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Linking market access to improved nutrition among smallholder maize farmers in Masindi and Kiryandongo Districts, Uganda

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Markets are stimuli for improved farm production and quality produce. Therefore, integrating rural households into market systems is essential for improved standard of living. Increased market access and commercialization makes households dependent on markets for services including food for consumption. This reduces dependency on own food consumption which in most cases offers limited variety foods as compared to market purchases. Paradoxically, increased production of cash crops displaces staple food crop production which compromises household consumption of the latter thus increasing vulnerability to food insecurity and malnutrition. Understanding the role of increased market access and participation to improved household nutrition through; increased consumption of nutritious foods, increased incomes, and increased nutrition value-addition transactions is crucial at this time when commercialization campaigns are at its highest. This study sought to determine the relationship between market access and nutritional security in addition to factors that influence farmers' market access and improved nutrition among smallholder maize farmers. The study employed a cross sectional survey design in the districts of Masindi and Kiryandongo. The target population was divided into two strata (market participants and non-participants). Descriptive statistics and the Binary Probit Model were used in analysis. The results indicate a significant relationship between nutrition status and market participation. Experience in maize production, formal education, household size, access to extension and access to credit significantly influenced market access and improved nutrition. The study recommends increased efforts on provision of extension services, mobilising farmers into saving groups for increased savings and credit availability for investment.

Key words: Market access, food and nutritional security and smallholder maize farmers.

INTRODUCTION

Rural households have a wide range of livelihood strategies which range from agriculture which forms the majority, agro-processing, trading and other off-farm occupations from which they seek to derive their food

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requirements and income for consumption, social purposes and investments (IFAD, 2003). Integrating rural households into market systems have significantly changed their livelihoods with improved income earning, better standards of living and reduced poverty (Oraboune, 2008). However, women have in most cases been less visible and appreciated despite their crucial role in household nutrition and food security (WFP, 2011). The opportunity for rural households to increase their incomes and food security from any agricultural undertaking largely depends on their ability to fully participate in the market place exchanges where as producers, they buy their inputs and sell their products and as consumers, spend their income from the sale of crops, livestock and non-agricultural activities to buy their food and investment requirements and also other consumption goods (Markelova and Meinzen, 2006). The major reason for poor standards of living among the rural people in many parts of the world has been indicated to be serious difficulties in accessing markets for exchanging their produce (IFAD, 2003). Markets provide the opportunity for farm production to contribute to poverty reduction through the cash income realized from sales of farm produce making them an effective means of ensuring integration of smallholder producers of agricultural products into the mainstream of national economies. Markets thus also drive production since they stimulate farmers to strive to meet the demands of buyers in terms of quality and quantity (Ajuruchukwu et al., 2011). There is need to emphasize the role of market access to improved nutrition since it evens out distribution of foods and incomes thus generating opportunities for rural farmers to access more foods than what they produce (Orden et al., 2004). In Uganda, the International Fund for Agricultural Development (IFAD) through the Community Agricultural Improvement Programme (CAIIP) has been contributing to rural development and market access through information sharing aimed at empowering poor people in the process of production and marketing (IFAD, 2013).

Increased market access and commercialization has been linked to making households more dependent on markets for services and more food for consumption. This reduces dependency on own food consumption which in most cases lacks variety to consumption of variety foods that can be purchased in markets. However, increased production of cash crops displaces food crop production which in turn compromises household consumption of staple foods from own production thus increasing the household's vulnerability to food insecurity and malnutrition (Ng'endo et al., 2013).

Market access in literature

Market infrastructure influences rural economic growth and employment through increased incomes and social development (ARDF, 2013). Provision of market infrastructure help improve the incomes of rural households thus reducing rural-urban migration and also help provide safety for farmers to produce in the process of selling (Olagunju et al., 2012). Improved market infrastructure leads to higher levels of commercialization thus ensuring better incomes for rural farmers mainly from agricultural activities (Oraboune, 2008). In addition, provision of connecting roads, agricultural extension and improvement of agricultural market information to help create awareness among rural farmers on the benefits of the market ensures better livelihoods among the rural system. Rural communities close to markets have more livelihood activities than their counterparts that lack or live far from market places. Markets reduce the cost of acquiring inputs, the impact of shocks and provide new opportunities for more profitable on-and off-farm activities (Jouanjean, 2013). Communities that have more market access have more non-agricultural and off-farm activities which are essential for capital accumulation to enhance monetary source of income. Linking farmers to the market helps to reduce costs associated with identification of serious buyers and activities that surround the market place offer diversified livelihood activities which result from opportunities for local people to develop and link into the livelihood value chain thus creating more income (Oraboune, 2008). Crop production and market access can help in achieving improved nutrition through three main channels: increased consumption of nutritious foods that can be produced in the household, increased incomes from value chain transactions which enables purchase of other crops in the markets and increased nutrition value-addition in the chain transactions (Gelli et al., 2015).

METHODOLOGY

Model and econometric issues

A binary Probit was used to determine the factors that influence the decision of smallholder maize farmers to participate in maize marketing. This resulted into two groups; the first group composed of farmers that market their maize and the second group composed of farmers who never sold their maize but rather consumed all their produced maize.

Taking Y_1 to represent the group of farmers who marketed their maize and Y_2 to represent the group of farmers who never marketed their maize, then the participation equation can be written as follows

$$Y_1^* = \beta_{Xi} + \varepsilon_i \quad (1)$$

Where, Y_1^* is a latent variable which is the utility the farmer gets from marketing their maize.

Specifically, the Probit model in stage one of estimation is stated as follows:

$$\Pr(Y_1) = f(X_1, X_2, \ldots\ldots\ldots X_{10}, \varepsilon) \quad (2)$$

Where, Pr(y) is the probability of a farmer making a decision to participate in maize markets.

X_1 - X_{10} are variables that determine participation in maize marketing and ε is the normally distributed error term.

RESULTS AND DISCUSSION

Market access and nutritional security

Food security and market access were evaluated based on the four categories of food secure households in accordance with the USAID's Food and Nutrition Technical Assistance (Swindale and Bilinsky, 2006). These include; food secure, mildly food insecure, moderately food insecure and severely food insecure. Based on the number of questions, the households were categorized in accordance with the above four categories and the results summarized in the Table 1. According to the above categories, food secure households experience none of the food insecurity conditions. On the other hand, mildly food insecure households worry about not having enough food sometimes or often and are unable to eat preferred food and eat a more monotonous diet than desired or sometimes food considered undesirable but only rarely. These households do not cut back on quantity nor experience any three most severe conditions; running out of food, going to bed hungry or going a whole day and night without eating. Moderately food insecure households sacrifice quality more frequently by eating a monotonous diet or undesirable food sometimes or often and have started to cut back on quantity by reducing the size of meals or number of meals rarely or sometimes. But they do not experience any of the three most severe conditions named above. A severely food insecure households have graduated to cutting back on meal size or number of meals often and experiences any of the three most severe conditions even as infrequently as rarely. Therefore, any household that experiences any one of the three most severe conditions even once in the four weeks is considered severely food insecure (Swindale and Bilinsky, 2006).

The results of the study indicated a significant relationship between nutrition status as a scale and market access. All food secure households were participants in maize market with no food secure household among non-participants. Mildly food insecure households were found to be composed of 90.70% participants and 9.3% non-participants. Moderately food insecure households were composed of 71.23% participants and 28.77% non-participants and finally, severely food insecure households were composed of 61.4% market participants and 38.6% non-participants in the maize market. This finding is consistent with that of Demeke and Haji (2017) who reported that increased commercialization is a means of achieving dramatic effects on health and malnutrition through increased access to better quality and nutritious foods in market exchanges.

Factors influencing farmers' market access among maize growing communities

Factors that influence farmers' market access among smallholder producers of maize in Masindi and Kiryandongo districts of mid-western Uganda were analysed using a binary Logit model. Results of the Logit model as presented in Table 2 indicates that experience of the farmer in maize production, years of formal education, household size of the farmer, access to extension and access to credit were significant in influencing market access among smallholder maize farmers in Masindi and Kiryandongo districts of mid-western Uganda.

Results from Table 2 show that increased experience in maize farming of the maize farmer increases the chances of the same farmer accessing market for maize and participating in market exchange for improved incomes and nutrition with the odd ratio 1.21. This indicates that increased farmers experience is most likely to increase participation in maize market. The probability of 0.002 further indicates that the relationship between experience of the farmer in maize production and participation in the market is significant at 1%. The odds ratio for the farmer's experience in maize farming was found to be 1.21 indicating that the increase in the experience of the farmer greatly increases the chances of participating in the maize markets by odds greater than one. This is because experience comes with more knowledge about the existence of different ways from where the farmer also gets to know the existence of better agronomic practices for improved yields and thus taking them over to see their performance. These results are consistent with those of Adesina and Baidu-Forson (1995) that experience positively influenced the adoption of sorghum in Burkina Faso.

Results also show that the education of the farmer increases the chances of a farmer participating in the maize market with the odd ratio of 1.39 which indicates that market participation is most likely to take place when the education of the farmer increases. The odds ratio for the education of the farmers was found to be 1.39. This indicates that an increase in the level of education of a farmer increases the chances of participating in the maize market odds greater than one. The probability of 0.002 further indicates that the relationship between years of formal education of the farmer and market participation at 1% level of significance. This is in agreement with the findings of Abay (2007) who found a positive relationship between education of the farmer and market participation of agricultural products. This can be explained by the fact that education increases the ability

Table 1. Relationship between market access and nutritional security.

Nutrition status	Participants (%)	Non-participants (%)	Overall (%)	X^2-value
Food secure	100.00	0.00	5.98	15.2427***
Mildly food insecure	90.70	9.30	23.37	
Moderately food insecure	71.23	28.77	39.67	
Severely food insecure	61.40	38.60	30.98	

Source: Survey data (2017). *** Represents significance at 1% level.

Table 2. Determinants of market access among smallholder maize farmers.

Variable	Odds ratio	P-value
Experience of farmer (years)	1.21	0.002
Sex of the farmer (male/female)	2.08	0.331
Age of the farmer (years)	0.95	0.25
Education of farmer (years of formal education)	1.39	0.002
Household size (number of household members)	0.48	0.000
Access to extension (yes/No)	12.69	0.006
Access to credit	16.52	0.082
Constant	0.003	0.000

Number of observations = 200. R chi2 (12) = 111.29; Prob > chi2 = 0.0000; Log likelihood = -250.90801; Pseudo R2 = 0.1815.
Source: Primary field data (2016).

of the farmer to read and interpret any information available thus making the same farmer better positioned to learn more about market opportunities and the benefits of taking part in these markets. This is true especially for technologies that provide practical solutions to farmers' problems such as market participation and its contribution to improved food security and welfare improvement.

Model results still show that increased household size reduces the chances of the maize farmers' participation in the market with odds ratio 0.48. The probability of 0.000 confirms the relationship between household size and market participation. This relationship can be explained by the fact that when a crop is a staple, increased household reduces market participation due to the large quantities of the harvested being consumed by the household as a food security crop. However, this finding is in disagreement with those of Lubungu et al. (2012) Muricho et al. (2015), Sebatta et al. (2014) and Reyes et al. (2012) who reported a positive relationship between household size and market participation mainly due to the ability of large households to provide a steady source of labor to produce large quantities of the crop under study thus leaving some good quantity after consumption that thus requires to be marketed so as to get some income for the family. Also as the family demand for services, big families demand more services thus have to get such services from participating in the market (Sebatta et al., 2014). Other studies also found household size to be positively related with the decision to participate in the market (Osmani and Hossain, 2015; Olwande and Mathenge, 2012). This they urged was mainly because family members provide a source cheap labor which can be utilized by the farmer to open up more land and increase production of the crop.

Access to extension was found to increase the chances of market participation with odds ratio 12.69 and probability 0.006. This indicates that households with access to extension were 12 times more likely to participate in the markets for maize as compared to their counterparts who have limited access to extension services. This can be explained by increased access to market information from extension staff. This finding is in agreement with those Muricho et al. (2015) together with Jari and Fraser (2013) who also reported a positive relationship between access to extension and market participation mainly due to increased access to market information as a result of increased access to extension. Access to market information is essential for market participation, therefore farmers that have access to extension services are expected to obtain more knowledge concerning production and market access. This information has a positive bearing on increased production, productivity and market participation.

In addition, access to credit was also found to increase

the chances of the maize farmer participating in the market with odds ratio 16.52 and probability 0.082. This indicates that farmers with access to credit are 16 times more likely to participate in the market as compared to their fellows with limited access to credit. This is in agreement with those of Xaba (2013) also found out that availability of credit to farmers improve participation of farmers in vegetable markets due to increased production and productivity in Swaziland. The author urged that the availability of credit facility to the farmer enables acquisition of improved seeds and other inputs like fertilizers which are highly productive thus improving the productivity and the need to dispose of surplus in the market. Credit offers an additional source of investment capital to farmers which are essential for increased production which in turn increases the probability of the farmer to participate in the market to sell any surplus output (Reyes et al., 2012).

CONCLUSION AND RECOMMENDATIONS

From the sample results, access to extension was found to be significant; therefore it is recommended that the government should continue the policy of putting more efforts on agricultural extension at all levels of Sub County, district and Ministry of Agriculture Animal Industry and Fisheries to ensure availability of market information to farmers. The extension system in both public and private arena should be strengthened and a section be established to ensure that active farmer groups are dealt with instead of only dealing with model farmers as the current status of operation wealth creation and NAADS is. This would equip farmers with post-harvest handling techniques that are vital for market participation.

Access to credit was also found to significantly influence market participation. Local governments should encourage formation of village savings groups to encourage more savings and credit to the farmers. In addition, more agricultural credit products should be developed by commercial banks to encourage smallholder access to credit for improved market participation and improved livelihoods.

Market access was found to be linked with food security among smallholder maize farmers. Policies and programs that promote food security should have a component of increased market access of the farmers so as to improve their incomes and develop their capacity to purchase more foods outside what they produce

Market access was found to contribute to the welfare of women and youth. It is therefore recommended that gender and youth promoting programs should look closely into issues of improved market participation for better incomes and job creation for women and youth along the agricultural value chain.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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