

Project Update: January 2018

1.0 Preamble

The project is to create awareness of and introduce efficient cook stove in selected rural households in Guinea-Savannah zone of Nigeria. The project is targeted at women who happen to be the main cooks and firewood collectors.



The main activities carried out in the third phase of the project were field data collection and awareness campaign in the selected communities for the study. The data collection was carried out between July and October 2017 while the awareness campaign was carried out in October 2017. The awareness campaign is to get the community aware of the project goal and get their consent for participation in the next stage of the project which is the introduction of the improved cook stove.

2.1 Results

2.1.1 Foods cook and eaten by households

All the visited households eat mainly starchy food. These are made from rice, corn, cassava, yam, millet, sweet potatoes, guinea corn and plantain. The people plant almost all the food they eat, except few like rice. They also plant and eat some vegetables such as okra, spinach, tomatoes, pepper, among others.



Figure 1: Farms of maize interplant with vegetables by villagers

All the vegetable soups are also cook by the households before eaten. An average family indicated that they eat starchy foods almost every day of the week. Some of these foods, for example fresh maize and potatoes, are eaten mostly during rainy season. Some raw foods are further processed to make their availability all year round. For instance, maize, yam, cassava, potatoes, guinea corn are dried and grind into powder to last longer and available all year round. Cassava could be processed and cooked over fire to form dry rough power popularly called gari. This is popular across the country. When it's time to eat these processed food stuff, they have to be cooked over fire.

Processed and packaged starchy food such as Semovita, spaghetti and noodles are also eaten by majority of the households. Major sources of protein include beans, fish, meat (chicken, cow and goat). Chicken and goats are kept by the people and raised under free range system. All these foods are also cooked before eaten. Some fruits like plantain are also fried or cooked.

In summary, all the foods eaten by the people, except fruits, undergo cooking and take quite some time as well as biomass energy to cook. On the average, most of the food cooked for as much as one to two hours.

2.1.2 Who is responsible for cooking in households?

Since the project is based on cooking in households, the question on who is responsible for cooking was first asked. About 81.1% of the sampled women indicated that women (wives) are responsible for cooking in their respective households. This was followed by female teenagers and/or girls who either carried out the cooking or assisted their mothers in cooking. None of the women indicated that their husband carry out cooking (Table 1).

The visited communities are typical Yoruba communities where women (mainly wives) are responsible for cooking in homes for their husband and children. Female teenagers and girls are expected to assist their mothers in cooking. Teenage female and girls are to be involved in cooking as a way of training them for the future responsibility in their respective homes. Husbands and male children are seen as "household head" or "head in making" respectively and are not to involve in cooking. Some women added that it will be consider a "taboo" to see their husbands carrying out cooking for them.

Table 1: Who is usually responsible for cooking in your household?

Person responsible	Frequency N=74	Percent
Women (wives)	60	81.1
Men (husbands)	0	0
Female teenager / girls	12	16.2
Male teenager / boys	2	2.7
Everyone in the house	0	0

2.1.3 People living in household

From the result presented in Table 2, the overall households have more female (131 individuals) than male (99 individuals). In terms of number of individuals per households by age, the highest was one adult female (51 individuals), followed by one adult male (36 individuals). For the offspring, there were more one female teenager (20 individuals) between ages 10 and 17 years, followed by one child ((16 individuals)) between ages 0 to 9 nine years.

From these results, it could be inferred that majority of the sampled households have more female adult, teenager and children than the male counterpart.

Table 2: Number of people living in household

No. of Individuals in Household	Male								Female							
	Teen		Child		Adult		Total		Teen		Child		Adult		Total	
	10-17 Yr		0-9 Yr		18 & >				10-17 Yr		0-9 Yr		18 & >			
	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%
1	12	38.7	13	41.9	36	97.3	61	61.6	16	21.6	20	27	51	68.9	87	66.4
2	10	32.3	10	32.3	1	2.7	21	21.2	5	6.8	3	4.1	17	23	25	19.1
3	4	12.9	6	19.4	0	0	10	10.1	4	5.4	4	5.4	3	4.1	11	8.4
4	2	6.5	1	3.2	0	0	3	3.0	4	5.4	2	2.7	1	1.4	7	5.3
5	1	3.2	1	3.2	0	0	2	2	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	1	1.4	0	0	1	0.8
7	2	6.5	0	0	0	0	2	2	0	0	0	0	0	0	0	0
T	31	100	31	100	37	100	99	100	29	39.2	30	40.6	72	97.4	131	100

2.1.4 Cooking stoves used in homes

As presented in Table 3, majority of the households (70.3%) use “three-stone” as their main cookstove. This was followed by traditional charcoal cook stove (12.2%). None of the households use cooking gas and electric stove. From this results, it could be deduced that majority of households used firewood for cooking in their homes. Only few used charcoal and kerosene while none use electricity and cooking gas.

Table 3: Cooking shoves used by households

Types of cooking stove	Frequency N=74	Percent
Three-stone fire	52	70.3
Fixed mud stove	5	6.8
Local improved cook stove	1	1.4
Traditional charcoal stove	9	12.2
Kerosene stove	7	9.5
Cooking gas	0	0
Biogas stove	0	0
Electric stove	0	0
Briquette stove	0	0

2.1.5 Location of cooking device in households

More than 40% of the households have their cooking stove located in kitchen detached from the main building. This is followed by those that have their stove in open space outside the house (31.1%). A few of the households (6.8%) have their cooking stoves in the living room (Table 4).

Table 4: Location of cooking stove in households

Locations	Frequency N=74	Percent
Inside living room	5	6.8
Open space outside the house	23	31.1
Under shelter outside the house	7	9.5
Kitchen attached to the house	6	8.1
Kitchen detached from the house	30	40.5
Combination of two of the above	3	4.1

2.2 Fuelwood Utilisation by the Households

2.2.1 Firewood collection

From the results of people responsible for collection of firewood in household (Table 6), women and girls (80%) were most responsible for the firewood collection. Many of the sampled women (more than 90%) indicated that the distance of the firewood collection is below 2 km to their respective communities. Majority of the sampled women indicated that they collect firewood from the wild twice a week (70.3%). Those that collected once were 20.3%. None of the women indicated daily collection of firewood (Table 5).

On the exception, men (husbands) do not normally collect firewood. Some old women were assisted by their neighbours and other people to collect firewood.

Although, further interview revealed that the nearby firewood are getting decrease and the distance is increasing farther from the communities. Collection of firewood is also affected by season of the year. During dry season, firewood collection is easier than rainy season. Also, the distance of collection is less when compared with rainy season. The reason is that people can easily get dry wood in dry season, and when wet wood are left for few days, it can quickly dry up and use as firewood.

Table 5: Firewood collection by the households

Firewood collection	Frequency	Percent
People mostly gather firewood in households		
Men (husbands)	0	0
Women (wives)	20	27.0
Female teenager and girls	14	18.9
Women and girls	25	33.8

Boys and male teenagers	11	14.9
Others (neighbor, helpers, etc.)	4	5.4
Distance to firewood collection (Km)		
0 - 0.5	56	75.7
0.6 - 1.0	9	12.2
1.1 - 1.5	3	4.1
1.6 - 2.0	3	4.1
2.1. - 2.5	1	1.4
2.6 - 3.0	1	1.4
3.1. - 3.5	1	1.4
3.6. 4.0	0	0
More than 5.0	0	0
Frequency of collection per week		
Once	15	20.3
Twice	52	70.3
Thrice	7	9.5
Everyday	0	0

2.1.1. Firewood purchase

Only about 20% of the sampled women purchased firewood for their domestic cooking. The average amount spent on purchase of firewood on weekly basis by the households was ₦50.95 (Table 6). Follow-up interviews revealed that those that purchase firewood are old people and people that engage in use of the firewood for commercial activities (e.g. food sellers, etc). Moreover, purchase of the firewood is used to complement those collected freely from the wild.

Table 6: Firewood rainy purchase

Purchase of firewood	Frequency N=74	Percent
Yes	15	20.3
No	59	79.7
Amount spent weekly by households on firewood purchase		
Minimum amount (₦)	100	
Maximum amount (₦)	1,000	
Average amount (₦)	50.95	
Std. Error	16.02	
Std. Deviation	137.8	

USD1 = ₦250

2.2.2 Charcoal utilization by households

As indicated in Table 7, only 32.4% of the households purchase and use charcoal. Out of those that purchase the charcoal, more than half (58.3%) purchased on monthly basis while 83.4% procured a bag (about 50 kg) on monthly basis.

Further interview revealed that charcoal was not produced by households but have to

be purchased. However, purchase of the charcoal by households is influenced by season and income. More households tend to purchase charcoal in dry season than rainy season due to rain which may render wood and open stove outside the house wet. Also, firewood collection in the wild may not be easy during rainy season. On income, households with extra income tend to purchase charcoal than those who are struggling with income. The charcoal is sold in sack bags (about 50 kg) and cost about ₦1, 200 per bag (about USD3.4). Hence, quite a number of the households still rely on firewood collection. The charcoal is purchased directly from the producers or from those that sold it in the community at wholesale or retail prices. The charcoal is produced in the wild from most species of trees. The process of the charcoal production is unsustainable. Many trees are felled and are not replanted by the producers.

Table 7: Purchase of Charcoal by households

Variables on purchase of charcoal	Frequency	Percent
Purchase of charcoal by household		
No	50	67.6
Yes	24	32.4
Sub-total	74	100
Frequency of purchase per month		
Once	14	58.3
Twice	10	41.7
Sub-total	24	100
Quantity of charcoal purchased per month		
Full bag (about 50kg)	20	83.4
Half bag	2	8.3
Retail quantity	2	8.3
Sub-total	24	100

2.3 Alternative Cooking Energy

2.3.1 Alternative cooking energy used by households

As shown in Table 8, the only alternative cooking energy to firewood and charcoal that some of the sampled households used was kerosene/paraffin (52.7%). None of the households indicate the use of agricultural waste, electricity, cooking gas (Liquefied Natural Gas) and briquette for domestic cooking.

Table 8: Other alternative energy used by households

	Frequency	Percent
Agricultural waste		
Yes	0	0
No	74	100
Kerosene (Paraffin)		
No	35	47.3

Yes	39	52.7
Electricity dry purchase		
Yes	0	0
No	74	100
Cooking gas (LPG)		
Yes	0	0
No	74	100
Briquettes		
Yes	0	0
No	74	100

2.3.2 Use of Kerosene (Paraffin) by households

Majority of the people buy one or two litres of kerosene per month. Further interviews reveal, rather than using of the kerosene directly in kerosene stove for cooking, majority of the local people normally add little quantity of the kerosene to firewood to facilitate quick burning. This means that most of the people use the kerosene to initiate quick burn of firewood rather than using it as domestic cooking fuel.

The kerosene is purchase mainly in cities such as Ilorin and Oke-Oyi which are about 12 kilometers to the community. The people purchase the kerosene when they either go to the city personally for other activities or send someone they found going to the city. Specifically, the people use the opportunity of sending their family members or neighbors going to sell their goods at Oke-Oyi on market days. Some community members also sell the kerosene in retail quantities within the community.

Table 9: Purchase of kerosene (paraffin) by households

Kerosene (Paraffin) purchase	Frequency n=39	Percentage
Frequency of kerosene purchase per month		
Once	22	56.4
Twice	7	17.9
Three times	3	7.7
More than 3 times	7	17.9
Unit (Litre) of kerosene purchase per month		
Half	1	2.6
One	14	35.9
Two	18	46.2
Three	2	5.1
Four	2	5.1
More than 4 Litres	2	5.1
Where do you purchase kerosene?		
In the city	28	71.8
In the next village	6	15.4
In this village	5	12.8
Total	39	100.0

2.4 Improved Cookstove

2.4.1 Acceptance and preference for improve cookstove

The best strategy used in selecting the type of improve cook stove to introduce to the community is to first determine their preferred cooking energy. As shown in Table 10, about 70.2% of the people preferred improved cook stove that is using firewood. As a follow-up to the question on energy preference, major reasons for preference of the energy were asked. Affordability (43.6%) ranked topmost, and this was followed by accessibility (30.9%). Affordability means cheapness of the fuelwood while accessibility means free and availability of the fuelwood for collection to the households. The question on preference for improved cookstove and energy was followed by presentation of the picture of prototype of the improve cookstove to be introduced to the communities. Almost 95% of the households agreed to change from their current cooking to improve cookstove (Table 10).

Table 10: Preference for improve cookstove by households

Preference for improved cookstove	Frequency	Percent
Preferred energy for improved stove:		
firewood	59	70.2
charcoal	16	19.0
kerosene	8	9.5
cooking gas	1	1.2
briquette	0	0
Sub-total	84	100.0
Reasons for preference		
Affordable (cheap)	24	43.6
Accessibility (free and ease of collection)	17	30.9
Firewood easy to use and cook fast	5	9.1
Small family size/children at home	2	3.6
Cook fast	2	3.6
Health wise	2	3.6
Cook for large people	1	1.8
Best for my cooking business (locust bean production)	1	1.8
To avoid smoke	1	1.8
Sub-total	55	100
Ready to accept improve cooking stove		
Yes	70	94.6
No	4	5.4
Sub-total	74	100.0

2.4.2 Negative impacts of cooking with firewood by households

Table 12 presents feedbacks from the respondents on the negative impacts of cooking with firewood in their households. From all the responses, more than half of the sampled respondents were always affected by eye irritation (74.3%) followed by

coughing and sneezing (63.5%) and irritation of nose and throat (44.6%). The respondents also indicated that considerable number of their households was also affected by these negative impacts of firewood.

Table 12: Cooking related sicknesses encountered within the last 6 months by the key respondents and other household members

Cooking related sickness		Key respondents					Other household members				
		Affected		Freq. of Occurrence			Affected		Freq. of Occurrence		
		Yes	No	Always	Sometimes	Rarely	Yes	No	Always	Sometimes	Rarely
Burns	Freq	35	3	28	5	6	21	3	21	3	2
	%	48.6	4.1	37.8	6.8	8.1	28.4	4.1	28.4	4.1	2.7
Eye irritation	Freq	55	2	46	8	2	30	1	25	6	2
	%	74.3	2.7	62.2	10.8	2.7	40.5	1.4	33.8	8.1	2.7
Coughing/ Sneezing	Freq	47	2	32	12	4	20	2	16	4	2
	%	63.5	2.7	43.2	16.2	5.4	27	2.7	21.6	5.4	2.7
Chest pain	Freq	18	2	14	2	2	11	1	12	0	0
	%	24.3	2.7	18.9	2.7	2.7	16.2	1.4	16.2	0	0
Shortness of breath	Freq	19	2	16	2	2	12	1	12	0	1
	%	25.7	2.7	21.6	2.7	2.7	16.2	1.4	16.2	0	1.4
Nose & throat irritation	Freq	33	1	23	8	2	13	1	12	2	0
	%	44.6	1.4	31.1	10.8	2.7	17.6	1.4	16.2	2.7	0

Note: The figures in the tables are respondents that are affected by the sicknesses out of the total respondents sampled (n=74).

3.0 Awareness Campaign

As earlier informed, the awareness campaign is to get the community aware of the project goal and get their consent for participation in the next stage of the project, which is the introduction of the improved cookstove.

The selected villages were visited as a follow-up to the data collection. Through the contact and relationship earlier built in each of the communities, the leaders assisted in assembling the women together for the awareness campaign, feedback and interaction.

After the women have been gathered together in each of the communities, they were once again briefed on the goal of the project as well as the second stage which is targeted at introducing the improved cookstove to the households. Out of the 69 women that participated in the awareness campaign, 68 (98.5%) indicated their interest in participating in the second stage of the project (Table 13).

The women leaders also gave their full support for the second stage of introduction of the improved cookstove. They also asked questions on the logistics and sought assurance of the researchers' coming back to fulfill the promise of the

introduction of the cookstove.

Table 13: Response of the women participation in the household introduction of improved cookstove

Participate in the project on introduction of improved cookstove	Frequency	Percentage
Yes	68	98.5
No	1	1.5
Total	69	100.0



Some picture sessions of Awareness Campaign Meeting with Women

4.0 Summary and Conclusion of the Study

From the field survey of this first stage of project on "Efficient Fuelwood Use as a Strategy to Reducing Household Pressure on Natural Forests of Guinea Savanna Zone of Nigeria", the following are summary of the study:

- Women (mainly wives) are responsible for cooking in households of the selected communities. Female teenagers and girls assist their mothers in the cooking as a way of training them for the future responsibility in their respective homes. Husbands and male children do not to involve in cooking. Also, more female adult, teenager and children are present and more than the male counterparts in households. This further support the significant role that female plays in cooking and domestic energy utilization in homes.
- All the foods eaten by the people, except fruits, undergo cooking and take quite some time as well as biomass energy to cook.
- Firewood is mainly used for the cooking in the communities. Charcoal was not used by household as much as firewood. The charcoal is not produced by households but have to be purchased. However, the purchase of charcoal is influence by season (mainly use in rainy season) and household income (only

purchase by those with extra income). Lastly, kerosene is only use to start firewood while none of the sampled people indicate the use of agricultural waste, electricity, cooking gas (Liquefied Natural Gas) and briquette for domestic cooking.

- Women and girls are most responsible for the firewood collection in the communities. The firewood collections are carried out freely in the wild, twice a week and within the distance of 2 km to the communities. Further interview revealed that firewood collection is difficult in the rainy season than dry season. However, firewood collection in the nearby forest is decreasing and the people have to travel farther distance to get the firewood.
- On location of cooking stoves in households, majority of the stoves are located in kitchen detached from the main building followed by those that have their stove in open space outside the house. Only a few of the households have their cooking stoves in the living room. This means that rain will affect some coming during rainy season and this will be considered during introduction of the improved cookstove to the people.
- Almost all the sampled women agreed to change from their current cooking stove to improve cookstove proposed by the research team. However, the women preferred improved cookstove that is using firewood; the major reasons for this preference were affordability and free accessibility to firewood.
- More than half of the sampled women indicated that they were always affected by eye irritation during cooking with firewood. This was followed by coughing, sneezing and irritation of nose and throat. Considerable number of the household members was also affected by these negative impacts of firewood.
- Virtually, all the sample women indicated their interest to participate in the second stage of the project which is on introduction of the improved cookstove to households.