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RESPONSIBLE USE OF CROP PROTECTION PRODUCTS AND NIGERIA'S GROWTH ENHANCEMENT SUPPORT SCHEME

Forthcoming: Development In Practice

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Abstract

We examine the impact of the federal government of Nigeria's (FGN) growth enhancement support scheme (GESS) on responsible use of crop protection products (CPPs) in rural Nigeria. Results from the use of logistic regressions show that GESS significantly impact on farmers' access to CPPs but does not significantly impact on farmers' knowledge and skill of CPP application, and in several cases the misuse has led to deterioration of soil fertility.

Findings suggest that embracing information on recommended CPPs, dose rates, dilutions, timing, frequency of applications and precautions should form the foundation of GESS activity attributable to CPPs in sub-Saharan Africa.

1.Introduction

Agriculture is an important economic sector as Africa's driver of rural development, job creation and poverty alleviation (African Development Report, 2015). Improved farming practices in the continent must therefore not only ensure profitable yields and the well-being of farmers and farm workers, but also protect the long-term productivity of the land alike. Crop Protection Products (CPPs) have enormous potential to help sub-Saharan Africa achieve food security, but in some cases, the misuse has actually led to the deterioration of soil fertility (Uduji and Okolo-Obasi, 2018a).

However, at the Second Ordinary Assembly of the African Union in July 2003 in Maputo, African Heads of States and Governments endorsed the Maputo Declaration on Agriculture and Food Security in Africa. The Declaration contained several important decisions regarding agriculture, but prominent among them was the commitment to the allocation of at least 10 percent of national budgetary resources to agriculture and rural development policy implementation within five years (Benin and Yu, 2013).

Since the Maputo Declaration, the share of national budget allocated to agriculture has therefore, been taken as proxy to governments' commitment to promote investment in the agricultural sector and thus a positive step in government policy to leverage agricultural sustainability.

Under the Comprehensive African Agricultural Development Programme (CAADP), the main framework for accelerating development in the continent, member countries are mandated to allocate at least 10 percent of their annual budget to agriculture. Figure 1 locates Nigeria in the African continent.
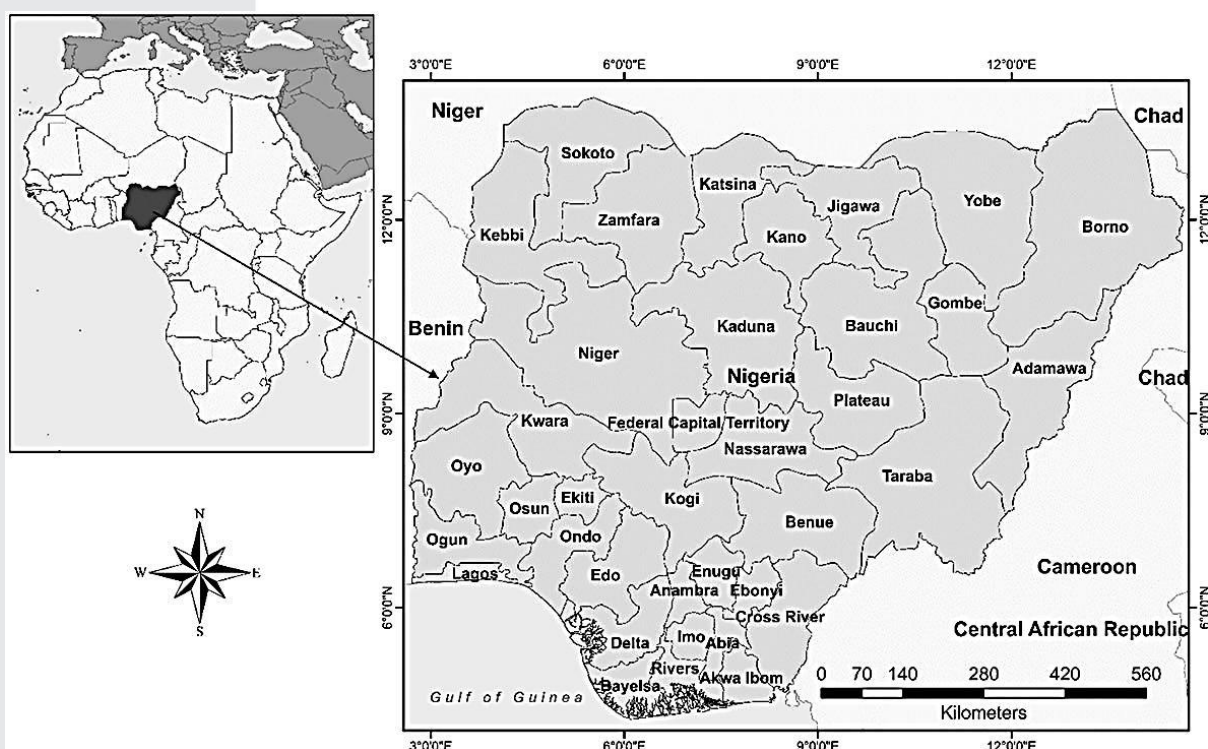
Figure 1. Constituent states of the Federal Republic of Nigeria in Africa.

In 2012, the Federal Government of Nigeria (FGN) liberalized agricultural inputs distribution and established the Growth Enhancement Support Scheme (GESS) to deliver subsidy inputs to farmers as part of its Agricultural Transformation Agenda (Adesina, 2012). Under the GESS, which operates in every State and Local Government Areas of the country, participating farmers receive electronic vouchers alerts (e-wallet) which entitle them to purchase a limited quantity of subsidized inputs directly from a government approved agro dealer in their communities, and in turn, the agro dealer collects the corresponding subsidy amount from the government (Adesina, 2013). This process represents a shift from the previous fertilizer market stabilization programme (paper vouchers scheme) to a new scheme that puts resources-constrained smallholder farmers at the center of the input subsidy policy. GESS delivers agricultural inputs (fertilizer, improved seed, crop protection products) to farmers through e-wallet (mobile phone alerts), thus getting rid of the middlemen and bringing down the level of perverseness and graft in the agricultural space (IFDC, 2013). However, while the GESS appears more efficient and reaches more smallholder farmers than the prior

paper voucher scheme (PVS), critics see it as a platform for new functions to be demanded by old institutions (Fadairo*et al*, 2013; Nwaliejie*t al*, 2015; Trini*et al*, 2014).

On the other hand, proponents view the GESS as a vehicle for potentially reinvigorating an old dynamic in agricultural and rural development (Uduji and Okolo-Obasi, 2018b; Adenegan*et al*, 2018; Grossman and Tarazi, 2014; Olomola, 2015; Adebo, 2014; Akinboro, 2014).

This difference in perceptions invariably sets the context for the GESS debate, pitting those in favour of preserving an already well-established scheme against those who insist that the scheme must adapt to challenges related to rural farms, which account for 80 percent of smallholders in sub-Saharan Africa. This paper contributes to agricultural transformation agenda in the agriculture and rural development debate by assessing the evidence in two areas that have received much attention in the literature:

i. To what extent do crop protection products (pesticides, herbicides, insecticides and fungicides) reach smallholder farmers in rural Nigeria via the Federal Government GESS programme?

ii. Does the Federal Government GESS programme impacts on application of crop protection products (pesticides, herbicides, insecticides and fungicides) by smallholder farmers in rural Nigeria?

Study Hypothesis

Crop protection products (pesticides, herbicides, insecticides and fungicides) have enormous potentials to help sub-Saharan Africa achieve food security. CPPs control weed species, harmful insects and plant diseases that afflict crops. In 2013, the IFC (International Finance Corporation) invested $6 million in SaroAgrosciences Ltd, a major distributor of herbicides and insecticides, in an effort to increase access to agrochemicals for over 500,000 smallholder farmers by 2016, via the GESS programme in Nigeria. However, cases of CPP

misuse by the smallholder farmers have actually led to the deterioration of soil fertility in the rural areas of the country. Thus, we hypothesize that the GESS programme has not impacted on the access and application of CPPs by smallholder farmers in rural Nigeria.

Thus, the further contents of the paper can be adumbrated as follows. Section 2 explains the GESS structure in Nigeria. Section 3 describes the methodology. Section 4 presents the empirical results. Section 5 provides the main findings and discourse. Finally, section 6 concludes with policy implications.

2.The growth enhancement support scheme structure in Nigeria

The Nigerian government launched the GESS in 2012, to transform the delivery of agricultural input subsides in the country. Under the GESS, the government role shifted from direct procurement and distribution of inputs to facilitation of procurement, regulation of input quality, and promotion of the private-sector input value chain (IFDC, 2013). In this process, the FGN and the state governments each contribute 25 percent of the input cost resulting in a 50 percent subsidy provided directly to smallholder farmers (Akinboro, 2014). The four broad objectives of the federal ministry of agriculture and rural development in the establishment of GESS are:

i.   To lift 20 million smallholder farmers out of subsistence into self-sufficiency through a market-led approach to production, processing and marketing of agricultural products in the six geopolitical zones of the country in a period of four years (Adesina, 2012).

ii. To disengage the Nigerian government from farm inputs procurement and distribution, in order to shift the responsibility to private sector actors, such as banks, producers, distributors, agro-dealers, and warehouse receipt operators to own and operate the value chain for farm inputs and outputs (IFDC, 2013).

iii. To use electronic wallet (E-wallet) as the ecosystem technology that would ensure that farmers receive the farm input subsidy through the accredited agro-dealers in the villages (Adesina, 2013).

iv. To stimulate demand for agricultural inputs in rural areas by putting the cash component of the product value directly into the hands of the smallholder farmers (Akinboro, 2014). Figure 2 illustrates the structure of the GESS operation in Nigeria.
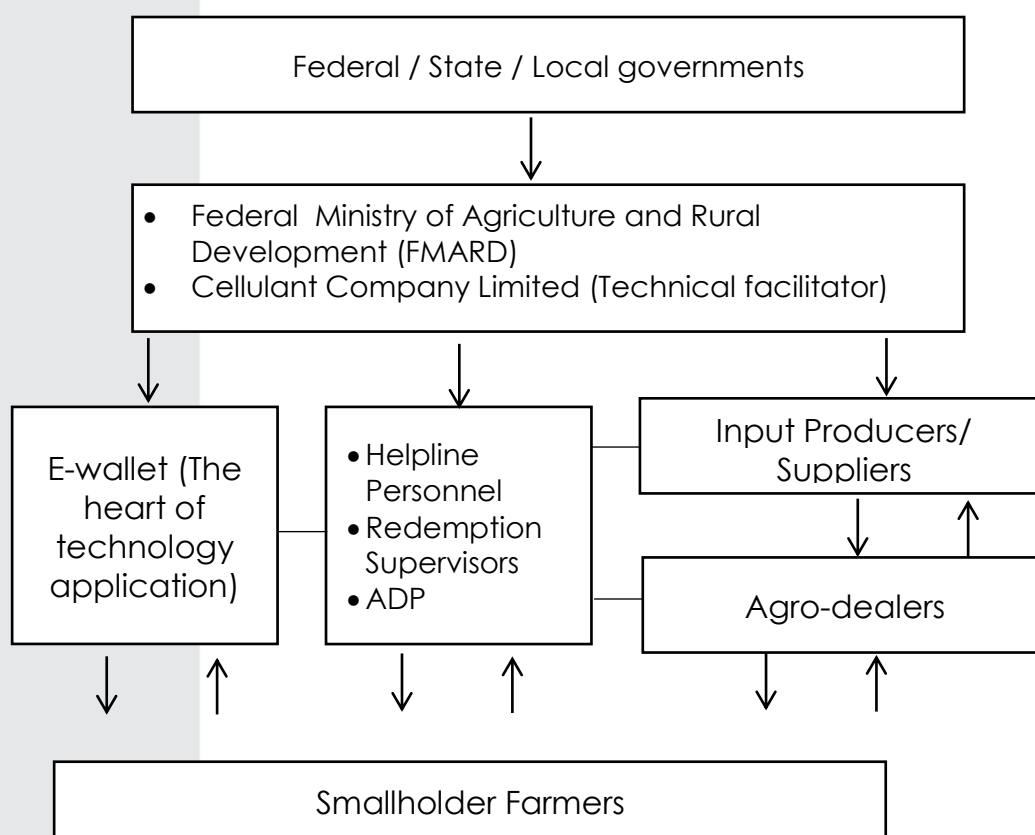

Figure 2:TheStructure of the GESS Operation

Source: Authors' Illustration

3.Methodology

Primary data were essentially used for this study and the data were generated using a survey research technique. The aim using this technique was to gather cross sectional data from a representative sample of the population.

Study Area

Figure 3 shows the study area which represent constituent states of the six geopolitical zones of Nigeria.
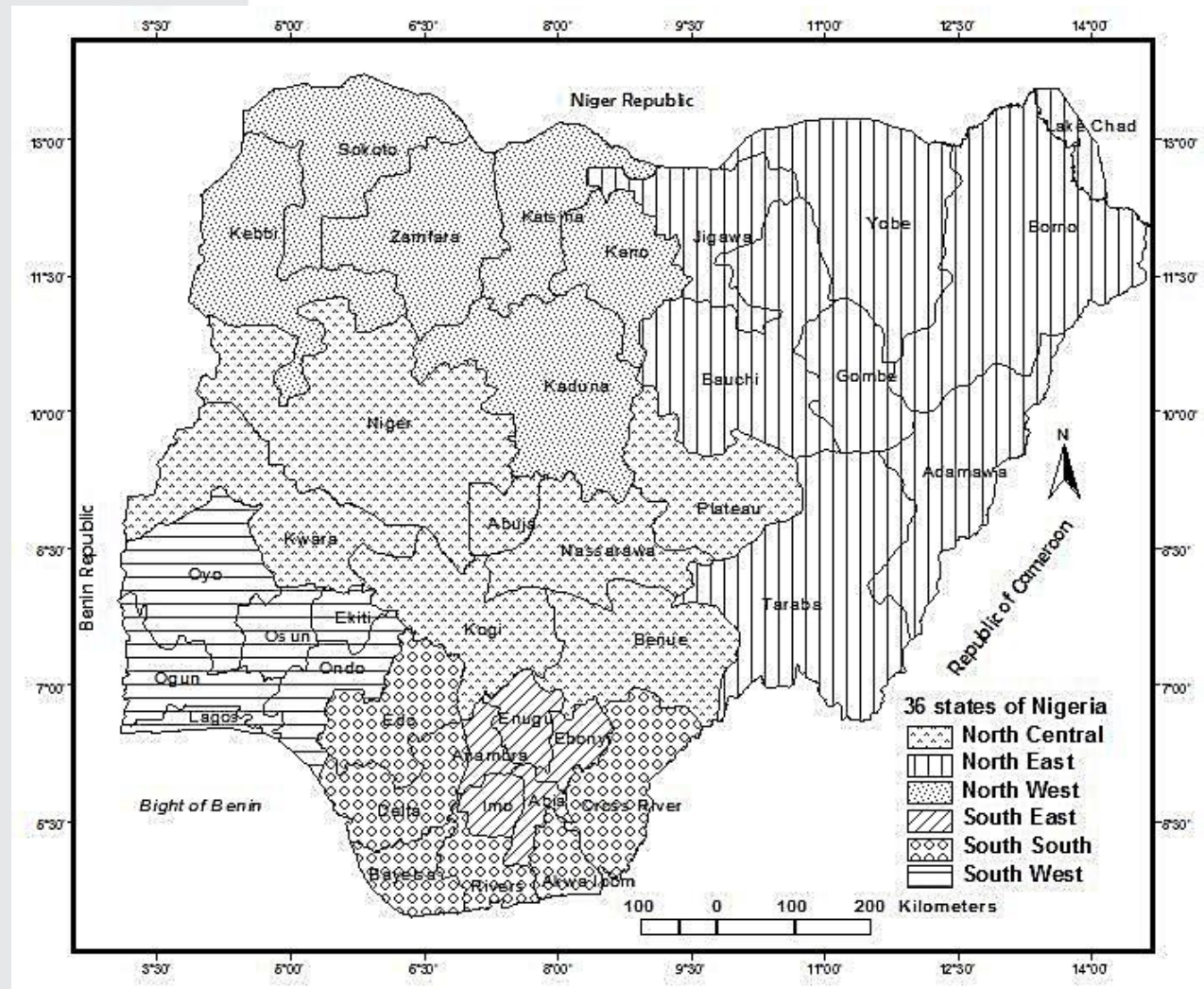

Figure 3. Constituent states of the geo-political zones in Nigeria

Sample size

Using the sample size determination formula developed by Yamane (1964), we determined the size of the population to be surveyed with Equation 1 below.

$$n = \frac{N}{1 + N(e)^2} \quad (1)$$

where n = the sample size

N = total population of the study area

e = level of significance (Limit of tolerable error)

1 = unity (constant)

In Table 2 below, N = 18,204,578 that is the total population of farmers in the study area. We also choose the tolerable limit of error to be 5%, hence e = .05, meaning that the confidence level of the study is 95%

Thus:

$$n = \frac{18,204,578}{1 + 18,204,578 \times .05 \times .05}$$

= 400

We simply multiply this by 3 to ensure that adequate samples of both farmers participating in the GESS and those not selected for the study. To this, the total sample size used for the work is 1,200 respondents.

Sampling procedure

Adapting the sampling method used by Uduji*et al* (2018), a four-stage sampling method was used to select the 1,200 respondents for this study. The stages are as follows: Stage one- we used cluster sampling to select 6 states out of the 36 states of the federation. The states where clustered according to the 6 geopolitical zones of North – Central, North –East, North –West, South – East, South –South and South –West. The purpose of selecting states from these clusters was based on the intensity of farming activities in the states. Benue was selected from North-Central, Adamawa from North-East, Kano from North-West, Ebonyi from South-East, Cross River from South-South and Ekiti from South-West.

Stage two –a purposive sampling method was also used to select two Local Government Areas (LGAs) each from the selected states. The purpose here also is based on the intensity of farming in the LGAs. With this, a total of 12 LGAs were selected. In stage three, we used random sampling to select 3 communities each from the selected LGAs. Hence, 36 rural communities were sampled.

Stage four – from the selected rural communities, we randomly selected 1,200 respondents with the help of community gate keepers and in line with

the population size of the state. Both GESS farmers and non GESS farmers were selected 600 apiece.

Table 1. Sample distribution

States (Geopolitical Zones)	Male	Female	Total Population	Farming Population	Sample per State	Sample per community Regd.	Non Regd.
Adamawa (North-East)	1,607,270	1,571,680	3,178,950	2,384,213	156	13	13
Benue (North-Central)	2,114,043	2,109,598	4,223,641	3,167,731	210	18	18
Cross River(South-South)	1,471,967	1,421,021	2,892,988	2,169,741	138	12	12
Ebonyi (South-East)	1,064,156	1,112,791	2,176,947	1,632,710	114	9	9
Ekiti (South-West)	1,215,487	1,183,470	2,398,957	1,799,218	120	10	10
Kano (North-West)	4,947,952	4,453,336	9,401,288	7,050,966	462	38	38
	12,420,875	**11,851,896**	**24,272,771**	**18,204,578**	**1200**	**100**	**100**

Source: FMARD, 2010/authors' computation

Data Collection

A questionnaire which is disclosed in the appendix was the main tool used for data collection in this study. The use of a questionnaire was necessitated because assessing each respondent individually (whether registered or non-registered farmers) is very crucial to ascertaining the impact of GEES in accessing and using farm inputs. Group information were only needed to collaborate or otherwise the information volunteered by the individuals. The questionnaire used was divided into sections according to the objective and socio-economic characteristics of the respondents needed by the study. The questionnaires were self-administered by the researchers with the help of a

few local research assistants used because of language difficulties. Because many of the respondents are not literate enough, there was a serious need for the research assistants who will interpret the questions in the languages they understand better.

Analytical framework

The main objective of this study is to ascertain if the growth enhancement support scheme (GESS) has made any significant impact on access and use of crop protection products (CPPs) among the rural farmers in Nigeria. We subjected the generated data to serious cleaning and before using it to test the hypothesis of the study.In testing this hypothesis, we used inferential statistics, while descriptive statistics was used to achieve the first objective as presented in figures and tables below. We estimated a binary logit model of usage or non-usage of GESS by rural farmers as functions of selected socio-economic variables to achieve the second objective and confirm the hypothesis. For binary response variables, the logistic link is the natural logarithm of the odds ratios, and the general equation is stated as follows

$$\text{Log}\frac{Pi}{1-Pi} = \alpha_0 + \alpha_1 X_1 + \alpha_2 X_2 + \alpha_3 X_3 + \alpha_4 X_4 + \ldots\ldots\ldots \alpha_n X_n \qquad (2)$$

Hence, the impact of GESS on crop protection usage among the rural farmers was estimated using the equation below.

$$\text{Logit (UCPP)} = \beta_0 + \beta_1 GESS + \beta_2 Age + \beta_3 Gen + \beta_4 FReg + \beta_5 HHSize + \beta_6 Edu + \beta_7 OfY + \beta_8 Exp + \beta_9 FS + \beta_{10} YOHM + \beta_{11} Ext + \beta_{12} Ombile + \beta_{13} PolA + \beta_{14} Dist + \mu$$
$$(3)$$

where:

UCPP = Usage of Crop Protection Products
GESS =Growth Enhancement support Scheme (whether the farmer have adopted and of the government GESS especially the current e-wallet)
Age = Age of the household head

Gen = Sex of the household head

FReg = Farmers registration status (Registered =1, otherwise 0)

HHSize = Household Size of the respondent

Edu = Level of Education of the Farmer

OfY = Off Farm Income of the Farmer

Exp = Experience of the farmer in framing

FS = Farm Size of the farmer

YOHM = Income of other Household members

PolA = Political affiliation (Ruling party =1 otherwise =0)

OMobile = Ownership of mobile phones

EXT = Contact with extension agents

Dist= Distance to source crop protection product

Binary logit was used because specifically our interest is to see what impact being a GESS farmer has made on the knowledge of the usage of CPP

4. The empirical results

The analysis of rural farmers' participation in the GESS and the impact of GESS in farm input distribution begins with a description of some of their social (gender, location, education), demographic (age, marital status, household size), and economic (occupation, household income, farm size) characteristics. These characteristics are important in understanding the differences in the socio-economic status of the rural farmers who are participating in the GESS compared with their non-participating counterparts.

Table 2. Socio-economic characteristics of smallholder farmers in rural areas

Variables	Registered Farmers			Non-Registered Farmer		
	Num	%	Cum	Num	%	Cum
Males	442	74	74	273	46	46
Females	158	26	100	327	55	100
	600	100		**600**	100	
Years of experience						
0- 10 Years	377	63	63	139	23	23
11- 20 Years	161	27	90	165	28	51

21 - 30Years	36	6	96	151	25	76
31 - 40 Years	19	3	99	79	13	89
Above 40 Years	7	1	100	66	11	100
	600	**100**		**600**	**100**	
Age of respondents						
Less than 20years	88	15	15	109	18	18
21-35 years	356	59	74	252	42	60
36-50 years	136	23	97	178	30	90
51 years and above	20	3	100	61	10	100
	600	**100**		**600**	**100**	
Level of Education						
None	94	16	16	199	33	33
FSLC	269	45	61	195	33	66
WAEC/WASSCE	118	20	80	100	17	82
B.Sc and Equivalent	48	8	88	51	9	91
Post Graduate Degrees	26	4	93	16	3	94
Others	45	8	100	39	7	100
	600	**100**		**600**	**100**	
Ownership Mobile phone						
Have a set	410	68	68	98	16	16
Uses a neighbours set	172	29	97	75	13	29
Have no set	18	3	100	427	71	100
	600	**100**		**600**	**100**	
Mobile Network coverage						
Network is good	340	57	57	159	27	27
Poor	85	14	71	105	18	44
Very poor	101	17	88	94	16	60
No network at all	74	12	100	242	40	100
	600	**100**		**600**	**100**	
Access to Credit						
Yes	44	7	7	118	20	20
No	556	93	100	482	80	100
	600	**100**		**600**	**100**	
Land Ownership Type						
Inherited	310	52	52	109	18	18
Purchased	160	27	78	196	33	51
Leased	130	22	100	295	49	100
	600	100		600	100	
Contact with extension agent						
Yes	381	64	64	482	80	80

No	219	37	100	118	20	100
	600	100		600	100	
Distance to selling point						
Close	365	61	61	411	69	69
Far	235	39	100	189	32	100
	600	100		600	100	
Monthly Income Level						
0 - 50,000	24	4	4	99	17	17
51,000 - 100,000	42	7	11	138	23	40
101,000 - 150,000	53	9	20	148	25	64
151,000 - 200,000	118	20	40	59	10	74
201,000 - 250,000	138	23	63	43	7	81
251,000 - 300,000	80	13	76	31	5	86
301,000 - 350,000	72	12	88	39	7	93
351,000 - 400,000	45	8	95	24	4	97
Above 400,000	28	5	100	19	3	100
	600	**100**		**600**	**100**	

Source: Authors' computation

The analysis of Table 2 shows that a total of 1200 farmers were sampled, 600 are registered farmer and the other 600 are non-registered famers. The statistics shows that men constitute 74 percent of the registered farmers 46 percent of non-registered farmer while women make-up 26 percent of the registered farmers and 55 percent of non-registered farmers. The gap in registration is consistent with Olomola (2015) in that it is due to the cultural practices that force the woman to farm under the husband. Further analysis shows that the 75 percent of the registered women farmer are widowed, separated or divorced. The analysis also shows the average age of registered farmer to be 28 years with average years of experience to be 11.5 years while the average age of the non-registered farmer is 41 years with and average experience of 21 years. The registered farmers are more educated with only 16 percent illiteracy level while the literacy level among the non-registered farmers is low with about 33 percent not able to read or write. About 68 percent of the registered farmers have their own mobile phone, while 29 percent use the phones of their neighbor, children or relatives and only 3 percent have no access to mobile phone at all. Among the registered

farmers, 57 percent have network coverage and only 12 percent have no network coverage at all. On the other hand, only 16 percent of non-registered farmers have access to mobile phone while 71 percent do not. This is a big issue as much as the model is concern because the main tool is having and being able to use mobile communication. General among the farmer both registered and non-registered, access to credit is very low as only 19 percent of the registered farmer have access to credit while only 6 percent of none registered have access to credit. Also, the study shows that 52 percent of the registered farmers have inherited land while 27 percent purchase theirs. Contrary, about 49 percent of none registered farmer lease their farm land. This shows that the registered farmers are surer of the availability of land than none registered farmers. About 64 percent of the farmers registered because they contacted the extension agent while about 89 percent of the farmers did not register as they never had contact with the agents. Also supported in Grossman and Tarazi (2014), 74 non registered farmers did not register because the registration point is far from them. About 44 percent of registered and 89 percent of non-registered farmers still earn between 0 -N100, 000 annually.

Table 3. Usage of crop protection products by smallholder farmers in rural areas

Usage of Crop Protection Product (CPP)	Frequency	Percentage	Cumulative
Yes	984	82	82
No	216	18	100
	1200	100	

Source: Authors' Computation

The result of Table 3 shows that about 82 percent of the smallholder famers in the rural areas use crop protect products like herbicides (to control weeds), insecticides (to control insects), fungicides (to prevent or cure infections and diseases), while 18 percent do not. Seed treatments which are chemicals that

help to protect the seeds are now common to the respondents. The farmer in the North-West and North-East use such chemicals to preserve their grains while the South-East, South-West, South-South and North-Central farmer who specialize in tubers use some form of chemical protections on the yam and cocoyam seedlings in the process of planting.

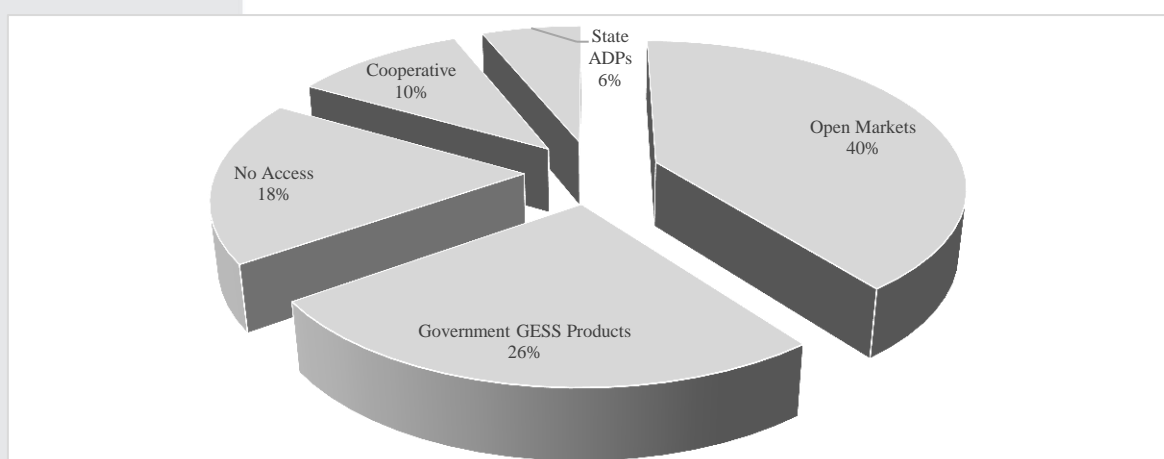*Access to Crop Protection Products in Rural Nigeria*

Figure 4. Access to crop protection products by smallholder farmers in rural Nigeria

Source: Authors' calculation

The analysis of Figure 4 shows that the 216 (18 percent) of the smallholders' farmers do not use crop protection products, not because they are not really necessary or could negatively impact human health or contaminate the environment, but because they have no access to the products and on time. This analysis further reveals that about 984 (82 percent) respondents have adopted and are using CPPs. Out of the 984 respondents (82 percent) that use crop protection products, 475 (40 percent) source CPPs from the open market. This creates a big risk of not using the product in line with the instruction of the producers as many hardly get in contact with the extension agents. Oerke and Dehne (2004) warned that it is important never to use or purchase containers with broken seals, and to always inspect the seals before use. They added that farmers should never to repack or purchase any product that has been repacked from anyone other than the original

manufacturer. But here in rural Nigeria, farmers who source from the open market don't have this information resource; hence the several cases of misuse and damages. Nevertheless, 127 respondents (11 percent) access CPPs from farmer's co-operative society offices. Others include 74 respondents (6 percent) who source from the state ADPs. Of paramount interest is that about 318 (26 percent) of the small holder farmers access the CPPs through any of the GESS distribution channels. This finding suggests that there is a significant level of farmers accessing CPPs through the use of government growth enhancement scheme in the study area. This finding agrees with the findings of Grossman and Tarazi (2014) in that GESS distribution system is effective in distributing agricultural inputs among smallholder farmers in Nigeria. However, evidence still show that there is need for more extensive work to motivate the remaining farmer to embrace the GESS.

Table 4. Types of CPP, recommended dosage and actual usage by farmers

S/N	Common Name	Trade name of CPP as used in Nigeria	General use	Ideal Qty per hectre in litres	% of compliance		
					Exact	Over	Under
1	Paraquat	Dragon, Bret-p, Parforce, Weedoff, Weedcrusher, Dizmazone, Miazone, Weedex, Ravage, etc	General weed control in all crop	3-4	12	52	36
2	Atrazine	Atraforce, Atrazine, Delzine, Xtarzine etc.	Control of weed in cereal	4	10	35	55
3	Butachior	Cleweed, Butaclear, Butacrop, ButacotButaforce etc.	Control of weed in rice	3.5 – 4	9	46	45
4	Propanil	Proper-force, Rhonil, Orizo, etc.	Post emergency	4	11	51	38

5	Oxidiaxone	Ronstar, Unicrown, Riceforce, etc	Pre emergency weed control	3.5	14	48	38
6	Pendimenthalin	Stomp, Pendilin, etc	Pre emergency in rice maize and legume	Sandy =2 Loam =3 Clay = 4	17	44	39
7	Alachlor	Lasso, Alachloretc	Pre emergency	3-4	18	47	35
8	Glyphosate	Wipeout, Touchdown forte, Bushfire, Roundup, Glycol, Clearweed, Forceup, etc.	General weed control	4	12	51	37
9	2,4D Amine	, Amineforce, 2,4D Amine, Delmin-forte etc.	Pre and post emergency control	3-4	11	40	49
10	Lamdacyhalothrin	Karate, Laraforce, Attack, Zap, Karto etc.	Systematic Insecticide to many crops	4	13	44	43
11	Cypermethrin	Suracksha, Cymbush, Superthrin, Best, etc	Contact Insecticide for many crops	4-5	18	35	47
12	Dichlovo	Nuvan, Pestoff, Dash, Delvap, Wonder, Shooter, Nopest, Clepest, VIP etc.	Contact Insecticide for Storage control	3-4	21	48	31
13	Mancozeb	Z-force, HighShield, Mycotrin.	Fungal treatment	3-4	16	38	46

Source: Authors' Computation

The analysis of Table 4 shows that only about 14% of the respondent use the recommended quantity of CPP, other response shows that 45% of the respondents over use the product while 41% underuse the products. This is a serious indication that the usage knowledge is still lacking. It conforms with the position of the federal government of Nigeria who says that there is generally poor knowledge of how to handle and use CPPs all over the country.

Table 5. Types of CPP, recommended dosage and actual usage by farmers

Problems/Control	Frequency	%
Soil Testing		
Yes	60	5
No	1,140	95
Soil Acidity		
Yes	180	15
No	960	85
Leaching/Nutrient Depletion		
Yes	900	75
No	300	25
Water Lodging Condition		
Yes	408	34
No	792	66
Erosion		
Yes	444	37
No	756	63
Reduction in Produce Yield		
Yes	1,032	86
No	168	14

Source: Authors' Computation

The analysis of Table 5 shows that, majority of the rural farmers seldom carries out soil test to know the type of CPP suitable to still maintain the soil fertility. Only 5% of the farmers both the GESS and non-GESS farmers carry out soil test while the rest do not. About 15% of the farmers identified soil acidity as the major challenge of the soil fertility, while 85% did not believe that maybe because they hardly test the soil. About 75% of the farmers believe that there is a serious Leaching/Nutrient Depletion of the soil while 25% say there are not. About 34% complains about water lodging while the rest are not. Generally, about 86% of the respondents believe there is reduction in productivity while the rest 14% did not believe that. Out of the farmers that believe there is reduction in productivity, 43% of them attributed it wholly to harmful use of CPPs, 35% partially and the other 22% attributed the reduction to other causes other the usage of CPP.
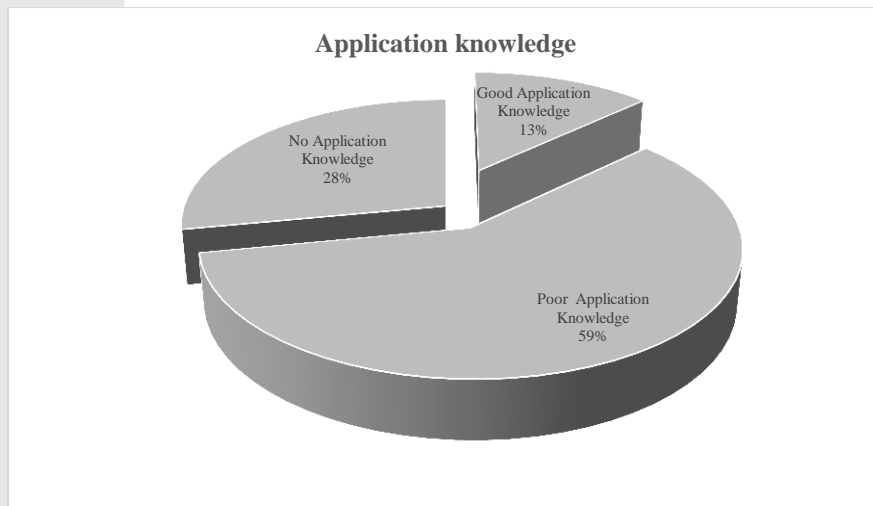
Figure 5. Rural farmers' knowledge of crop protection product Application
Source: Authors' calculation

The analysis of Figure 5 shows that only 13 percent of the farmers have good application knowledge of CPPs. This set of farmers applies the right quantity of CPP and at the right time. About 59 percent of the respondents have poor application knowledge, this set of farmers use CPP any how they like, they use the quantity they like and at any time. It is very dangerous because the bulk of farmers are in this category; this is why it appears that a whole lot of the farmers abuse the use of CPP. On the other hand, about 28 percent have no application knowledge at all (probably because of the illiteracy percentage of the rural farmers). These are the set of farmers that will either hire other to help or not use at all. However, the study also found out that the practice of the farmers without application knowledge is better than those with half knowledge. This finding is consistent with Abhilash and Singh (2009) that governments should provide sufficient guidelines and training aimed at educating CPP users regarding best practices. Cooper and Dobson (2007) emphasized that governments should provide all reasonable assistance in training and advising the end-users in the storage, transportation and end-use of the CPPs. The rural farmers in this case would be more influenced by GESS e-wallet through qualified advisors (extension agents).

However, Abhilash and Singh (2009) criticize detail of pesticide policies in developing countries, as most authors on crop protection concentrate on the hazardous nature of the CPPs instead of finding how farmers should understand the usage instructions. Pesticides are developed to tackle specific issues in specific locations. Therefore, regulations are developed on a country level and regulatory bodies should only approve a product if there is a need for them in their country. But where most of the smallholder farmers source CPPs from the open market in rural Nigeria, these have led to acquiring adulterated products, and also with poor knowledge of application. If the smallholder farmers access the CPPs through any of the GESS distribution channels, it is expected that they get the right products and the correct application knowledge from the line officers. Therefore, while government is encouraging smallholder farmers in rural areas to source the CPPs mainly from the GESS channels, serious efforts should be made to ensure that more extension agents are engaged to make the application knowledge easily accessible.

Table 6. Impact of CPP on the fertility of the soil

Productivity	10 years ago	5 years ago	Last year
	%	%	%
Very High Productivity	37	20	8
High Productivity	32	31	12
Medium Productivity	21	21	16
Low Productivity	7	17	35
Very Low productivity	3	11	29

Source: Authors computation

In attempt to ascertain the fertility of the soil, we interrogated the farmer on the productivity of the soil in the past 10 years. The analysis of Table 6 shows that ten years ago the 37% of the farmers said their soil was very highly

productive while only 3% says the productivity was very low. The analysis shows that while very high productive decreased to 20% five years later very low productivity increased to 9%. Also, at this time the use of CPP also increased; four years later very high productivity decreased by 8%, while very low productivity increased to 29%. This shows that, if nothing is done, the use of CPP may not be the only reason for low productivity; however, it must have made a lot of contribution. In support of this finding, previous studies indicated that Soil microbial activity can play an important part in the degradation of CPPs like pesticides, but this activity can also be affected by pesticides (Abhilash and Singh, 2009; Uduji and Okolo-Obasi, 2017). Hence on the long run, soil micro-organism breakdown of organic matter is always affected by the use of agrochemicals. Also, Kola and Lawal (1999) came out with the assertion that the natural nutrient regeneration capacity of the soil can be damaged by the use of CPPs. They opined that soil water retention capacity and porosity may be adversely affected leading to less water infiltration and more run-offs[1].

Table 7. Projected effects of government GESS on access and usage of crop protection products among small holder farmers in the rural household in Nigeria

		B	S.E.	Wald	df	Sig.	Exp(B)	95.0% C.I. for EXP(B)	
		Lower	Upper	Lower	Upper	Lower	Upper	Lower	Upper
Step 1(a)	Age	-.076	.009	.0205***	1	.073	.983	.966	1.002
	FReg	-.39	.212	.033	1	.856	.962	.635	1.459
	HHSize	1.42	.021	.0492	1	.483	.986	.947	1.026
	Edu	1.07	.021	.0652*	1	.419	1.017	.977	1.059
	OfY	.096	.114	.0715	1	.398	.908	.727	1.135
	YOMH	.047	.115	.171	1	.679	.954	.761	1.194
	Exp	-.211	.124	.0295*	1	.029	1.810	.635	1.033
	FS	-.076	.114	.0715	1	.398	.908	.727	1.135
	Gender	-.319	.312	.033**	1	.456	.562	.435	1.459
	OMobile	.167	.213	.531	1	.031	.281	.542	1.353
	Ext	1.921	.212	4.327*	1	.256	5.124	.635	1.223
	PolA	-.021	.013	.012	1	.651	. 629	. 362	1.547
	GESS	-.413	.061	.023**	1	.003	.962	1.045	1.443
	Dist	-.492	023	.492	1	.483	.816	.427	1.120

---

[1] It is also important to note that rural farmers in Nigeria may not have to acquire the government approved standard CPP. FGN (2017) noted that the quality of CPPs is generally poor and sub-standard, with a lot of products in the market being adulterated products. In an attempt to force such adulterated products to work, farmers misapply them to the level of harming the soil.

Constant	1.216	.667	1.940	1	.164	4.331	.329	4.761

Source: Authors' computation

A logistic regression analysis was conducted to predict the impact of GESS on Access to Crop Protection Products among Smallholder Farmers in the Rural Areas in Nigeria using the variables in the equation above as predictors.

Logit (UCPP) = 4.216 + (413) GESS + (.076)Age + (319) Gen + .39FReg + .42 HHSize + 1.07Edu + .096OfY + (.211)Exp + .076FS+ .167OMobile + .047YOHM +3.921Ext + (.021)PolA+ (.492)Dist

A test of the full model against a constant only model was statistically significant, indicating that the predictors as a set reliably distinguished between the "yes" and "no" impact of GESS (chi square = 45.210, p <.000 with df= 8). Nagelkerke's R^2 of .842 indicated a strong relationship between prediction and grouping. Prediction success overall was 92 percent. (94 percent for Yes and 90 percent for the No).

The analysis shows that at a 10% significance level, the age of the respondent has an impact on the usage of CPP. This simply means that as the ages of farmers increase, the tendency to adopt and use CPP properly keeps decreasing. Also at a 5% significant level, we showed that GESS as a programme has a negative impact on usage of CPP. This implies that as access to CPP by GESS farmers fluctuates and the corresponding training on usage has not been properly handled, GESS farmers abuse the products either by over or under application. The result also showed that at the same 5% significance level, the gender of the farmer is significant but negative. The implication here is that as men continue to dominate ownership of farms, misuse of CPP continue to increase. Hence, if more women are involved in the usage of CPP better usage practices will be in place.

At a 1% significance level, the result shows that both the educational level of the respondent and contact with an extension agent are significant and positive while experience is also significant but negative. This further implies that, the more contact the farmers have with the change agent, the better for CPP usage and also the more educated the farmer, enhanced CPP usage is apparent. Surprisingly, farming experience is negative showing that more experienced farmers abuse CPP the more. Other factor measures that did not show any significance include registration of farmers as GESS farmer which is negative but not significant. The implication here is that both the GESS and non GESS farmers have not come to the knowledge of using the CPPs. Others are political affiliations, farm size, which are both negative also but not significant, while household size, mobile phone ownership, and the incomes are all positive but no significant impact.

The Z- value for Extension services is GESS 0.023, with an associated p-value of .0013. Based on the set 5 percent significance level, the study concluded that the GESS has not made any significant impact on the usage of crop protection products among smallholders' farmer in the rural areas in Nigeria. As, the EXP (B) value of the Predictor – Ext is 5.124, this implies that if the government should raise the investment in GESS geared towards making extension service available with the CPPs to the rural farmer by one unit, equivalent of 1USD, the odds ratio is 5.1 times as large and therefore rural farmers are 5.1 times more likely to make proper use of crop protection products so as to boost their productivity.

This is in agreement with the assertions of Uduji and Okolo-Obasi (2017) who emphasized that extension services for small farms must be strengthened to improve their responsiveness to the needs of farmers; and should also receive regular training so that they can transfer appropriate location and crop-specific knowledge to rural farmers. And also, Oerke and Dehne (2004) who added that extension agents should be required to complete the crop protection courses, not only for accreditation, but also to improve and

maintain their technical knowledge base in respect of crops, products, best practices and regulatory topics; an ongoing professional development programme should be implemented to encourage extension agents to strive for and maintain high levels of competency and professionalism. Abhilash and Singh (2009) suggested that the training programme to be followed by extension agents should include topics on crop production, crop pests and diseases and control thereof, weeds and weed control, crop fertilization, the use and application of crop protection products and other agricultural chemicals, business management topics, as well as industry-related legal aspects.

The Impact CPPs on Productivity of the Rural Farmers

As shown in Figures 4 and 5 above, where only 26 percent of the respondents get their CPPs through the GESS channels and about 40 percent patronize open markets and also only 13 percent of those that use the products have good application knowledge. It becomes justified that the impact of the product on the productivity of the farmer is examined.
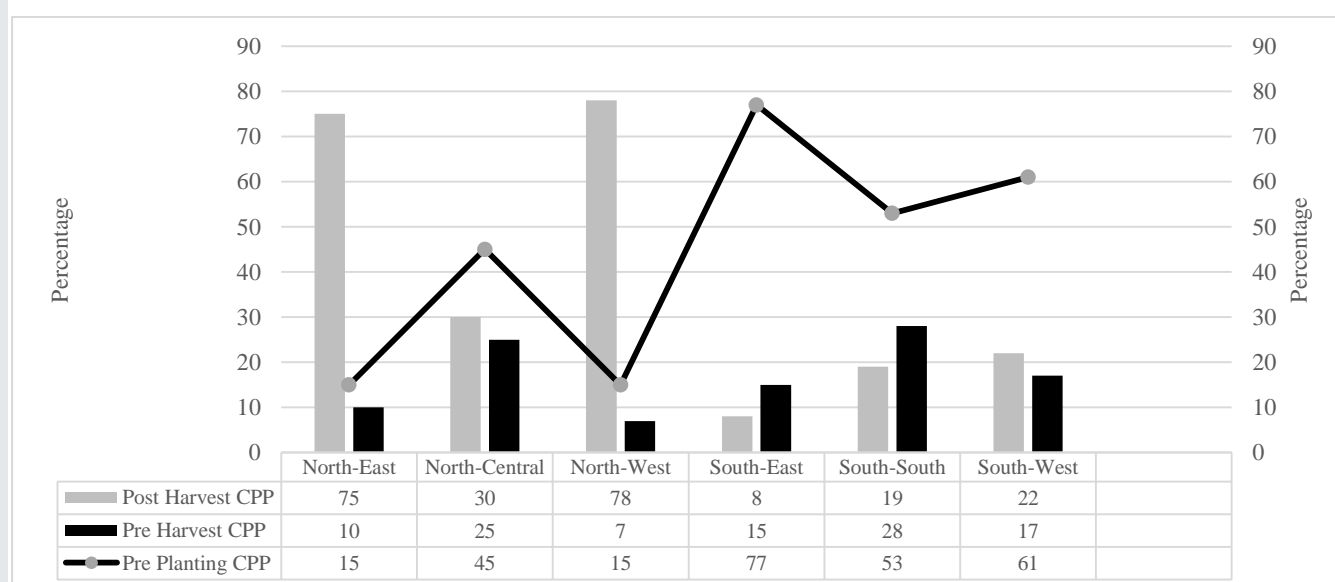

	North-East	North-Central	North-West	South-East	South-South	South-West	
Post Harvest CPP	75	30	78	8	19	22	
Pre Harvest CPP	10	25	7	15	28	17	
Pre Planting CPP	15	45	15	77	53	61	

Figure 7. Types of crop protection products used by geo-political zones in Nigeria

Source: Authors' calculation

The analysis of Figure7 shows that in the north east part of the country, most farmers' plant grains, hence, they use mostly post-harvest CPPs to preserve the harvested grains. This is also the case in the North West. However north central and the southern parts are mostly into root crop production and use the pre-planting CPPs that protect the seedlings from rodents and beetles. Hence the usage of CPP in the southern and north central is directly impacting the soil that harbors these root crops. These set of chemicals are applied directly on the surface of the soil; hence they react directly with other soil flora and faunas. This most of the time affects the soil's fertility.
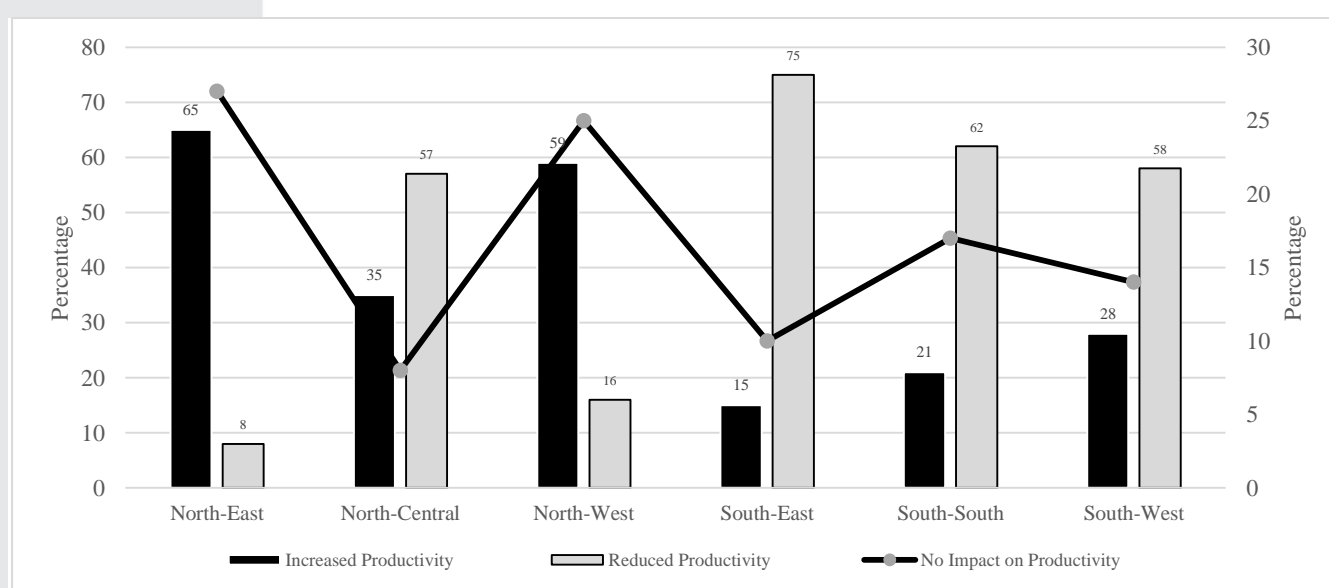

Figure 8. Impact of the application of CPPs on farmers' productivity by geo-political zones in Nigeria

Source: Authors' calculation

The analysis of Figure 8 shows that for the North-East and North-West, 65 percent, 59 percent of the farmers respectively opined that their fortunes have increased due to crop protection products. On the other hand, in the South-East, South-South and South-West and the North-Central, 75 percent, 62 percent, 58 percent and 57 percent of the farmers respectively opined that their fortunes have decreased due to usage of CPPs. This is because most of the farmers have little or no knowledge of how to use the CPPs. A critical look at this shows that for the grain producing zones, the usage of CPPs has been good, while it has not favoured the root crop producing zone.

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On this note, the study found out that the usage of CPPs has impacted negatively on the root crop producers especially the cocoyam producer in the South-East and South-South. The study found out that the misuse of CPPs may have led to the deterioration of soil fertility in the region and critically reduced the production of cocoyam drastically. For five years running, the cocoyam farmers in the South-East have been going down and appear to have no solution in sight. These findings are consistent with the findings of others in the area of availability of input but strongly opined that the issue is no longer availability or accessibility but right and timely application.

On the whole, this paper agrees with Oerke and Dehne (2004) in that CPP has enormous potential to help sub-Saharan Africa achieve food security. So far, it has proved to be accessible for many smallholders, through the federal government intervention GESS programme as presumed that mobile phone message that impact on the smallholder farmers' access and application of crop protection chemicals (pesticides, herbicides, insecticide, and fungicides) may be pointing out also that sub-Saharan Africa has huge potential to scale-up and unlock agricultural productivity in the region, most especially at such a crucial time in the development of Africa's agriculture landscape. Results also show that cases of CPP misuse by the smallholder farmers have actually led to the deterioration of soil fertility in the rural farms. Most critically, the findings suggest that the relative priorities of GESS programme should also focus on access and application of crop protection products by smallholder farmers in rural Nigeria. Therefore, if the federal government of Nigeria would work towards an ideal Agricultural Transformation Agenda, we argue for the pursuit of safe and effective use of CPPs in reducing the deterioration of soil fertility in rural farms. It is our contention that the federal ministry of agriculture and rural development holds the key to improvements in access and use of CPP in accordance with the government regulations and manufacturer's recommendations. Hence, embracing information in recommended CPPs, dose rates, dilutions, timing,

frequency of approach and precautions should form the foundation of GESS activity attributable to crop protection products in sub-Saharan Africa.

6. Conclusion and policy implications

Crop protection products (pesticides, herbicides, insecticides and fungicides) have enormous potentials to help sub-Saharan Africa achieve food security. CPPs control weed species, harmful insects and plant diseases that afflict crops. In 2013, the IFC (International Finance Corporation) invested $6 million in SaroAgrosciences Ltd, a major distributor of herbicides and insecticides, in an effort to increase access to agrochemicals for over 500,000 smallholder farmers by 2016, via the GESS programme in Nigeria. However, cases of CPP misuse by the smallholder farmers have actually led to the deterioration of soil fertility in the rural areas of the country. Thus, we hypothesize that the GESS programme has not impacted on the access and application of CPPs by smallholder farmers in rural Nigeria. Thus, we set out to examine the impact of federal government (FGN) growth enhancement support scheme (GESS) on responsible use of crop protection products (CPPs) in rural Nigeria. This paper contributes to agricultural transformation agenda in the agriculture and rural development debate by assessing the evidence in two areas that have received much attention in the literature:

i. To what extent do crop protection products (pesticides, herbicides, insecticides and fungicides) reach smallholder farmers in rural Nigeria via the Federal Government's GESS programme?

ii. Does the Federal Government's GESS programme impacts on application knowledge of crop protection products (pesticides, herbicides, insecticides and fungicides) by smallholder farmers in rural Nigeria?

One thousand two hundred rural farmers were sampled across the six geo-political zones of Nigeria. The empirical evidence is based on logistic

regressions. Results show that GESS significantly impact on small farms' access to government approved herbicides, insecticides, fungicides, bactericides, nematicides and rodenticides. However, theses access has not translated into proper application knowledge. Therefore, the results also indicate that the GESS has no significant impact on rural farmers' knowledge and skill of CPPs application guidelines, and in several cases the misuse has actually led to health hazard, environmental degradation - the deterioration of soil fertility. Findings suggest that extension services must be strengthened to improve their responsiveness to the needs of farmers and transfer appropriate location and crop-specific knowledge to smallholders. Also, existing extension service system must be well equipped and adequately staffed to cover the large number of small farms in rural Nigeria.Hence, embracing information on recommended CPPs, dose rates, dilutions, timing, frequency of applications and precautions should form the foundation of GESS activity attributable to crop protection products in sub-Saharan Africa.

However, as debate on agricultural transformation agenda continues in agricultural and rural development in sub-Saharan Africa, comparative studies would be necessary in other developing regions on further relationship between mobile technology and responsible use of crop protection products for agricultural sustainability in rural areas. A caveat to this study could be that a lot of elite capture may be prevalent during the GESS implementation. While this dimension is not considered in the present analysis, it is worthwhile for future research to assess whether the established linkages in this study withstand empirical scrutiny when elite capture of the GESS program is considered.

References

Abhilash, P.C., and N. Singh. 2009. "Pesticide Use and Application: An India Scenario". *Journal of Harzardous Materials* 165(1-3):1-12.

Adebo, G.M. 2014. "Effectiveness of E-Wallet Practice in Grassroot Agricultural Services Delivery in Nigeria- A Case Study of Kwara State Growth Enhancement Support Scheme". *Journal of Experimental Biology and Agricultural Sciences*2 (4): 411- 418.

Adenegan, K.O., F. Fagbemi., O.I. Osanyinlusi., and A.O. Omotayo. 2018. "Impact of the Growth Enhancement Support Scheme (GESS) on Farmers' Income in Oyo State, Nigeria. *The Journal of Developing Area*52(1): 15-28.

Adesina, A. 2012.*Agricultural Transformation Agenda: Repositioning Agriculture to Drive Nigeria's Economy.*Abuja: Federal Ministry of Agriculture and Rural Development.

Adesina, A. 2013.*Agricultural Transformation Agenda: Mid-Term Report May 29, 2011-May 29, 2013 Score Card.* Abuja: Federal Ministry of Agriculture and Rural Development.

African Development Report. 2015. *Growth, Poverty and Inequality Nexus: Overcoming Barriers to Sustainable Development*. Abidjan: African Development Bank Group.

Akinboro, B. 2014.*The Concept of GESS and Technology Components.*Paper Presented at the Inauguration of Agricultural Transformation Agenda Economic Policy Working Group, Transcorp Hilton Hotel, Abuja, September 15, 2014.

Benin, S. and B. Yu. (2013). *Complying the Maputo Declaration Target: Trends in Public Agricultural Expenditures and Implications for Pursuit of Optimal Allocation of Public Agricultural Spending.* RESAKSS Annual Trends and Outlook Report 2012, Washington, DC: International Food Policy Research Institute (IFPRI).

Cooper, J. and H. Dobson.2007."The Benefits of Pesticides to Mankind and the Environment".*Crop Protection*26(9): 1337 -1348.

Fadairo, O.S., N.S. Olutegbe.,andA.M. Tijani.2015. "Attitude of Crop Farmers Towards E-Wallet Platform of Growth Enhancement Support Scheme for Input Delivery in Oke-Ogun Area of Oyo State". *Journal of Agricultural Informatics*6(2): 62-71.

FGN, 2017 Assessment of Access to Fertilizers, Seeds and Crop Protection Products. Abuja: Bureau of public Service Reforms

FMARD. 2010. *ECOWAP/CAADP Process of National Agricultural Investment Plan (NAIP), 2010-2013.*Abuja: Federal Ministry of Agriculture and Rural Development.

Grossman, J. and M. Tarazi. 2014. *Serving Smallholder Farmers: Recent Development in Digital Finance*. CGAP Focus Note, No. 94. Washington DC: World Bank Group.

IFDC. 2013. *Procedures of the Nigeria's Growth Enhancement Support Scheme*. IFDC Report Describing the GESS 2013 Experiences and Challenges. Abuja: International Fertilizer Development Corporation (IFDC).

Kola, R.I. and Lawal, S.L. 1999."Degradation of Aquatic Environment by Agro-chemicals in the middle –belt of Nigeria". In Osuntokun, A. (ed): Environmental Problems of Nigeria; Ibadan, Davidson Press, Pages 78 – 88.

Mittal, S. and M. Mehar. 2016. "Socio-Economic Factors Affecting Adoption of Modern Information Technology by Farmers in India: An Analysis Using Multivariate Probit Model. *The Journal of Agricultural Education and Extension* 22(2): 199-212.

Nwalieji, H.U., C.O. Uzoegbunam., and M.N. Okeke.2015. "Assessment of Growth Enhancement Support Scheme among Rice Farmers in Anambra State, Nigeria". *Journal of Agricultural Extension* 19(2): 71-81.

Oerke, E.C. and H.W. Dehne.2004."Safeguarding Production-Loses in Major Crops and the Role of Crop Protection.*Crop Protection* 23(4): 275.

Olomola, A.S. 2015.*Driving agriculture transformation with the power of information and communication technology: The performance of Nigeria's Growth Enhancement Support Scheme*.NSSP Working Paper 30, Washington DC: International Food Policy Research Institute (IFPRI).

Trini, G.D., E.A. Ojoko., and A. Aruwayo. 2014. "Growth Enhancement Support Scheme (GESS) and the Challenges of Food Security in Nigeria: A

Review". *ARPN Journal of Agricultural and Biological Science*9(7): 226 - 232.

Uduji, J.I. andE.N. Okolo-Obasi. 2017. "Multinational Oil Firms' CSR Initiatives in Nigeria: the Need of Rural Farmers in Host Communities". *Journal of International Development* 29(3): 308-329.

Uduji, J.I. and E. N. Okolo-Obasi.2018a. "Young Rural Women's Participation in the E-Wallet Programme and Usage Intensity of Modern Agricultural Inputs in Nigeria".*Gender, Technology and Development* 22(1):59-81. http://doiorg/10.1080/097185.24.2018.1445894

Uduji, J. I. and E.N. Okolo-Obasi.2018b. "Adoption of Improved Crop Varieties by Involving Farmers in the E-Wallet Programme in Nigeria".*Journal of Crop Improvement*.32(5):717-737.http://doiorg/10.1080/15427528.2018.1496216

Uduji, J. I.; E.N. Okolo-Obasi, and S.A. Asongu. 2018. "Does CSR Contribute to the Development of Rural Young in Cultural Tourism of sub-Saharan Africa? Evidence from the Niger Delta in Nigeria".*Journal of Tourism and Cultural Change*.https://doi.org/10.1080/14766825.2018.1502777

Yamane, T. 1964. *Statistics: An introductory analysis.* New York, Harper and Row Publishers.

Appendix

DRAFT QUESTIONNAIRE FOR RURAL FARMERS IN NIGERIA

State _____ LGA
_____

City/Town_____
_

Name of
Respondent:_____

1. Sex of Respondent :
   Male   [   ]   Female [   ]
2. Age Bracket:
   a) Between 20 – 30 [   ]   b) Between 31 – 40   [   ] c) Between 41 – 50 [   ]
   d) Between 51 - 60 [   ]   e) Above 60 [   ]
3. Marital Status:
   a) Married [   ]   b) Single [   ]   c) Separated [   ] d) Widowed [   ]   e)
Divorced [   ]
4. Number   living   in   household   at   present   (Household   Size):
   _____
5. Highest Educational Qualification of Respondent:
   a) None   [   ] b) Primary   [   ]   c) Secondary [   ]   d) Tertiary [   ]
6. Religion of the Respondent
   a) Christianity   [   ]   b) Islam [   ]   c) Traditional   d)   others [   ]
7. Employment status of Respondent
   a) Government/Private non-farm Paid Employment [   ]   b) Self-employed
   (non-farm) [   ]   c) Full Time Farming [   ] d) Full time Student   [   ]
        e)Unemployed [   ]   g) Others [   ]
8. If self-employed, what is the major occupation of Respondent?

a) Trading [   ]   b) Handicraft e.g mechanic, welding, bicycle repairs, etc[   ]

c) Palm wine Tapping [   ]   d) Others (Pls

Specify)_____

9. If in other employment, are you involved in part time farming

 a) Yes [ ]   b) No [   ]

10. How long have you been farming:

a) 0- 10 Years [   ] b) 11- 20 Years[ ] c) 21 - 30Years [   ] d) 31 - 40 Years [ ] e)

Above 40 Years [   ]

11. If you are involve in farming, what is the size of your farm:

a) 0 - 1 hectare [   ] b) 2- 3 hectares[ ] c) 4 - 5 hectares[   ] d) 6- 7 hectares[   ]

e) Above 7 hectares[   ]

12. Range of monthly income of Respondent

a)   (0- 50,000)   [   ]   b) (51,000 – 100,000)   [   ] c) (101,000 – 150,000) [   ] d)

(151,000- 200,000) [   ] e) (201,000 – 250,000) [   ] f) (251,000 – 300,000) [   ]

g) (301,000- 350,000) [   ]   h) 351,000- 400,000 [   ] i) Above 400,000) [   ]

13. Do you or any other person(s) in your household earn off farm income

a) Yes [   ] b) No [   ]

14. If yes, what is the range of the monthly income from other household

members put together

a)   (0- 50,000)   [   ]   b) (51,000 – 100,000)   [   ] c) (101,000 – 150,000) [   ] d)

(151,000- 200,000) [   ] e) (201,000 – 250,000) [   ]   f) (251,000 – 300,000) [   ]

g) (301,000- 350,000) [   ]   h) 351,000- 400,000 [   ] i) Above 400,000) [   ]

Section B Knowledge and Participation in E-wallet

15. Are you registered as a farmer?

a) Yes [   ]   b) No [   ]

16. If no, why

 a) I know nothing about that [ ] b) The distance to the registration point is far [ ]

c) I am not a party member [   ]

d) Our religion is against it [   ] e) I have no access to telephone [   ] f) I don't

know how to read and write [   ]

17. What is the walking distance between your house and the registration/redemption point?

    a) Between 1 -20 minutes [ ] b) between 21-40 minutes [   ] c) between 41-60 minutes [ ] above 1 hour [ ]

18. Have you heard about GESS(e-wallet) before now

    Yes [   ]   No [   ]

19. If yes to 19 above, have ever used it to access agricultural input like

    Yes [   ]   No [   ]

20. If no what is the major reason for not accessing input with e wallet.

    _____

    _____

21. If yes to 21 above tick the input you have used it to access (tick as many as possible)

    a) Fertilizer   [   ] b) Improved seed [ ] c) Crop protection products like (herbicides, pesticides, fungicides etc) [ ] d) Farm credit [ ] e) Input Application training [ ]

22. Do you have access to a mobile phone

    a) Yes, I have my own phone [ ] b) Yes, but I use that of relatives [   ] c) No, I have no access at all.

23. Is your village/location properly covered by mobile network

    a) Yes fully [   ] b) Yes but partially [ ] c) No not at all

24. If yes to 23 above, how best do you charge your mobile phone

    a)   Our village is covered by the national grid [ ] b) we use solar power supply
    c) we use standby generator in our home [ ] d) we pay to use the public charging system [ ]

25. Do you use crop protection products (CPP) in your farming? a) Yes   [ ] b) No [ ]

26. Before the last 8 years, how do you source your farm input (crop protection products CPP)

    a) Personal reserve [ ] b) ADP [ ] c) Cooperatives [ ] d) E wallet [ ] e) Open market [ ]

27. In the last five years, how best do you source your farm input (crop protection products CPP)

a) Personal reserve [   ] b) ADP [   ] c) Cooperatives [   ] d) E wallet [   ] e) Open market [   ]

28. Before   the last 8 years, how early do you source your farm input (crop protection products CPP)

a)   Very early [   ] b) Moderately early [   ] c) Lately [   ] d) Very lately [   ] f) Not at all [   ]

29. In the last five years, how   early do you source your farm input (crop protection products CPP)

a)Very early [   ] b) Moderately early [   ] c) Lately [   ] d) Very lately [   ] f) Not at all [ ]

30. Before   the last 8 years, how costly was   your farm input   (crop protection products CPP)

a)Very early [   ] b) Moderately early [   ] c) Lately [   ] d) Very lately [   ] f) Not at all [   ]

31. In the last five years, how costly is your farm input (crop protection products CPP)

a)Very early [   ] b) Moderately early [   ] c) Lately [   ] d) Very lately [   ] f) Not at all [   ]

32. Kindly list the names of the CPPs you have used in the past, as many as you can remember

_____

_____

_____

_____

33. What is the quantity of CPP you use per hectare in your farming?

	Product	Less than	1– 2kg	2.1- 3kg	3.1-4kg	4.1- 5kg	5.1- 6kg	Others Pls

		1kg						specify
1	Herbicide							
2	Pesticide							
3	Fungicide							
4	Chemical fertilizer							
6	Others							

34. Where you trained formally on the use and application of CPP

    a) Yes [   ]   b) No [   ]

35. If yes to 34 above by who

a) Through the GESS programme [ ] b) By ADP [   ] c) By a cooperative [   ] d) Self training [ ]

36. In the last five year, have there been any improvement in your farm entrepreneurship

    b) Yes [   ]   b) No [   ]

37. If Yes, to 36 how will you attribute it to the government GESS programme

    (a) Wholly [ ] (b) To a large extent [ ] (c) To a little extent [ ] (d) Not at all [ ]

38. If you use CPP in your farm, how will rate its impact on your farming activities

    (a) To a large extent [ ] (b) To a little extent [ ] (c) Not at all [ ] d) negatively [ ]

39. Do you carry out soil test on your farm before planting Yes [   ] No [   ]

40. How do you rate the productivity of the soil you farm on in the last ten years

Productivity	10 years ago	5 years ago	Last year
Very High Productivity			
High Productivity			
Medium Productivity			
Low Productivity			
Very Low productivity			

41. Which other area of your entrepreneurship has GESS made a significant input

a) Providing input [   ] b) provision of farm credit [   ] c) provision of market information [   ]

d) Provision of counselling and extension services [   ] f) All the above [   ] g) None [   ]

h) other please specify_____

42. Do you have access to any source of farm credit

Yes [   ] No [   ]

43. If yes, where do you get the credits

a)   Commercial bank [   ] b) Agric Bank [   ] c) bank of industry [   ] d) Micro finance bank   [   ]   e) Non-bank micro finance institutions   [   ] f) Unregistered money lenders [   ]

g) Others pls specify _____

44. How do you get access to land

a)   Inheritance [   ] b) Lease [   ] c) Outright purchase [   ] d) Exchanges

45. What do you see as the four major challenges of e wallet in your Locality

_____

_____

_____

_____

_____

_____

_____

We thank you most sincerely for your time and support in completing this questionnaire.

Name of Enumerator: _____

Signature: _____ Date: _____