

INTRODUCTION

The problem of limited application of technologies, inadequate infrastructure (e.g., roads and irrigation), and basic support services are major threats to productivity improvement, food security and poverty reduction in Sub-Saharan Africa [SSA] (Ragasa, 2016). Inadequacy of basic support services such as agricultural extension and credit undermines the full and sustainable utilization of limited resources by smallholders, consequently, reducing farm productivity in SSA (Mohanty, 2013). Agricultural productivity improvement is the basis for economic transformation in agricultural-based post-conflict economies such as Liberia (Zhou & Babu, 2015). Investment in R&D to generate new technologies and their dissemination to farmers increases productivity (Tiruneh et al., 2015). Further, extension services play a critical role in the transfer of knowledge to influence farmers' attitudes towards making appropriate farm-level decisions to adopt new technologies (Swanson & Rajalahti, 2010).

In Liberia, agriculture is the primary source of livelihood for about 80% of the population contributing about 36% to GDP (Tyson, 2017). Rice, as the leading staple food, accounts for about 50% of adult calorie intake (Adeola, 2018) with a per capita annual consumption of 108 kg, one of the highest in SSA compared to 35kg in Nigeria and 43 kg in Ghana (FAO, 2020). Despite the important role of the crop, its annual yield hovers between 1.2 and 1.6 metric tons per hectare (MT/ha) against that of 2.6 MT/ha in Ivory and 4.1 MT/ha in Senegal (FAO, 2019). As a result, Liberia imports more than one-third of its annual rice demand which drains the scarce foreign exchange reserves.

Following the cessation of the 14-year civil conflict in 2003, several commitments were made by the Government of Liberia and partners to transform the agricultural sector to spur an agriculture-led economic growth. Despite the interventions, less than 10% of rice farmers are reached by extension service providers or linked to platforms to access new technologies while those using fertilizers and improved seeds are below five percent (GoL, 2016, 2018).

Previous studies have focused on extension delivery methods and human resource capacity of extension staff in Liberia (Lah et al., 2018 & Moore, 2014). There is a dearth of empirical evidence about the drivers of rice farmers' access to extension services and use intensity particularly in Gibi District of Liberia, the largest rice-producing area in Margibi County, Liberia. Yet, studies indicate that understanding the drivers of farmers' access to extension services and use intensity improves the quality of extension services and technology transfer for rural poor farmers that leads to favorable attitude towards acceptance of new technologies, increase levels of farm output and welfare (Ragasa et al., 2013; Tadesse, 2017; Wossen et al., 2017).

OBJECTIVE

- Compare the socio-economic characteristics of smallholder rice farmers by access to extension services and
- Assess the determinants of smallholder rice farmers' access to extension services and the intensity of use in Gibi District, Liberia.

MATERIALS AND METHODS

Study Area and Sampling Method

- The study was conducted in Gibi District in Margibi County, Liberia. The district is the highest rice producing zone in the country. A multistage sampling technique was used to sample 296 rice farmers in the district (144 accessors and 152 non-accessors)

Theoretical Framework

- Farm household decision to seek extension services is a behavioral response to the need to increase agricultural productivity based on its production objectives. Assuming the household is faced with an inseparable decision between consumption and production, the underlying motivation for seeking extension services can be explained by the agricultural household model (AHM) of Singh et al. (1986). The model posits that farm output is consumed by producing households, with the surplus being marketed.
- Descriptive statistics was used to compare the socio-economic characteristics of rice farmers.
- The heckpoisson sample selection model was used to simultaneously accessed the determinants of access and intensity of use of extension services both decisions were considered a two-step decision-making process. First, the farmer decides to accesses the services or not and in the second stage, he decides how much of the services to use contingent on the choice decision in the first stage.

RESULTS

Household socio-demographic characteristics

Table 1 presents a comparison of the socio-economic characteristics of households by access to extension services.

- On average, farmers were 44 years old and spent 15 years in farming and earn monthly farm income was US\$43.0. Extension accessors earned a significantly higher income than non-accessors. The high farm income earned by accessors is likely due to improvement in crops as a result of the services they accessed.
- On average, distance to the nearest extension source was four kilometers and majority of the rice farmers practiced crop diversification.
- More than two-thirds of the farmers were aware of the existence of NGO extension programs in Gibi District. Significant higher proportion of the accessors were aware than the non-accessors.
- Further analysis of the results shows that more than half of the farmers owned a mobile phone with significant difference in non-accessors category. On average, only 35.8% of the rice farmer used improved seeds and more than half owned cash crops.

- The majority (82.4) of the rice farmers were male and the degree of rice commercialization among rice farmers was low. In fact, only 15 % of the farmers reported having sold a portion of their yield. The difference was significantly higher in the accessors group.

Table 1: Summary statistics of socio-economic characteristics of smallholder rice farmers in Gibi District

Variable	Pool (n= 296)	Access (n=144)	Non-Access (n=152)	
		Means		t-ratio
Age of household head (Years)	44.1	43.4	44.8	1.10
Farming experience (year)	15.0	14.5	15.4	0.76
Farm income (US\$)	43.0	53.0	33.3	-4.14 ^a
Farm Size (ha)	1.4	1.4	1.3	-0.63
Distance to extension source (km)	4.0	3.9	4.1	0.44
		Percentages		z-ratio
Crop Diversification (Yes)	94.3	94.4	94.1	-0.14
Awareness of NGOs (Yes)	68.6	80.0	57.9	-4.07 ^a
Mobile phone (Yes)	53.0	46.5	59.2	2.19 ^b
Access to improved seeds (Yes)	35.8	36.8	34.9	0.73
Cash Crops Ownership (Yes)	52.7	51.4	53.9	0.44
Gender (Male)	82.4	81.9	82.9	0.21
Commercialization (Yes)	15.0	21.5	9.8	-2.76 ^a

Not: a, b & c indicate significant level at 1, 5 and 10%

Factors influencing rice farmer' demand for extension services

Table 2 presents the Heckpoisson model results. The Wald Chi-square statistic was significant at the 1% level implying a strong explanatory power of the model. The Wald test of independent equations was significant at 1% level, justifying a rejection of the null hypothesis of zero correlation between the decisions to access extension services and the intensity of use.

Table 2: Factors influencing demand for and intensity of use of extension services in Gibi District

Variables	Selection: Access to extension			Outcome: Intensity of use		
	Coef	Robust Std. Err.	Marginal Effect	Coef.	Robust Std. Err.	Marginal Effect
Age of household head	-	-	-	-0.004	0.004	-0.010
Gender household head (1=Male)	-	-	-	-0.241 ^a	0.078	-0.583
Household size	-0.051	0.032	-0.022	-0.005	0.016	-0.013
Monthly farm income	0.008 ^a	0.002	0.003	-	-	-
Distance to extension source	-0.043	0.031	-0.022	0.007	0.014	0.008
Commercialization(1=Yes)	0.464 ^b	0.219	0.182	-	-	-
Access to improved seeds (1=yes)	-0.077	0.175	-0.031	0.244 ^a	0.080	0.566
Awareness (1=Yes)	0.625 ^a	0.179	0.242	-0.237 ^a	0.086	-0.576
Cash crops (1=Yes)	-0.040	0.160	-0.016	0.125 ^c	0.069	0.303
Access to credit (1=Yes)	0.366 ^b	0.160	0.145	0.092	0.067	0.223
Farm Size	-	-	-	0.004	0.004	0.014
Crop diversification (1=Yes)	-0.336	0.318	-0.134	-	-	-
Main Income Source (1=farming)	-0.072	0.186	-0.029	-	-	-
Constants	-0.150	0.444		1.271	0.200	
Rho	0.927					
Sigma	0.021					

Wald chi2(9) = 40.45; Prob > chi2 = 0.000***

Wald test of independent equations (rho = 0): chi2(1) = 32.91 Prob > chi2 = 0.000***

Total Observations = 296 (Extension = 144; Non-extension = 152)

Not: a, b & c indicate significant level at 1, 5 and 10%

- Both monthly farm income and commercialization of crops had a positive and significant influence on access to extension services at 1 and 5% levels respectively, implying that a unit increase in farm income and sale of crops increase the probability to access by 0.3 and 18.4% respectively.
- Awareness of extension services had a significant positive influence on access to extension services at a 1% level. This means that being aware of extension services increased the probability of a farmer to access extension services by 25%. For the intensity of use, awareness had a negative effect at 1% level, indicating that if farmers are aware of extension services, the probability of use decreases by 58%.

- Access to credit had a positive and significant influence on farm households access extension services. This means that access to credit increased the probability of accessing extension services by 15%.
- The gender of the household head had a significant negative influence on the intensity of use of extension services at 1% level, implying that being male decreased the probability of use of the service by 58%.
- Access to improved seeds had a positive and significant relationship with the utilization of extension services at 1% level. The marginal effect indicates that access to improved seeds increases the probability of use of extension services by 59%.
- Cash crops ownership has a positive and significant influence on the intensity of use of extension services by farmers at 10% level, implying that ownership of cash crops increased the probability of using the services by 29%.

CONCLUSION

- Access to extension services increased farmers' income and higher farm income increases the need for extension services.
- Crop commercialization was found to be a key driver of access to extension services but remains low among the farmers because their production is basically for subsistence purposes.
- While farm households are mostly headed by males, females headed households have higher intensity of use of extension services.
- Furthermore, use of improved seeds has positive effect on the use of extension services. However, most farmers in Gibi District do not have access to improved varieties because they are not available or the farmers are not aware of their existence.

It is recommended that the government:

- Promotes demand-pull approach through contract farming between farmers and agribusiness entrepreneurs to provide seeds and inputs.
- Implement policies that will promote high farm yield and increase farmers' income through greater levels of crop commercialization among rice farmers.

Key References

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