

*Does addressing gender inequalities and empowering women improve development programme outcomes? The Case of C:AVA project in Ghana*

Paul Boadu, Wilhemina Quaye, Asafu-Adjaye Nana Yamoah, Adelaide Agyeman and Mavis Akuffobe

CSIR-Science and Technology Policy Research Institute,  
P. O. Box CT 519, Accra, Ghana

## Abstract

The study adapted the Community Based Monitoring System (CBMS) tool to collect data in 20 communities in the Atebubu-Amantin District Assembly to assess the effect of C:AVA project, which incorporated gender and women empowerment on income, participation in decision making, and access to market. The study was motivated by the need for evidence based and informed planning to ensure effective allocation and distribution of scarce resources to areas where they are mostly needed for outmost impacts. Mixed methods involving interaction with key informants at the District Assembly, focus group discussions, and census were used to collect data on 2716 households in 20 communities. The study finds that C:AVA project has raised the incomes of participants by GHC981.71 on the average. This is statistically significant at 10 percent level. The incomes of female headed households' participants increased by 2.2 percent higher than the overall average to GHC2,167.75. This is statistically significant at 5 percent level.

Factors such as household size, farming experience, religion and income were found to influence market access in the study location. The coefficient of the policy variable, *treat*, shows that C:AVA project participants were 25.4% more likely to have access to market for their produce as compared to non-participants. This is statistically significant at 1 percent level. Furthermore, apart from markets and markets information, and improved processing technology, collective decision-making regarding household production resources use as land, seeds, extension services, fertilizer, tractor services, irrigation services and credit saw more than 10 percent increase after participation in C:AVA project. The study found limited socio-cultural barriers to women participation in C:AVA and development programmes in the study communities. Based on the findings the study concludes that C:AVA project empowered women by increasing their level of income, participation in household decision making regarding use of productive resources and access to market.

The study recommends the adaption of the CBMS tool by the District Assemblies in Ghana to help provide data to aid planning and assess outcomes of development interventions for improved livelihoods. Further expansion of C:AVA project may require identifying and including measures that will enhance improvement of outcomes to both male and female headed households. This is important especially in most African countries where male headed households dominate communities.

**Keywords:** gender, women empowerment, poverty, market access

## Acknowledgment

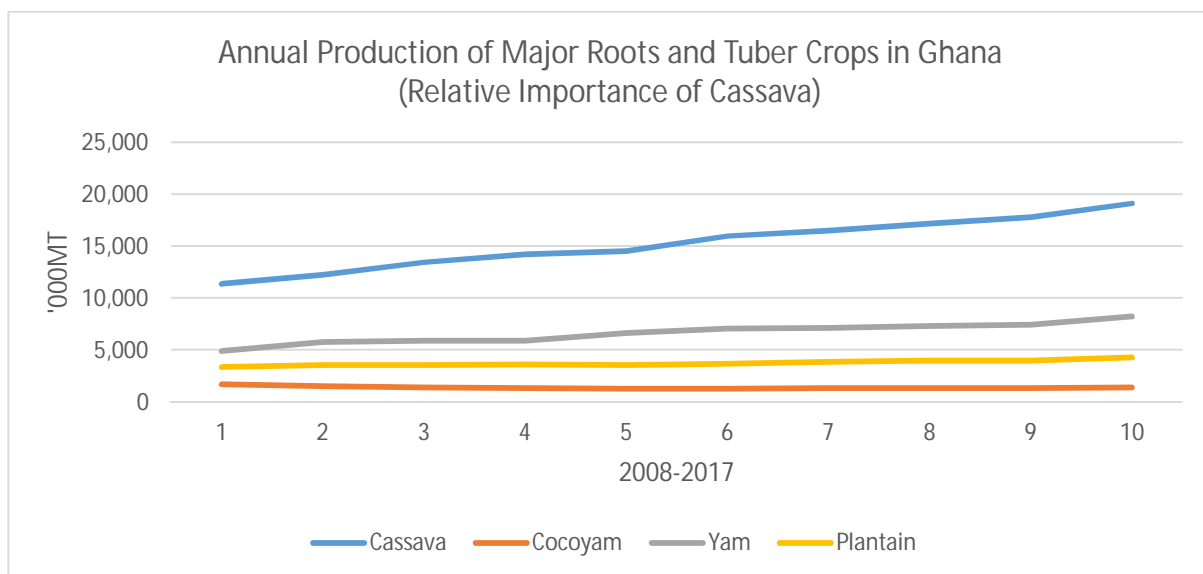
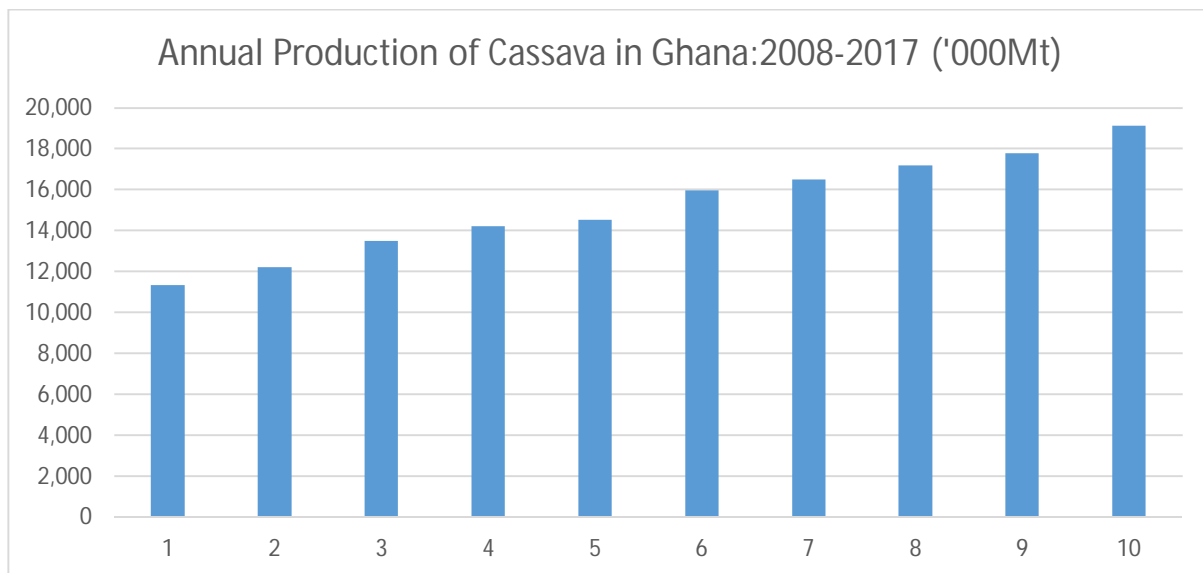
The study was undertaken with financial and technical support from Partnership for Economic Policy (PEP). In particular, we would like to acknowledge the contribution of Dr. Celia M. Reye and Ms. Jasmina A. Quilitis and the entire PEP team at Manila, Philippines; Mr Thomas Atibilla (Atebubu-Amantin District Assembly) and Mr. Nash Ansu (C:AVA project coordinator). We are grateful to the people of Atebubu-Amantin District for receiving us and making time to respond to the survey instruments.

## Introduction

Ghana has a population size of 29 million as of 2017 with estimated population growth rate of 2.2%. Although Ghana is a lower-middle income country is still battling with issues of poverty, unemployment, housing deficit, equity and inclusive growth among others. Ghana has launched its Coordinated Programme of Economic and Social Development Policies (CPESDP) 2017-2024. The CPESDP is an agenda for jobs, creating wealth and equal opportunities for all. The CPESDP 2017-2024 has been aligned with the SDGs. Ghana has aligned its medium-Term Development Planning Framework (MTDPF) 2018-2021 indicators with continental targets, Malabo Targets, as well as global targets, Sustainable Development Goals (SDGs). Ghana has a National Gender Policy 2015 which seeks to mainstream gender equality concerns into national development processes paying attention to the social, legal, civic, political economic and socio-cultural conditions of Ghanaians particularly women, girls, children and vulnerable. Efforts to tackle inequalities by successive governments have included promotion of girl child education, skilled training for young girls, free Senior High School Education, Ghana School Feeding Program, Free antenatal services for pregnant women, Livelihood Empowerment Against Poverty (LEAP), Planting for Food and Jobs in the Agriculture Sector and industrialisation pursuit, among others.

In 2016, the agriculture sector contributed 20.1% of Ghana's GDP (ISSER 2017). It employs about two thirds of its population, but the sector is challenged with issues of low productivity levels, post-harvest losses and low value addition along the commodity value chains (FASDEP II, 2013). Undoubtedly, women play very significant roles in the Ghana's Agriculture Sector but receive little attention in the provision of agricultural services and inputs support (Quaye et al 2014, MOFA/WAAPP 2014).

One of the agricultural commodities that forms part of the major staples in Ghana is cassava. Cassava production and processing provide sources of livelihoods to farmers particularly women who dominate the processing and marketing subsectors (Diego et al 2014). Cassava production is increasing. Ghana produced 17,212,760MT (in 2015), 17,798, 220MT (in 2016) and 19,137,940MT (in 2017).



Vanhuyse (2012) established that approximately 50% of the harvest cassava is either consumed or sold as fresh roots to be consumed at the household level in boiled or pounded (*fufu*) 25% is processed into *gari* (roasted fermented cassava), 18% used to produce *Agbelima* (fermented cassava mash), 6% used to produce *konkonte* (dried cassava chips) and 1% of the harvested roots for industrial use.

This research focuses on the Cassava: Adding Value for Africa (C:AVA) Project that seeks to reduce poverty and improve access to markets by cassava value chain actors. C:AVA project targets farmers and processors of cassava and consciously empower women in selected communities in the Brong Ahafo and Volta Regions of Ghana. Implementation of C:AVA in the Brong Ahafo Region started in 2009-2014 (phase 1) and 2015-2018 (Phase 2) covering

112 communities and total of 70 active groups. C:AVA project is funded by Bill & Melinda Gates Foundation (BMGF).

C:AVA Project outcomes include access to improved cassava varieties, training and capacity building of farmers in improved agronomic practices and better farm management that result in increased yields and incomes of farmers and processors, particularly women. For processors, C:AVA **transfers value addition processing methods and enhanced market access and linkages to market aggregators**. Under the C:AVA Project there is capacity building and training on business advisory services, records keeping and access to credit facilities. C:AVA mainstreams gender in its project implementation to ensure that women are empowered and equally benefit from the project's activities as their male counterparts.

By the theory of change, the C:AVA Project expectation is that livelihood conditions of project beneficiaries will improve as reflected in increase in yields and incomes by gender, enhance market access and women's empowerment in participating in decision making processes at both household and community levels as well as changes in socio-cultural factors that limit women participation in interventions.

### Women Empowerment

This study aims at assessing the effectiveness of C:AVA as an intervention tool to address gender gaps, empower women and improve on the livelihood situation of its beneficiaries. From the literature, women empowerment is a multi-dimensional concept that can be investigated from the political, social, financial and educational aspects (Iyam et al 2017, Kaur and Singh 2017, Vigneri and Lombardini 2016). Women have been empowered through their participation in Self Help Group and access to credit (Badruddin 2017, Poonam 2017), through their involvement in Global Value Chains and markets (Gianluca Nardi 2015, Said-Allsopp and Tallontire, 2014, Morioka and Nicholas 2014, Spence 2011, Chain 2010). Alkire et al (2013) developed women's empowerment index with reference to Women's empowerment in Agriculture Index (WEAI) by International Food Policy Research Institute (IFPRI) within the context of impact evaluations of interventions. Their study emphasized that empowerment is a multi-dimensional concept and so they looked at the possibility of combining a variety of indicators into a composite index.

In their study, Alkire et al (2013) considered relational indicators that looked at power dynamics among gender at the households and community levels, participation in decision making, contribution to household income, participation in community governance, control over household assets and personal time by gender, among others. Zoogah (2010) tackles the women empowerment issue by investigating gender disparities in access to economic resources including credit, land and economic power sharing as well care taking roles and responsibilities. Agarwala and Lynch (2006) considered women's autonomy as empowerment in a multi-dimensional construct involving factors such as violence, family decision, community involvement and household economic decisions. In this research, decision making with regards to production assets by gender and access to market have been considered as empowerment factors.

## 2. Research Objectives

This research adapted and implement a community-based monitoring system (CBMS) to investigate the extent of effect of C:AVA Project is addressing gender inequalities and empowering women in Ghana.

The specific objectives are to:

- (i) Investigate the effectiveness of C:AVA Project in addressing poverty reduction by gender;
- (ii) Investigate barriers to women empowerment in the study communities (using women participation in C:AVA project and other interventions; and
- (iii) Recommend options for improving gender focused projects outcomes.

## 3. Research Questions

The overall research question addressed in this study is “Does women participation in C:AVA project lead to improvement in their empowerment?”. Within this, five specific research questions were subsumed. The associated hypothesis and analytical model employed are presented in Table 1.

Table 1 Specific research questions, hypothesis and analytical model

Research Question	Hypotheses	Proposed model and methodology to be used to answer each research question
RQ1. What is the effect of the C:AVA Project participation on farm income by gender (women and men)?	HO: There is no significant effect of C:AVA project participation on farm income by gender (women and men)	Propensity Score Matching (PSM)
	HA: There is significant effect of C:AVA project participation on farm income by gender (women and men)	
RQ2. Is there association between C:AVA project participation and poverty level of households?	HO: There is no significant association between C:AVA project participation and poverty level of households.	Correlation coefficient and Chi2 statistics
	HA: There is significant association between C:AVA project participation and poverty level of households.	
RQ3. What is the effect of the C:AVA Project participation on market access by gender?	HO: There is no significant relationship between C:AVA project participation and market access by gender.	Probit regression model
	HA: There is significant relationship between C:AVA project participation and market access by gender.	
RQ4. Does women participation in C:AVA project lead to improvement in their	HO: Women participation in C:AVA project does not lead to improvement in women empowerment	Proportional distribution test, Chi2 test

empowerment?	HA: Women participation in C:AVA project leads to improvement in women empowerment	
RQ5. How did the community and families respond to women's participation in C:AVA project? Barriers to women empowerment		Content analysis of Focused group discussion outcomes Proportional distributions

### 3. Methodology

#### Study area

This study was carried out in the Atebubu-Amantin district of Brong-Ahafo region in Ghana where the C:AVA was implemented. The Brong Ahafo region is the second largest producer of cassava following the Eastern region in Ghana. The region produced 3,797,416 metric tonnes, representing 23 percent, of cassava roots produced in 2015 (SRID/MoFA, 2015). The majority of households in the area are involved in cassava farming and processing of agricultural produce, and also trading. The Atebubu-Amantin District has 8 Area Councils serving as the smallest planning unit at the district level. The Konkrompe area council in the Atebubu-Amantin District was selected for the CBMS census because most of the communities where the C:AVA project was implemented were located within the Area Council.

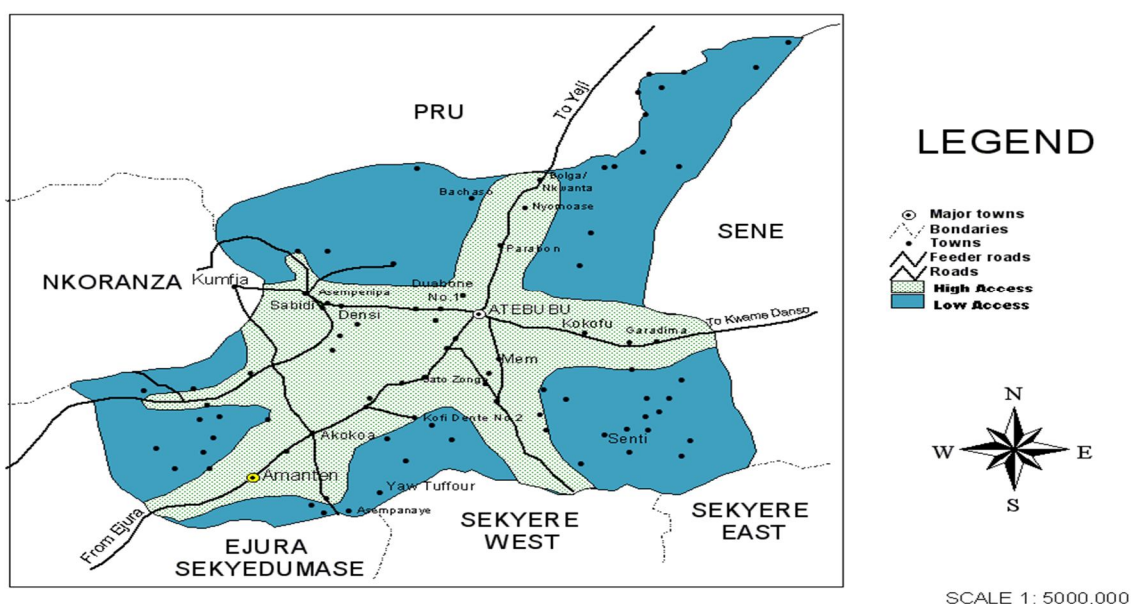


Figure 1: A map Atebubu-Amantin District showing area councils and major communities

## Survey design and implementation

The Community Based Monitoring System (CBMS) developed by Reyes (1993) was adapted<sup>1</sup> to gather household and community data in the study locations. Two CBMS survey questionnaires were used for the data gathering. The CBMS household questionnaire was designed to capture information on various demographic and socioeconomic characteristics at the household and individual level, while the CBMS community questionnaire were designed to gather community level data on physical and availability of basic services and institutions in the study communities. The two questionnaires were uploaded onto a tablet with the aid of CBMS Scan software. Provisions were made to gather data on geographic positioning system (GPS) of household, basic services and available social amenities in the study locations.

The survey took the form of census. In each of the building/house in the study locations, the number of households were identified to respond to questions regarding the household and the individuals within it, after given their consent. The household head or any person knowledgeable enough to provide information about the household and members responded to the questionnaire. The surveys were assisted by Assembly men, teachers and national services personnel recruited and trained<sup>2</sup> from the study communities. The survey was implemented from February to March 2018. In all, a data on a total of 2716 households in 20 communities in the study locations were collected. Table 2 shows the distribution of households per community.

**Table 2: Distribution of household per study communities**

No.	Communities	Total HHs Interviewed	Percentage
1	Kokofu	248	9.13
2	New Konkrompe	589	21.69
3	Afrefreso	145	5.34
4	Sawakye	77	2.84
5	Old Konkrompe	99	3.65
6	Mem	103	3.79
7	Watro	139	5.12
8	Praprabon	174	6.41
9	Fakwasi	348	12.81
10	Bompa	70	2.58
11	Kumfia	479	17.64
12	Famfour	55	2.03
13	Seanti	28	1.03
14	Seneso	52	1.91
15	Kumkumso	11	0.41
16	Boniafo	56	2.06

<sup>1</sup> The adaptations were made based on Ghana Living Standard Survey Instruments and other available survey instruments for the purposes of comparison. Also, specific questions regard C:AVA project and participation were included in the questionnaire.

<sup>2</sup> A three(3) day training was organized to training the recruited enumerators at the district Attebubu-Amantin District Assembly. Day



17	Abrewanko	11	0.41
18	Dagatiline	5	0.18
19	Ali Kura	16	0.59
20	Kwabena Gyan	11	0.41
<b>Total</b>		<b>2,716</b>	<b>100</b>

### Analytical techniques

Based on literature and experience, appropriate analytical methods were employed to address the research questions of the study. This subsection presents the methods of analysis of the research questions outlined in the study.

#### *Research question 1: What is the effect of the C:AVA Project participation on farm income by gender (women and men)?*

Propensity Score Matching (PSM) method was employed to assess the effect of participation in C:AVA project on farm income. This quasi-experimental method was adopted because lack of baseline data and no random assignment of project’s targeted beneficiaries into treatment and control group prior to the implementation of the project. Following Herbert (2009), the Propensity Score Marching was estimated in four stages.

*In stage 1*, propensity scores were estimated using an appropriate probit regression model of participation in C:AVA project. The model took the form:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_k X_k + \epsilon$$

Where Y = 1 if the respondent is a beneficiary of C: AVA and 0 otherwise.

Table 3 presents the description of the explanatory variables used in the model.

**Table 3: Explanatory Variables**

Variables	Definition	C:AVA beneficiaries	Non C:AVA beneficiaries	difference	t-statistics <sup>3</sup>
Farm Incomes	Farm income (GHS)	3183.30	1839.26	1344.04***	3.2145
Age	Age of household head	54.33	47.40	3.49***	2.8440

<sup>3</sup> A t-statistic is a type of inferential statistic used to determine if there is a significant difference between the means of two groups (beneficiaries and non-beneficiaries), which are related in certain features.

	in years				
Household size	Household size	5.5	5.2	.8***	3.4341
Educational level	1 if the household head has some form of formal education and 0 if no formal education	.32	.40	.08	1.1890
Land ownership	1 if household owns a land and 0 otherwise	.81	.59	.22***	3.1873
Gender	1 if Male and 0 if female	2	2		
Experience	1 if household head has 3 or more years of experience in farming and 0 otherwise	0.60	0.45	.15**	2.1345
Extension	1 if household has access to extension services and 0 otherwise	.30	.07	.23***	11.9924

**Note:** difference significant at 10% (\*), 5%(\*\*), 1%(\*\*\*)

The estimated probit regression resulted used to predict the propensity scores are shown in appendix 1.

*In the second stage (Stage 2):* the results of stage 1 was used to estimate the propensity scores.

*Stage 3:* An evaluation of the quality of the balance of the predicted propensity scores between C:AVA beneficiary and non-beneficiary groups was conduct. This was done with the aid of graphical representation as indicated in Figure 1. Following the distribution of the propensity scores, near neighbourhood matching method was used to create comparable groups. One-to-many matching was used in order not to lose a sizeable number of the sample for estimation.

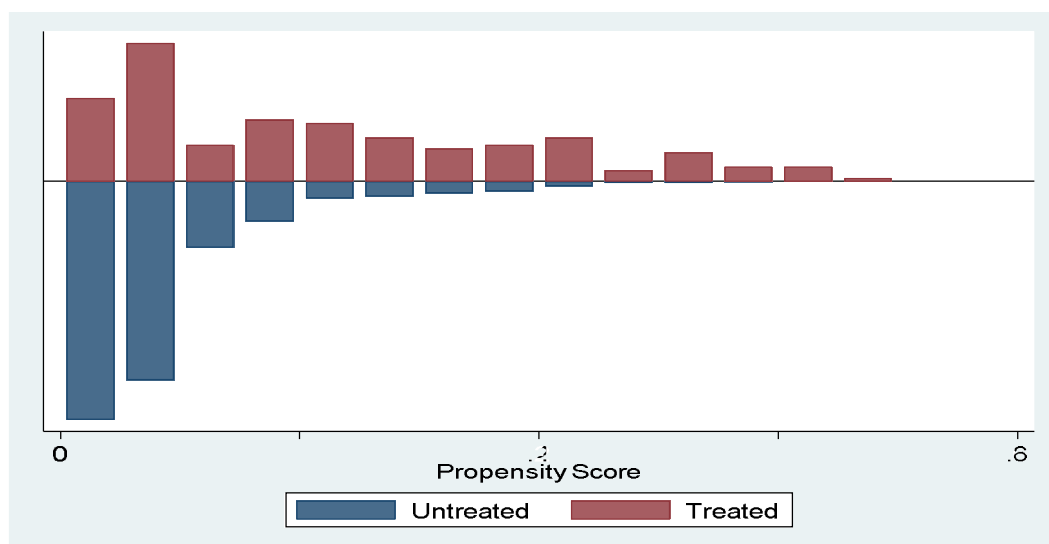


Figure 1: Distribution of propensity scores

The final stage (*Stage 4*) saw the estimation of the differences in outcomes of interest (changes in income levels). The results are presented and discussed in Table 4.

**Research question 2: Is there association between C:AVA project participation and poverty level of households?**

In this study poverty was proxied by a number of factors including access to potable water, toilet facility, electricity and average daily income of individual household members. These variables were correlated with the dummy variable of participation in C:AVA project. z-statistics were generated to assess the level of significance of the level of associations between the variables.

**Research Question 3: What is the effect of the C:AVA Project participation on market access by gender?**

Probit regression model was estimated to assess the effect of C:AVA project participation on market access by gender. The model is presented in equation (2)

$$\text{Market\_Access} = \beta_0 + \beta_1 \text{Treat} + \beta_2 \text{Female} + \beta_3 \text{Christian} + \beta_4 \text{Muslim} + \beta_5 \text{C:AVA} + \beta_6 \text{Female} * \text{C:AVA} + \epsilon \quad (2)$$

Where:

Market\_Access is equal to 1 if farmer is able to sell all produce regularly and zero otherwise;

Treat (policy variable) is equal to 1 if the farmer is C:AVA beneficiary and zero otherwise;

The interaction terms *Female*\*C:AVA is equal to 1 if the gender of farmer is a females and C:AVA beneficiary and zero otherwise;

Christian is equal to 1 if the religion of the household head is Christian and zero otherwise; and Muslim is equal to 1 if the religion of the household head is Muslim and zero otherwise.

The estimate coefficients (probabilities) are presented in **Appendix 2**. The estimated marginal effects are presented and discussed in the results section.

**Research question 4: Does women participation in C:AVA project lead to improvement in their empowerment?**

As indicated earlier, women empowerment in this study was assessed using women participation in decision making at the household level. Proportional distributions and

differences in means were computed to assess participation in decision making regarding the use of productive resources before and after participation in C:AVA project. Table 5 present the estimated results.

***Research question 5: How did the community and families respond to women’s participation in C:AVA project? Barriers to women empowerment?***

The research question was addressed using information gathered through focus group discussion. Separate focus group discussions were held for women and men in five (5) randomly selected out of the 20 study communities. Content analysis was done to support to support percentage distribution results generated from the data.

### 3. Results and Discussion

This section presents and discusses the result of the study. The results are presented sequentially as per the research questions.

#### 3.1 Effect of participation in C:AVA project on farm incomes

Table 4 presents the results of the effect of C:AVA participation on farm income. The overall results show that C:AVA project raised participants crop income by GHC981.71 on the average. This is statistically significant at 10 percent level.

**Table 4: Average treatment effect of C:AVA interventions on participants.**

	Variable	Sample	Average Treatment Effect <sup>4</sup> Coefficient	t-value
Pool sample	Farm Income	Matched	981.71*	1.67
		Unmatched	943.64***	2.91
Female	Farm Income	Matched	2,167.75**	2.18
		Unmatched	2,318.69***	4.48
Male	Farm Income	Matched	276.40	1.11
		Unmatched	790.49	0.27

**Note:** Coefficient significant at 10% (\*), 5%(\*\*), 1%(\*\*\*)

A further analysis by gender shows that incomes of female headed households’ participants increased by 2.2 percent higher than the overall average of GHC2,167.75. This is statistically significant at 5 percent level. The results further show that although male headed households recorded an increase on income of about GHC276.40 compared to non-participant of C:AVA. This is not statistically significant. This shows that on the average the C:AVA project benefited female headed households. Further expansion of the programme may require

<sup>4</sup> The Average Treatment Effect measures the difference in mean (average) outcomes between units assigned to the treatment and units assigned to the control

identifying and including measures that will enable improvement of outcomes for both male and female headed households. This is important especially in most African countries where male headed households dominate our communities.

### 3.2 Association between C:AVA project participation and poverty level of households

The C:AVA project outcomes was anticipated to alleviate poverty level of beneficiaries. Table 5 shows the results of the Pearson measure of the level of association of participation in C:AVA and level of poverty proxy by daily expenditure of individuals (below and above poverty line), access to potable water, decent toilet, electricity. The results show that about 60 percent of C:AVA participants are above the poverty line with daily expenditure being above **GHC10** per day. The associated chi2 statistics was 6.6, this is statistically significant at 5% level. Thus, there is associated difference between C:AVA participation and average daily expenditure of household members. Also, the study observed a higher proportion of C:AVA participants with access to portable water (77.2%), descent toiled facility (86.4%) and electricity (55.3%). The associated chi2 statistics were 12.3, 38.8 and 4.2, respectively. While the observed association were statistically significant at 1% level in the case of assess to water and decent toilet facility. That of access to electricity was significant at 5% level (Table 5).

**Table 5: Association between cover participation and poverty indicators**

Variable	C:AVA Participation		All	Pearson Chi(2) <sup>5</sup>	Probability
	No	Yes			
<b>Poverty level</b>					
Above poverty line	1,682 (67.8)	140 (59.6)	1,822 (67.1)	6.57**	0.010
Below poverty line	799 (32.2)	95 (40.4)	894 (32.9)		
<b>Water</b>					
No access	587 (23.7)	32 (13.6)	619 (22.8)	12.30***	0.000
Access	1,894 (76.3)	203 (86.4)	2,097 (77.2)		
<b>Toilet</b>					
No access	401 (16.2)	76 (32.3)	477 (17.6)	38.80***	0.000
Access	2,080 (83.8)	159 (67.7)	2,239 (82.4)		
<b>Electricity</b>					
No access	939 (37.9)	105 (44.7)	1,044 (38.4)	4.24**	0.040
Access	1,542 (62.2)	130 (55.3)	1,672 (61.6)		

<sup>5</sup> The Chi-square test is intended to test how likely it is that an observed distribution is due to chance.

**Note: Coefficient significant at 10% (\*), 5%(\*\*), 1%(\*\*\*); Column percentage in parenthesis**

### 3.3 Effect of the C:AVA Project participation on market access by gender?

Farmers' access to market to sell their produce remains one of the challenges faced by farmers in the Attebubu-Amantin District and in Ghana as a whole. This is partly as a result of the poor and unmotorable road networks that render some of the major food producing villages unreachable especially during raining season. Access to emerging food processing markets could be constrained due to lack of information on traders and prices as well as capacity to meet food processing and safety standards. Consequently, it is anticipated that any intervention aimed at increasing productivity, including C:AVA, should incorporate measures to ensure access to market to help farmers and processors sell off their produce.

Access to market will also serve as a stimulus in enhancing adoption of improved production and processing practices by farmers and processors respectively. Interactions with C:AVA project managers revealed that efforts were made to enhance market access as part of project support to beneficiaries. As stipulated in the introduction section, C:AVA Project outcomes included the following:

- Access to improved cassava varieties by farmers (who were also processing),
- Enhanced capacity building of farmers/processors and improved training on agronomic practices and better farm management that result in increased yields and incomes of farmers/processors
- Enhanced access to value addition processing methods
- Enhanced market and linkages to market aggregators by cassava farmers and processors.

This sub-section presents and discussed the marginal effect results obtained as post estimation from a logistics regression model on the determinant of market access among farmers (Table 6).

**Table 6: Marginal effect results of Probit regression Model on market access**

Variables	Coefficient	z	P>z <sup>6</sup>
<i>Age</i>	.0007662	1.06	0.289
<i>Age2</i>	-.0000135	-1.29	0.197
<i>Education</i>	-.0417426***	-4.44	0.000
<i>Household size</i>	.0123979***	8.27	0.000

<sup>6</sup> Z-Score is a standard deviation and explains how many standard deviations from the mean the result is. If z-score is +ve, it indicates that the score is above the mean and if it's -ve it indicates the score is below the population mean and if it's 0 it indicates the score is same as the population mean. Whereas p-value is a probability that provide results to reject or not to reject our null hypothesis or accept our alternative hypothesis

<i>Experience</i>	.0202876**	2.02	0.043
<i>Gender (Female)</i>	-.02009**	-2.14	0.032
<i>Treat</i>	.2539643***	9.98	0.000
<i>Female-C:AVA</i>	-.0004413	-0.02	0.987
<i>Christian</i>	.0852374***	9.26	0.000
<i>Muslim</i>	.0728677***	3.24	0.001
<i>Extension</i>	-.1298052***	-11.31	0.000
<i>Income</i>	.0511249***	12.56	0.000
<i>Pseudo R2</i>		0.0703	
<i>Prob &gt; chi2</i>		0.0000	
<i>Log likelihood</i>		-4986.571	

**Note:** Coefficient significant at 10% (\*), 5%(\*\*), 1%(\*\*\*)

The results show that an increase in household size increases access to market by 1.2 percent. This is statistically significant at 1% level. Farmers with at least three years or more experience in farming are 2% more likely to have access to market compared to farmers with less than 3 years of farming experience, this is significant at 5% level. The coefficient of the policy variable, *treat*, shows that C:AVA project participants are 25.4% more likely to have access to market for their produce as compared to non-participants. This is statistically significant at 1 percent level. Religion of a farmer was found to have influence on market access. Farmers who were Christians and Muslims in the study locations were 8.5% and 7.2%, respectively, more likely to have market access compared to farmers who belongs to other religions believes such as traditional religion. These were both statistically significant at 1 percent level. Also, the results show that farmer with access to extension services in the study location about 13% less likely to have market access. This is statistically significant at 1 percent level. While this does not conform to apriori expectations, it gives indication of the limited extension services delivery in the study location. The data shows only 10 percent of the study sample indicated they have access to extension service. The need to capacitate the District Agricultural Development Units in terms of staffing and logistics for effective extension delivery cannot be overemphasized.

Overall, the study predicted 23.1% of the determinant of market access to farmers/processors in the study location. Other factor must be explored in future study to help offer policy recommendations to enhance farmers' access to market.

### **3.4 Effects of C:AVA project participation on women empowerment (participation in decision making on productive resources?)**

Women empowerment were assessed using participation in decisions regarding household productive resources. They include decisions on household use and non-use of productive resources such as land, seed, extensions, services, tractor services, irrigation services, improved processing technologies, market and marketing information and credit decisions. An assessment of the participation in decision making (Table 7) before and after C:AVA participation shows an improvement in collective decision making regarding productive resources. The percentage increases in collective decision-making ranges from 7.9 to 23.4 percent. The percentage increases were all statistically significant.

**Table 7: Decision Making on Access to Productive Resources**

Resource	Before Participation in C:AVA (%)			After CAVA (%)			% Diff. Both	Z-statistic
	Men	Women	Both	Men	Women	Both		
Land	59.8	3.4	36.8	38.7	1.2	60.1	23.4***	8.0113
Seed	40.9	11.6	47.5	28.7	3.1	68.2	20.8***	6.5520
Extension	48.6	7.0	44.4	31.6	1.7	66.8	22.4***	7.1803
Fertilizer	27.3	7.2	65.5	19.9	2.3	77.8	12.3***	3.5073
Tractor Services	60.9	3.5	35.6	40.0	3.9	56.1	20.5***	7.2117
Irrigation Services	43.7	5.4	51.0	29.6	5.5	64.9	13.9***	4.3939
Improved Processing Technology	27.1	8.2	64.7	21.8	5.0	73.2	8.5**	2.4684
Market and Marketing Information	18.6	19.7	61.8	14.3	16.1	69.6	7.9**	2.3326
Credit	46.0	3.0	51.1	25.4	6.7	67.9	16.8***	5.2319

**Note:** Coefficient significant at 10% (\*), 5%(\*\*), 1%(\*\*\*); Z-statistic computed using proportional test

It could be observed from Table 7 that before C:AVA project, men dominated decision making on productive resources such as land (59.8%), extension services (48.9%) and tractor services (60.9%). While the proportion of collective decision making on productive resources was over 50% for resources such as fertilizer(65.5%), irrigation service (51.0%), improved processing technology(64.7%), markets and marketing information (61.8%) and services on credit (51.1%); comparatively, the proportion of women taking decision regarding productive resources was lower, less than 20 percent in all cases.

Apart from markets and marketing information, and improved processing technology, collective decision-making regarding household production resources saw more than 10 percent increase after participation in C:AVA project. In a focus group discussion with C:AVA project participants, it became evidenced that training on farming as a business given by the project contributed immensely to this development. The results show that inclusive decision making on land by household increased by 23.4 percent while that on extension services increased by 22.4 percent. They are both statistically significant at 1 % level. Other details can be found in Table 7.

### 3.5 Socio-Cultural Factors Influence Women Participation in C:AVA

The C:AVA participants were asked to evaluate some socio-cultural factors the influence women participation in C:AVA and for that matter women participation in development projects in the study communities. The factors were informed by a preliminary outcome of focus group discussions, literature and intuition. Table 8 shows the findings.

**Table 8: Socio-Cultural Factors Influence Women Participation in C:AVA**

Socio-Cultural Factors	Yes (%)
------------------------	---------



Limitations by gender roles in the households	5.24
Culturally women are supposed to get permission from the husbands before participating	7.70
Women do not own their own cassava farms	2.54
Women spend all their time on household chores and care giving	5.13
Women are not allowed to join groups	1.99
Women are not allowed to make their own decisions	3.43
Others	0.15

Source: Field Survey (2018)

The results show that there were limited socio-cultural barriers to women participation in C:AVA and development programmes in the study communities in general. However, about less than 8 percent of the respondents admitted to the existence of some socio-cultural barriers to women participation in development programmes. Factors such as the need to seek permission from spouse (7.7%), gender roles in households (5.2) and time spent by women on household chores and care given (5.1%) were prominent among them. Furthermore, the respondents indicated other factors that attracted women to participate in C:AVA project to include their realization of good market opportunity offered by the project and the monies initial project participants were realised from their participation.

From the literature, women need both resources and a sense of agency to achieve livelihood outcomes (Sharaunga et al 2019; Jost *et al* 2016) and interventions need to target both strategic and practical needs of women. According to Miriti et al (2019), power imbalances and cultural stereotypes that deter socio-economic development need to be tackled through awareness initiatives on women empowerment.

### Gaps, limitations and opportunities

The study adapted the CBMS tool to assess development outcomes of interventions with C:AVA project as a case study and demonstrate the tool's potential to aid planning at the District Assembly level in Ghana. Due to the lack of baseline data on C:AVA, the study employed a quasi-randomized approach to assess the impact of C:AVA on beneficiaries. Consequently, the data gathered were based on respondents' recall information on before and after participating in C:AVA. That notwithstanding, it is believed that important inferences could be made on the outcomes of the study with proper caveat.

The study has demonstrated the potential of the CBMS tool for data collection to support planning at the district assembly to enhance local governance and improve livelihoods in Ghana.

### Conclusions and recommendations

The need for evidence based and informed planning is critical in ensuring effective allocation and distribution of scarce resources to areas where they are mostly needed for outmost

impacts. The CBMS is proven very useful tool for obtaining census information to support this course as evidenced in this study. The study finds that overall C:AVA project raised the incomes of participants by GHC981.71 on the average. This is statistically significant at 10 percent level. The incomes of female headed households increased by 2.2 percent higher than the overall average to GHC2,167.75 on the average. This is statistically significant at 5 percent level.

Factors such as household size, farming experience, religion and income were found to influence market access in the study location. The coefficient of the policy variable, *treat*, shows that C:AVA project participants were 25.4% more likely to have access to market for their produce as compared to non-participants. This is statistically significant at 1 percent level. Furthermore, apart from markets and markets information, and improved processing technology, collective decision-making regarding household production resources saw more than 10 percent increase after participation in C:AVA project. Also, the results show that there were limited socio-cultural barriers to women participation in C:AVA and development programmes in the study communities in general.

Interactions with the C:AVA Project coordinator at the local level, it was shared that in establishing market linkages, the women formed cooperatives which influenced their bargaining power. It was re-echoed that farmers and processors need to form associations to have one voice for greater influence in areas such as credit access, markets and crop insurance.

Mainstreaming gender and ensuring women participation in C:AVA project led to improvement in their empowerment status as reflected in an enhanced market access and their involvement in household decision making. Beneficiaries had more marketing opportunities than non-beneficiaries and the difference in market access (measured in terms of ability to sell off produce) was statistically significant.

Reflecting back on the theory of change, the C:AVA project expectation of improving the livelihood conditions in terms of increased incomes by gender, enhanced market access and women's participation in decision making were met although there is still room for improvement.

Based on the findings the study concludes that the C:AVA project empowered women by increasing their level of income and participation in household decision making regarding use of productive resources.

The study recommended the adaption of the CBMS tool to the District Assemblies in Ghana to help provide data to aid planning and assess outcomes of development interventions for improved livelihoods. At the municipal and district levels, women should be encouraged to enrol in developmental projects by eliminating any socio-cultural barriers that tend to limit women's participation in development interventions.

Further expansion of C:AVA project may require identifying and including measures that will enhance improvement of outcomes to both male and female headed households. This is important especially in most African countries where male headed households dominate communities.

## 5. References

1. Alkire, S., Meinzen-Dick, R., Peterman, A., Seymour, G. and A. Vaz (2013). The Women's Empowerment in Agriculture Index. *World Development*, 52:71-91
2. Agarwala R and Lynch SM (2006) Refining the measurement of women's autonomy: AN International Application of a Multi-dimensional Construct. *Social Forces* 84(4):2069-2090
3. Austin et al. (2008). *Journal of Clinical Epidemiology*, 26: 537-545
4. Badruddin, S.T. (2017) Self Help Groups: An Emerging Power in Women Empowerment *Asian Journal of Multidisciplinary Studies* 5(10):80-82
5. Chan, M.K. (2010) Improving Opportunities for Women in Smallholder-based Supply Chains: Business case and practical guidance for international food companies. Prepared for the Bill & Melinda Gates Foundation
6. Diego Naziri, Wilhelmina Quaye, Bernard Siwoku, Sittichoke Wanlapatit, Tu Viet Phu and Ben Bennett (2014). The diversity of postharvest losses in cassava value chains in selected developing countries. *Journal of Agriculture and Rural Development in the Tropics and Subtropics* , 115(2):111-123
7. FASDEP II (2013) Food and Agricultural Sector Development Policy, Ministry of Food and Agricultural, Ghana
8. Gianluca Nardi (2015) Women's economic empowerment in rural value chains: The role of the private sector. CARE Insights
9. Herbert P. L. (2009). A practical guide to propensity score models. University of Washington
10. Iyam MA, Obono ON and Abam AI (2017) Nutrition, poverty and women empowerment. *International Journal of Food Science and Nutrition* 2(4):179-180
11. Jost, C, F Kyazze, J Naab *et al* (2016), Understanding gender dimensions of agriculture and climate change in small holder farming communities. *Climate and Development* 8(2):133-144.
12. Kaur A and N Singh (2017) Changing Behaviour of Society Towards Women Empowerment. *International Journal of Research in Commerce & Management*, 8(2):20-23
13. ISSER (2017) The State of the Ghanaian Economy. Report by Institute of Statistical Social and Economic Research, University of Ghana, Legon.
14. Miriti L, C Masiga, N Wamue and I Maina (2019) Gender gaps in decision making power in households: Case of improved bee keeping among the Maasai Community in Trans Mara, Narok county, Kenya. *International Journal of Gender Studies* 4(1):19-36
15. MOFA/WAAPP (2014) Gender Analysis of Agricultural Sector in Ghana (2014) Report of the MOFA under West African Agricultural Productivity Improvement Project (WAAPP)
16. MOFA/Statistics Research and Information Directorate (SRID) Agricultural Sector Progress Report (2017)
17. Morioka K and G Nicholas (2014) Women's empowerment and value chains: Experiences from women from Cambodia, Palestine and Uganda. Actionaid Report
18. Poonam, K., Madhu, A., and Y.M., Prasad (2017) An empirical research on role of banks in women empowerment. *Journal of Indian Management & Strategy* 22(2):40-44
19. Quaye, W., Okai, M., Dowuona, S.N. and Dziedzoave, N. (2014). Gender dimensions of decision making and production assets and challenges facing women in making

- decisions regarding production and processing activities. *Development in Practice*, 26(1):77-90
20. Quisumbing AK and L Pandofelli (2009) Promising Approaches to Address the Needs of Poor Female Farmers: Resources, Constraints and Interventions. *World Development* 38(4)581-592
  21. Reyes, C. and Alba, I. (1994). Assessment of Community-Based Systems Monitoring Household Welfare.
  22. Said-Allsopp M and Tallontire AM (2014) Pathways to employment? Dynamics of women's participation in Global Value Chains. *Journal of Cleaner Production* 107:114-121
  23. Sharaunga S, M Mudhara and A Bogale (2019). Conceptualisation and Measurement of Women's Empowerment Revisited. *Journal of Human Development and Capabilities* 20 (1):1-25
  24. Spence N (2011) Gender Issues in Trade: Agricultural value chains, What have we learnt to date prepared by Nancy Spence for the UNECA 2011.
  25. Vigneri M and Lombardini S (2016). Women's Empowerment in Mali: Impact Evaluation of the educational project 'Girls can - promoting secondary education in West Africa'. Oxford: Oxfam GB
  26. Vanhuyse, F. (2012) Draft: Monitoring Visit to C:AVA Ghana Nov.4 to 17, 2012
  27. Zoogah D.B (2010) Why should I be left behind? Employees' perceived relative deprivation and participation in development activities. *Journal of Applied Psychology*, 96(1):159-173

## Appendices

### Appendix 1a: Estimated Probit regression results for predicting propensity scores.

```

Probit regression                               Number of obs   =    9,583
                                                LR chi2(13)     =   953.26
                                                Prob > chi2     =    0.0000
Log likelihood = -2591.5762                    Pseudo R2      =    0.1553

```

treat	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
age_yr	.0103536	.0037193	2.78	0.005	.0030639	.0176433
age_yr2	-.0000578	.000047	-1.23	0.219	-.0001499	.0000343
Education	.2249393	.041486	5.42	0.000	.1436282	.3062505
Male	.0415301	.0387833	1.07	0.284	-.0344838	.1175439
phsize	.0040847	.0069183	0.59	0.555	-.0094749	.0176442
experience	.4524178	.0555573	8.14	0.000	.3435274	.5613081
land_own	.1241097	.0634743	1.96	0.051	-.0002977	.248517
Extension	1.009069	.0492347	20.50	0.000	.9125705	1.105567
Married	-.0568351	.0539618	-1.05	0.292	-.1625983	.0489281
logIncome	-.1303319	.0168747	-7.72	0.000	-.1634056	-.0972581
christian	.0156343	.0385471	0.41	0.685	-.0599166	.0911852
muslim	-.1250691	.0854645	-1.46	0.143	-.2925765	.0424383
market	.5759372	.0424067	13.58	0.000	.4928215	.6590528
_cons	-1.252596	.1711957	-7.32	0.000	-1.588133	-.9170587

## Appendix 1b: Estimated effect of C:AVA in farm income, and total household income (totin) aggregated from data

. psmatch2 treat, outcome(Income\_farming\_N totin) pscore(ps)

Variable	Sample	Treated	Controls	Difference	S.E.	T-stat
Income_farming_N	Unmatched	6572.51227	5628.87069	943.641582	324.242305	2.91
	ATT	6572.51227	5590.80043	981.711846	587.755167	1.67
totin	Unmatched	12989.6169	14877.273	-1887.65612	638.575639	-2.96
	ATT	12989.6169	13479.671	-490.054108	1275.33855	-0.38

Note: S.E. does not take into account that the propensity score is estimated.

psmatch2: Treatment assignment	psmatch2: Common support On suppor		Total
Untreated	8,646		8,646
Treated	937		937
Total	9,583		9,583

. psmatch2 treat if reln==1 & sex==2, outcome(Income\_farming\_N totin) pscore(ps)

Variable	Sample	Treated	Controls	Difference	S.E.	T-stat
Income_farming_N	Unmatched	4514	2195.31376	2318.68624	517.000813	4.48
	ATT	4514	2346.25	2167.75	996.29863	2.18
totin	Unmatched	6797.85	7839.90977	-1042.05977	1449.52537	-0.72
	ATT	6797.85	6716.05	81.8	1630.77442	0.05

Note: S.E. does not take into account that the propensity score is estimated.

psmatch2: Treatment assignment	psmatch2: Common support On suppor		Total
Untreated	647		647
Treated	40		40
Total	687		687

. psmatch2 treat if reln==1 & sex==1, outcome(Income\_farming\_N totin) pscore(ps)

Variable	Sample	Treated	Controls	Difference	S.E.	T-stat
Income_farming_N	Unmatched	6160.4012	5369.93308	790.468114	714.56507	1.11
	ATT	6160.4012	5884	276.401198	1012.8536	0.27
totin	Unmatched	12292.9701	14557.38	-2264.4099	1411.08479	-1.60
	ATT	12292.9701	13629.2796	-1336.30958	2083.18182	-0.64

Note: S.E. does not take into account that the propensity score is estimated.

psmatch2: Treatment assignment	psmatch2: Common support On suppor		Total
Untreated	1,599		1,599
Treated	167		167
Total	1,766		1,766

## Appendix 2a: Initial estimates of market access model

```
. probit market age_yr age_yr2 Edu phsize experience Female treat Female_cava christian muslim Extension logInco
> me
```

```
Iteration 0: log likelihood = -5363.7199
Iteration 1: log likelihood = -4989.4109
Iteration 2: log likelihood = -4986.5713
Iteration 3: log likelihood = -4986.571
```

```
Probit regression                               Number of obs   =       9,583
                                                LR chi2(12)    =       754.30
                                                Prob > chi2    =       0.0000
Log likelihood = -4986.571                    Pseudo R2      =       0.0703
```

market	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
age_yr	.0025168	.0023722	1.06	0.289	-.0021325	.0071662
age_yr2	-.0000443	.0000343	-1.29	0.197	-.0001115	.000023
Education	-.1361432	.0304508	-4.47	0.000	-.1958257	-.0764608
phsize	.0407268	.0049263	8.27	0.000	.0310714	.0503822
experience	.0671044	.0333758	2.01	0.044	.001689	.1325197
Female	-.0660086	.0309193	-2.13	0.033	-.1266093	-.005408
treat	.7156882	.0651841	10.98	0.000	.5879296	.8434467
Female_cava	-.0014505	.0899179	-0.02	0.987	-.1776864	.1747854
christian	.2800021	.0303482	9.23	0.000	.2205208	.3394834
muslim	.2288514	.0677995	3.38	0.001	.0959668	.361736
Extension	-.5011288	.0540957	-9.26	0.000	-.6071544	-.3951033
logIncome	.1679438	.0134561	12.48	0.000	.1415704	.1943172
_cons	-2.921182	.1412367	-20.68	0.000	-3.198001	-2.644363

## Appendix 2b: Predicted marginal effects of market access model

Marginal effects after probit  
y = Pr(market) (predict)  
= .23104303

variable	dy/dx	Std. Err.	z	P> z	[	95% C.I.	]	X
age_yr	.0007662	.00072	1.06	0.289	-.000649	.002181		24.9798
age_yr2	-.0000135	.00001	-1.29	0.197	-.000034	7.0e-06		989.455
Educat~n*	-.0417426	.0094	-4.44	0.000	-.060162	-.023323		.575811
phsize	.0123979	.0015	8.27	0.000	.00946	.015336		5.30888
experi~e*	.0202876	.01002	2.02	0.043	.000646	.039929		.636961
Female*	-.02009	.00939	-2.14	0.032	-.038485	-.001695		.497443
treat*	.2539643	.02545	9.98	0.000	.204078	.30385		.097777
Female~a*	-.0004413	.02735	-0.02	0.987	-.054039	.053156		.046958
christ~n	.0852374	.00921	9.26	0.000	.067195	.103279		1.41459
muslim*	.0728677	.02247	3.24	0.001	.02882	.116916		.213086
Extens~n*	-.1298052	.01147	-11.31	0.000	-.152294	-.107316		.116143
logInc~e	.0511249	.00407	12.56	0.000	.043147	.059103		9.30313

(\*) dy/dx is for discrete change of dummy variable from 0 to 1

### Appendix 3 Household Characteristics

Relation to Household Head	Percentage
Head	25.64
Spouse	14.56
Son/Daughter	45.95
Son/Daughter in-law	0.68
Grandson/Granddaughter	3.55
Father/Mother	6.98
Other relatives, specify	1.67
Housemaid/boy	0.06
Step-son/Step-daughter	0.2
Others, specify	0.72

Sex of Household Member	Percentage
Male	50.25
Female	49.75

Marital Status	Percentage
Single	44.43
Married	46.68
Widowed	4.5
Divorced/Separated	3.39
Loose Union	0.99

<b>Religion</b>	<b>Percentage</b>
Christianity	71.39
Muslim	21.32
Traditionalist	3.73
Other(specify)	3.56

<b>Nature of Employment</b>	<b>Percentage</b>
A paid employee	5.87
Self-employed in non-agric. (with employees)	1.68
Self-employed in non-agric. (Without employees)	11.08
Contributing family worker non-agric.	4.12
Self-employed in agric. (With employees)	5.4
Self-employed in agric. (Without Employees)	40.5
Contributing family worker non-agric.	28.58
Domestic employee (house help)	0.15
Apprentice	2.08