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The Influence of an Agricultural Subsidy Extension Program on Smallholder Maize Farmers in Tanzania

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Abstract

Smallholder farming in Tanzania is a household activity implemented at the subsistence level. The government of Tanzania launched the subsidy program to promote food secure households and shift subsistence farming to business farming. Food insecurity was associated by low rates of fertilizer application and poor seed quality among smallholder farmers due to fertilizer and seed costs which led to an increase in food prices. This study aimed at assessing the impact of the agricultural subsidy program for smallholder maize farmers. Four research objectives focused on agricultural productivity, food security, usage of improved inputs, and farmers' perceptions of how the program functioned. An ex post facto research design was used with a sample of 120 smallholder farmers. The investigation involved 60 farmers who received subsidies and 60 who did not. The study used an interviewer administered questionnaire. Farmers who received subsidies significantly increased maize production. Comparison of average output before and after subsides shows an increase in number of bags (100 kg) per acre from an average of 5.35 bags to 10.10 bags. Farmers who did not receive subsides produced about the same amount of maize at time one and time two. There was general satisfaction with the functioning of the program, however certain areas need to be improved including that program objectives are followed, ensuring farmers can manage market price of inputs, and enhancing extension services for farmers to produce more surplus.

Keywords: smallholder farmers, maize, Tanzania, extension subsidy program

Introduction

The economy of Tanzania depends heavily on agriculture and is the backbone of its economy (Government of Tanzania Publications, 2014). Agriculture alone provides 85% of the total exports and employs about 80% of the work force of the rural population (Cochrane & D'Souza, 2015; Government of Tanzania Publications, 2014). Those employed in agriculture are mainly smallholder farmers cultivating less than one hectare of land (Cochrane & D'Souza, 2015). Farming is a household activity implemented at the subsistence level for smallholder farmers. The government of Tanzania launched an extension agricultural subsidy program as a bridge to shift subsistence farming to business farming and to promote food secure households. Food insecurity was associated with low rate of fertilizer application and poor seed quality among smallholder farmers due to fertilizer and seed costs. These conditions were the major reasons for launching the program.

The extension agricultural program specifically administers subsidies to smallholder farmers through the allocation of vouchers to purchase fertilizers and improved seeds. Select farmers received a subsidy to purchase 10 Kg of improved variety of seeds and 100 Kg of fertilizers in which 50 Kg is for basal fertilizers and 50 Kg for top dressing fertilizers. The price of subsidized inputs is 50% lower than non-subsidized inputs (Druilhe & Barreiro-Hurlé, 2012). Subsidies were justified by being efficient in increasing the use of fertilizers to an optimal level for farmers who have limited knowledge and low ability to purchase inputs and to transfer income to poor farming households. This study aimed at assessing the impact of the agricultural extension subsidies program to smallholder maize farmers.

Theoretical Framework

Diffusion of Innovation theory was used as the theoretical framework to guide this research (Rogers, 2003). The theory helped to explain how smallholder farmers may adopt new innovations of using improved seed and soil fertilizers to increase maize production. Adoption involves the process whereby smallholder farmers take up different agricultural practices through the realization these methods are better than prior farming practices. Diffusion of innovation theory (Rogers, 2003) posits that five factors influence adoption of an innovation: relative advantage (innovation seen as better than current practice), compatibility (new approach is consistent with farmers beliefs and experiences), complexity (level of difficulty to understand), triability (ability to test innovation), and observability (tangible results are evident). Rogers' theory (2003) states that for an innovation to be adopted, phases are followed of awareness, decision to adopt (or reject), initial use (testing), and continued use. The scope of this investigation falls within these phases for adoption of improved maize seeds and fertilizer application.

Purpose & Objectives

The purpose of the study is to assess the impact of an extension agricultural subsidy program on smallholder maize farmers (primary crop) in the Mbeya District Council of Tanzania. The four research objectives were to:

1. Determine whether agricultural subsidies contribute to the smallholder farmers' productivity;
2. Examine how subsidizing agricultural inputs (fertilizer and seed) contribute to farmers' food security;
3. Investigate what role the extension program contributed to post-program usage of improved inputs; and

4. Determine farmers' perceptions of how the extension program functioned.

Methods

The study employed survey techniques using purposive sampling of 120 smallholder farmers in areas where the subsidy program operated. The investigation involved 60 farmers who received subsidies and 60 who did not. These farmers were selected from their respective households from four different wards (i.e., 15 smallholder farmers who received subsidies and 15 smallholder farmers who did not). Hence from each ward, 30 smallholder farmers were purposively selected to form the sample used in the study.

The researchers employed two interviewer administered questionnaires to collect data from the respondents. One questionnaire was utilized with farmers who received subsidies and the other with farmers who did not. The questionnaire for farmers who did not receive subsidies, excludes questions about the subsidy program. The survey was conducted by interviewing each head of household or their representative. Questionnaires were given by an interviewer to address issues related to literacy and reduction of missing information. The questionnaire consisted of items categorized into sections about demographics, agricultural productivity, food security, usage of improved agricultural inputs, and farmers' satisfaction on the impact of the subsidy program and their attitude toward farming as a business. For instrument reliability, Cronbach's alpha was used to test for internal consistency and coefficients ranged from α=0.52 to α=0.80. Content validity of the instrument was established with a panel of four experts in this field of study.

Results

The first objective examined agricultural productivity for farmers who participated in the subsidy program and those who did not. Paired sample t-tests indicated a statistically significant difference between the number of bags harvested (100 kg) per acre before subsidies (5.35 bags) and number of bags (100 kg) after subsidies (10.10 bags; $t=9.06$, $p<.0001$). There was not a statistical difference in mean harvest scores for farmers who did not receive subsides. See Table 1.

Table 1

Paired Sample t-Tests with Farmer Groups Who Received and Did Not Receive Subsidies

	n	Mean	SD	df	t
Received Subsidies					
Number of bags per acre before subsidies – Time 1	60	5.35	3.50	59	9.06***
Number of bags per acre after subsidies – Time 2	60	10.10	6.06		

Did Not Receive Subsidies					
Number of bags per acre – Time 1	52	6.26	4.92	51	0.18
Number of bags per acre – Time 2	52	7.01	5.31		

Note: *** p<.0001

To determine the effect size of the subsidy program, a Cohen's d score was calculated (Cohen, 1988). Effect size for Cohen's d uses the following scale: small effect (d = .20), medium effect (d = .50), and large effect (d = .90 or greater). The subsidy program had a large effect for maize agricultural productivity with a Cohen's d score of 0.96. The farmers who did not receive the subsidies in comparing maize production from time 1 to time 2 had a small or little effect (d = 0.15).

The second objective addressed how agricultural subsidies contributed to famers' food security. Ninety percent of farmers who received subsidies believed their food security improved due to their participation in the program. In addition, results indicated most farmers agreed that availability of maize stored in their household makes them feel food secure (90.8% of total sample). Refer to Table 2.

Table 2
Food Security Based on Stored Maize

	Received Subsidies		Did Not Receive Subsidies		Total	
	f	%	f	%	f	%
Yes	57	95.0	52	86.7	109	90.8
No	3	5.0	8	13.3	11	9.2
Total	60	100.00	60	100.0	120	100.0

Note: f = frequency

The third objective explored how the subsidy program contributed to post-program usage of improved inputs. Both groups were similar in their use of improved inputs (63.4% participants, 58.3% non-participants), however more farmers in the program planned to use improved inputs than farmers who did not participate (78.3%, 66.6% respectively). Refer to Table 3 below.

The fourth objective examined how the subsidy program functioned. Results showed that farmers reported their agricultural activities generally improved because of their program participation (73.3%, n=44, out of 60). Reasons farmers who stated there was not an improvement in agricultural activities were incomplete package of subsidies, delays in distribution of inputs, longer participation in program required, and inadequate training on good agronomic practices.

Table 3
Use of Inputs in 2015 and Plan to Use in 2016 Agricultural Seasons

		Group Category					
		Received Subsidies		Did Not Receive Subsidies		Total	
		f	%	f	%	f	
Use of improved inputs in the 2015 ag-season	Yes	38	63.4	35	58.3	73	60.8
	No	22	36.6	25	41.7	47	39.2
	Total	60	100	60	100	120	100
Plans to use improved inputs in 2016 ag-season	Yes	47	78.3	40	66.6	87	72.5
	No	13	21.7	20	33.4	33	27.5
	Total	60	100	60	100	120	100

To assess farmers opinions on the functioning of the subsidy program, four-point Likert items were used which ranged from strongly disagree to strongly agree. Farmers' satisfaction on these items were measured by merging the positive responses of "strongly agree' and 'agree' to indicate a positive opinion. Items were ranked from high to low according to farmers' satisfaction of the extension subsidy program (see Table 4). Farmers' attitudes aligned with use of improved inputs and knowledge has improved about agricultural inputs were the highest ranked items for farmer satisfaction with the program.

Table 4
Farmers' Opinions on the Functioning and the Impact of the Extension Subsidy Program

Item	Responses	f	Merged Score	%	Rank
My attitudes are now aligned with the use of improved agriculture inputs	Agree	36	53	88.3	1
	Strongly Agree	17			
Farmers' knowledge about the use of improved agriculture inputs have improved	Agree	37	50	83.3	2
	Strongly Agree	13			
Extension services were adequately provided to me during subsidies provision	Agree	28	43	71.7	3
	Strongly Agree	15			
Agriculture inputs subsidies program reached the intended farmers	Agree	29	34	56.7	4
	Strongly Agree	5			
The objectives of agriculture input subsidies program have been reached	Agree	25	26	43.3	5
	Strongly Agree	1			

Conclusions, Implications & Recommendations

There was an increase in the number of farmers who used fertilizers and improved seeds. The subsidy program contributed to greater maize production for smallholder farmers. Maize is a staple food for this population and with increased production, there was improved food security. Both groups (farmers who did and did not receive subsidies) perceived that the availability of stored maize increases food security. For post-program use of improved inputs, both groups were also similar for initial usage, however more farmers in the program planned to continue to use improved inputs after the program ended than those who did not participate. Almost three-fourths of farmers believed their agricultural activities improved by participating in the extension program.

Ability to produce and sell surplus was assessed to determine whether farmers can produce enough to feed their households and sell part of their produce to generate income. Farmers who received subsidies produced more maize after subsides, and in comparison to farmers who did not receive subsidies. As result, subsidy farmers were able to sell their surplus to generate income. This implies subsidies have contributed to help move farmers from subsistence to business farming.

There are implications for having surplus production which includes getting maize to the market. Most farmers have associated this issue with the following factors: absence of nearby market places, buyers setting own prices, and lack of information about where to get fair market prices. These factors lead to the inability for smallholder farmers to achieve profits in farming activities. For example, the absence of nearby markets increases transport cost burden to farmers and loss due to inefficient ways of storing maize. Sack storage can cause 30 – 40% loss of maize in Tanzania (Suleiman & Rosentrater, 2015).

The findings of this study have implications for implementing agricultural subsidy extension programs. Similar programs that focus on food security using improved inputs of seed and fertilizer can benefit from utilizing similar outreach education methods to produce positive outcomes. Also, strategies and approaches can be followed to enhance overall functioning and operation of comparable programs.

Recommendations to improve the subsidy program includes better distribution of seeds and fertilizers, along with quality training about agronomic techniques. In the order of priority, farmers suggested the following: subsidies should be provided in a complete package (i.e., improved seeds, basal fertilizers, and top dressing fertilizers); subsidies should be given earlier to catchup with the agricultural calendar (enable farmers to use inputs in a full set as per recommended agronomical practices); consistency in program to ensure farmers receive subsidies for three consecutive years; and monitor farmers who receive subsidies so they use them as intended rather than exchanging vouchers for money. Other recommendations are that subsidies should be provided to support crops based on agro-ecological zone, climate, and farmers preferences rather than dictated by authority.

References

Cochrane, N., & D'Souza, A. (2015). *Measuring access to food in Tanzania: A food basket approach.* Retrieved from

https://ageconsearch.umn.edu/record/198784/files/eib135.pdf

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Lawrence Erlbaum Associates.

Druilhe, Z., & Barreiro-Hurlé, J. (2012). *Fertilizer subsidies in Sub-Saharan Africa.* Rome: FAO. Retrieved from http://www.fao.org/3/a-ap077e.pdf

Government of Tanzania Publications. (2014). *Tanzania Economy*. Retrieved from https://www.tanzania.go.tz/

Rogers, E. M. (2003). *Diffusion of innovations* (5th ed.). New York, NY: Free Press.

Suleiman, R. A., & Rosentrater, K. A. (2015, July). *Current maize production, postharvest losses and the risk of mycotoxins contamination in Tanzania.* Paper presented at the 2015 ASABE Annual International Meeting (pp. 1-128). St. Joseph, MI: ASABE.