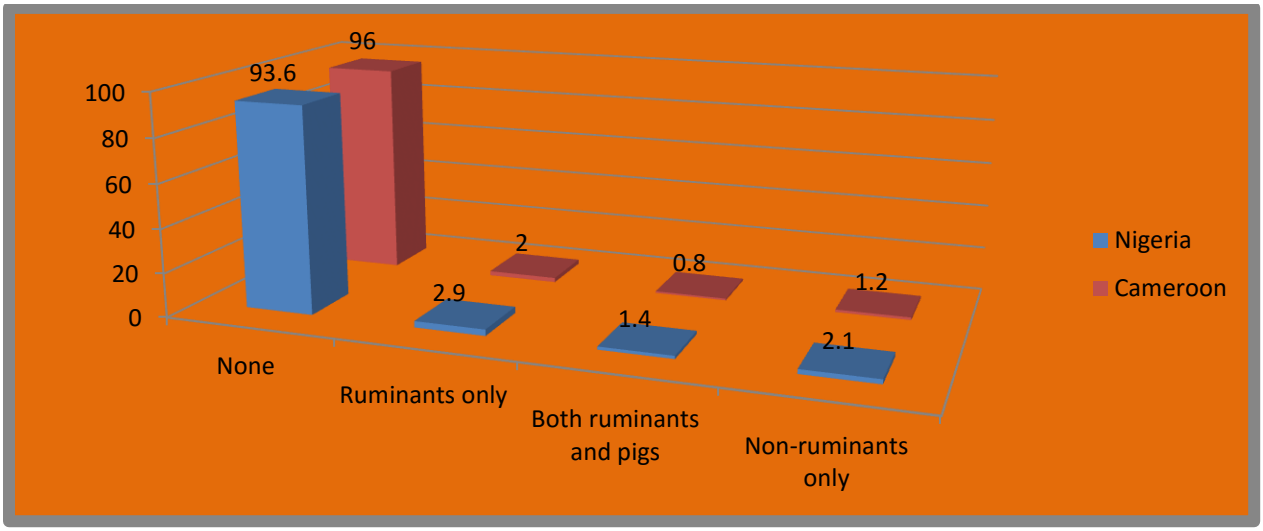
In Table xxx , we present the percentage distribution of households by ownership of ruminants and /or pigs at state/provincial and country levels. The answer options provided are 'none', 'ruminants only',' both ruminants and pigs' and 'non-ruminants only'. Using the national sample as our guide, 93.6% of the Nigerian respondents have neither pigs nor ruminants. This leaves only 6.4% of the households nationally owning combinations of the livestock types across both states in Nigeria. Among the Cameroon households, 96% of the respondents also have neither pigs nor ruminants . Again, these results perhaps explain why only 33 households responded to the livestock activities section of the survey. Table xxx is illustrated in Fig xxx (country level only).

Table xxx: Distribution of the respondents by ownership of ruminants and /or pigs

Country		Ownership of ruminants and /or pigs				
	State/province	None	Ruminants only	Both ruminants and pigs	Non-ruminants only	Total
Nigeria	Osun	89.7	5.4	1.9	3.1	261
	Oyo	97.6	0.4	0.8	1.2	252
	Total	93.6	2.9	1.4	2.1	513
Cameroon	Central province	96.7	1.1	0.6	1.7	180
	West province	97.9			2.1	96

	Southwest province	95.2	3.2	1.6		62
	Littoral province	94.6	3.6	1.2	0.6	167
	Total	96.0	2.0	0.8	1.2	505

Fig xxx: Distribution of households by ownership of pigs and ruminants



Livestock activity and season

This section presents the percentage distribution of the households by livestock activities and seasons. Because data is scanty, we interpret the available results across all the activities, i.e. using the total rows. Among the Nigerian households, the (feeding) activity is performed in the rainy season by 18.2% and in both seasons by 81.8% of the households. Among the Cameroon households, the activities responded to are performed in the dry season by 14.3%, in the rainy season by 38.1% and in both seasons by 47.6% of the households. Thus, in both countries, the dominant response is the performance of livestock activities during both seasons.

Table xxx: Distribution of households by livestock type, livestock activity and season, Nigeria

Country	Livestock type	Livestock activity	Season			
			Dry	Rainy	Both	Total
Nigeria	Pigs	Herding /Grazing				
		Calving				
		Feed collection, prep & storage				

		Feeding		18.2	81.8	11
		Housing maintenance				
		Total		18.2	81.8	11
Cameroon	Cattle	Herding /Grazing	12.5	75.0	12.5	8
		Calving	100.0			2
		Feed collection, prep & storage		50.0	50.0	2
		Feeding		25.0	75.0	4
		Housing maintenance			100.0	5
		Total	14.3	38.1	47.6	21

Labour employment in livestock management

Gender and seasonal aspects of labour use for livestock

Table xxx shows the gender and seasonal aspects of labour use in livestock management among the households surveyed. Pig was the only livestock indicated among the Nigerian respondents, while cattle was the only indicated livestock among Cameroon households. Data was scanty, so we will discuss available results across the listed activities. Among the 9 Nigerian households using male labour in livestock activities , 22.2% of them used it during rainy season and 77.8% during both seasons. All the 8 households using female labour did so in both seasons, while 4 households use child labour during both seasons. No household indicated use of hired labour for any livestock activity among the Nigerian households.

Among the 10 Cameroon households using male labour in livestock activities , 10% of them used it during dry season, 20% during rainy season and 70% during both seasons. For the 12 households using female labour, 16.7% of them used it during dry season, 25% during rainy season and 58.3% during both seasons . All the 4 households that use child labour do so during both seasons. A total of 13 households use hired labour in livestock activities, distributed as 15.4% dry season, 38.5% rainy season and 46.2% during both seasons .

Table xxx: Distribution of households by livestock type, labour type and season, Nigeria

Labour type	Livestock activity	Nigeria (Pigs)				Cameroon (Cattle)			
		Dry	Rainy	Both	Total	Dry	Rainy	Both	Total
Male	Herding /Grazing					33.3	33.3	33.3	3
	Calving								

	Feed collection, prep & storage							100.0	1
	Feeding		22.2	77.8	9		25.0	75.0	4
	Housing maintenance							100.0	2
	Total		22.2	77.8	9	10.0	20.0	70.0	10
Female	Herding /Grazing						75.0	25.0	4
	Calving					100.0			2
	Feed collection, prep & storage			100.0	8				
	Feeding							100.0	4
	Housing maintenance								
	Total			100.0	8	16.7	25.0	58.3	12
Child	Herding /Grazing			100.0	4			100.0	4
	Calving								
	Feed collection, prep & storage								
	Feeding								
	Housing maintenance								
	Total			100.0	4			100.0	4
Hired	Herding /Grazing					16.7	66.7	16.7	6
	Calving					100.0			1
	Feed collection, prep & storage						100.0		1
	Feeding							100.0	3
	Housing maintenance							100.0	2
	Total					15.4	38.5	46.2	13

Livestock feed and seasonality of usage

Table xxx shows the distribution of the households by feed type and seasons the feed are used. The feed options are straws, hay, maize stover, cut grass, grazing and other feed types. Interpreting across the feeds, 20% of the Nigerian households use the feeds strictly in the dry season while 80% uses the feeds during both seasons . For cattle production in the Cameroon , the feeds are used by 14.3% in the dry season, 42.9% in the rainy season and 42.9% during both seasons.

Table xxx: Distribution of households by livestock type, feed type and season, Nigeria

Country	Livestock type	Feed item	Season			
			Dry	Rainy	Both	Total
	Pigs	Straws			100.0	1
		Hay			100.0	2
		Maize stover			100.0	5
		Cut grass	100.0			2
		Grazing				
		Other feed types				
		Total	20.0		80.0	10
Cameroon	Cattle	Straws	8.3	66.7	25.0	12
		Hay				
		Maize stover		25.0	75.0	4
		Cut grass			100.0	1
		Grazing			100.0	1
		Other feed types	66.7		33.3	3
		Total	14.3	42.9	42.9	21

Non-labour input usage in livestock

Table xxx shows the distribution of the households by input types and seasons the inputs are used. The input options are none, vaccine, pesticide and other. Interpreting across the inputs, 11.1% of the Nigerian households use the inputs strictly in the rainy season while 88.9% uses the inputs during both seasons . For cattle production in Cameroon , the inputs are used by 26.3% in the dry season, 26.5% in the rainy season and 47.4% during both seasons.

Table xxx: Distribution of households by livestock type, input type and season, Nigeria

Country	Livestock type	Input type	Season			
			Dry	Rainy	Both	Total
Nigeria	Pigs	None		12.5	87.5	8
		Vaccine			100.0	1
		Pesticide				
		Other				
		Total		11.1	88.9	9
Cameroon	Cattle	None	26.7	20.0	53.3	15
		Vaccine		50.0	50.0	2
		Pesticide		100.0		1
		Other	100.0			1
		Total	26.3	26.5	47.4	19

Quantities and values of livestock inputs

In this section we attempt to attach some numbers to the quantities and values of the livestock inputs already discussed in this report. The results are limited by data, as previously.

Daily feed quantity and market value

Table xxxx shows the average daily quantity of feed (kg/day) and average market value of feed. Guided by the responding subsample, we will discuss only the results for maize stover (Nigeria) and Straw (Cameroon). Among the Nigerian households, the average quantity of maize stover fed is 2.6 kg/day, and its average market value is N940.00. Among the Cameroon households, 13.4 kg of straw is fed per day, with average market value of CFA16,041.67.

Table xxx: Average daily quantity and market value of feed fed, by livestock type

	Nigeria				Cameroon			
Feed type	Average daily quantity of feed (kg/day)	(n)	Average market value of feed (Naira)	(n)	Average daily quantity of feed (kg/day)	(n)	Average market value of feed (CFA)	(n)
Straws					13.4	11	16,041.67	12
Hay	1.5	2	750.00	2				
Maize stover	2.6	5	940.00	5	7.5	4	26,375.00	4
Cut grass	5.0	2						
Grazing								
Other feed types					9.7	3	26,666.67	3

Seasonality and duration of feed use

Table xxx shows the duration and seasonality of livestock feed usage. Maize stover is fed during both seasons over a 12-month period among Nigeria households. In the case of the feeding livestock with straw, 8 households use it over a 3-month period during rainy season, while 12 households (possibly double-counting the previous 8 households) uses the feed during both seasons.

Table xxx: Average number of months fed of feed, by livestock type

	Nigeria			Cameroon		
Feed type	Season	Ave. number of months fed per season	(n)	Season	Ave. number of months fed per season	(n)
Straws				Rainy Both	3.0 9.0	8 12
Hay	Both	12	2			
Maize stover	Both	12	5	Both	5	3
Cut grass	Dry	3	2			
Grazing						
Other feed types				Dry Both	7 9	2 3

Quantity and total cost of purchased feed

Table xxx shows the average quantity and total cost of purchased feed, by livestock type, season and feed type. Guided by maize stover, this feed is fed during both seasons in Nigeria, an average of 6.5 kgs are purchased at the cost of N2,350.00. Among the Cameroon households, straws are fed to cattle during rainy season by some households, with average quantity of 167.4 kg purchased at CFA63,312.50. Still with straws, some households fed this feed during both seasons, purchasing about 101 kg at an average cost of CFA56,277.78.

Table xxx: Average quantity and total cost of purchased feed, by livestock type, season and feed type, Nigeria

	Nigeria (Pigs)					Cameroon (Cattle)				
Feed type	Season	Average quantity of feed	(n)	Average total cost of purchased feed (Naira)	(n)	Season	Average quantity of feed	(n)	Average total cost of purchased feed (CFA)	(n)
Straws						Rainy Both	167.4 kg 101 kg	7 12	63,312.50 56,277.78	8 9
Hay	Both	18.0 kg	2	50.00	2					
Maize stover	Both	6.5 kg	5	2,350.00	5	Both	56.7 kg	3	26,666.67	3
Cut grass										
Grazing										
Other feed types						Dry	46.5 kg	2	17,500.00	2

Other feed - related costs

Table xxx shows the average values of other feed related costs, by livestock type, season and feed type. Guided by the maize stover, the average value of other costs related to feeds during both seasons is N300.00. Among the Cameroon households, the average value of other costs related to straw feed is CFA12, 075.00 during the rainy season.

Table xxx: Average other feed related costs, by livestock type and season

	Nigeria (Pigs)			Cameroon (Cattle)		
Feed type	Season	other feed related costs (Naira)	Computing subsample	Season	other feed related costs (CFA)	Computing subsample
Straws				Rainy Both	12,075.00 667.67	8 3
Hay	Both	100.00	2			
Maize stover	Both	300.00	5	Both	3,666.67	3
Cut grass						
Grazing						
Other feed types				Dry	10,000.00	2

Livestock products and seasonality

Table xxx shows the distribution of the households by livestock products and the seasons they are produced. The product options are milk, curd/yoghurt, butter, cheese, meat, eggs, whole animal, hair, and skin. Among the Nigerian households, the products indicated by 10 households (meat, whole animal and skin) are produced during both seasons. Among the Cameroon households, 20 households responded and produce a longer list of products. Across all the products produced from cattle, 15% of the households produce in the dry season, 35% in the rainy season and 50% during both seasons.

Table xxx: Distribution of households by livestock type, product type and season

Livestock type	Product	Nigeria, Pigs				Cameroon, Cattle			
		Dry	Rainy	Both	Total	Dry	Rainy	Both	Total
Pigs	Milk					25.0	75.0		4
	Curd/yoghurt						100.0		2
	Butter						100.0		2
	Cheese						50.0	50.0	2
	Meat			100.0	7	14.3		85.7	7
	Eggs								
	Whole animal			100.0	2				
	Hair					100.0			1
	Skin			100.0	1			100.0	2
	Total			1100.0	10	15.0	35.0	50.0	20

Main buyers of livestock products

Table xxx shows the distribution of the households by livestock products and the main product buyers. There is nothing to discuss concerning Nigeria, since only 2 households responded to this inquiry. Among the Cameroon households, the indication from 13 respondents is that the main buyers of the cattle products are assemblers (7.7%), brokers (7.7%), neighbor (7.7%), retailer (23.1%) and wholesaler (46.2%), respectively.

Table xxx: Distribution of households by livestock type, product type and main buyer

Country	Livestock type	Product	Main buyer						
			Assemblers	Brokers	Neighbor	Other	Retailer	Wholesaler	Tota
Nigeria	Pigs	Milk							
		Curd/yoghurt							
		Butter							
		Cheese							
		Meat			100.0				1
		Eggs							
		Whole animal							
		Hair							
		Skin					100.0		1
		Total					50.0	50.0	2
Cameroon	Cattle	Milk					25.0		
		Curd/yoghurt						100.0	1
		Butter					50.0	50.0	2

		Cheese	50.0	50.0					2
		Meat			33.3	33.3	33.3		3
		Eggs							
		Whole animal							
		Hair						100.0	1
		Skin							
		Total	7.7	7.7	7.7	7.7	23.1	46.2	13

Production and allocation of livestock products

Table xxx shows the livestock products, in terms of total production and allocation to consumption and sale. Only meat is responded to by just 4 Nigeria households, with 18.5 kg produced and home consumed, on the average . Longer array of cattle products are responded to among Cameroon households , but the averages presented are each supported by no more than 3 respondents. Guided by meat, a total of 40 kg is produced, of which 20.7 kg is sold and 8.7 kg is home consumed.

Table xxx: Average quantity of livestock product consumed, sold and produced, by season, product type and livestock type, Nigeria

Country	Livestock type	Product type	Quantity home consumed (kg)	(n)	Quantity sold (kg)	(n)	Quantity of produced (kg)	(n)
Nigeria	Pig	Milk						
		Curd/yoghurt						
		Butter						
		Cheese						
		Meat	18.5 kg	4			18.5 kg	4
		Eggs						
		Whole animal						
		Hair						
		Skin						
Cameroon	Cattle	Milk	97.5 kg 37.0 lit	2 2	125.0 kg 133.5 lit	2 2	302.5 kg 175.0 lit	2 2
		Curd/yoghurt						
		Butter	30.0 kg	2	100.0 kg	2	150.0	2
		Cheese			62.5 kg	2	105.0	2

		Meat	8.7 kg	3	20.7 kg	3	40.0 kg	2
		Eggs						
		Whole animal						
		Hair						
		Skin					2.0 kg	2

Market value of livestock product

Table xxx is intended toshow the average market values of livestock products sold by product type and livestock type. There was no data to compute the Nigeria side of the table. Among the Cameroon households, the market value of livestock product averages CFA51,750 per household for milk, and CFA38,333 per household for meat.

Table xxx: Average market value of livestock product sold by product type and livestock type

	Nigeria (Pigs)		Cameroon (Cattle)	
Product type	Average market value of livestock product sold (Naira)+	(n)	Average market value of livestock product sold (CFA)	(n)
Milk			51,750.00	4
Curd/yoghurt				
Butter			62,500.00	2
Cheese			60,000.00	2
Meat			38,333.33	3
Eggs				
Whole animal				
Hair				
Skin				

+ no data to compute results

3.4 COMMUNAL PROPERTY AND RESOURCES

This section presents access to and uses of communal property and scattered trees. These resources were surveyed separately, but we found them sufficiently related to be under the same discussion. Also, for most tables, state or provincial level results are presented, to emphasize ‘’grassroot’’ situations for the relevant inquiries.

Access to communal property

Table xxx shows the percentage distribution of households by access to indicated communal property. The communal property options are forest for animal food collection (hunting), forest for fuel collection, forest for plant food collection, forest grazing resources, grassland grazing resources, structures controlling erosion, water bodies for fishing and water/irrigation resources. Among the Nigerian households, 80-100% of the households in both Osun and Oyo states do not own the listed communal properties. Across all the properties listed, the percentage not owning is 94.4% in Osun and 96.8% in Oyo.

Among the Cameroon households, the same pattern of results is retained. Specifically, across the listed properties, the percentage not owning is 98.8% (central province), 100% (west province), 78.4% (southwest province) and 93.8% (littoral province).

Table xxx: Distribution of households by access to indicated communal property

	Nigeria						Cameroon											
	Osun			Oyo			Central			West			South west			Littoral		
	No	Yes	Total	No	Yes	Total	No	Yes	Total	No	Yes	Total	No	Yes	Total	No	Yes	Tot
Forest for animal food collection (hunting)	86.5	13.5	37	96.6	3.4	29	100.0		40	100.0	0.0	18	92.3	7.7	13	100.0		22
Forest for fuel collection	94.1	5.9	34	100.0		30	97.1	2.9	35	100.0	0.0	18	51.7	42.9	14	96.3	3.7	27
Forest for plant food collection	80.6	19.4	31	96.7	3.3	30	100.0		42	100.0	0.0	20	69.2	30.8	13	95.7	4.3	23
Forest grazing resources	97.1	2.9	34	100.0		32	97.8	2.2	45	100.0	0.0	17	77.8	22.2	9	100.0		25
Grassland grazing resources	100.0		37	100.0		29	97.9	2.1	47	100.0	0.0	17	78.6	21.4	14	95.2	4.8	25
Structures controlling erosion	100.0		35	91.2	8.8	34	100.0		38	100.0	0.0	19	100.0		14	96.0	4.0	25
Water bodies for fishing	100.0		35	96.7	3.3	30	100.0		36	100.0	0.0	19	78.6	21.4	14	95.7	4.3	23
Water/irrigation resources	100.0		32	94.1	5.9	34	97.8	2.2	46	100.0	0.0	18	72.7	27.3	11	75.0	25.0	28
Total	94.4	5.1	275	96.8	3.2	248	98.8	1.2	329	100.0	0.0	146	78.4	21.6	102	93.8	6.2	194

Regular use of communal property

Table xxx shows the percentage distribution of households by regular use of communal property. The responding households are few and country level analysis was therefore done. Taking all the properties together, 72.7% of the responding Nigerian households indicate regular use . Among the Cameroon households, however, most of the households (63.6%) do not use the properties regularly. The Cameroon result appears to make more sense, because it is not clear why most households will regularly use properties they do not own. The only possible explanation in the Nigerian case is that some of the properties listed are likely publicly owned. This was however not investigated in the survey.

Table xxx: Distribution of households by regular use of indicated communal property

Communal property	Nigeria: Use regularly			Cameroon: Use regularly		
	No	Yes	Total	No	Yes	Total
Forest for animal food collection (hunting)	66.7	33.3	6		100.0	1
Forest for fuel collection		100.0	2	37.5	62.5	8
Forest for plant food collection		100.0	7	40.0	60.0	5
Forest grazing resources		100.0	1	100.0		3
Grassland grazing resources				40.0	60.0	5
Structures controlling erosion	33.3	66.7	3	100.0		1
Water bodies for fishing		100.0	1	100.0		4
Water/irrigation resources	50.0	50.0	2	63.6	36.4	11
Total	27.3	72.7	22	57.9	42.10	38

Ownership of scattered trees

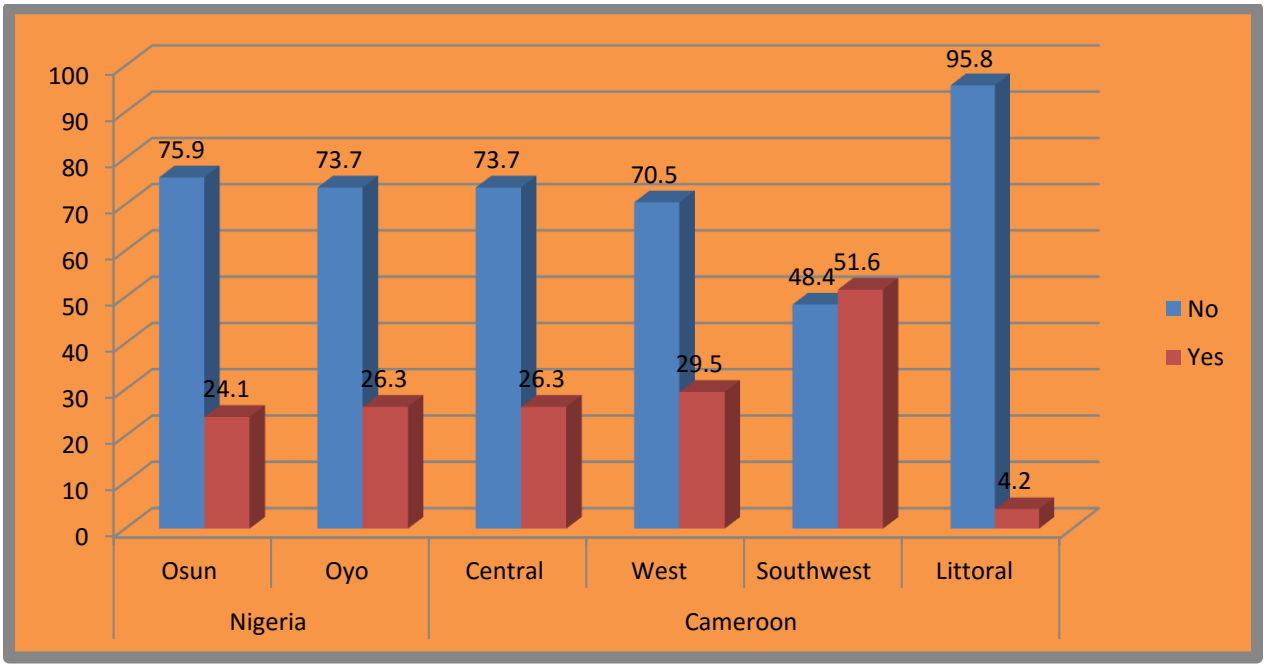
Table xxx shows the percentage distribution of households by ownership of scattered tress. This inquiry does not specify any type of scattered tree. Among the Nigerian households, 74-76% of the households in both states do not own any scattered tree. For both states, the percentage not owning is 75.

Among the Cameroon households, the same pattern of results is largely retained. Specifically, the percentage of households not owning scattered tress varies from 48.4 (southwest province) to 95.8 (littoral province), giving a country level average of 77.2%. Table xxx is illustrated in Fig xxx.

Table xxx: Distribution of the respondents by ownership of scattered trees

		Own scattered trees		
Country	State/province	No	Yes	Total
Nigeria	Osun	75.9	24.1	270
	Oyo	73.7	26.3	255
	Total	74.9	25.1	525
Cameroon	Central	73.7	26.3	186
	West	70.5	29.5	95
	Southwest	48.4	51.6	62
	Littoral	95.8	4.2	165
	Total	77.2	22.8	508

Fig xxx: Distribution of the respondents by ownership of scattered trees



Types of scattered trees possessed

Table xxx gives the percentage distribution of households by the type of scattered trees. Among the Nigerian households, the top four types of trees, in descending order, are orange,

other/unspecified, mango and banana. Among the households in Cameroon , the top types of trees are Avocado, Mango and papaya, in descending order of prominence.

Table xxx: Distribution of households by type of scattered trees by type

	Nigeria		Cameroon	
Type of tree	No. of respondents	Percent	No. of respondents	Percent
Avocado tree			78	29.5
Papaya tree	7	3.1	45	17.0
Guava tree	10	4.4	4	1.5
Mango tree	40	17.8	61	23.1
Orange tree	75	33.3	24	9.1
Lemon tree	1	0.4	6	2.3
Grapefruit tree	3	1.3		
Java plum(Zambarao)			14	5.3
White sappote tree				
Banana tree	31	13.8	7	2.7
Mulberry tree				
Moringa tree	1	0.4	1	0.4
Other Fruit				
Timber tree	1	0.4	2	0.8
Folder tree			1	0.4
Medicinal tree	3	1.3		
Other	53	26.6	21	8.0
Total	225	100.0	264	100.0

Number of scattered trees owned by type

Table xxx shows the average number of scattered trees possessed by type per household. The top four trees in terms of number owned among Nigerian households in descending order are Banana, other (unspecified), orange and papaya. Among the households in Cameroon , the top four trees in terms of number owned are Banana, orange, other, and mango, in descending order.

Table xxx: Average number of scattered trees owned per household

	Nigeria		Cameroon	
Type of tree	Average number of scattered trees	(n)	Average number of scattered trees	(n)
Avocado tree			5.4	78
Papaya tree	15.0	7	5.2	45
Guava tree	4.8	10	2.0	4
Mango tree	6.5	40	6.1	61

Orange tree	25.7	75	11.6	24
Lemon tree			1.8	6
Grapefruit tree	6.0	3		
Java plum(Zambarao)			4.3	14
White sappote tree				
Banana tree	1,948.6	31	13.7	7
Mulberry tree				
Moringa tree				
Other Fruit				
Timber tree			10.0	2
Folder tree				
Medicinal tree	2.3	3		
Other	153.7	53	6.6	21

Uses of scattered trees by type

Table xxx shows the percentage distribution of households by indicated uses of the scattered trees. The use options are food, feed, timber and fuel. Because of the scanty number of respondents, we will interpret only the results across all the trees (last or total row for each country). Among the Nigerian households, 82.4% use the trees for food, 41.4% for feed, 0.9% for timber and 0.5% for fuel. Among Cameroon households, the trees are used for food by 79.2%, for feed by 7.2%, for timber by 6.1% and for fuel by 9.8%, respectively. In both countries, the dominant use of the trees is food.

Table xxx: Distribution of households by uses of scattered trees and by type of uses

		Tree produces food			Tree produces feed			Tree produces timber			Tree produces fuel		
Country	Type of tree	No	Yes	Total	No	Yes	Total	No	Yes	Total	No	Yes	Total
Nigeria	Avocado tree												
	Papaya tree		100.0	7	28.6	71.4	7	100.0		7	100.00		7
	Guava tree	10.0	90.0	10	60.0	40.0	10	100.0		10	100.0		10
	Mango tree	25.0	75.0	40	62.5	37.5	40	100.0		40	97.5	2.5	40
	Orange tree	23.3	76.7	73	54.9	45.1	71	100.0		71	100.0		71
	Lemon tree		100.0	1		100.0	1	100.0		1	100.0		1
	Grapefruit tree	50.0	50.0	2	50.0	50.0	2	100.0		2	100.0		2
	Java plum(Zambarao)												
	White sappote tree												
	Banana tree	6.5	93.5	31	9.7	90.3	31	100.0		31	100.0		31
	Mulberry tree												
	Moringa tree		100.0	1	100.0		1	100.0		1	100.0		1
	Other Fruit												
	Timber tree	100.0		1	100.0		1		100.0	1	100.0		1
	Folder tree												
	Medicinal tree	66.7	33.3	3	100.0		3	100.0		3	100.0		3
	Other	9.4	90.6	53				98.1	1.9	53	100.0		53
	Total	17.6	82.4	222	58.6	41.4	220	99.1	0.9	220	99.5	0.5	220
Cameroon	Avocado tree	7.7	92.3	78	87.2	12.8	78	96.2	3.8	78	88.5	11.5	78
	Papaya tree	22.2	77.8	45	97.8	2.2	45	100.0		45	100.0		45
	Guava tree	25.0	75.0	4	75.0	25.0	4	75.0	25.0	4	75.0	25.0	4
	Mango tree	23.0	77.0	61	91.8	8.2	61	90.2	9.8	61	86.9	13.1	61
	Orange tree	45.8	54.2	24	100.0		24	95.8	4.2	24	87.5	12.5	24
	Lemon tree	66.7	33.3	6	100.0		6	100.0		6	100.0		6
	Grapefruit tree												

	Java plum(Zambarao)	14.3	85.7	14	100.0		14	100.0		14	92.9	7.1	14
	White sappote tree												
	Banana tree		100.0	7	100.0		7	100.0		7	100.0		7
	Mulberry tree												
	Moringa tree	100.0		1	100.0		1		100.0	1	100.0		1
	Other Fruit												
	Timber tree	100.0		2	100.0		2		100.0	2		100.0	2
	Folder tree	100.0		1	100.0		1		100.0	1		100.0	1
	Medicinal tree												
	Other	14.3	85.7	21	90.5	9.5	21	95.2	4.8	21	95.2	4.8	21
	Total	20.8	79.2	264	92.8	7.2	264	93.9	6.1	264	90.2	9.8	264

Market values of scattered trees, by use

Table xxx shows the average values of trees owned, by various uses. We will discuss results computed with at least 5 observations. Among the Nigerian households, the average feed value is N2,800.00 for papaya, N1,948.33 for mango tree, N8,120.31 for orange tree, N3,746.43 for banana tree and N4,000.60 for other (unspecified) trees. Still on the Nigeeria data, the average food value is N8,857.14 for papaya, N6,000.00 for Guava, N11,272.67 for Mango, N18,220.74 for Orange tree, N24,938.97 for Banana and N37,175.00 for other (unspecified) trees.

Among the Cameroon households, the average timber value of mango is CFA1,000.00, while the average feed value is CFA10,600.00 for Avocado and CFA2,000.00 for Mango. The average fuel value is CFA4,277.78 for Avocado and CFA21,937.50 for Mango. The average food value is computed for a number of trees and include CFA14,666.67 for Avocado, CFA2,405.71 for Papaya, CFA8,340.43 for Mango, CFA34,730.77 for Orange, CFA14,090.91 for Java plum CFA9,142.86 for banana and CFA33,502.78 for other (unspecified) trees.

Table xxx: Average value of trees owned, by usage

Country	Type of tree	Average timber value of trees (Naira)	(n)	Average feed value of trees (Naira)	(n)	Average food value of trees (Naira)	(n)	Average fuel val of trees (Naira)
Nigeria	Papaya tree			2,800.00	5	8,857.14	7	
	Guava tree			625.00	4	6,000.00	9	
	Mango tree			1,948.33	15	11,272.67	30	
	Orange tree			8,120.31	32	18,220.74	54	
	Banana tree			3,746.43	28	24,938.97	29	
	Other			4,000.60	5	37,175.00	48	
		Average timber value of trees (CFA)	(n)	Average feed value of trees (CFA)	(n)	Average food value of trees (CFA)	(n)	Average fuel val of trees (CFA)
Cameroon	Avocado tree	8,333.33	3	10,600.00	10	14,666.67	72	4,277.78
	Papaya tree					2,405.71	35	
	Guava tree					3,333,33	3	
	Mango tree	1,000.00	6	2,000.00	5	8,340.43	47	21,937.50
	Orange tree					34,730.77	13	4,666.67
	Lemon tree					8,000.00	2	
	Java plum(Zambarao)					14,090.91	11	
	Banana tree					9,142.86	7	
	Timber tree	2,500.00	2					3,000.00
	Other					33,502.78	18	

Note: no data to compute empty cells, or not applicable

3.5 INNOVATIONS AND ADOPTION

This section presents adoption results for different technologies / innovations and the institutional framework that are expected to support adoptions, such as cooperative memberships and access to extension services.

Usage of available innovations

Table xxx presents state or provincial level distribution of households by ‘’ever-use’’ of the listed innovations. The technology options are artificial insemination, chemical fertilizer, deworming (livestock), improved breed (livestock), manure as fertilizer, tractor ploughing, pesticide, purchased seed and vaccination (livestock). Among the Nigerian households, 67-100% of the households in Osun had never used any of the listed innovations. In Oyo, 68-100% of the households have never used any of the listed innovations. Taking all the innovations together, they have never been used by 96.2% of Osun and 91.2% of Oyo households. Among the Cameroon households, and focusing on results computed with 10 or more respondents per innovation, 60-100% of the households in the central, west, southwest and littoral provinces have never used any of the listed innovations. Taking all the innovations together, they have never been used by 98.8% of central, 92.6% of west, 78.0% of southwest and 91.2% of littoral households, respectively.

Table xxx: Distribution of respondents by who ‘’ever-used’’ innovation or technology

	Nigeria						Cameroon											
	Osun			Oyo			Central			West			Southwest			Littoral		
Type of technology/innovation	No	Yes	Total	No	Yes	Total	No	Yes	Total	No	Yes	Total	No	Yes	Total	No	Yes	T
Artificial insemination	100.0	0.0	29	100.0	0.0	22	100.0		23	100.0		6	100.0		9	100.0		2
Chemical fertilizer	100.0	0.0	22	68.4	31.6	19	100.0		29	42.9	57.1	7	60.0	40.0	10	64.7	35.3	1
Deworming (livestock)	100.0	0.0	23	100.0	0.0	23	100.0		18	100.0		10	100.0		8	100.0		1
Improved breed (livestock)	100.0	0.0	25	100.0	0.0	20	100.0		33	100.0		14	100.0		9	100.0		1
Manure as fertilizer	100.0	0.0	29	92.9	7.1	28	100.0		23	88.9	11.1	9	77.8	22.2	9	69.2	30.6	1
Tractor ploughing	100.0	0.0	55	97.8	2.2	45	100.0		51	100.0		20	100.0		16	100.0		2
Pesticide	66.7	33.3	21	81.5	18.5	27	96.0	4.0	25	100.0		12	20.0	80.0	5	90.9	9.1	1
Purchased seed	90.0	10.0	30	74.1	25.9	27	92.0	8.0	25	77.8	22.2	9	33.3	66.7	12	88.9	11.1	1
Vaccination (livestock)	100.0	0.0	26	100.0	0.0	27	100.0		25	100.0		7	100.0		4	100.0		1
Total	96.2	3.8	260	91.2	8.8	238	98.8	1.2	252	92.6	7.4	94	78.0	22.0	82	91.2	8.8	1

First-year use of innovation

Table xxx shows country level percentage distribution of households by the first year each innovation was used. The data is scanty, so we interpret the last row in the table. Among the Nigerian households, a total of 31 households responded, and 51.6% of them used some of the innovations 1999 or earlier, 22.6% within 2000-2005, 12.9% within 2006-2010 and 12.9% 2011 or later. And, Among the Cameroon households, 25.9% of the 54 households used some of the innovations 1999 or earlier, 38.9% within 2000-2005, 24.1% within 2006-2010 and 11.1% 2011 or later. The results shows that adoption of the technologies listed occurred more among the responding households mostly prior to the year 2011.

Table xxx: Distribution of respondents by first year of innovation use

	Nigeria					Cameroon				
Type of technology/innovation	1999 or earlier	2000-2005	2006-2010	2011 or later	Total	1999 or earlier	2000-2005	2006-2010	2011 or later	T
Artificial insemination										
Chemical fertilizer	33.3	33.3	16.7	16.7	6	26.3	42.1	26.3	5.3	1
Deworming (livestock)									100.0	1
Improved breed (livestock)										
Manure as fertilizer	100.0				2	14.3	57.1	14.3	14.3	7
Tractor ploughing		100.0			1			100.0		1
Pesticide	58.3	16.7	8.3	16.7	12	50.0	25.0	12.5	12.5	8
Purchased seed	50.0	20.0	20.0	10.0	10	23.5	41.2	23.5	11.8	1
Vaccination (livestock)								100.0		1
Total	51.6	22.6	12.9	12.9	31	25.9	38.9	24.1	11.1	5

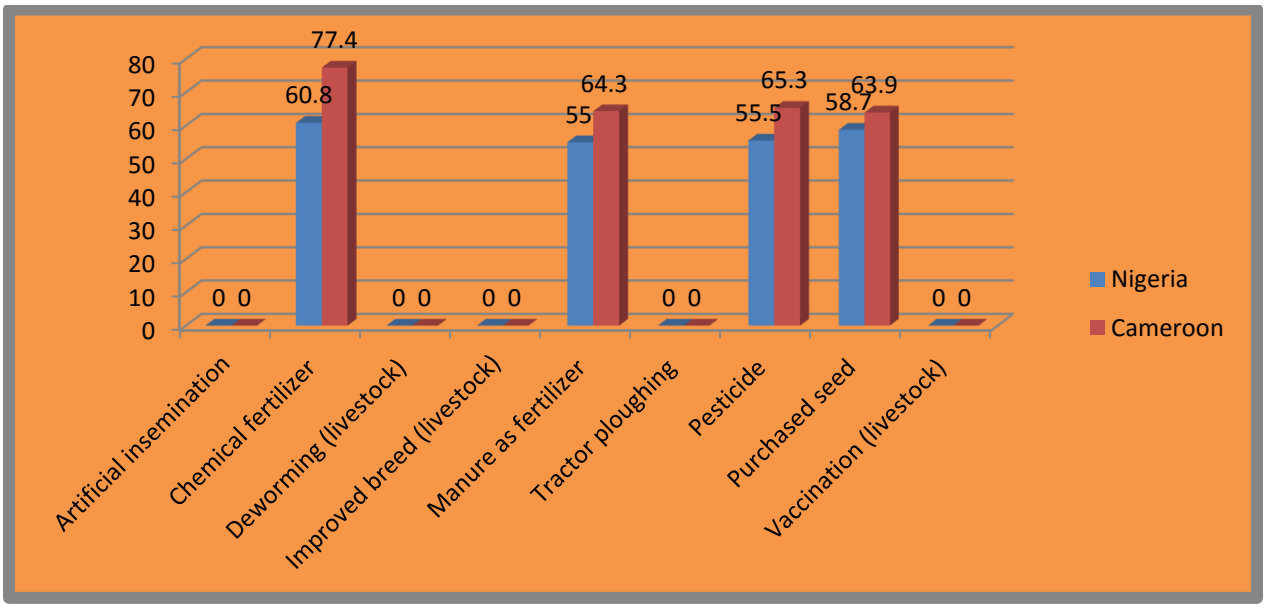
Innovation use / adoption intensity

The results in Table xxx are measures of adoption using percentage of 'yes' among responding households. Table xxx shows another measure of adoption rate, which relies on the percentage share of land/herd on which technology is applied. The adoption rates shown across both countries exceed 50% for the innovations responded to, but must be interpreted with caution since the computations are based on few respondents Table xxx is illustrated further in Fig xxx.

Table xxx: Percentage share of land/herd on which technology is applied /used

	Nigeria		Cameroon	
Type of technology/innovation	Percentage of use	Computing subsample	Percentage of use	Computing subsample
Artificial insemination				
Chemical fertilizer	60.8	6	77.4	14
Deworming (livestock)				
Improved breed (livestock)				
Manure as fertilizer	55.0	2	64.3	7
Tractor ploughing				
Pesticide	55.5	12	65.3	6
Purchased seed	58.7	10	63.9	14
Vaccination (livestock)				

Fig xxx: Percentage share of land/herd on which technology is applied



Organizational and institutional support for innovation and adoption

The premise for the analysis in this section is that the institutional framework within which a farmer operates can influence his innovation adoption decision. Factors in this regard include membership of cooperatives, main source of information about innovation and access to extension contacts.

Membership of groups

Table xxx shows state or provincial level distribution of households by membership of farmer group or cooperatives. The options provided are breeder (livestock), marketing (livestock), producer/co-op (crop), savings and water management. Among the Nigerian households, 95-100% of the respondents in Osun had never been members of the listed farmer groups. In Oyo, 71-100% of the households have never been members of the listed farmer groups. Taking all the farmer groups together, 97.6% of the Osun households and 96.3% of the Oyo households had never been members of the listed farmer groups.

The Cameroon results shows that all the households in the central and west provinces, 78-100% in the southwest province and 98-100% in the littoral province had never been members of the listed farmer groups. Taking all the farmer groups together, non-membership of groups amounts to 100% in the central and west province, 95.6% in the southwest province and 99.4% in littoral province, respectively.

Table xxx: Distribution of households by Membership of groups/cooperatives

	Nigeria						Cameroon											
	Osun			Oyo			Central province			West province			Southwest			Littoral province		
Group/ Coop	No	Yes	Total	No	Yes	Total	No	Yes	Total	No	Yes	Total	No	Yes	Total	No	Yes	To
Breeder (livestock)	100.0	0.0	49	100.0	0.0	47	100.0	0.0	42	100.0	0.0	19	100.0			100.0		28
Marketing (livestock)	97.9	2.1	48	100.0	0.0	36	100.0	0.0	36	100.0	0.0	16	100.0			100.0		29
Producer/co-op (crop)	95.4	4.6	87	98.0	2.0	101	100.0	0.0	68	100.0	0.0	32	96.0	4.0	25	98.1	1.9	54
Savings	97.0	3.0	33	70.8	29.2	24	100.0	0.0	32	100.0	0.0	17	77.8	22.2	9	100.0		28
Water management	100.0	0.0	35	100.0	0.0	37	100.0	0.0	36	100.0	0.0	11	100.0		8	100.0		25
Total	97.6	2.4	252	96.3	3.7	245	100.0	0.0	214	100.0	0.0	95	95.6	4.4	68	99.4	0.6	16

Year household began membership of groups

Table xxx shows the year group membership began among those declaring membership in both countries. Because households with memberships are low, only country level analysis are presented. In the total/last row for Nigeria, 6.7% of the households became members of some groups 1991-2000, 73.3% during 2001-2010 and 20.0% in 2011 or later. Among the Cameroon households (total row), 11.15 of the households became members 1980 or earlier, 22.2% of the households became members 1991-2000, 33.3% during 2001-2010 and 33.3% in 2011 or later.

Table xxx: Year joined Group or Cooperative

Country	Group/ Coop	Year joined group /coop				
		1980 or earlier	1991-2000	2001-2010	2011 or later	Total
Nigeria	breeder (livestock)					
	Marketing (livestock)		0.0	100.0	0.0	1
	producer/co-op (crop)		16.7	50.0	33.3	6
	Savings		0.0	87.5	12.5	8
	water management					
	Total		6.7	73.3	20.0	15
Cameroon	breeder (livestock)					
	Marketing (livestock)					
	producer/co-op (crop)	0.0	0.0	50.0	50.0	6
	Savings	33.3	66.7	0.0	0.0	3
	water management					
	Total	11.1	22.2	33.3	33.3	9

Main source of information about innovation

Table xxx shows the distribution of households by type of innovation and main source of information among the Nigerian and Cameroon households. We are strictly interested in the modal source of information about each innovation. But we will present the top two sources of information about each innovation in each country. Among the Nigerian households, the innovations for which government extension and Radio/TV program are the top sources of information are artificial insemination, deworming, improved breed, tractor ploughing, and vaccination. The innovations for which government extension and private input dealers are the

top sources of information are chemical fertilizer, pesticide and purchased seed. Private input dealer and Radio/TV program are the main information sources for manure as fertilizer. Taking all the innovations together (last row), the Nigerian households are distributed among the information sources as 31.4% (government extension), 22.7% (private input dealer), 11.5% (private veterinarian), 11.3% (producer organization) and 23.1% (Radio/TV program).

Among the Cameroon households, the innovations for which government extension and Radio/TV program are the top sources of information are artificial insemination, chemical fertilizers, manure as fertilizers, and pesticides. The innovations for which government extension and private input dealers are the top sources of information are deworming, improved livestock breed, tractor ploughing, purchased seed and vaccination. Taking all the innovations together (last row), the Cameroon households are distributed among the information sources as 32.5% (government extension), 22.4% (private input dealer), 10.8% (private veterinarian), 12.4% (producer organization) and 21.8% (Radio/TV program).

Table xxx: Distribution of households by type of innovation and main source of information

	Nigeria						Cameroon			
Type of innovation	Government extension	Private input dealer	Private veterinarian	Producer organization	Radio/TV program	Total	Government extension	Private input dealer	Private veterinarian	Producer organization
Artificial insemination	39.3	23.2	7.1	10.7	19.6	56	22.7	22.7	13.6	16.7
Chemical fertilizer	34.8	21.7	13.0	15.2	15.2	46	35.2	15.5	9.9	11.3
Deworming (livestock)	26.5	20.4	14.3	14.3	24.5	49	40.3	19.4	9.7	16.1
Improved breed (livestock)	38.3	17.0	12.8	0.0	31.9	47	30.8	32.1	7.7	9.0
Manure as fertilizer	18.6	25.4	11.9	11.9	32.2	59	27.3	18.2	15.2	10.6
Tractor ploughing	29.6	19.4	15.7	13.9	21.3	108	35.5	22.0	8.5	14.2
Pesticide	34.6	28.8	9.6	11.5	15.4	52	26.7	23.3	16.7	8.3
Purchased seed	31.7	28.3	5.0	8.3	26.7	60	36.1	22.2	12.5	11.1
Vaccination (livestock)	32.7	21.8	10.9	12.7	21.8	55	34.3	25.4	7.5	13.4
Total	31.4	22.7	11.5	11.3	23.1	532	32.5	22.4	10.8	12.4

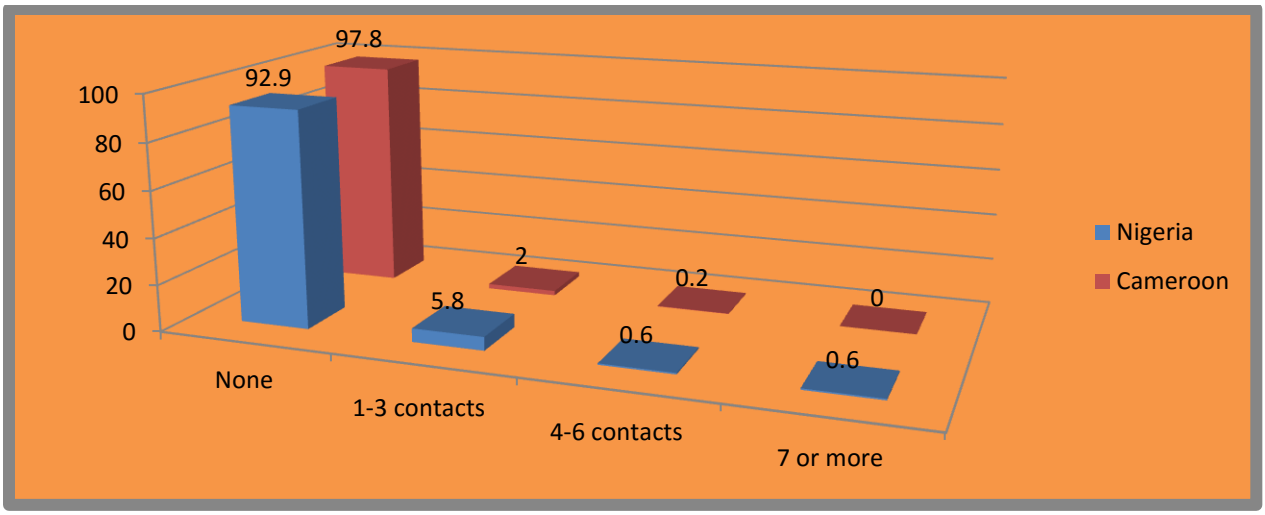
Extension contacts per annum on innovation

Table xxx further explore extension services, being the top source of innovation in the previous section. We are here interested in how households distributed by the number of extension contacts per annum for each innovation type. It is very revealing that among the Nigerian households, 87-95% did not have any extension contact in the past 12 months on any of the listed innovations. And, among the Cameroon households, 94-100% did not have any extension contact in the past 12 months on any of the listed innovations. Taking all the innovations together, the results averages 92.9% for Nigeria and 97.8% for Cameroon in terms of no contact with extension services in the last 12 months.

Table xxx: Distribution of respondents by number of extension contacts last 12 months

	Nigeria					Cameroon				
Type of technology/innovation	None	1-3	4-6	7 or more	Total	None	1-3	4-6	7 or more	Total
Artificial insemination	93.8	2.1	2.1	2.1	48	98.4	1.6	0.0	0.0	62
Chemical fertilizer	92.3	7.7	0.0	0.0	30	98.5	1.5	0.0	0.0	66
Deworming (livestock)	95.2	4.8	0.0	0.0	42	93.3	5.0	1.7	0.0	60
Improved breed (livestock)	90.9	9.1	0.0	0.0	44	95.9	4.1	0.0	0.0	74
Manure as fertilizer	96.2	3.8	0.0	0.0	53	98.5	1.5	0.0	0.0	65
Tractor ploughing	94.7	4.3	1.1	0.0	94	99.2	0.8	0.0	0.0	132
Pesticide	93.6	4.3	2.1	0.0	47	100.0	0.0	0.0	0.0	57
Purchased seed	90.7	7.4	0.0	1.9	54	98.6	1.4	0.0	0.0	69
Vaccination (livestock)	87.2	10.6	0.0	2.1	47	96.9	3.1	0.0	0.0	65
Total	92.9	5.8	0.6	0.6	468	97.8	2.0	0.2	0.0	650

Fig xxx: Percent distribution of households by number of extension contacts per annum



3.5 FOOD CONSUMPTION AND HABITS

Food items consumed

Table xxx shows a long list of crop and animal product food items. Households were asked to indicate their consumption decision on each item and in each season. . Among the Nigerian households, the food items consumed during the rainy season by 50% or more of respondents include cassava, yam, rice, pepper, tomato and cow meat. During the dry season, the items consumed by at least 50% of the households are beans, cocoyam, maize, pepper, tomato, palm oil and cow meat. Among the Cameroon households, the food items consumed by at least 50% of the respondents during the rainy season are ground nuts, maize, rice, pepper, plantain and palm oil. During the dry season, at least 50% of the Cameroon respondents consume beans, cassava, ground nuts, rice, plantain, tomato and sugar.

Table xxx: Distribution of households by who consume indicated food item during dry and rainy seasons

	Nigeria						Cameroon					
Food item	Rainy season			Dry season			Rainy season			Dry season		
	No	Yes	Total	No	Yes	Total	No	Yes	Total	No	Yes	Total
Beans/Cowpea	53.8	46.2	13	40.0	60.0	10	58.3	41.7	12	44.4	55.6	9
Cassava	25.0	75.0	4	14.3	85.7	7	58.3	41.7	12	46.2	53.8	13

Cocoyam	72.7	27.3	11	90.9	9.1	11	72.7	27.3	11	85.7	14.3	7
Groundnuts	75.0	25.0	8	88.9	11.1	9	46.7	53.3	15	30.0	70.0	10
Sorghum	100.0		11	100.0		9	100.0		13	100.0		14
Maize	66.7	33.3	9	45.5	54.5	11	45.5	54.5	11	62.5	37.5	8
Melon	100.0		16	85.7	14.3	7	100.0		14	100.0		9
Water Melon	100.0		7	100.0		9	84.6	15.4	13	100.0		11
Millet/Maiwa	100.0		11	100.0		7	100.0		10	100.0		6
Rice	16.7	83.3	6	66.7	33.3	6	36.4	63.6	11	27.3	72.7	11
Yam	33.3	66.7	15	60.0	40.0	10	85.7	14.3	7	81.8	18.2	11
Banana	63.6	36.4	11	80.0	20.0	15	77.8	22.2	9	77.8	22.2	9
Carrot	100.0		16	100.0		10	100.0		13	90.9	9.1	11
Cucumber	100.0		12	100.0		8	100.0		9	77.8	22.2	9
Cabbage	100.0		9	100.0		14	92.3	7.7	13	91.7	8.3	12
Letus	100.0		12	100.0		9	100.0		16	100.0		9
Garden Egg	55.6	44.4	9	100.0		6	100.0		10	100.0		13
Okro	66.7	33.3	12	90.0	10.0	10	84.6	15.4	13	66.7	33.3	6
Onion	58.3	41.7	12	71.4	28.6	14	53.8	46.2	13	80.0	20.0	10
Pepper	20.0	80.00	10	40.0	60.0	5	50.0	50.0	6	54.5	45.5	11
Pigeon Pea	100.0		7	100.0		7	100.0		12	100.0		15
Pineapple	85.7	14.3	7	100.0		8	100.0		9	62.5	37.5	8
Plantain	87.5	12.5	8	100.0		5	40.0	60.0	10	35.7	64.3	14
Potato	100.0		11	100.0		11	100.0		10	88.9	11.1	9
Sweet Potato	100.0		12	100.0		10	100.0		8	100.0		3
Pumpkin Seed	100.0		7	100.0		12	100.0		8	100.0		11
Green Vegetable	55.6	44.4	9	57.1	42.9	7	75.0	25.0	8	90.9	9.1	11
Soya Beans	93.8	6.3	16	100.0		9	100.0		12	100.0		10
Sugar Cane	100.0		12	100.0		9	93.8	6.3	16	100.0		11
Tea	93.3	6.7	15	100.0		8	100.0		11	91.7	8.3	12
Tomato	45.5	54.5	11	14.3	85.7	7	71.4	28.6	14	42.9	57.1	7
Wheat	100.0		12	100.0		8	100.0		12	100.0		16
Cashew Nut	100.0		13	100.0		14	93.3	6.7	15	100.0		7
Cocoa	100.0		5	100.0		9	100.0		7	100.0		8
Coconut	100.0		12	100.0		8	100.0		12	100.0		7
Kolanut	100.0		9	100.0		7	100.0		10	100.0		9
Bitter Kola	100.0		9	100.0		8	80.0	20.0	10	66.7	33.3	6
Locust Bean	71.4	28.6	7	77.8	22.2	9	100.0		11	100.0		4
Mango	75.0	25.0	8	100.0		4	80.0	20.0	10	100.0		8
Orange	69.2	30.8	13	80.0	20.0	10	100.0		9	91.7	8.3	12
Palm Oil	55.6	44.4	9	40.0	60.0	5	23.1	76.9	13	77.8	22.2	9
Ogbono(Oro Seed)	100.0		15	100.0		9	100.0		10	100.0		9
Pawpaw	92.3	7.7	13	100.0		5	94.4	5.6	18	87.5	12.5	8
Pear	100.0		11	100.0		13	84.6	15.4	13	81.8	18.2	11
Chicken	92.3	7.7	13	75.0	25.0	4	78.6	21.4	14	88.9	11.1	9
Turkey	100.0		9	100.0		10	100.0		17	100.0		14
Guinea Fowl	100.0		18	100.0		8	100.0		11	100.0		13

Pig Meat	100.0		15	83.3	16.7	6	92.3	7.7	13	83.3	16.7	6
Cow Meat	46.2	53.8	13	44.4	55.6	9	100.0		7	72.7	27.3	11
Goat	83.3	16.7	12	93.3	6.7	15	100.0		10	100.0		10
Sheep/Ram	92.9	7.1	14	100.0		8	100.0		12	100.0		10
Eggs	100.0		6	90.9	9.1	11	61.1	38.9	18	100.0		8
Fresh Or Dried Fish	60.0	40.0	5	70.0	30.0	10	58.3	41.7	12	60.0	40.0	15
Milk	91.7	8.3	12	92.9	7.1	14	90.9	9.1	11	100.0		14
Vegetable Oil	90.9	9.1	11	100.0		8	90.0	10.0	10	76.9	23.1	13
Honey	100.0		12	100.0		9	91.7	8.3	12	100.0		10
Sugar	88.9	11.1	9	90.9	9.10	11	82.4	17.6	17	50.0	50.0	16
Total	83.7	16.3	614	86.7	13.3	510	84.3	15.7	664	83.1	16.9	573

Market value of items consumed

Table xxx shows the average market values of items consumed during rainy and dry seasons in LCUs. The data for computing mmost of the market values of the items consumed are very scanty. Among the Nigerian and Cameroon households, the food items for which the combined market values in the dry and rainy seasons are more than LCU10,000 are very few, namely, maize, rice, tomato (Cameroon only) and fresh or dry fish (Cameroon only). This perhaps reflects some underlying poverty among the households in the survey.

Table xxx: Average market value of item consumed during rainy and dry seasons (LCU)

	Nigeria				Cameroon			
	Rainy season		Dry season		Rainy season		Dry season	
Food item	Average market value (Naira)	(n)	Average market value (Naira)	(n)	Average market value (CFA)	(n)	Average market value (CFA)	(n)
Beans/Cowpea	4,418.00	6	3,785.83	6	2,008.00	5	5,001.00	5
Cassava	2,667.00	3	950.00	6	3,022.00	5	4,450.11	9
Cocoyam	1,133.00	3	250.00	1				
Groundnuts	750.00	2	500.00	1	3,576.00	8	2,602.70	10
Maize	3,000.00	3	716.67	6	10,006	6	4,085.00	5
Melon			2,000.00	1				
Rice	7,800.00	5	4,002.50	2	5,431.00	7	10,837.67	12
Yam	3,420.00	10	2,814.00	4				
Banana	4,313	4	1,600.00	3				
Carrot							253.00	2
Garden Egg	1,013.00	4						
Okro	875.00	4	500.00	1				
Onion	3,261.00	5	5,760.75	4	2,885.00	6		

Pepper	1,319.00	8	1,933.33	3			2,503.33	6
Pineapple							880.00	4
Plantain					3,340.00	6	1,910.40	10
Green Vegetable	1,258.00	4	1,100.00	3				
Tomato	1,532.00	6	3,583.33	6	12,506.00	4	590.14	7
Kolanut							3,000.00	1
Locust Bean			1,500.00	2				
Mango					5,002.00	2		
Orange	756.00	4	3,500.00	2				
Palm Oil	3,250.00	4	2,766.67	3	8,683.00	10	5,500.25	4
Pig Meat			12,000.00	1			2,500.00	1
Cow Meat	4,005.00	7	2,960.00	5				
Goat	2,001.00	2						
Eggs			240.00	1	1,001.00	7		
Fresh Or Dried Fish	5,800.00	2	3,166.67	3	23,006	5	11,172.00	6
Vegetable Oil							3,252.25	4
Sugar							1,252.88	8

Number of weeks item consumed per season

This inquiry sought to assess the frequency with which the listed food items are consumed per season. Table xxx presents the results. Data was a limitation in this aspect of the analysis. It is not clear how many weeks constitute a dry or rainy season in either country, nor do we know the acceptable minimum number of weeks to consuming each of the listed items per season. The food items which are consumed for at least 6 weeks in each season in Cameroon include Beans, cassava, maize, rice and plantain. And, among the Nigerian respondents, the food items which are consumed for at least 6 weeks in each season are Beans, tomato and cow meat. Palm oil and fish (fresh or dried) are consumed in among Cameroon households for up to 12 weeks during the rainy season.

Table xxx: Average number of weeks item consumed during rainy and dry seasons

	Nigeria				Cameroon			
Food item	Rainy season		Dry season		Rainy season		Dry season	
	Number of weeks	(n)	Number of weeks	(n)	Number of weeks	(n)	Number of weeks	(n)
Beans/Cowpea	13	6	7.8	6	14	5	8.2	5
Cassava	20	3	9.8	6	12	5	6.3	9
Cocoyam	7	3			5	3		
Groundnuts	10	2			7	8	5.3	10

Maize	15	3	7.3	6	8	6	8.6	5
Water Melon					3	2		
Rice	7	5	7	2	10	7	7.6	12
Yam	9	10	12.5	4			8.0	4
Banana	5	4	6.7	3	10	2	7.3	3
Carrot							5.0	2
Garden Egg	4	4						
Okro	8	4			10	2	6.5	4
Onion	8	5	10.5	4	5	6	10.0	2
Pepper	12	8	16.3	3	5	3	5.5	6
Plantain					9	6	7.6	10
Green Vegetable	8	4	9.7	3				
Tomato	8	6	8.3	6	10	4	5.1	7
Bitter Kola					5	2	4.5	2
Locust Bean	3	2	8.5	2				
Mango	3	2			4	2		
Orange	11	4	5.5	2				
Palm Oil	15	4	5.0	3	12	10	7.3	4
Pear					8	2	7.5	2
Chicken					5	2	3.5	2
Cow Meat	9	7	10.0	5			3.3	3
Goat	15	2						
Eggs					2	7		
Fresh Or Dried Fish	9	2	14.3	3	12	5	5.7	6
Vegetable Oil							6.5	4
Sugar							4.6	8

Quantity of food item consumed per week

This inquiry sought to quantify the average consumption of the listed food items per week. This question was asked only for the rainy season, so we have no dry season results to match. Table xxx shows the results. Among the Nigerian households, the items of which at least 3kgs are consumed per week during the rainy season are Beans, yam, pepper and cow meat. Among the Cameroon households, the items of which at least 3kgs are consumed per week during the rainy season are rice, plantain and fish (fresh or dried).

Table xxx: Average quantity of item consumed per week during rainy season

	Nigeria		Cameroon	
Food item	Average quantity of item consumed per week (kg)	(n)	Average quantity of item consumed per week (kg)	(n)

Beans/Cowpea	4	6	3	5
Cassava	3	3	2	5
Cocoyam	2	3	2	3
Groundnuts	2	2	2	8
Maize	5	3		
Rice			4	7
Yam	3	10		
Banana			10	2
Okro	2	4	1	2
Onion	2	5	2	6
Pepper	3	8	2	3
Plantain			4	6
Green Vegetable	7	4		
Tomato			7	4
Mango	3	2	3	2
Orange	9	4		
Palm Oil	8	4	2	10
Pawpaw				
Pear			2	2
Chicken			4	2
Cow Meat	12	7		
Goat	2	2		
Eggs			1	7
Fresh Or Dried Fish	4	2	4	5
Sugar			4	3

Food habits of households

The survey sought to know households' consumption decision on the major food groups in the last 24 hours preceding the interview. Table xxx shows the distribution of households by who ate a listed food item in the last 24 hours. Among the Nigerian respondents, at least 80% of the households did not consume 11 of the 17 food groups during the last 24 hours. Furthermore, 60% or more of the Nigerian households did not consume 15 of the 17 food groups during the last 24 hours. Among the Cameroon households, at least 80% of the households did not consume 9 of the 17 food groups, while 60% or more of the households did not consume 15 of the 17 food groups during the last 24 hours. These results largely agree with our earlier results on the frequency of food items consumption during the seasons, and households' consumption decisions on the listed individual food items.

Table xxx: Distribution of households by who ate a food group last 24 hours

Food group	Nigeria			Cameroon		
	No	Yes	Total	No	Yes	Total
Cereals	83.9	16.1	31	93.9	6.1	33
Dark Green Leafy Vegetables	63.8	36.2	47	92.3	7.7	39
Eggs	96.2	3.8	26	92.3	7.7	39
Fish	53.3	46.7	30	47.1	52.9	34
Flesh Meats	70.0	30.0	30	78.9	21.1	38
Insects	92.0	8.0	25	94.7	5.3	38
Legumes, Nuts And Seeds	88.5	11.5	26	72.4	27.6	29
Milk And Milk Products	90.0	10.0	30	90.6	9.4	32
Oils And Fats	71.4	28.6	28	83.3	16.7	36
Organ Meat (Ironrich)	91.1	2.9	35	100.0		31
Other Fruits	86.5	13.5	37	63.6	36.4	33
Other Vegetables	73.3	26.7	30	59.4	40.6	32
Spices, Condiments, Beverages	90.3	9.7	31	68.2	31.8	44
Sweets	96.7	3.3	30	87.8	12.2	41
Vitamin A Rich VegeTable And Tubers	82.5	17.5	63	71.0	29.0	69
White Tubers And Roots	97.1	2.9	34	76.5	23.5	34
Total	82.7	17.3	533	79.2	20.8	602

3.7 Description of the Agricultural by-Products

This section is devoted to the by-products from crop and livestock activities of the households in the HT baseline survey. The survey specifically covered crop residues and animal dungs.

Residue production on farm plot

Table xxx shows state or provincial level distribution of households by the production of crop residues from their various plots. Among the Nigerian households, residue is produced by 61.4% of the households in Osun state and by 26.9% of the households in Oyo state. Among Cameroon households , residues are produced by 24% in the central province, by no household in the west province, by 38.3% in the southwest province and by 66.3% in littoral province. Thus, the variations in these results justify carrying out state or provincial level analysis of this inquiry.

Table xxx: Distribution of households by residue production on farm plot

Country	State/ province	residue production on farm plot		
		No	Yes	Total
Nigeria	Osun	38.6	61.4	368
	Oyo	73.1	26.9	264
	Total	53.0	47.0	632
Cameroon	Central	76.4	23.6	174
	West	100.0	0.0	97
	Southwest	61.7	38.3	81
	Littoral	33.7	66.3	166
	Total	64.9	35.1	518

Share and value of crop residues for different purposes

Table xxx shows the percentage share of crop residues that are left on the farm for household use and the share sold. Among the Nigerian households, at least 60% of the residues are left on the farm for most crops. The only exception in this table is tomato of which 62% of the residue is sold. Among the Cameroon households, the results are a bit mixed, with at least 50% of the residues left on the farm for 5 crops (cocoyam, groundnuts, plantain, cocoa and coffee), while less than 50% is left on the farm for other crops (beans, cassava and maize).

Table xxx: Average share and value of crop residues for different purposes (LCU)

	Nigeria						Cameroon				
Crop	Average share of residue left on farm	(n)	share of residue sold	(n)	total value of residue sold (Naira)	(n)	Average share of residue left on farm	(n)	share of residue sold	(n)	total val residue
Beans/cowpea	100	1			7,729.00	7	49	7	20	4	50,000.0
Cassava	77	54	23	17			25	72	17	59	25,503.0
Cocoyam	100	4					85	6			
Groundnuts							54	21	3	9	
Maize	72	36	28	9	19,917.00	6	41	88	16	57	25,158.0
Yam	84	31									
Banana	65	2					53	4	43	2	
Okro	52	7	48	2							
Pepper	70	9									
Pineapple	10	1					67	3			
Plantain	92	13					73	26			
Green veggie	55	2									
Tomato	38	12	62	5	15,875.00	4	23	3			
Cocoa	81	24					73	47	19	15	20,313.0
Coffee							65	26			3,000.00
Kolanut	75	20									
Orange	100	11									
Oil palm	100	3					100	4			

Main buyer of crop residues

Table xxx shows the distribution of the households by the main buyer of the crop residues. Only 20 of the Nigerian households and 63 households in Cameroon responded to this inquiry. So, we will interpret only the last row of each table. Taking all the crops together for the Nigerian households, 15% of the main buyer of crop residues are neighbours, 65% are retailers, 10% are wholesalers and 10% are other (unspecified) buyers . Among the Cameroon households, 1.6% of the main buyer of crop residues are neighbours, 36.5% are retailers, 28.6% are wholesalers , 25.4% are assemblers, and 7.9% are brokers. Thus, there seem to be more participants in the crop residue marketing chain in the Cameroon, than in Nigeria .

Table xxx: Distribution of households by main buyer of crop residues

Country		main buyer of residue of crop residue						
	Crop	Neighbor	Retailer	Wholesaler	Assemblers	Brokers	Other	Total
Nigeria	Beans/cowpea							
	Cassava	14.3	42.9	14.3			28.6	7
	Cocoyam							
	Groundnuts							
	Maize	16.7	66.7	16.7				6
	Yam							
	Banana	100.0						1
	Okro		100.0					1
	Pepper		100.0					1
	Pineapple							
	Plantain							
	Green veggie							
	Tomato		100.0					4
	Cocoa							
	Coffee							
	Kolanut							
	Orange							
	Oil palm							
	Total	15.0	65.0	10.0			10.0	20
Cameroon	Beans/cowpea		50.0	50.0				2
	Cassava		42.9	21.4	28.6	7.1		28
	Cocoyam		100.0					1
	Groundnuts		100.0					1
	Maize		21.1	42.1	31.6	5.3		19
	Yam							
	Banana					100.0		1

	Okro							
	Pepper							
	Pineapple							
	Plantain		100.0					1
	Green veggie							
	Tomato							
	Cocoa	12.5	37.5	25.0	12.5	12.5		8
	Coffee			50.0	50.0			2
	Kolanut							
	Orange							
	Oil palm							
	Total	1.6	36.5	28.6	25.4	7.9		63

Main controller of income from crop residue

Table xxx show the distribution of the households by the controller of the income from the crop residues. Only 20 of the Nigerian households and 63 households in Cameroon responded to this inquiry. So, we will again interpret only the last or total row of table, as previously done. Taking all the crops together for Nigeria , 95% of the households indicate husband as the controller of crop residue income. Among the Cameroon households, all the 63 respondents indicate husband as the controller of crop residue income.

Table xxx: Distribution of households by who controls income from crop residue

Country		who controls income from crop residue				
	Crop	Husband	Wife	Joint	Other member	Total
Nigeria	Beans/cowpea					
	Cassava	100.0				7
	Maize	100.0				6
	Banana	100.0				1
	Pepper	100.0				1
	Tomato	75.0	25.0			4
	Total	95.0	5.0			20
Cameroon	Beans/cowpea	100.0				2
	Cassava	100.0				28
	Cocoyam	100.0				1
	Groundnuts	100.0				1
	Maize	100.0				19
	Banana	100.0				1

	Plantain	100.0				1
	Cocoa	100.0				8
	Coffee	100.0				2
	Total	100.0				63

Animal dung

Dung utilization by households

Dung represents for animals what residues represent for crops. So, we will briefly explore the use of dungs among the responding households. Table xxx shows the distribution of households by usage of animal dung. Among the Nigerian households virtually all the households indicate non-usage of animal dungs. (Cameroon), the pattern is similar to the Nigeria's results, with 94-99% of all households indicating non-use of animal dung.

Table xxx: Distribution of the respondents by who use animal dung

		use of animal dung		
Country	State/province	No	Yes	Total
Nigeria	Osun	99.6	0.4	255
	Oyo	100.0		253
	Total	99.8	0.2	508
Cameroon	Central province	99.4	0.6	172
	West province	98.9	1.1	95
	Southwest province	95.2	4.8	62
	Littoral province	94.4	5.5	164
	Total	97.2	2.8	493

Dung allocation to different uses

The survey was interested to know the sharing of animal dung among manure, fuel, house maintenance, biogas, sale and waste. Arising from the results in Table xxx , however, it is hardly surprising that there were no responses to this inquiry among the Nigerian households. Among the Cameroon households, the only data available was from the littoral province. In the littoral

province, the dry season allocation of animal dung is 36.7% to manure, 4.9% as fuel, 0.8% for house maintenance, 0.6% as biogas, 1.4% for sale and 2.1% as waste. During the rainy season, the allocation of animal dung is 37.5% to manure, 2.6% as fuel, 1.0% for house maintenance, 0.4% as biogas, 10.0% for sale and 0.4% as waste.

Table xxx: Average percentage of dung utilized for indicated purposes

Country	State/ province	Season	% used as manure	% used as fuel	% used for house maintenance	% used as biogas	% sold	% wasted
Nigeria	Osun	Dry						
		Rainy						
	Oyo	Dry						
		Rainy						
Cameroon	Central	Dry						
		Rainy						
	West	Dry						
		Rainy						
	Southwest	Dry	100.0(3)					
		Rainy	100.0(3)					
	Littoral	Dry	36.67(9)	4.9(7)	0.8(7)	0.6(7)	1.4(7)	2.1(7)
		Rainy	37.5(6)	2.6(5)	1.0(5)	0.4(5)	10.0(5)	0.4(5)

Note: for each x(y), x is the percent of total dung utilized for a purpose, and y is the computing subsample.
Note: no data to compute results for the empty cells

3.8 Household Expenditure and Income

Expenditure for non-agricultural purposes

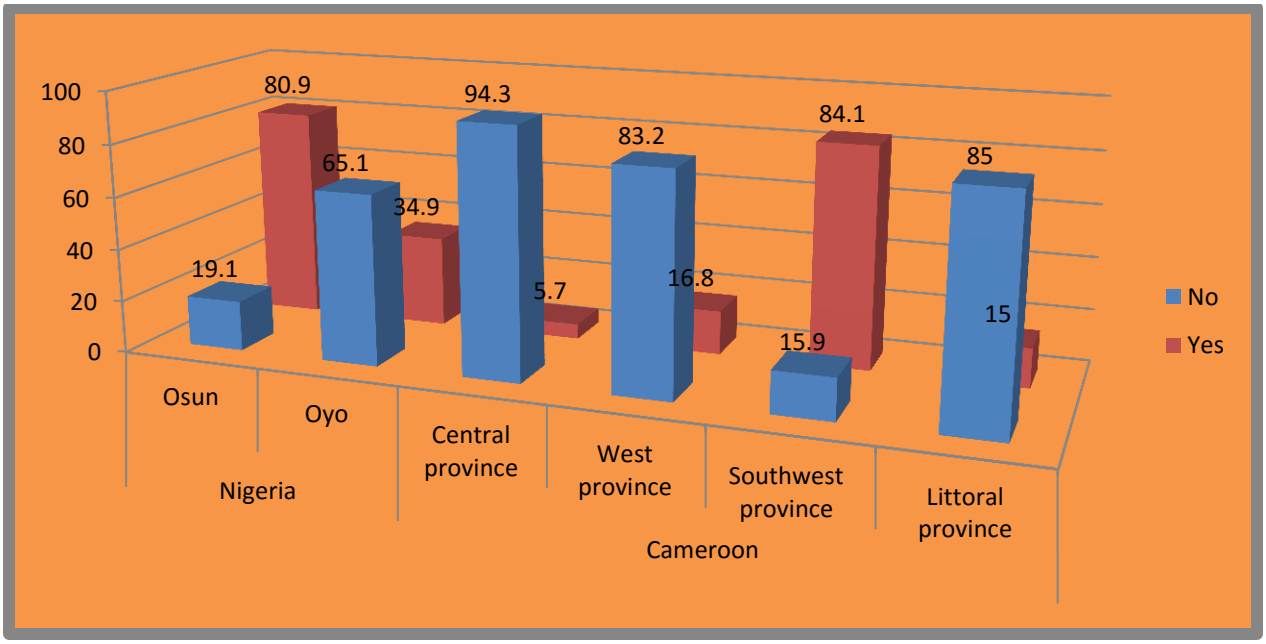
Table xxx shows the distribution of household by nonfarm expenditure decision. State or provincial and country level analyses are presented. Among the Nigerian households, 80.9% of Osun respondents and 34.9% of Oyo respondents spend on non-farm activities, with country average of 58.2%. Among the Cameroon households, and with the exception of southwest province with 84.1%, the percentages of households spending on nonfarm activities are 5.7-16.8,

with a country average of 20.2. Thus, state level analysis helps to bring out inter-state differences, where they exist. Table xxx is illustrated further in Fig xxx.

Table xxx: Distribution of the respondents by who spend on nonfarm activities

		Spend on nonfarm activities		
Country	State/province	No	Yes	Total
Nigeria	Osun	19.1	80.9	257
	Oyo	65.1	34.9	252
	Total	41.8	58.2	509
Cameroon	Central province	94.3	5.7	194
	West province	83.2	16.8	95
	Southwest province	15.9	84.1	63
	Littoral province	85.0	15.0	167
	Total	79.8	20.2	519

Fig xxx: Distribution of households by nonfarm spending decision



Types of non-agricultural expenses, by season

Table xxx show the distribution of households by types of nonfarm expenses and seasons they are incurred. Among the Nigerian households, the number of respondents staggers, with school fees (37.5%) and personal expenses (42.4%) topping all other expense types. Taking all the

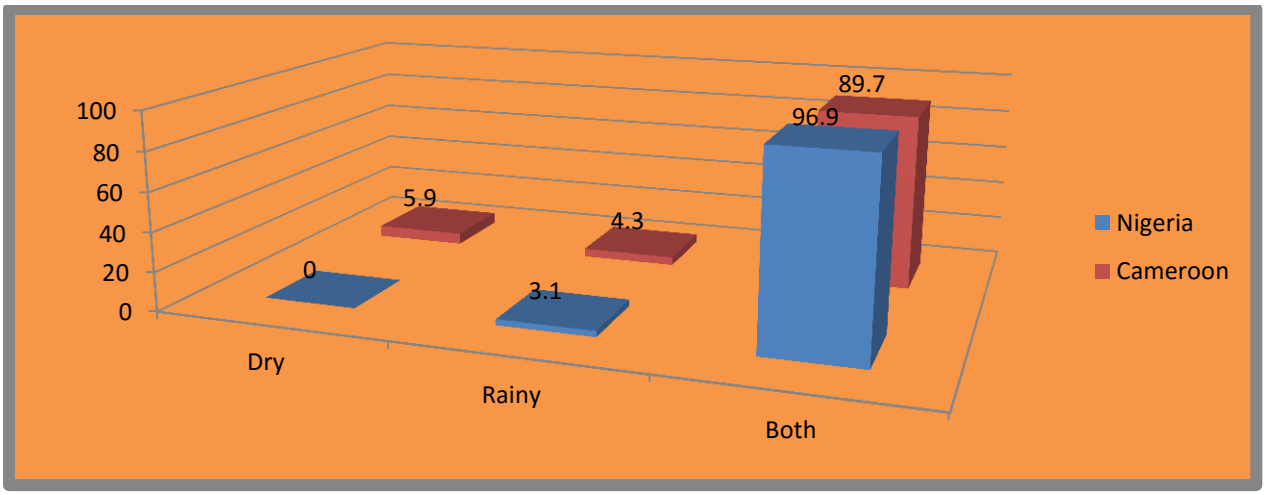
nonfarm expenses together, no household spent on any item strictly in the dry season, 3.1% of the households spend on nonfarm items during the rainy season, while 96.9% of them spend on the items listed during both seasons.

Among the Cameroon households, with relatively fewer respondents compared to Nigeria, school fees (38.4%), business (20.5%) and personal expenses (17.3%) topping all other expense types. Taking all the nonfarm expenses together (last row), 5.9% of the households spend on some items strictly in the dry season, 4.3% spend on some items during the rainy season, while 89.7% of them spend on the items listed during both seasons. Table xxx is further illustrated in Figs xxx .

Table xxx: Distribution of households by non-agricultural expenses and season

	Nigeria				Cameroon			
Expense type	Dry	Rainy	Both	Total	Dry	Rainy	Both	Total
School fees		3.0	97.0	169	8.5	2.8	88.7	71
Business			100.0	41	7.9	10.5	81.6	38
Services (like water)		100.0		1			100.0	9
Personal (like clothing)		2.1	97.9	191	6.3	6.3	87.5	32
Saving in banks		5.6	94.4	18			100.0	7
Saving in groups		50.0	50.0	2			100.0	4
Payment of loan (bank)								
Payment of loan (groups)								
Health			100.0	11			100.0	20
Social/Cultural events		14.3	85.7	7			100.0	1
Social ceremony			100.0	10			100.0	3
Remittances		100.0		1				
Other								
Total		3.1	96.9	451	5.9	4.3	89.7	185

Fig xxx: Distribution of households by season of nonfarm expenditure



Amount of non-agricultural expenses, by type and season

Table xxx shows the average expenditure on nonfarm items disaggregated by seasons for Nigeria and Cameroon. Consistent with our earlier results on this aspect of the survey, expenses were reported more for 'both' seasons than either dry or rainy season. Also, in instances with sufficient observations for computations, the average expenses associated with 'both' seasons tends to be higher, as expected, than those for either seasons. Among the Nigerian households, non-agricultural expenses for both seasons average N58,243.90 for school fees, N54,829.27 for business, N7,548.15 for personal expenses, among other results. Among the Cameroon households, non-agricultural expenses in both seasons average CFA216,650.80 for school fees, CFA172,290.30 for business, CFA39,285.71 for personal expenses and CFA33,500 for health.

Table xxx: Average non-agricultural expenses by type and season (LCU)

	Nigeria			Cameroon		
Expense type	Season	Average non-agricultural expenses (Naira)	(n)	Season	Average non-agricultural expenses (CFA)	(n)
School fees	Rainy Both	39,000.00 58,243.90	5 164	Dry Rainy Both	197,500.00 200,000.00 216,650.80	6 2 63
Business	Both	54,829.27	41	Dry Rainy Both	83,333.33 32,000.00 172,290.30	3 4 31
Services (like water)				Both	23,333.33	9

Personal (like clothing)	Rainy Both	3,275.00 7,548.15	4 187	Dry Rainy Both	60,000.00 43,000.00 39,285.71	2 2 28
Saving in banks	Both	157,771.20	17	Both	364,285.70	7
Saving in groups				Both	137,500.00	4
Payment of loan (bank)						
Payment of loan (groups)						
Health	Both	8,090.91	11	Both	33,500.00	20
Social/Cultural events	Both	7,166.67	6			
Social ceremony	Both	7,900.00	10	Both	23,333.33	3
Remittances						
Other						

Nonfarm employment and income

Table xxx shows the distribution of household by nonfarm income earning. State or provincial and country level analyses are presented, as was for nonfarm expenses. Among the Nigerian households, 37.4% of Osun households and 27.4% of Oyo households earn non-farm income, with country average of 32.4%. Among the Cameroon households , the percentages of households earning nonfarm income varies from 28.4 (Central province) to 37.9, with a country average of 32.8. Thus, it would appear that households in both countries are less forthcoming about their nonfarm income than nonfarm expenses.

Table xxx: Distribution of the respondents by who earn nonfarm income

		earn nonfarm income		
Country	State/province	No	Yes	Total
Nigeria	Osun	62.6	37.4	257
	Oyo	72.6	27.4	252
	Total	67.6	32.4	509
Cameroon	Central province	71.6	28.4	194
	West province	62.1	37.9	95
	Southwest province	63.5	36.5	63
	Littoral province	66.5	33.5	167
	Total	67.2	32.8	519

Types of non-farm employment and season

Households were asked to indicate the types of nonfarm employment they engage in. The options are self-employment, student, formal employment and informal employment.Table xxx shows the results, disaggregated by seasons. Self-employment appear to dominate other non-farm employment types, with 80.0% in Osun and 90.5% in Oyo associated with it . Taking all the nonfarm employments together, 94.3% of the households in Osun and 88.4% of the households in Oyo engage in some nonfarm employment in 'both' seasons.

Among the Cameroon households, self-employment again dominate other non-farm employment types, involving 91% of the households in southwest and 100.0% of the households in each of the central, west and littoral provinces. Taking all the nonfarm employments together, 83.6% of the households in the central province, all the households in the west province, 93.9% in the southwest province and 55.7% of the households in the littoral province engage in some nonfarm employment in 'both' seasons.

Table xxx: Distribution of households by type of non-farm employment and season

Country	State/province	Non-farm employment	Season			
			Dry	Rainy	Both	Total
Nigeria	Osun	Self-employment		7.1	92.9	112
		Student			100.0	22
		Formal employment			100.0	4
		Informal employment			100.0	2
		Total		5.7	94.3	140
	Oyo	Self-employment	2.3	9.3	88.4	86
		Student		11.1	88.9	9
		Formal employment				
		Informal employment				
		Total	2.1	9.5	88.4	95
Cameroon	Central	Self-employment	12.7	3.6	83.6	55
		Student				
		Formal employment				
		Informal employment				
		Total	12.7	3.6	83.6	55
	West	Self-employment			100.0	40

		Student				
		Formal employment				
		Informal employment				
		Total			100.0	40
	Southwest	Self-employment	3.3	3.3	93.3	30
		Student			100.0	3
		Formal employment				
		Informal employment				
		Total	3.0	3.0	93.9	33
	Littoral	Self-employment	8.6	35.7	55.7	70
		Student				
		Formal employment				
		Informal employment				
		Total	8.6	35.7	55.7	70

Types of non-farm income

Table xxx shows the distribution of households by type of nonfarm income, disaggregated by seasons. The options are remittances, business, employment, interests from savings, revolving fund (esusu). Business appear to dominate other non-farm income types, with 90.5% households in Osun and 79.7% in Oyo selecting this option . Taking all the nonfarm income types together, 93.7% of the households in Osun and 93.8% of the households in Oyo earn nonfarm employment in 'both' seasons.

Among the Cameroon households, business again dominate other non-farm income types, involving 71.4% of the households in the central province, 77.5% in the west province, 78.6% in the southwest and 81.0 in littoral province. Taking all the nonfarm income types together87.8% of the households in the central province, all the households in the west province, 92.9% in the southwest province and 46.6% of the households in the littoral province engage in some nonfarm employment in 'both' seasons. a strong 43.1% of the households in littoral province also earn their nonfarm income strictly in the rainy season.

Table xxx: Distribution of households by type of non-farm income and season

Country	State/province	Non-farm income	Season			
			Dry	Rainy	Both	Total

Nigeria	Osun	Remittances			100.0	1
		Business		70.0	93.0	114
		Employment			100.0	11
		Interests from savings				
		Revolving fund (Esusu)				
		Total		6.3	93.7	126
	Oyo	Remittances			100.0	3
		Business	3.9	2.0	94.1	51
		Employment		14.3	85.7	7
		Interests from savings				
		Revolving fund (Esusu)			100.0	3
		Total	3.1	3.1	93.8	64
Cameroon	Central	Remittances				
		Business	11.4	2.9	85.7	35
		Employment	7.1		92.9	14
		Interests from savings				
		Revolving fund (Esusu)				
		Total	10.2	2.0	87.8	49
	West	Remittances			100.0	2
		Business			100.0	31
		Employment			100.0	7
		Interests from savings				
		Revolving fund (Esusu)				
		Total			100.0	40
	Southwest	Remittances			100.0	1
		Business	4.5	4.5	90.9	22
		Employment			100.0	5
		Interests from savings				
		Revolving fund (Esusu)				
		Total	3.6	3.6	92.9	28
	Littoral	Remittances		100.0		1
		Business	10.6	46.8	42.6	47
		Employment	12.5	12.5	75.0	8
		Interests from savings		50.0	50.0	2
		Revolving fund (Esusu)				
		Total	10.3	43.1	46.6	58

Controller of non-farm income, by type and season

Table xxx shows the distribution of households by the main controller of nonfarm income, disaggregated by nonfarm income type. Taking all the nonfarm income types together, the modal controllers are the female/wife in Osun (57.3%) and male/husbands in Oyo (72.7%). Among the Cameroon households, the modal controllers of nonfarm income are male/husbands in the central province (95.5%), west province (100%), southwest province (79.2%) and littoral province (100.0%).

Table xxx: Distribution of households by controller of non-farm income

Country	State/province	Non-farm income	controller			
			Male	Female	Joint	Total
Nigeria	Osun	Remittances				
		Business	34.3	60.6	5.1	99
		Employment	27.3	27.3	45.5	11
		Interests from savings				
		Revolving fund (Esusu)				
		Total	33.6	57.3	9.1	110
	Oyo	Remittances	100.0			3
		Business	72.7	27.3		44
		Employment	50.0	33.3	16.7	6
		Interests from savings				
		Revolving fund (Esusu)	100.0			2
		Total	72.7	25.5	1.8	55
Cameroon	Central	Remittances				
		Business	96.8	3.2		31
		Employment	92.3	7.7		13
		Interests from savings				
		Revolving fund (Esusu)				
		Total	95.5	4.5		44
	West	Remittances	100.0			1
		Business	100.0			28
		Employment	100.0			7
		Interests from savings				
		Revolving fund (Esusu)				
		Total	100.0			36
	Southwest	Remittances		100.0		1

		Business	90.0	10.0		20
		Employment	33.3	66.7		3
		Interests from savings				
		Revolving fund (Esusu)				
		Total	79.2	20.8		24
	Littoral	Remittances	100.0			1
		Business	100.0			45
		Employment	100.0			7
		Interests from savings	100.0			2
		Revolving fund (Esusu)				
		Total	100.0			55

Amount of nonfarm income

Table xxx shows the average nonfarm income, disaggregated by seasons. Households have reported more income for 'both' seasons than either dry or rainy season. Also, for computations done with sufficient observations, the average nonfarm income associated with 'both' seasons tends to be higher, than those for either seasons. For both Nigeria and Cameroon, the average income from business and employment under self-employment outweighs any other type of nonfarm income in magnitude.

Table xxx: Average nonfarm income of households, by nonfarm income type, nonfarm employment type and season (LCU)

		Nigeria			Cameroon		
Nonfarm employment type	nonfarm income type	Season	Average income (Naira)	(n)	Season	Average income (CFA)	(n)
Self-employment	Remittances	Both	5,000.00	3	Both	158,333.33	3
	Business	Dry Rainy Both	2,000.00 38,888.89 35,799.21	2 9 127	Dry Rainy Both	77,500.00 38,620.00 116,820.10	10 24 100
	Employment	Both	60,545.45	11	Dry Both	112,500.00 106,379.31	2 29
	Interests from savings						
	Revolving fund (Esusu)	Both	60,000.00	3			

Student	Remittances						
	Business	Both	39,590.91	22			
	Employment	Both	114,000.00	5	Both	250,000.00	2
	Interests from savings						
	Revolving fund (Esusu)						
Formal employment	Remittances						
	Business	Both	115,000.00	3			
	Employment						
	Interests from savings						
	Revolving fund (Esusu)						
Informal employment	Remittances						
	Business	Both	75,000.00	2			
	Employment						
	Interests from savings						
	Revolving fund (Esusu)						

3.9 Principal Component Analysis of the HT Project:

Theoretical Framework

A large dataset presumably begins with a large number of variables. PCA attempts to use fewer variables to reflect most of the information contained in the large dataset. The expectation is that the variables in the initial dataset are related to the fewer unobserved factors or latent variables or constructs. The key steps in the PCA include tests for data adequacy, factor extraction, factor rotation, factor interpretation and factor score classification of subjects.

Tests for data adequacy

In order to apply PCA successfully, there is a minimum set of data requirements that must be met. First, it is recommended to have a minimum of 300 subjects in the sample (Field, 2005). Second, a set of variables is expected to be inter-correlated if they are to successfully reflect some underlying dimension(s). All variables are expected to measure their underlying construct

in the same direction. It is also expected that clusters of variables measuring a given construct should themselves be inter-correlated. At the same time, we do not wish for too high correlations between pairs of variables, which may suggest multicollinearity or singularity of the correlation (R-matrix) matrix.

For a determinant value greater than 0.00001, the R-matrix is said to be non-singular. For any pair of variables with correlation greater than 0.8, it is recommended to eliminate one of the variables from PCA analysis. In the Bartlett's test of sphericity, the null hypothesis is that the R-matrix is an identity matrix. A significant Chi-square statistic (p=0.05 or less) suggests that the R-matrix is not an identity matrix and thus, factor analysis is appropriate. A widely reported measure of data adequacy is the Kaiser-Meyer-Olkin (KMO)index. The KMO measure of sample adequacy is assessed on (0,1). PCA is best applied for KMO index $\geq$ 0.8, and unacceptable if <0.5. In index value of 0 means that the pattern of correlations are relatively diffuse, while 1 means a relatively compact correlation pattern.

Factor extraction

The number of factors extracted will normally equal the number of variables in the dataset. Since PCA is a variable reduction method, some criteria are applied to determine the relevant factors among those extracted. Extracted factors are retained or dropped based on Kaiser's Eigenvalue criterion and the scree plot. To aid the determination of the factors to be retained, SPSS display the eigenvalues before factor extraction, after factor extraction and after factor rotation. Eigenvalues are also displayed in terms of the % of the total variance explained by each extracted factor. By default (Kaiser's recommendation), the retained factors have eignevalues or characteristic roots higher than 1.0 (Kaiser, 1960; Sharma 1996; Hair et al, 1995). The number of factors up to the scree plot's inflexion point (or elbow) provides a complementary guide. The 'total variance explained' table shows the variability in the dataset accounted for by the extracted factors. The variance explained by each retained factor is the same before and after rotation. However, the magnitudes of the retained eigenvalues after rotation are redistributed almost equitably, compared to those displayed before factor rotation.

A supplementary output at factor extraction shows the communality values. For each variable, communality is set to 1.0 before factor extraction. The amount of variance in each variable that is accounted for by the relevant factors after extraction is the community value and may be interpreted in % terms. A value of over 0.5 is recommended is recommended for a variable to be retained, after factor extraction (Field, 2005). In another sense, communality measures the total influence on a variable by all the relevant factors. Measured on (0,1), 1 means that a set of factors fully predict a variable, and 0 means that the variable cannot be predicted by any of the factors in the model. Communality is similar to the R-square in multiple regression. The computation may be motivated as $C_i = f^2_{1i} + f^2_{2i} + \ldots\ldots\ldots\ldots\ldots + f^2_{ki}$, where f_{ji} is the loading of variable i on factor j, j=1,2,……., k. Each communality value is computed using the component matrix output.

Factor rotation and interpretation

Towards improving the interpretation of the extracted factors, it is recommended to rotate them. Varimax method is recommended if the retained factors are assumed independent or orthogonal (Anastasiadou, 2006), while Direct Oblimin is one of the methods recommended if the factors are assumed to be interrelated. In the rotated or unrotated component matrix, factors with loadings of 0.4 or more are preferred for interpretation. Factor loading measures the correlation between a variable and an extracted factor. Loading is measured on (0,1) and preferred when closer to 1.0. The loadings in the unrotated component matrix are not very important for interpretation, unless they are unchanged after factor rotation. The loading of a variable on to a factor can be positive or negative; what is important is high loading.

The beauty of factor analysis lies in the eventual ability to associate each factor with real-world constructs, based on the variables loaded on to it. Where possible, an important outcome of PCA/FA is to be able to label each factor, that is, give a name to the factor or construct based on the observed variables loaded on to it. For ease of labeling, it is preferred to have unique loadings, that is, having a variable loaded on to no more than one factor. For each retained factor, scores are generated on the subjects in the sample. The scores can be analyzed to know which subject or group score low or high on each factor. Each factor score is distributed N(0,1), being standardized normal variables.

PCA Application to the HT data

The foregoing procedures were applied to the HT dataset. The decision for the scope of PCA application was guided by the necessity that PCA works best on interval variables and reluctantly on ordinal variables (Beaumont, 2012). This, along with the need to have a minimum of 300 subjects in each country's sample, resulted in only 44 variables eligible for our PCA dataset. The 44 variables, taken from 12 data files, are presented in Appendix Table xxx. In deciding which variables to include in the PCA, bivariate correlations of the 44 variables were computed. Being a huge R-matrix, we simply summarized this into the number of statistically significant correlations between variable Xi and other Xjs for each country. This information is sorted in decreasing order and presented in Appendix Table xxx.

The next step was to determine the adequacy of the data for each country for PCA. In Table xxx, K-M-O's measure of sample adequacy (MSA) is above 0.7 for each country, clearly higher than the recommended minimum of over 0.5. Furthermore, Bartlett's approximate Chi-Square test of sphericity is significant at less than 5% for each country. Finally, the determinant of the R-matrix for Nigeria (0.001) and Cameroon (0.002) each exceed the recommended minimum value of 0.00001. Thus, we have non-singular R-matrices for both countries, and PCA can proceed. We should add that attempts to admit more variables into the PCA beyond those reported below depressed the determinant of the R-matrix, and often trended towards singular matrices.

Table xxx: tests of data adequacy

Test		Nigeria	Cameroon
K-M-O MSA		0.725	0.724
Bartlett's TOS	Approx Chi_Square	3764.46	4017.25
	df	153	66
	Sig.	.000	.000
Determinant of R-matrix		.001	0.002

Note: MSA= Measure of sampling adequacy; TOS= test of sphericity

The outputs for factor extraction occurs in three parts, communality table, total variance explained table and the scree plot. The scree plots are not presented in this report because they agree with the decisions using both Kaiser's eigenvalue criterion and Watkins'(2000) Monte Carlo parallel eigenvalues. In the Nigeria data, only variable 'own scattered trees' had less than

0.5 communality value, while the overall average for the country is 0.663. And, in the Cameroon data, only variables 'household member age' and 'use male labour for (farm) activity' scores less than 0.5, with a national average value of 0.724.

Table xxx: communality values

	Nigeria			Cameroon		
Variables	Initial	Extraction	Variables	Initial	Extraction	
Most important for sales	1.000	.829	Does this household own any scattered trees?	1.000	.643	
Taking most of the land	1.000	.833	Does this household have any expenses for non-agricultural activities?	1.000	.667	
Taking most of the labour	1.000	.782	Taking most of the land	1.000	.904	
Most important for household consumption	1.000	.511	Is hired/shared labor used for this activity during this season?	1.000	.709	
How many different crops does the household grow?	1.000	.585	Taking most of the labour	1.000	.906	
Does this household have any expenses for non-agricultural activities?	1.000	.622	Household member age	1.000	.410	
Does this household own any scattered trees?	1.000	.396	During the Main cropping/rainy season, does this member engage in on-farm (Domestic) activities?	1.000	.948	
During the Main cropping/rainy season, does this member engage in on-farm (Domestic) activities?	1.000	.963	During the Dry season, does this member engage in on-farm (Domestic) activities?	1.000	.945	
Is respondent the household head?	1.000	.543	Most important for household	1.000	.699	

			consumption			
How long does it take you to get to the farm from your home? (minutes)	1.000	.526	Is male labor from the household used for this activity during this season?	1.000	.477	
How was this farm acquired?	1.000	.628	Please state the other costs (e.g. value meals paid in kind)	1.000	.538	
Does this household generate income from non-agricultural activities?	1.000	.659	Most important for sales	1.000	.836	
During the Dry season, does this member engage in on-farm (Domestic) activities?	1.000	.962	Overall		0.724	
Are any residues produced on this farm?	1.000	.527				
Did you sell any of the products from this crop?	1.000	.660				
What is your opinion on the changes in yield level of your crops in this farm?	1.000	.648				
How many products are produced from this crop?	1.000	.568				
Please state the other costs (e.g. value meals paid in kind)	1.000	.691				
Overall		0.663				

Tables xxx and xxx show the total variance explained outputs for Nigeria and Cameroon, respectively. Based on Kaiser's criterion, only 7 of the extracted factors are retained for Nigeria and only 4 factors are retained in the Cameroon table. In the Nigeria table, a total of 66.3% of the total variability in the data is explained by the 7 factors retained, while the 4 factors retained in the Cameroon table explained 69.3% of the variability in the data. As previously explained, the initial eigenvalues (column 2) have been resized in after factor rotation (column 8) in each of Tables xxx and xxx.

Table xxx: Total variance explained - Nigeria

Total Variance Explained									
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.580	19.888	19.888	3.580	19.888	19.888	3.053	16.959	16.959
2	2.306	12.808	32.697	2.306	12.808	32.697	2.026	11.257	28.216
3	1.468	8.154	40.850	1.468	8.154	40.850	1.603	8.904	37.120
4	1.317	7.314	48.165	1.317	7.314	48.165	1.542	8.567	45.687
5	1.121	6.226	54.391	1.121	6.226	54.391	1.312	7.289	52.976
6	1.099	6.108	60.499	1.099	6.108	60.499	1.275	7.086	60.061
7	1.044	5.800	66.299	1.044	5.800	66.299	1.123	6.238	66.299
8	.921	5.119	71.418						

Table xxx: Total variance explained – Cameroon

Total Variance Explained									
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.390	28.248	28.248	3.390	28.248	28.248	3.349	27.910	27.910
2	1.999	16.661	44.909	1.999	16.661	44.909	1.938	16.147	44.057
3	1.631	13.595	58.504	1.631	13.595	58.504	1.714	14.285	58.342
4	1.301	10.844	69.348	1.301	10.844	69.348	1.321	11.006	69.348
5	.988	8.233	77.580						

Interpretation of extracted factors

To aid the interpretation of the retained factors we present them in their rotated forms. Table xxx shows the rotated component matrix for both Nigeria and Cameroon. The country results are placed side by side for convenience, but not variable-wise, because different variables loaded into different factors in each country. In Nigeria, the variables with high and positive loadings on factor 1 are those that rank crop as 'Most important for sales' (.903), 'Taking most of the

land' (.900), 'Taking most of the labour' (.870) and 'Most important for household consumption' (.690), respectively.

Two inquiries load heavily and positively on factor 2, namely 'During the Main cropping/rainy season, does this member engage in on-farm (Domestic) activities?' (.963) and 'During the Dry season, does this member engage in on-farm (Domestic) activities?' (.960). We should mention that other variables in this category were highly correlated with these two variables and had to be eliminated to avoid a singular R-matrix. These include 'During the Main cropping/rainy season, does this member engage in on-farm (Farming) activities?', 'During the Main cropping/rainy season, does this member engage in off-farm activities?', 'During the Dry season, does this member engage in on-farm (Farming) activities?', and 'During the Dry season, does this member engage in off-farm activities?'

Only 2 of the 3 variables loading on factor 3 does so highly. These are 'What is your opinion on the changes in yield level of your crops in this farm?' with negative loading (-.789) and 'How was this farm acquired?' (.720). One variable loads highly on factor 4, that is 'Does this household generate income from non-agricultural activities?' (.797) while the other 2 variables demonstrates medium-level loading, 'Does this household have any expenses for non-agricultural activities?' (.642) and 'Does this household own any scattered trees?'(.522). Two variables loads fairly highly on factor 5, namely 'Did you sell any of the products from this crop?' (.782) and 'How many products are produced from this crop?' (.693). Variable 'Is respondent the household head?' shows high and positive loading on factor 6 (.708), while medium-level loadings are shown on this factor by 'How many different crops does the household grow?' (.583) and 'Are any residues produced on this farm?' (.575). Two variables showed high and medium loadings on factor 7, respectively, namely 'Please state the other costs (e.g. value meals paid in kind)' (.796) and 'How long does it take you to get to the farm from your home? (minutes)' (.636).

On the Cameroon side of the table, the variables with high and positive loadings on factor 1 are those that rank crop as 'Taking most of the land' (.950), 'Taking most of the labour' (.950), 'Most important for sales' (.914), and 'Most important for household consumption' (.832), respectively. As obtained for Nigeria, the two inquiries that loads heavily and positively on factor 2 are 'During the Main cropping/rainy season, does this member engage in on-farm

(Domestic) activities?' (.972) and 'During the Dry season, does this member engage in on-farm (Domestic) activities?' (.971). Again, we note here that other variables in this category were highly correlated with these two variables and had to be eliminated to avoid a singular R-matrix.

Three variables load highly and positively on factor 3. These are 'Is hired/shared labor used for this activity during this season?' (.839), 'Please state the other costs (e.g. value meals paid in kind)' (.723) and 'Is male labor from the household used for this activity during this season?' (.681). Finally, two inquiries load highly and positively on factor 4, namely 'Does this household have any expenses for non-agricultural activities?' (.806) and 'Does this household own any scattered trees?' (.791).

Table xxx: Rotated Component Matrix

	Nigeria							Cameroon				
	Component							Component				
	1	2	3	4	5	6	7		1	2	3	4
Most important for sales	.903							Taking most of the land	.950			
Taking most of the land	.900							Taking most of the labour	.950			
Taking most of the labour	.870							Most important for sales	.914			
Most important for household consumption	.692							Most important for household consumption	.832			
During the Main cropping/rainy season, does this member engage in on-farm (Domestic) activities?		.963						During the Main cropping/rainy season, does this member engage in on-farm (Domestic) activities?		.972		
During the Dry season, does this member engage in on-farm (Domestic)		.960						During the Dry season, does this member engage in on-farm		.971		

	Nigeria							Cameroon				
	Component							Component				
	1	2	3	4	5	6	7		1	2	3	4
activities?								(Domestic) activities?				
What is your opinion on the changes in yield level of your crops in this farm?			-.789					Household member age				
How was this farm acquired?			.720					Is hired/shared labor used for this activity during this season?			.839	
Does this household generate income from non-agricultural activities?				.797				Please state the other costs (e.g. value meals paid in kind)			.723	
Does this household have any expenses for non-agricultural activities?			.403	.642				Is male labor from the household used for this activity during this season?			.681	
Does this household own any scattered trees?				.522				Does this household have any expenses for				.806

	Nigeria							Cameroon				
	Component							Component				
	1	2	3	4	5	6	7		1	2	3	4
								non-agricultural activities?				
Did you sell any of the products from this crop?					.782			Does this household own any scattered trees?				.791
How many products are produced from this crop?					.693							
Is respondent the household head?						.708						
How many different crops does the household grow?						.583						
Are any residues produced on this farm?						.575						
Please state the other costs (e.g. value meals paid in kind)							.796					
How long does it take you to get to the farm							.636					

	Nigeria							Cameroon				
	Component							Component				
	1	2	3	4	5	6	7		1	2	3	4
from your home? (minutes)												
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.												

Labeling of the factors

Table xxx shows the suggested labels for the retained factors. The suggestions are based on some presumed underlying concern for livelihood improvement among the Nigerian and Cameroon households in the study areas. Any number of labels is open to suggestions; so, factor labeling may be a subjective exercise, but nonetheless a useful guide for the use of the factor scores in the classification of subjects, if desired. In the alternative, factor scores may be simply classified and described using the variables loaded on to each.

Table xxx: suggested labels for the retained factors

Country	Factor	Variables loaded	Suggested factor label
Nigeria	1	'Most important for sales', 'Taking most of the land', 'Taking most of the labour' , 'Most important for household consumption'	Food security activities
	2	'During the Main cropping/rainy season, does this member engage in on-farm (Domestic) activities?', 'During the Dry season, does this member engage in on-farm (Domestic) activities?'	On-farm domestic Activity
	3	'What is your opinion on the changes in yield level of your crops in this farm?', 'How was this farm acquired?'	Technology adoption
	4	'Does this household generate income from non-agricultural activities?', 'Does this household have any expenses for non-agricultural activities?' and 'Does this household own any scattered trees?'	Non-farm income and expenses
	5	'Did you sell any of the products from this crop?' and 'How many products are produced from this crop?'	Product Selling activity
	6	'Is respondent the household head?' , 'How many different crops does the household grow?' and 'Are any residues produced on this farm?' .	Cropping activities
	7	'Please state the other (hired labour)costs (e.g. value meals paid in kind)' and 'How long does it take you to get to the farm from your home? (minutes)'	Labour hiring activities
Cameroon	1	'Taking most of the land' , 'Taking most of the labour' , 'Most important for sales' , and 'Most important for household consumption'	Food security activities
	2	'During the Main cropping/rainy season, does this member engage in on-farm (Domestic) activities?' and 'During the Dry season, does this member engage in on-farm (Domestic) activities?'	On-farm domestic Activity

	3	'Is hired/shared labor used for this activity during this season?' , 'Please state the other costs (e.g. value meals paid in kind)' and 'Is male labor from the household used for this activity during this season?'	Labour hiring activities
	4	'Does this household have any expenses for non-agricultural activities?' and 'Does this household own any scattered trees?'	Non-farm income and expenses

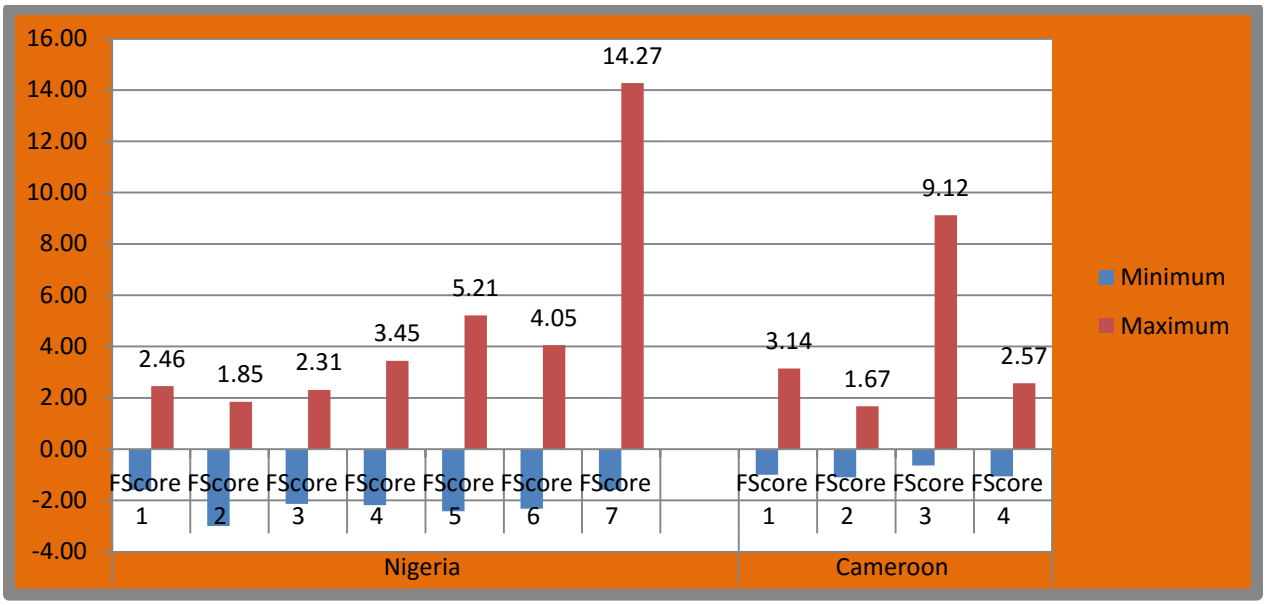
Descriptive statistics of the factor scores

Scores have been generated on each retained factor, which can be used to describe or classify the subjects, depending on the research objectives. Table xxx and Fig xxx are two sides of the same information. Because each factor score (FS) was generated as a standard normal variable, its mean and variance are 0 and 1, respectively. More technically, S ~ N(0,1). The top 2 highest scores in the Nigeria data are associated with factor 7 (14.3), suggested as 'labour hiring activities' and factor 5 (5.2), suggested as 'product selling activities'. And, in the Cameroon data, the top 2 scores are for factor 3 (9.1) or 'labour hiring activities' and factor 1 (3.1) or 'food security activities'. If one is persuaded by Chebychev's theorem, then we expect at least 90% of the scores for each factor to be located within 3 standard deviations of the zero mean. In this sense, scores outside this boundaries are likely more of outliers.

Table xxx: Descriptive statistics of the factor scores

Country		N	Minimum	Maximum	Mean	Variance
Nigeria	Regr factor score 1	565	-1.58579	2.46417	.0000000	1.000
	Regr factor score 2	565	-2.99453	1.85188	.0000000	1.000
	Regr factor score 3	565	-2.12706	2.31441	.0000000	1.000
	Regr factor score 4	565	-2.17997	3.45025	.0000000	1.000
	Regr factor score 5	565	-2.41427	5.21171	.0000000	1.000
	Regr factor score 6	565	-2.31893	4.05254	.0000000	1.000
	Regr factor score 7	565	-1.58094	14.27129	.0000000	1.000
Cameroon	Regr factor score 1	655	-.99786	3.13897	.0000000	1.000
	Regr factor score 2	655	-1.10183	1.66941	.0000000	1.000
	Regr factor score 3	655	-.63825	9.12451	.0000000	1.000
	Regr factor score 4	655	-1.06507	2.57207	.0000000	1.000

Fig xxx: Minimum and Maximum values of the Factor scores



Source: Table xxx.

Classification of households by retained factor scores

Following from the previous section, we now attempt to assess how households place on the various factor scores. Our unit of classification is the state or province, depending on the country. Table xxx shows the crosstab results for Nigeria. Starting with factor 1 (labeled food security activities), the modal score class is .01 to 1.00 for 29.9% in osun, -.99 to .00 for 32.2% households in oyo and -.99 to .00 for 30.9% in the full sample. Households scoring within +3 units of the factor mean are 46% in Osun, 49.7% in oyo and 48% in the full sample.

For factor 2 (labeled onfarm domestic activities), the modal score class locates on .01 to 1.00 for 88.2% of the osun households, 52.9% in oyo and 69.5% in the full sample. Thus, with the exception of oyo where 42.8% of the households place negatively on the score, most of the households score positively on factor 2. On factor 3 (technology adoption), the modal score class is .01 to 1.00 for 33% of the households in osun, 32% in oyo and 32% in the full sample. While 61% of the oyo households score negatively on technology adoption, 65.2% of the full sample scores positively.

For factor 4 (nonfarm income and expenses), the modal score class is -.99 to .00 for 44.5% of osun households, 38.6% in oyo and 41.4% in the full sample. Only among the osun households did we have at least 50% scoring positively on this factor. For factor 5 (labeled product selling activities), the modal score class is .01 to 1.00 among 53.4% in osun, 61.5% in oyo and 54.4% in the full sample. Close study further shows that 60.6% in osun, 66.8% in oyo and 60.6% in the full sample score within +3 units of the factor 4 mean.

For factor 6 (cropping activities), the modal score class is mixed, with 46% of the osun households and 37% of the full sample on .01 to 1.00, and 34.4% of oyo households on -.99 to .00 class. Thus, 71.8% of the households in osun and 52.8% of the full sample scores within +3 units, while 63.6% of the oyo households score within -3 units of factor 6 mean. And for factor 7 (labeled labour hiring activity), the modal score class is -.99 to .00 for 77.9% of osun households, 57% of oyo households and 67.4% of the full sample. Thus, households score low on this factor. However, a relatively strong 21% of the households in osun and 32.7% in oyo and 27.2% in the full sample score within +1 unit of the factor mean.

Table xxx: Distribution of households by factor scores, Nigeria

Factor	Suggested factor label	Score class	Osun	Oyo	Total
1	Food security activities	-2.99 to -2.00			
		-1.99 to -1.00	24.5	18.1	21.1
		-.99 to 0.00	29.5	32.2	30.9
		0.01 to 1.00	29.9	23.8	26.7
		1.01 to 2.00	15.7	25.2	20.8
		2.01 to 3.00	0.4	0.7	0.5
		3.01 to Highest			
		Total	261	298	559
2	On-farm domestic Activity	-2.99 to -2.00	1.5	1.3	1.4
		-1.99 to -1.00	8.4	39.1	24.6
		-.99 to 0.00	1.1	2.4	1.8
		0.01 to 1.00	88.2	52.9	69.5
		1.01 to 2.00	0.8	4.4	2.7
		2.01 to 3.00			
		3.01 to Highest			
		Total	263	297	560
3	Technology adoption	-2.99 to -2.00	0.0	1.0	0.5
		-1.99 to -1.00	8.3	31.3	20.6

Factor	Suggested factor label	Score class	Osun	Oyo	Total
		-.99 to 0.00	26.5	28.7	27.7
		0.01 to 1.00	32.6	31.7	32.1
		1.01 to 2.00	32.2	7.3	19.0
		2.01 to 3.00	0.4	0.0	0.2
		3.01 to Highest			
		Total	264	300	564
4	Non-farm income and expenses	-2.99 to -2.00	0.0	0.7	0.4
		-1.99 to -1.00	3.0	25.8	15.1
		-.99 to 0.00	44.5	38.6	41.4
		0.01 to 1.00	31.9	19.3	25.3
		1.01 to 2.00	16.3	12.2	14.2
		2.01 to 3.00	3.8	3.4	3.6
		3.01 to Highest	0.4	0.0	0.2
		Total	263	295	558
5	Product Selling activity	-2.99 to -2.00	0.8	1.3	1.1
		-1.99 to -1.00	28.8	14.8	21.4
		-.99 to 0.00	9.1	22.2	16.0
		0.01 to 1.00	53.4	55.2	54.4
		1.01 to 2.00	6.8	4.0	5.3
		2.01 to 3.00	0.4	1.3	0.9
		3.01 to Highest	0.8	1.0	0.9
		Total	264	297	561
6	Cropping activities	-2.99 to -2.00	0.0	3.7	2.0
		-1.99 to -1.00	3.4	25.4	15.1
		-.99 to 0.00	24.7	34.4	29.9
		0.01 to 1.00	46.0	29.1	37.0
		1.01 to 2.00	25.1	6.4	15.1
		2.01 to 3.00	0.8	0.7	0.7
		3.01 to Highest	0.0	0.3	0.2
		Total	263	299	562
7	Labour hiring activities	-2.99 to -2.00			
		-1.99 to -1.00	0.4	1.0	0.7
		-.99 to 0.00	77.9	57.0	66.7
		0.01 to 1.00	21.0	32.7	27.2
		1.01 to 2.00	0.4	6.3	3.6
		2.01 to 3.00	0.0	2.3	1.2
		3.01 to Highest	0.4	0.7	0.5
		Total	262	300	562

Table xxx shows the crosstab results for the factor scores in the Cameroon data. For factor 1 (food security activities), 66.1% of the central province households, 82.4% in the west province, 67.4% in the southwest province and 63.4% of the full sample have a modal score class of -.99 to

.00. This largely represents poor score on food security. In the littoral province, 48.1% of the households have a modal score class of -.99 to .00, and 51% of them score within +3 units of the factor mean. For factor 2 (onfarm domestic activities), 88.4% of the west province, 71.9% of the southwest province, 51.7% of the littoral province and 60% of the full sample have a modal score class of -.99 to .00. In the central province, 47.2% of the households has a modal score class of -.99 to .00, but with 52.9% scoring within +3 units of the zero mean.

In respect of factor 3 (labour hiring activity), the modal score class is -.99 to .00 for 60.3% of the households in the central province, 81.1% in the west province, 86.5% in the southwest province, 76.4% in the littoral province and 73% in the full sample. And, for factor 4 (nonfarm income and expenses), the modal score class is -.99 to .00 for 70.7% of the households in the central province, 63.6% in the west province, 81% in the littoral province and 65.1% of the full sample. In the southwest province, the score for factor 4 is bi-modal at .01 to 1.00 and 2.01 to 3.00 for 40.4% of the households, giving a total of 92% scoring within +3 units of the factor 4 mean.

Summarizing based on the full sample, at least 50% of the Nigerian households score within +3 units of the mean for factor 2 (nonfarm domestic activities), factor 3 (technology adoption) and factor 5 (cropping activities). Scores on the remaining factors are mainly in the negative territories. Among the Cameroon households, all the factors extracted (labeled as food security activities, onfarm domestic activities, labour hiring and nonfarm income and expenses), score mainly in the negative.

Table xxx: Distribution of households by factor scores, Cameroon

Factor	Suggested factor label	Score class	Central	West	Southwest	Littoral	Total
1	Food security activities	-2.99 to -2.00					
		-1.99 to -1.00					
		-.99 to 0.00	66.1	82.4	67.4	48.1	63.4
		0.01 to 1.00	17.4	11.8	16.9	12.9	14.8
		1.01 to 2.00	13.9	5.9	15.7	33.3	19.0
		2.01 to 3.00	2.2	0.0	0.0	5.2	2.5
		3.01 to Highest	0.4	0.0	0.0	0.5	0.3
		Total	230	119	89	210	648
2	On-farm domestic Activity	-2.99 to -2.00					
		-1.99 to -1.00	3.1	0.0	0.0	0.9	1.4
		-.99 to 0.00	44.1	88.4	71.9	51.7	58.6
		0.01 to 1.00	0.9	6.6	4.5	7.1	4.5
		1.01 to 2.00	52.0	5.0	23.6	40.3	35.5
		2.01 to 3.00					
		3.01 to Highest					
		Total	227	121	89	211	648
3	Labour hiring activities	-2.99 to -2.00					
		-1.99 to -1.00					
		-.99 to 0.00	60.3	81.1	86.5	76.4	73.0
		0.01 to 1.00	24.6	14.8	13.5	22.6	20.6
		1.01 to 2.00	0.4	0.8	0.0	0.5	0.5
		2.01 to 3.00	10.3	2.5	0.0	0.0	4.1
		3.01 to Highest	4.3	0.8	0.0	0.5	1.8
		Total	232	122	89	212	655
4	Non-farm income and expenses	-2.99 to -2.00					

Factor	Suggested factor label	Score class	Central	West	Southwest	Littoral	Total
		-1.99 to -1.00	0.9	2.5	1.1	0.5	1.1
		-.99 to 0.00	70.7	63.6	6.7	81.0	64.0
		0.01 to 1.00	22.0	22.3	40.4	14.7	22.2
		1.01 to 2.00	2.6	0.0	11.2	1.9	3.1
		2.01 to 3.00	3.9	11.6	40.4	1.9	9.6
		3.01 to Highest					
		Total	232	121	89	211	653

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APPENDIX RESULTS

Table A.1: Average total allocation of main product of crop to different uses, Nigeria

Crop	Average total human consumption of main product of crop	Computing subsample	average quantity of the crop product sold	Computing subsample	Average quantity of seed from product of crop	Computing subsample	average quantity of feed from main product of crop	Computing subsample	average quantity for other uses of product of crop	Computing subsample		
Beans/cowpea	29 bags	2	40 bags	2	2 bags	2			2 bags	2		
Cassava	298 kg 4 bags	29 33	1,195 kg 18 tons 384 bags	22 19 29	2kg 2 tons	34 7	1 kg	35	40 kg 1 bag	34 27		
Cocoyam			5 bags	2								
Groundnuts												
Maize	272 kg 28 bags	15 32	4,319 kg 7 tons 41 bags	12 6 28	8 kg 1 bag	23 26	1 kg	21	48 kg 2 bags	21 28		
Yam	21 kg 1 bag	8 20	11 tons 23 bags	6 22					5 kg 1 bag	11 17		
Banana												
Okro	10 kg 2 bags	3 2	40 kg 15 bags	2 2	3 kg	4			3 kg 1 bag	4 2		
Pepper	153 kg 3 bags	13 5	1,356 kg 3 tons 50 bags	6 3 8	2 kg	13	1 kg	12	6 kg 2bags	14 4		

Pineapple	10 kg	2							13 kg	2		
Plantain	11 kg 2 bags	6 6	105 bags	12			1 bag	5	2 kg 2 bags	7 5		
Green veggie												
Tomato	82 kg	9	667 kg 31 tons	7 2	5 kg	8			12 kg	9		
Cocoa			7 tons 20 bags	22 10	3 kg 1 bag	21 11						
Coffee												
Kolanut	5 kg	14	298 bags	16	1 kg	13			3 kg 1 bag	11 11		
Orange	3 kg	5	19 bags	8			1 bag	5	7 kg 2 bags	6 6		
Oil palm	15 other	4										

Note: The data in Appendix Tables A.1 and A.2 may appear similar to those in Appendix Tables A.3 and A.4, but they are not exactly the same. Each pair tables were generated from different inquiries during the survey

Table A.2: Average total allocation of main product of crop to different uses, Cameroon

Crop	Average total human consumption of main product of crop	Computing subsample	average quantity of the crop product sold	Computing subsample	Average quantity of seed from product of crop	Computing subsample	average quantity of feed from main product of crop	Computing subsample	average quantity for other uses of product of crop	Computing subsample
Beans/cowpea	3 bags	7	10 bags	13	8 kg 1 bag	3 6			1 bag	7
Cassava	101 kg 5 bags 18 other	2 47 10	1,848 bags	49	6 kg 1 bag	4 43	22 kg 1 bag	5 43	8 kg 2 bags	2 41
Cocoyam	8 bags	4	12 bags	6	6 kg	3	4 kg	3		
Groundnuts	4 bags 6 other	4 2	5 bags	4	5 kg 3 bags	3 2				
Maize	59 kg 4 bags 3 other	5 29 14	138 kg 20 bags	4 39	5 kg 2 bags	6 30	2 kg	7	1 kg	4
Yam										
Banana	5 bags	2	58 bags	2						
Okro	10 other	3	9 other	3	2 kg	2				
Pepper										
Pineapple	225 kg 43 other	2 3	26 bags	4						
Plantain	20 bags 53 other	10 12	51 bags 144 other	9 13					2 kg	2
Green veggie										
Tomato	13 bags	2	38 bags	2					2 bags	2
Cocoa			1,118 kg 3 tons 21 bags	5 13 65	2 kg 2 bags	26 37	1 kg 1 bag	23 39	6 kg	24
Coffee			2,500 kg	3			1 bag	13		

			31 bags	18						
Kolanut										
Orange										
Oil palm	19 kg	3	8 tons	2	9 kg	3			18 kg	3

Note: The data in Appendix Tables A.1 and A.2 may appear similar to those in Appendix Tables A.3 and A.4, but they are not exactly the same. Each pair tables were generated from different inquiries during the survey

Table A.3: Average quantities of food items produced and purchased during dry and wet seasons, Nigeria

	Dry season				Wet season			
Food item	On-farm production		Market purchase		On-farm production		Market purchase	
	Quantity	Subsample	Quantity	Subsample	Quantity	Subsample	Quantity	Subsample
Beans/Cowpea	30.0 bags 50.0 kg	1 1	10.5 bags 10.0 kg	2 2	10kg	4	22kg	4
Cassava	32.5 bags 30.0 kg	4 1	2.0 bags 1.0 kg	1 1	175kg	2		
Cocoyam	1.0 bag	1			50kg	1		
Groundnuts			1.0 (other)	1				
Sorghum								
Maize	1.0 bag 106.0 kg	1 3	1.0 bag	1	165kg	2		
Melon			10.0 bags	1				
Rice	5.0 bags	1	5.0 bags	1				
Yam	100.0 kg	1	3.5 (other)	2	20kg	1	3 (other)	4
Banana	2.0 ton	1	5.0 (other)	1	10 (other)	3		
Garden Egg					4 (other)	4		
Okro			5.0 kg	1	20kg	2		
Onion			1.3 (other)	3			3 (other)	4
Pepper			1.0 bag 15.0 kg	1 3	10 kg	5	13 kg	4
Green Vegetable			7.0 kg 4.0 (other)	2 1			14 (other)	2
Tomato	2.0 bags 19.0 kg	1 1	21.7 kg	3	3kg	4	14 kg	4
Locust Bean			1.5 (other)	2				
Orange			7.0 (other)	1	20 kg	2		
Palm Oil	40.0 kg	1	59.0 kg 20.0 (other)	1 1	30 kg	2		

Chicken	10.0 kg	1	23.0 kg	1				
Pig Meat			2.0 (other)	1				
Cow Meat			15.0 kg 4.0 (other)	3 2			15 kg 11 (other)	4 3
Fresh Or Dried Fish	20.0 kg	1	9.0 kg	2				
Sugar			2.0 kg	1				

Note: The data in Appendix Tables A.1 and A.2 may appear similar to those in Appendix Tables A.3 and A.4, but they are not exactly the same. Each pair tables were generated from different inquiries during the survey

Table A.4: Average quantities of food items produced and purchased during dry and wet seasons, Cameroon

	Dry season				Wet season			
Food item	On-farm production		Market purchase		On-farm production		Market purchase	
	Quantity	Subsample	Quantity	Subsample	Quantity	Subsample	Quantity	Subsample
Beans/Cowpea	4.0 bags	1	 2.0 kg 10.7 (other)	 1 3			18 (other)	5
Cassava	6.8 bags 47.3 kg	4 3	3.7 bags 32.5 kg	3 2	5kg	2	15 kg	2
Cocoyam					2 (other)	3	5 (other)	2
Groundnuts	2.0 bags 2.0 kg	1 1	 5.0 kg 6.5 (other)	 1 8	3 bags 18 (other)	3	26 (other)	2
Maize	9.5 bags 15.0 kg	2 1	5.7 bags	3	13 bags 18 (other)	3 3	5 bags	2
Water Melon							2 (other)	2
Rice	2.0 bags	2	1.7 bags 18.0 kg 3.3 (other)	3 5 4	102 kg	3	51 kg	2
Yam			7.5 (other)	2				
Banana	3.5 (other)	2	1.0 (other)	2				
Carrot			1.0 kg	1				
Cucumber			3.0 (other)	2				
Cabbage			20.0 (other)	1				
Okro	47.0 (other)	3	5.0 (other)	1				
Onion			7.5 kg	2			4 (other)	4
Pepper	6.5 (other)	2	1.0 bag 4.0 kg	2 1	3 (other)	3	3 (other)	2
Pineapple	7.0 kg	2	6.0 kg	2				
Plantain	3.0 bags 15.0 (other)	1 6	2.5 bags 4.0 (other)	2 5	4 other	6	7 (other)	4

Potato			15.0 (other)	1				
Green Vegetable			2.0 (other)	1				
Sugar Cane	2.0 (other)	1						
Tomato	20.0 kg	1	13.7 kg 3.5 (other)	3 4	3 kg	2		
Kolanut	5.0 kg	1						
Bitter Kola			4.5 kg	2			5kg	2
Mango					12 bags	2	12 bags	2
Palm Oil	12.0 kg	1	5.5 (other)	2	15 kg 6 (other)	5 4	25 kg 5 (other)	4 3
Pear	27.5 (other)	2						
Chicken							20 kg	2
Pig Meat			1.0 kg	1				
Cow Meat			8.5 kg	2				
Eggs							2 (other)	4
Fresh Or Dried Fish	14.3 kg	3	12.8 kg	5			13 kg 28 (other)	2 3
Vegetable Oil	20.0 kg	1	11.0 kg 4.5 (other)	2 2				
Sugar	8.0 bags 15.33 kg	1 3	10.2 kg 1.0 (other)	5 2			6 kg	3

Note: The data in Appendix Tables A.1 and A.2 may appear similar to those in Appendix Tables A.3 and A.4, but they are not exactly the same. Each pair tables were generated from different inquiries during the survey

Table B.1: Variable definitions and scales of measurement

S/N	Variable	Variable label	Measurement scale
1	Country	country	
2	ActionSite	states/provinces	
3	FieldSite	LGAs/Zones	
4	HouseholdID	Household ID	
5	resp_hhh	Is respondent the household head?	Nominal
6	resp_gend	What is the gender of the respondent?	Nominal
7	fmsz	How much land area does the household cultivate (quantity)?	Interval
8	num_plots	How many farms does the household manage?	Interval
9	num_crops	How many different crops does the household grow?	Interval
10	own_scat_tree	Does this household own any scattered trees?	Ordinal
11	own_livestock	Does this household own any livestock (excluding aquaculture/fish)?	Ordinal
12	own_ruminant	Does this household own ruminants and/or pigs, non-ruminants, or both?	Ordinal
13	use_dung	Does the household make use of animal dung?	Ordinal
14	nonfam_inc	Does this household generate income from non-agricultural activities?	Ordinal
15	nonfam_exp	Does this household have any expenses for non-agricultural activities?	Ordinal
16	member_age	Household member age	Interval
17	yrs_education	How many years of formal education?	Interval
18	farm_exp	Number of years of farming experience	Interval
19	rain_farm	During the Main cropping/rainy season, does this member engage in on-farm (Farming) activities?	Ordinal

S/N	Variable	Variable label	Measurement scale
20	rain_domestic	During the Main cropping/rainy season, does this member engage in on-farm (Domestic) activities?	Ordinal
21	rain_off_farm	During the Main cropping/rainy season, does this member engage in off-farm activities?	Ordinal
22	dry_farm	During the Dry season, does this member engage in on-farm (Farming) activities?	Ordinal
23	dry_domestic	During the Dry season, does this member engage in on-farm (Domestic) activities?	Ordinal
24	dry_off_farm	During the Dry season, does this member engage in off-farm activities?	Ordinal
25	number_group	How many of the following groups has someone from this household joined?	Interval
26	manage_plot	Who in the household manages this farm?	Nominal
27	time_to_plot	How long does it take you to get to the farm from your home? (minutes)	Interval
28	plot_acquire	How was this farm acquired?	Ordinal
29	plot_opinion	What is your opinion on the changes in yield level of your crops in this farm?	Ordinal
30	resid_prod	Are any residues produced on this farm?	Ordinal
31	intercrop	Is this crop intercropped?	Ordinal
32	num_products	How many products are produced from this crop?	Interval
33	sell_products	Did you sell any of the products from this crop?	Ordinal
34	hhmale_labour	Is male labor from the household used for this activity during this season?	Ordinal
35	hhfemale_labour	Is female labor from the household used for this activity during this season?	Ordinal
36	hhchild_labour	Is child labor from the household used for this activity during this season?	Ordinal
37	hired_labour	Is hired/shared labor used for this activity during this season?	Ordinal

S/N	Variable	Variable label	Measurement scale
38	hiredlabour_cost	What is the total cost of hired labour (amount)?	Interval
39	otherlabour_costs	Please state the other costs (e.g. value meals paid in kind)	Interval
40	input_use	Do you use this input for this crop on this farm?	Ordinal
41	input_cost	Estimate the total cost of the input	Interval
42	use_tech	Has anyone in the household ever used this type of listed technology?	Ordinal
43	num_ext_cont	How many times in the past 12 months have you had contact/receive information regarding farming issues from?	Interval
44	total_asset_own	What is the total number of this asset owned by household?	Interval
45	rank_sales	Ranking of crop for sales income	Interval
46	rank_consume	Ranking of crop for household consumption	Interval
47	rank_labour	Ranking of crop for labour requirement	Interval
48	rank_land	Ranking of crop for land requirement	Interval

Table B.2: List of variables and corresponding number of statistically significant bivariate correlations

	NIGERIA					CAMEROON				
	Unsorted			Sorted			Unsorted			Sorted	
	VARIABLE	Number of stat sign corr coefs with this variable+	S/N	VARIABLE	Number of stat sign corr coefs with this variable+	S/N	VARIABLE	Number of stat sign corr coefs with this variable+	S/N	VARIABLE	Number of stat sign corr coefs with this variable+
1	resp_hhh	12	41	rank_sales	21	1	resp_hhh	8	6	own_scat_tree	16
2	resp_gend	6	44	rank_land	21	2	resp_gend	7	11	nonfam_exp	14
3	fmsz	4	43	rank_labour	20	3	fmsz	10	44	rank_land	13
4	num_plots	15	42	rank_consume	18	4	num_plots	4	33	hired_labour	12
5	num_crops	17	5	num_crops	17	5	num_crops	9	43	rank_labour	12
6	own_scat_tree	16	11	nonfam_exp	17	6	own_scat_tree	16	12	member_age	11
7	own_livestock	8	6	own_scat_tree	16	7	own_livestock	4	16	rain_domestic	11
8	own_ruminant	8	4	num_plots	15	8	own_ruminant	3	3	fmsz	10
9	use_dung	3	12	member_age	13	9	use_dung	7	5	num_crops	9
10	nonfam_inc	11	16	rain_domestic	13	10	nonfam_inc	2	13	yrs_education	9
11	nonfam_exp	17	1	resp_hhh	12	11	nonfam_exp	14	15	rain_farm	9
12	member_age	13	23	time_to_plot	12	12	member_age	11	17	rain_off_farm	9
13	yrs_education	9	24	plot_acquire	12	13	yrs_education	9	19	dry_domestic	9
14	farm_exp	9	10	nonfam_inc	11	14	farm_exp	6	28	num_products	9
15	rain_farm	9	17	rain_off_farm	11	15	rain_farm	9	42	rank_consume	9
16	rain_domestic	13	19	dry_domestic	11	16	rain_domestic	11	1	resp_hhh	8
17	rain_off_farm	11	26	resid_prod	11	17	rain_off_farm	9	20	dry_off_farm	8
18	dry_farm	8	29	sell_products	11	18	dry_farm	6	29	sell_products	8
19	dry_domestic	11	25	plot_opinion	10	19	dry_domestic	9	30	hhmale_labour	8
20	dry_off_farm	8	28	num_products	10	20	dry_off_farm	8	35	otherlabour_costs	8
21	number_group	8	35	otherlabour_costs	10	21	number_group	4	41	rank_sales	8

	NIGERIA					CAMEROON				
	Unsorted			Sorted			Unsorted			Sorted	
	VARIABLE	Number of stat sign corr coefs with this variable+	S/N	VARIABLE	Number of stat sign corr coefs with this variable+	S/N	VARIABLE	Number of stat sign corr coefs with this variable+	S/N	VARIABLE	Number of stat sign corr coefs with this variable+
22	manage_plot	2	13	yrs_education	9	22	manage_plot	3	2	resp_gend	7
23	time_to_plot	12	14	farm_exp	9	23	time_to_plot	5	9	use_dung	7
24	plot_acquire	12	15	rain_farm	9	24	plot_acquire	6	26	resid_prod	7
25	plot_opinion	10	32	hhchild_labour	9	25	plot_opinion	5	34	hiredlabour_cost	7
26	resid_prod	11	34	hiredlabour_cost	9	26	resid_prod	7	39	num_ext_cont	7
27	intercrop	5	7	own_livestock	8	27	intercrop	5	14	farm_exp	6
28	num_products	10	8	own_ruminant	8	28	num_products	9	18	dry_farm	6
29	sell_products	11	18	dry_farm	8	29	sell_products	8	24	plot_acquire	6
30	hhmale_labour	8	20	dry_off_farm	8	30	hhmale_labour	8	23	time_to_plot	5
31	hhfemale_labour	5	21	number_group	8	31	hhfemale_labour	4	25	plot_opinion	5
32	hhchild_labour	9	30	hhmale_labour	8	32	hhchild_labour	4	27	intercrop	5
33	hired_labour	7	36	input_use	8	33	hired_labour	12	36	input_use	5
34	hiredlabour_cost	9	39	num_ext_cont	8	34	hiredlabour_cost	7	37	input_cost	5
35	otherlabour_costs	10	33	hired_labour	7	35	otherlabour_costs	8	4	num_plots	4
36	input_use	8	2	resp_gend	6	36	input_use	5	7	own_livestock	4
37	input_cost	4	40	total_asset_own	6	37	input_cost	5	21	number_group	4
38	use_tech	3	27	intercrop	5	38	use_tech	4	31	hhfemale_labour	4
39	num_ext_cont	8	31	hhfemale_labour	5	39	num_ext_cont	7	32	hhchild_labour	4
40	total_asset_own	6	3	fmsz	4	40	total_asset_own	4	38	use_tech	4
41	rank_sales	21	37	input_cost	4	41	rank_sales	8	40	total_asset_own	4
42	rank_consume	18	9	use_dung	3	42	rank_consume	9	8	own_ruminant	3
43	rank_labour	20	38	use_tech	3	43	rank_labour	12	22	manage_plot	3

	NIGERIA					CAMEROON				
	Unsorted			Sorted			Unsorted			Sorted	
	VARIABLE	Number of stat sign corr coefs with this variable+	S/N	VARIABLE	Number of stat sign corr coefs with this variable+	S/N	VARIABLE	Number of stat sign corr coefs with this variable+	S/N	VARIABLE	Number of stat sign corr coefs with this variable+
44	rank_land	21	22	manage_plot	2	44	rank_land	13	10	nonfam_inc	2

+screened at p=0.05 or p=0.01