INTERNATIONAL INSTITUTE OF TROPICAL AGRICULTURE (IITA)

Ex-post analysis of the impacts of improved cassava varieties on smallholder livelihoods in Sierra Leone

By

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Contents

1.0. Introduction

Cassava (*Manihot esculenta*) is among the dominant starchy staples in the diet of people in Sub-Saharan Africa. It has been estimated that cassava serves as a staple food for over 200 million people in Africa, making it among most consumed crops in the continent (Yidana et al, 2013). It is one of the six commodities that African Heads of States have, via the Comprehensive African Agricultural Development Programme (CAADP), defined as strategic crops for Africa. Over the years, several efforts have been made to support cassava producers in many sub-Saharan African countries, including Sierra Leone to improve their livelihoods. Among such efforts is Support to Agricultural Research for Development of Strategic Crops in Africa (SARD SC) which is a research, science and technology development project targeted at cassava, maize, rice and wheat. The SARD-SC project has promoted a number of improved cassava varieties such as SLICASS 4, SLICASS 6 and SLICASS 7 through demonstration, multiplication and distribution of planting materials along with the appropriate agronomic practices including planting material selection and preparation, weeding practices and methods, fertilization, intercropping and diseases control. This study estimates the adoption rate of improved cassava varieties and assesses their poverty reduction impacts in Sierra Leone. More specifically, it addresses the question of whether and to what extent adoption of improved cassava varieties has resulted in reducing poverty among adopters. Further, it analyses the impact on farm yield, farm income/expenditure and poverty reduction.

The report is organized into 5 sections. Section 2 presents background information about SARD-SC project and its technology dissemination approach. Section 3 presents a detailed description of the survey methodology including the study location, sampling procedure and sample size, the method of data collection and management as well as the process of analysis. Section 4 presents the major findings on awareness, use of improved cassava varieties, productivity and per capita income gains, poverty status, household income and income distribution. Finally, Chapter 5 summarizes the report, provides conclusion and gives broader policy recommendations.

2.0. Background to the SARD-SC Project

The SARD-SC Project (Support to Agricultural Research for Development of Strategic Crops in Africa) was designed to improve livelihoods, tackle poverty and reduce food importation in Africa through enhancement of productivity and income from priority agricultural value chains. The context was that the rate of growth in agricultural productivity and production in most developing countries failed to keep pace with the needs of a rapidly growing population, resulting in a progressive rise in import bills for food and industrial raw materials. SARD-SC is a multinational CGIAR-led project, which has the overall objectives of enhancing food and nutritional security and contributing to reducing poverty in selected Regional Membership Countries (RMCs) in Africa. The targeted RMCs are Benin Republic, Côte d'Ivoire, DR Congo, Eritrea, Ethiopia, Ghana, Kenya, Lesotho, Madagascar, Mali, Mauritania, Niger, Nigeria, Senegal, Sierra Leone, Zambia, and Zimbabwe. The project was funded by the Africa

Development Bank (AfDB) and it is focused on raising the productivity and profitability of four strategic commodities: Cassava, Maize, Rice, and Wheat. These are four of the six commodities that African Heads of States have defined as strategic crops for Africa through the Comprehensive African Agricultural Development Programme (CAADP). The SARD-SC project is being implemented under four components including: (i) generation of agricultural technologies and innovations, (ii) sustainable dissemination and adoption of agricultural technologies and innovations across the value chain, (iii) sustainable capacity strengthening of project stakeholders, and (iv) efficient project management. Apart from overseeing the overall coordination of the Bank's support, IITA implemented the cassava and maize components of the SARD-SC project while rice and wheat components were handled by Africa Rice and ICARDA, respectively. The targeted beneficiaries of SARD-SC project are inclusive, comprising all the stakeholders that constitute the value chains of the selected crops: farmers, farmer groups, youth, the private sector, policy makers, marketers and traders, transporters, fabricators, the National Research and Extension System (NARES), and NGOs/CBOs.

The specific objectives of the SARD-SC are to enhance the productivity and income of four CAADP's priority value chains (cassava, maize, rice, and wheat) on a sustainable basis. The key project outcomes are:

- A 20% yield increase in cassava, maize, rice and wheat
- A $600 ($370 presently) increase in average annual household cash income
- A 20% increase in food security (84% from the present 73%) at end of project

2.1. SARD-SC technology dissemination approach

SARD-SC has implemented a participatory approach around Innovation Platforms (IPs) to successfully achieve awareness creation and adoption of cassava improved technologies along the value chain including inputs supply, production, processing, marketing and consumption (nutrition). The composition of IPs consists of all the stakeholders along the cassava value chain. This includes research institutions, policy makers, and farmers' associations, fabricators of processing machines, youth groups, financial institutions, input suppliers and ICT operators. These IPs serve not only as a space for strengthening production, organizational and business skills, but also as a social guarantee to reduce innovation risks through secured and formal contracts between stakeholders. Comprising financial institutions, the IPs provide innovative credit that is farmer friendly in terms of amount, interest rate, collateral requirement and instalments (Figure 1).

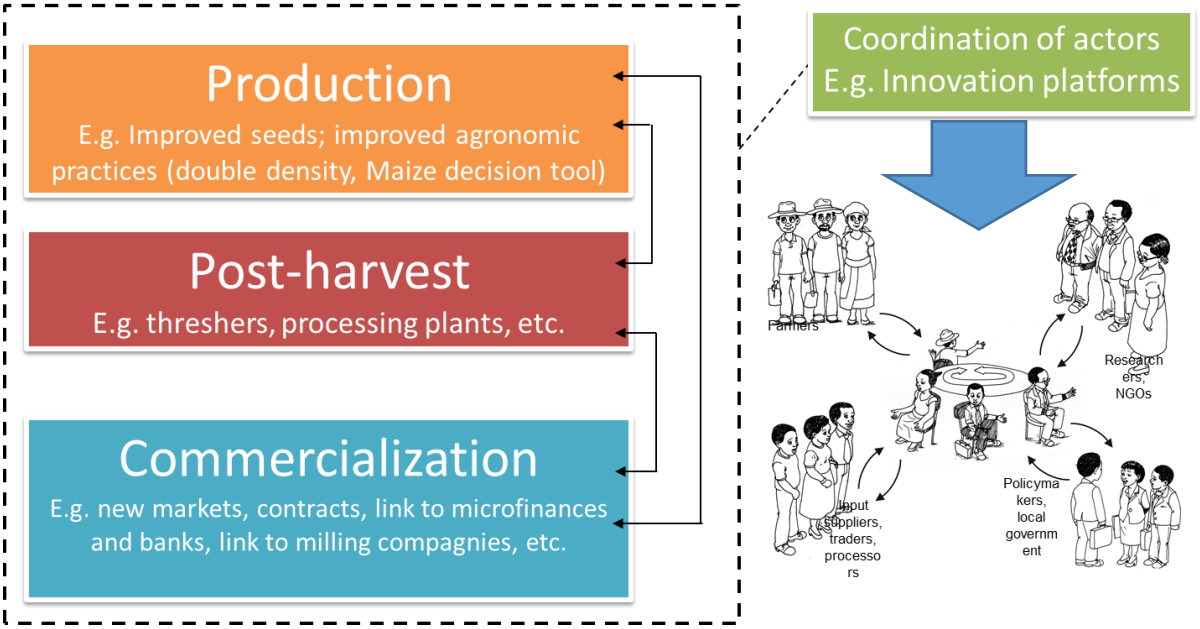


Figure 1: SARD SC strategy of implementation

Market participation by farmers was envisaged as adoption of SARD SC technologies would increase production and value addition capacity of farmers which would then lead to market surplus. Access to quality inputs was facilitated by the participation of farmers/farmers' groups and NGOs willing to engage in cassava planting materials multiplication and agro-dealers willing to supply inputs through contracts secured by the platform.

Marketing was further facilitated by the introduction and development of community cassava processing centers (CCPC) in strategic area with easy access and high level of production. The CCPCs assemble cassava products scattered in different villages from various producers and organize collective marketing. Youth Agripreneurs are key actors in this process and serve as service providers (e.g. they train farmers on best agronomic practices, processing, etc.) as well as buyers of semi-processed cassava products (e.g. cassava chips) which they later process into high quality cassava flour and other cassava by-products. Youth Agripreneurs also play the role of brokers and linkage with mega buyers such as World Food Program, etc.

3.0. Methodology

3.1. Sampling procedure and sample size

This report is based on data collected between June and October 2016 as a follow up of the 2013 household survey. In 2013, the sampling in each country was done at the community and household level using a random procedure implemented from stakeholder's meetings organized in the country to identify appropriate locations. The sample villages during the baseline were, thereafter, divided into two groups, namely "Controlled" and "Treated" villages. The "treated" villages were villages in which the SARD SC cassava program was implemented while the "controlled" villages were similar villages where the project was not implemented. In 2016, the survey followed the same strategy as in 2013 to do the follow-up

by revisiting and interviewing most of the households in controlled and treated areas where SARD-SC activities where implemented. The sampling frame follow the one used in the SARD SC baseline conducted in 2013. The lists of households that participated in the baseline study and the lists of households compiled by the village committee served as a sampling frame from which households randomly sampled but an attempt was made to revisit household surveyed in 2013. A total of 387 households from 26 villages were interviewed (Table 1). Efforts made to interview households surveyed during the baseline study resulted in revisiting about 36% of the total sample of households interviewed in the baseline. The level of representation of the baseline sample was 48.8%. Moreover, the level of representation of the baseline sample was also affected by the attrition because some households left the panel due to death and relocations to areas that were difficult for the survey team to access. We used the simple random sampling technique to select additional farmers.

Table 1: Survey sample distribution

District/Sub country/state	Village	Treatment	# HHs, 2016	Revisited
Bo	9	5	138	62
Moyamba	8	0	116	64
Bonth	4	0	62	38
Pujehum	5	0	71	25
Overall	26	5	387	189

3.2. Recruitment and training of enumerators

Enumerators were recruited following a predefined procedure agreed between IITA and African Development Bank. They were either Extension Agents (EAs) of the Extension Units in the State Ministry of Agriculture and Agricultural Development Program (ADP), undergraduate and graduate students of the national and private collaborating universities or professionals who have experiences in the administration of survey questionnaire. The criteria for final appointment of the required enumerators among numerous individuals that were recommended were: (a) a minimum SSCE academic qualification with the possession of OND, HND and BSc as an added advantage; (b) ability to fluently speak and write English or French; (c) adequate knowledge of the survey area or farming communities and (d) the ability to speak the local language and good knowledge on ICT. The personal qualities or attributes of the recruited enumerators included self-discipline, integrity, honesty, skillful disposition and emotional stability. These qualities were observed during the training of enumerators to finally select those who participated in the survey implementation.

The selected enumerators received 4 to 5 days training including in-class and pre-testing of the questionnaire in a nearest village. Enumerators were walked through an overview of SARD-SC project and the need for the early impact survey. The training was focused on understanding of different sections of the survey questionnaire. The teams were also given an opportunity to ask questions regarding the survey tool. During the third day of the training

they were required to read through the questionnaire themselves, practiced in pairs, one acting as a respondent and the other as an enumerator. After the 3 days training they were taken to nearby villages for field practice during which time each enumerator administered at least one questionnaire to evaluate challenges in a real environment. Reactions during the pre-test were gathered for modifications and production of the final version of the survey questionnaire. The training was not only to ensure good understanding of the questions and questioning techniques in the administration of the survey tool but also to get familiar with the electronic survey tools that were used for the survey. Tablets were used for data collection to speed up the process allowing rapid transmission of data to the survey coordinator for quick identification of potential problems with data collection and correct them in almost real time. The decision to use tablets was also to improve data accuracy reducing transcription errors by capturing digital data at the source and making easy combination of data sets form different countries. The software used in the tablet was *Surveybe*, an application designed to implement complex surveys questionnaires.

3.3. Methods of data collection

Trained enumerators collected all household data using structured questionnaire from selected households under the supervision of national and international supervisors. Interviews were held with the head of the household or other appropriate members of the household who have good knowledge of the household activities including farming activities in case of unavailability of the household head.

In cases where the selected household head and other suitable respondent was not available to be interviewed, the enumerators were encouraged to replace with another household from the list of households provided by the village committee. To ensure data quality, completeness, accuracy and reliability from the time of data collection, supervisors reviewed and validated the data every single day of field work. Efforts were made to limit challenges with regards to metric conversions of measurements of area, quantities and distances during data collection. Local measures (sacks, bags, basins etc.) were converted into standard weights (kilograms). Enumerators were trained on metric conversion and they were given handbook of metric conversions for the field work. Data were transferred from *Surveybe* 5.2 to STATA 14.1 for both processing and analysis.

3.4. Definition, contextualization and measurement of key indicators

Awareness

Awareness of a given technology is fundamental for its adoption. Awareness creation is one of the strategies used by SARD SC to promote improved cassava varieties and other technologies. To assess the contribution of the project in terms of awareness creation in the study area, we define awareness as a mere knowledge of the technology. Following this definition, a given farmer is considered aware of SARD SC technologies if he/she has ever heard about at least one improved variety promoted by SARD SC. In addition, the year of first hearing should fall between 2013 and 2016 and the information source should be from SARD SC and its partners' members of the innovation platforms.

Access (reach, extension)

Once the farmer is aware of the technology, he/she may still not take the decision to adopt if he/she does not have access to the technology. Therefore, we consider that a farmer has access to the technology if he/she can easily get the technology from his/her village or from the neighboring villages. For technologies which do not have market such as agronomic practices, access will mean the possibility for a farmer to get an extension agent or any other person knowledgeable to explain to him/her how to use the practices in case he/she forget how to do so.

Adoption

The definition of adoption is not unanimous among researchers and practitioners. There is still an open debate among scholar and researchers around the definition of adoption. However, in this study, we define that a farmer is an adopter if he/she has ever heard about the technology, has access to it and has taken the decision to use at least one of the technology during one or many cropping seasons between 2013 and 2016.

Cassava yield

Cassava yield is captured as the quantity produced on a given land size and it is expressed in ton per hectare. Many challenges were faced during the survey when collecting information on both farm size and harvested quantities. Some farmers, especially those with advanced age and low education level could not consistently provide information regarding their farm sizes and the quantities they harvested and consumed fresh. This was further complicated with the fact that those quantities consumed were harvested progressively, making it more difficult for farmers to recall appropriately since they don't keep formal records. To overcome these challenges, enumerators were asked to visit and physically measure at least two parcels for each farmer surveyed. The parcels visited and measured were selected on the basis of their importance in cassava production and their distance to homestead. In case the farmer has more than two parcels or if a given parcel was not measured because of its long distance from home, enumerators were asked to draw on a sheet of paper all the parcels owned by the farmers and thereafter, use the size of the measured plot to approximate the size of the others parcels through a comparison process with the farmer. For example, the farmer was asked to compare the size of the parcel that was not measured with the measured one (double, triple of, half of the measured one). The same comparison process was used to approximate the quantity harvested and consumed fresh in case the farmer experienced difficulties to give reliable information. Finally, to obtain the cassava fresh yield, the quantities fresh and dry were all converted in fresh using standard conversion factors.

Total per capita expenditure

The total per capita expenditure was computed by adding up food and non-food expenditure and dividing them by household size. Given that the distribution of consumption is not equal among household members because of different characteristics (age and gender particularly), we used the OECD scale (also called Oxford scale) to account for differences. The OECD scale assigns a value of 1 to the household head or spouse, 0.7 to each additional adult and 0.5 to each child (generally household members less than 15 years old). The adult equivalent (AE) is given as AE =1 + 0.7 (N adults - 1) + 0.5 N children.

4.0. Main findings

This section presents the main findings of the study, highlighting household characteristics, cassava production, level of awareness and adoption of improved varieties, and the impact of the adoption of improved cassava varieties on selected outcomes indicators such as yield, poverty and income inequality.

Descriptive statistics are first presented on household and farm characteristics. Advanced econometric methods are then used to compare the findings on outcome indicators including yield and poverty before and after the project implementation and between adopters and non-adopters. Details on the methods used to capture, measure and compute each of the indicators are also presented in the respective sections.

4.1. Description of household characteristics

To provide context to the poverty impact analysis of improved cassava varieties, the demographic and socioeconomic characteristics of the survey participants are provided in Table 2. A typical participant in the study area is characterized as a middle-aged married man with no formal education, heading a family of 8.5 members of whom about 3 are children under the age of 15 years. The number of males and females in the age of 15-64 years is 3 each, resulting in a dependence ratio of 50%. He can further be characterized as engaged in crop production with 1-9 years of experience in cassava farming, earning most of his income thereof with cassava processing being the second important source of income followed by off-farm activities including petty trade, casual labour and other income generating activities.

Table 2: Household characteristics

Characteristics household members	% or mean
Sex of the household head (%)	
Female	25.0
Marital status (%)	
Married	90.0
Single	2.6
Divorced, widowed	7.5
Household size	8.5
Age of the household head	46.0
# of male members aged between 15 and 64 years	2.9
# of female members aged between 15 and 64 years	2.6
# of members under 15 years of age	3.0
# of members aged 65 years above	0.9
Dependency ratio	0.5
# of members working on the household farm	5.6
# of members working full time on the household farm	0.8
Average number of members working in other people's farms	1.1
Level of formal education (%)	
None	71.4
Primary	10.7
Secondary	8.8
Tertiary	3.7

Others	5.1
Household head main occupation (%)	
Crop production	91.4
Livestock keeping	2.3
Others (business, salaried employment, petty trade, fishing, etc.)	6.3
Source of income (%)	
Agriculture	68.6
Cassava processing	21.5
Others (trade, animal rearing, etc.)	9.9
Years of experience in cassava production (%)	
1–9 yrs.	44.0
10-19 yrs.	42.0
20-49 yrs.	14.0

4.2. Description of household crop production

The most commonly grown crops include cassava, rice, groundnut, maize, beans and okra. Cassava is grown by almost everybody and rice is grown by about 44% of households in the study areas while maize is reported to be grown by about 31% of households (Table 3). Other crops grown include Banana, Sweet potatoes, Potatoes , Pepper , Others crops, Palm oil, Cocoa , Pineapple , Soybean, Eggplant , Pumpkin , Millet, Wheat , Onion , Carrot, Chilies, Tea. Farmers in the study area grow three crops on average, meaning that apart from cassava that is generally the main crop, they have about two other crops to grow. Nearly 60% of the farmers have reported practicing intercropping in their cassava farms. They are aware of about 5 varieties of cassava on average of which 2 are improved varieties. They grow about 3 cassava varieties simultaneously on one plot and reported that about 2 of them (on average) are improved.

Table 3: Major crops grown in the study area

Crops	% or mean
Crop grown (%)	
Cassava	98.2
Rice	43.9
Groundnut	31.2
Maize	28.0
Beans	12.0
Okra	10.5
Yam	15.2
# of different crops grown	2.6
# of cassava varieties known	5.1
# of improved cassava varieties known	2.4
# of cassava varieties grown	2.0
# of improved cassava varieties grown	2.3
# of cassava plots operated	1.2
Mono-cropping	40.6
Inter-cropping	59.4

4.3. Labor use

Analysis of labour sources shows that the family is the most important source of agricultural labour in the study area. Generally, family labour contributes to about 65.6% of agricultural labour requirements (Table 4). Hired labour is also an important source, contributing about 23% of the total labor use. It is used mainly for land preparation, planting, weeding, harvesting, threshing and transporting farm produce. Communal labour is used, to some extent, accounting for 11% of the total labor use in the study area.

Table 4: Labor used for farm operations

Farm activities	Family	Hired	Communal
Land preparation	36.1	50.5	13.4
Planting	45.8	38.2	16.0
Weeding	47.4	31.4	21.2
Fertilizer application	83.0	7.6	9.4
Harvesting	44.2	38.0	17.8
Threshing/shelling/bagging/pilling	58.6	26.7	14.7
Sourcing of planting materials	72.5	14.4	14.4
Postharvest processing	66.0	18.6	15.5
Obtaining market information	84.3	9.2	6.5
Selling	94.5	3.9	1.6
Transportation	58.6	37.4	3.9
Others	95.8	2.6	1.6
Overall	65.6	23.2	11.3

4.4. Social Networks and Innovation Platforms in SARD-SC Approach

4.4.1. Social Networks

Social networks provide space for exchanging experiences, information and dissemination of agricultural innovations. In this study, participation in social networks has been captured through membership to associations, with attention given to the type of association, the motivation to join, as well as the benefit received by the farmer when joining the association.

Table 5 shows that about 66% are members of at least one association. Nearly 80% are in farmers' associations. Other types of associations in which the visited farmers are members include cultural associations, religious groups, clan groups and NGOs. Farmers join association for different reasons. The majority of them join association for easy access to cassava planting materials (37%), easy access to credit (26%) and easy access to farm inputs (20%). Other important sources of motivation for farmers to adhere in their associations are their expectation to reduce their cost of transportation through collective freight transportation and increase their bargaining power through group selling of cassava products.

Table 5: Membership to associations

Characteristics	%
Membership of Association (%)	65.7
Type of association (%)	
Farmer organization	78.7
Cultural association	2.0
Religious association	4.8
NGO	7.6
Clan Group	4.4
Other	7.8
Status membership (%)	
Ordinary member	67.3
Leader/official	32.7
Association still functioning (%)	
Yes	94.1
Benefit of the association (%)	
Easy access to credit	25.7
The association supplies cassava planting materials	36.7
Easy access to inputs	19.9
Others (easy access to inputs, collective freight, sale, etc.)	17.4

4.4.2. Innovation platform

Results in Table 6 below indicate the role being played by innovation platforms in terms of creating awareness, improving access to credit and facilitating commercialization. SARD SC intervention did not have much impact in terms of increasing access to extension in Sierra Leone. For example, both members and non-members have a very high rate of access to extension partly because some of the platforms were established during the previous UPOCA projectthat was implemented in the country prior to the SARD SC intervention. However, the innovation platforms of SARD SC have improved access to information regarding improved cassava varieties and their adoption. They have also significantly facilitated commercialization of cassava products through collective marketing.

Table 6: Benefits of membership to innovation platform

Benefits	Membership to association		
	Yes	No	Chi-square/t-statistics
% having extension service	97.3	97.7	0.1
# of improved varieties known	2	2	0.2
% receiving training	8.2	1	16.8***
% adopting improved varieties	74.0	54.6	9.2***
% having access to credit	17.8	2.9	24.5***
# of improved varieties grown	2	2	0.1
% participating in collective marketing	20.6	2.3	34.1***

4.5. Awareness of SARD-SC cassava varieties

Awareness about agricultural technologies is an important condition for adoption by smallholder famers. From to 2013 to 2016, SARD-SC project has significantly raised awareness about improved cassava varieties among small holder farmers. Respondents reported that on average, they are aware of about 4 varieties of cassava among of which 2 are improved. In Sierra Leone, the level of awareness increased from 62.5% in 2013 to 96.0% in 2016 (Table 2).

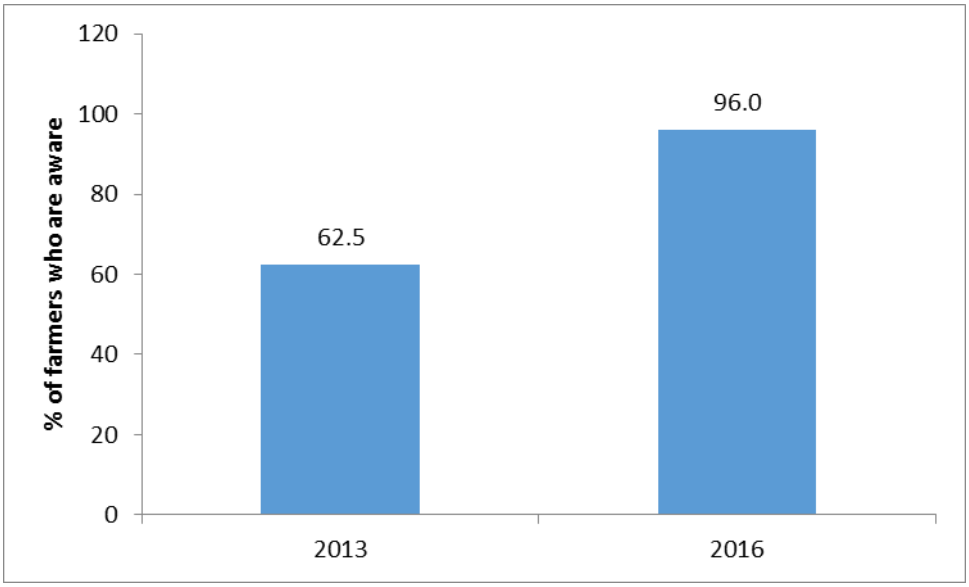


Figure 2: Change in awareness between 2013 and 2016

4.6. Source of Information

The main source of information about improved cassava varieties is the SARD SC and its partners. About 43% of households reported getting their information from that source (Table 7). Others important sources reported by households are fellow farmers (34%) and farmer Coops/ groups (12%).

Table 7: Source of information about cassava

Sources	%
Government extension	7.4
Farmer Coop/ groups	12.2
SARD SC and partners	42.8
Research Centre (trials/demos/ days)	1.6
Local seed producers	1.2
Fellow farmer	33.7
Radio/newspaper/TV	0.20

4.7. Farmer training

Farmer training was one of the tools used to create awareness and encourage adoption of SARD SC technologies. During the household survey, respondents were asked about the

training that any member of their households had received in the past three years. About 23% of the households reported to have received training in one or more agricultural issues (Table 8). Of these, about half (57%) of households had received training on processing techniques followed by agronomic practices (21%). In general, about 85% of the households who participated in those training found the training useful or very useful. Only 4% of them reported that it was not useful.

Table 8: Types of training

Type of training	%
Attended training	*23.3*
Agronomic practices	20.9
Pests and diseases control	7.6
Storage practices	5.7
Processing techniques	57.1
Marketing strategies	5.7
Other	2.9
Usefulness of training	
Not useful	3.81
Fairly useful	10.5
Useful	35.2
Very useful	50.5

4.8. Adoption of promoted technologies

The project has availed to farmers a set of cassava varieties. Farmers have been exposed to those varieties through trainings, demonstration fields and other interactions within innovation platforms. By this approach, the project has generally increased the rate of adoption of improved cassava varieties by about 3.3 percentage points from 54.6% in 2013 to 57.9% in 2016 (Figure 3). This is very low probably because some of the varieties promoted (e.g. SLICAS 4-7) were already introduced and adopted in the areas through SLARI and other organizations. It is important to note that some of the varieties and practices were already in existence prior to the SARD SC implementation. For these technologies, SARD SC contributed in increasing the awareness among farmers as well as promoted best practices to facilitate their adoption. In addition, SARD SC through the innovation platforms worked with different stakeholders to ensure the availability and the accessibility of those technologies.

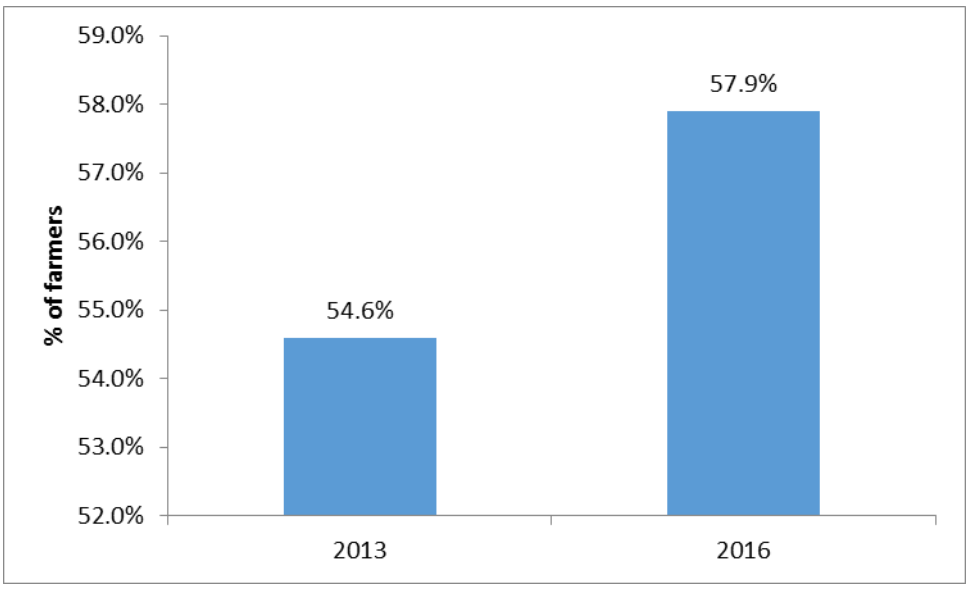


Figure 3: Change in adoption rate of improved cassava varieties between 2013 and 2016

4.9. Mean differences in cassava yield

Adoption of improved varieties coupled with use of good agronomic practices and management of pests and diseases as promoted by SARD-SC project have induced an important increase in cassava yield from 2013 to 2016. Figure 4 shows that the adoption of improved cassava varieties combined with appropriate agronomic practices contributed to productivity increase with the yield in 2016 representing more than the double of the yield observed in 2013.

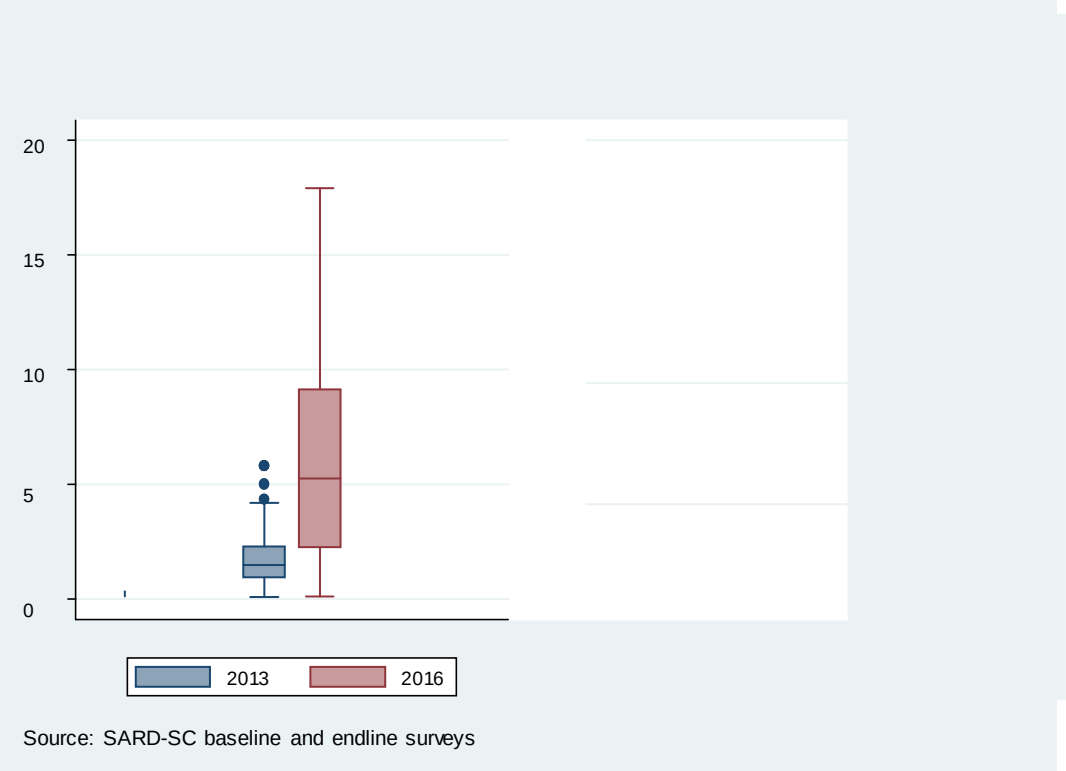
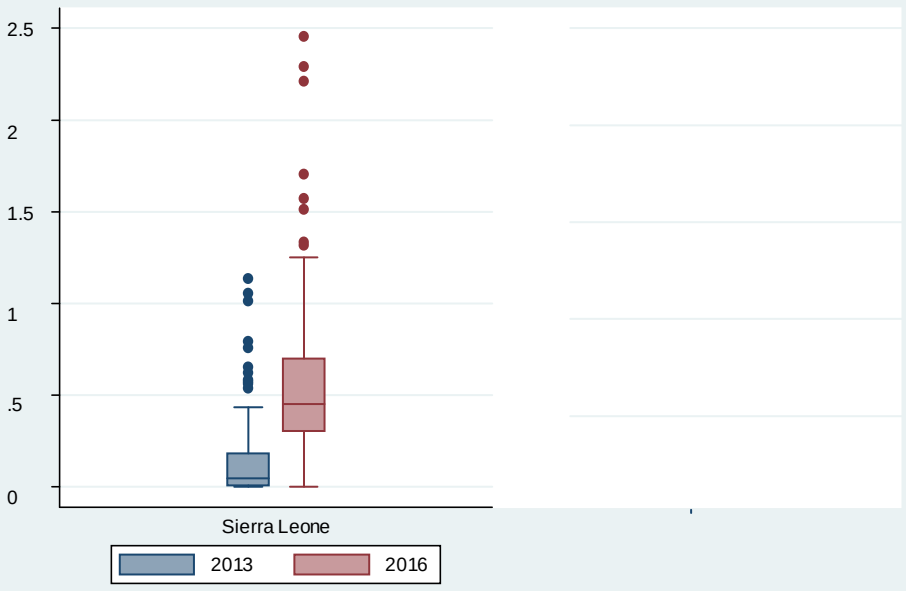


Figure 4: Change in cassava yield between 2013 and 2016

4.10. Change in household daily per capita expenditure and poverty status

Analysis was performed to evaluate the change in expenditure within intervention areas of SARD-SC project where improved varieties have been adopted. Evidence from the analysis show that per capita household adult equivalent expenditure tripled during the targeted period increasing from $0.27/person/day in 2013 to nearly $0.50/person/day in 2016 among the adopting farmers revisited (Figure 5). However, the level of poverty reduced very little during the same period. The poverty lines of $1.90/person/day and $1.25/person/day were used to estimate the different poverty indices among beneficiaries. This includes the poverty headcount, gap and severity between 2013 and 2016. The headcount decreased by about 1.8% points from 100% in 2013 to 98.2% in 2016 at the poverty in of US$1.90 per capita per day. Similarly, at the same poverty line, the poverty gap and poverty severity decreased respectively from 91.9% and 85.7% in 2013 to 69.9% and 53.2% in 2016 (Table 9). However, at the poverty line of US$1.25 per capita per day, the poverty rate decreased by 6.7% points from 100% in 2013 to 93.3% in 2016.



Source: SARD-SC baseline and endline surveys

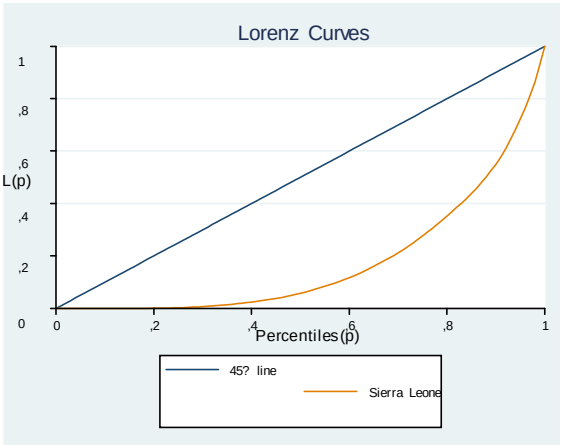
Figure 5: change in per capita expenditure between 2013 and 2016

Table 9: Change in poverty status between 2013 and 2016

Poverty indicators	2013	2016	Change
Poverty line of $1.9			
Headcount index	100.0	98.2	-1.8
Poverty gap index	*91.9*	*69.9*	*-22.0*
Poverty severity index	85.7	53.2	-32.5
Poverty line of $1.25			
Headcount index	100.0	93.3	-6.7
Poverty gap index	87.7	56.3	-31.4
Poverty severity index	79.8	38.5	-41.3

4.11. Income Inequality of cassava producing households

The discussion in the previous sections show that SARD SC contributed in improving productivity and reducing poverty in the treatment areas. The question of how the income generated is distributed among the population is important for the sustainability of the project achievements. To address this, we used the Gini coefficient to assess the change in income inequality between 2013 and 2016. The Gini coefficient is a measure of inequality of a distribution. It is defined as a ratio with values between 0 and 1, with 0 corresponding to perfect income equality (i.e. everyone has the same income) and 1 corresponding to perfect income inequality (i.e. one person has all the income, while everyone else has zero income). Figures 6 and 7 show that income inequality decreased among the households from 2013 to 2016.



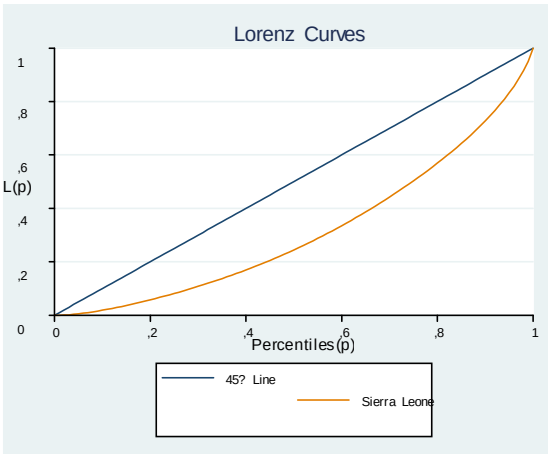


Figure 6: Income inequality in 2013 **Figure 7: Income inequality in 2016**

5.0. Conclusion

The study was conducted to assess the impact of improved cassava varieties and associated agronomic technologies in reducing poverty in Sierra Leone. The study has provided insight

into an understanding of (i) the socio-economic profile of cassava farmers and a description of their agricultural activities related to cassava production, (ii) adoption of improved cassava varieties by farmers in the intervention areas, and (iii) the impact of adoption of cassava varieties on farm yield, per capita expenditure, and poverty reduction.

In terms of socioeconomic profile, a typical cassava producing farmer in the study area is characterized as a middle-aged married man with no formal education, heading a family of 8.5 members of whom about 3 are children under the age of 15 years. The number of males and females in the age of 15-64 years is 3 each, resulting in a dependence ratio of 50%. He can further be characterized as one engaged in crop production with 1-9 years of experience in cassava farming, earning most of his income thereof, with cassava processing being the second important source of income followed by off-farm activities including trade, casual labour and other income generating activities.

Cassava is the most important crop grown in the area and key element of farmers' livelihood strategy. It is mostly planted in association with legumes and cereals such as rice. Farmers were found to operate about two cassava plots on average where they simultaneously grow about 3 cassava varieties with about 2 of them being reported as improved. The major source of labour used for different activities of cassava production comes from the family.

SARD-SC project used a participatory approach around Innovation Platforms to promote improved varieties and good agronomic practices for improving cassava production. The approach has increased awareness and adoption of cassava production, processing and marketing technologies. Findings revealed that innovation platforms have contributed to increasing awareness, improving access to information regarding improved cassava varieties and facilitating adoption and commercialization of cassava products through collective marketing. In terms of awareness, results show that the project has contributed to raising awareness about improved varieties by about 34 percentage points, increasing from 62.5% in 2013 to 96% in 2016. This has been achieved through a combination of extension services, trainings, follow-ups and linkages within the platforms. The increase in awareness resulted in an increase of 3.3 percentage points in adoption rate and considerable improvement in terms of application of best-bet agronomic practices and disease management from 2013 to 2016. Adoption of the improved varieties promoted by the project was found to be driven by a set of socio-economic factors, including membership to platforms and farmer associations, which facilitated awareness of improved varieties.

The above reported increase in the use of improved varieties and application of best-bet agronomic practices and disease management has been translated into doubling of the cassava yield reported in 2013 and tripling of per capita expenditure between 2013 and 2016.

In terms of poverty profile, results show that at the $1.90 poverty line, headcount decreased by about 1.8% points from 100% in 2013 to 97.2% in 2016. With the poverty line of $1.25 per capita per day, however, the level of poverty decreased by 6.7 % points from 100% in 2013 to 93.3% in 2016.

Although the Innovation platform approach has led to substantial success in terms of dissemination, uptake and impact of best bet cassava technologies, it still need to be strengthened and up-scaled to achieve more impact on poverty alleviation. Innovation platform approach should be integrated as part of agricultural development strategy at local and national levels to achieve greater adoption rate and poverty reduction.

6.0. References

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