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Research Application Summary

Socio-economic factors affecting adoption of climate smart agriculture technologies in Malawi

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Abstract

A number of organizations in Malawi are keen on bringing awareness to farmers on Climate Smart Agriculture (CSA) technologies. Farmers face increased negative impacts of climate change. Adoption of climate smart agriculture technologies is identified as the best alternative to mitigate the impacts of climate change. This study identified various socio-economic factors that affect farmer's decision to adopt climate smart agriculture technologies. Data were collected using a semi-structured questionnaire and was administered through direct interviews of 120 households. The households were randomly selected and were composed of 31% (n=37) male headed households and 69% (n=83) female headed households. Data were analyzed using SPSS and STATA and a Logit model was employed to identify the main factors influencing adoption of CSA technologies. The results of the Logit analysis showed that education, age, gender, household size and total income influenced CSA technologies practice.

Key words: Adoption, climate smart agriculture technologies, Logit model, Malawi, socioeconomic factors

Résumé

Un certain nombre d'organisations au Malawi s'intéressent vivement à la sensibilisation des agriculteurs aux technologies intelligentes d'agriculture face au climat. Les agriculteurs sont confrontés aux impacts négatifs accrus du changement climatique. L'adoption de technologies agricoles intelligentes face au climat est perçue comme la meilleure alternative pour atténuer les impacts du changement climatique. Dans cette étude les facteurs socio-économiques qui influencent la décision des agriculteurs d'adopter des technologies agricoles intelligentes face au climat ont été identifiés. Les données ont été collectées à l'aide de questionnaire semi-structuré administré à 120 ménages. Les ménages étaient aléatoirement choisis et étaient composés de 31% (n = 37) de ménages dirigés par un homme et de 69% (n = 83) de ménages dirigés par une femme. Les données ont été analysées avec SPSS et

STATA et un modèle Logit a été utilisé pour identifier les principaux facteurs influençant l'adoption des technologies. Les résultats de l'analyse ont montré que l'éducation, l'âge, le sexe, la taille du ménage et le revenu total influençaient l'adoption des technologies.

Mots clés: Adoption, technologies agricoles intelligentes face au climat, modèle Logit, Malawi, facteurs socio-économiques

Background

In recent decades productivity in the agriculture sector has been high and impressing hence playing a crucial role in food security, development and management of natural resources. Currently, however, agricultural production has declined due to climate change (Place *et al.,* 2004). Article 2 of the United Nations Framework Convention on Climate Change (UNFCCC) advocates for stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. It is only full adoption of climate smart agriculture technologies that can help achieve the goal. There are a lot of climate-smart agriculture technologies that are practiced in many countries, Malawi inclusive. Such technologies include conservation agriculture, agroforestry, use of organic manure, etc., and some of these were initially introduced to farmers by Total Land Care, Ministry of Agriculture, ICRAF, Concern Universal and Christian Association Organization. This study was therefore carried out to determine the socioeconomic factors affecting adoption of climate smart agriculture technologies in Malawi.

Literature summary

Climate-Smart Agriculture (CSA) is defined by the Food and Agriculture Organization of the UN (FAO) (2013) as the farming practices that sustainably increase agricultural productivity and income, adapt and build resilience to climate change. In Malawi, Climate change will lower absolute production and yields due to increases in extreme events (flooding and drought); increased temperatures causing crop failure and animal stress; and increased incidence of crop and livestock pests and disease (http://dx.doi.org/10.12774/eod_cr.april2015.gristn1). Climate smart agriculture technologies including agroforestry and conservation agriculture have emerged as sustainable land management practices. However, the adoption of such technologies remains generally low, particularly in sub-Saharan Africa (SSA) with the most commonly cited constraint to increased adoption being the lack of robust property rights and an associated lack of land tenure security.

Study description

Data were collected in selected districts of Malawi (Mzimba, Ntcheu and Dedza) because of different climate smart agriculture interventions being implemented by government and NGOs in those districts. The study area was divided into three clusters and using households as sampling units, 40 households were selected per cluster using the simple random sampling technique. A total of 120 respondents were interviewed using structured questionnaires composed of 31% (n=37) males and 69% (n=83) females. Data were analyzed using SPSS

and STATA and a logit model was employed to identify the main factors influencing adoption of Climate Smart Agriculture technologies.

Results and discussions

Conservation agriculture. There was a negative relationship between adoption of conservation agriculture with age and education level of the household head (Table 1). This finding is consistent with those of Tizale (2007) who observed that older farmers have shorter planning horizons and hence are more reluctant to invest in modern agriculture technologies which take a long time before farmers realize the benefits.

Agroforestry. Education level and sex of the household head (respondent) had a positive and significant effect ($p < 0.05$) on adoption of agroforestry (Table 2). The results indicated that respondents' exposure to education increases his or her ability to comprehend and utilize information relevant to the adoption of agroforestry technologies. The results corroborate with those of Ajayi *et al*. (2003) who observed that education level of the farmer influences adoption of Agroforestry technologies.

Use of organic manure. Household size, education level and total annual income of the household head had a positive and significant influence on the adoption of the use of organic manure (Table 3).

In summary, the main socio-economic factors influencing adoption of organic manure were identified as household size, education level and total annual income. Sex of the respondent and educational level were identified to have an effect on adoption of agroforestry while age and education level significantly affected adoption of conservation agriculture. Therefore

Table 1. Factors affecting adoption of conservation agriculture

Dependent variable: Adoption of conservation agriculture

Independent variable	Marginal effects	Std. Error	Z-value	P-value
Sex of respondent	0.00156	0.04483	0.03	0.973
Age of respondent	-0.3047	0.16689	-2.86	0.004**
Household members	-0.0092	0.01862	-0.61	0.543
Size of land	0.01423	0.02331	0.75	0.451
Education level	-0.0154	0.01052	-2.07	0.038**
Total annual income	-0.0211	0.02864	-0.97	0.331
Number of obs = 120			Prob > chi^2 =	0.0000
Wald statistic = 113.86				
Pseudo R^2 = 0.6845				
Log likelihood = -26.241098				

**, ***Significant at 5% & 10% respectively

Table 2. Factors affecting adoption agroforestry

Dependent Variable: Adoption of Agroforestry

Independent variable	Marginal effects	Std. Error	Z-value	P-value
Sex of respondent	0.16885	0.05763	2.93	0.003**
Age of respondent	-0.0005	0.00153	-0.35	0.724
Household members	0.01329	0.01348	0.99	0.324
Education level	0.12548	0.03171	3.96	0.000**
Size of land	0.00835	0.02463	0.34	0.735
Total annual income	0.02596	0.02182	1.19	0.234

Number of obs = 120 Prob > chi^2 = 0.0000

Wald
statistic = 34.43
Pseudo R^2 = 0.3083
Log likelihood = -38.622182

**, ***Significant at 5% & 10% respectively

Table 3. Factors affecting adoption of use of organic manure

Dependent Variable: Adoption of Use of Organic Manure

Independent variable	Marginal effects	Std. Error	Z-value	P-value
Sex of respondent	-0.0619	0.09343	-0.66	0.508
Age of respondent	-0.0033	0.00285	-1.15	0.252
Household Size	0.06445	0.02288	2.28	0.005**
Size of Land	0.00881	0.03859	0.23	0.819
Education level	0.091	0.03987	2.28	0.022**
Total annual income	0.22561	0.04371	5.16	0.000**

Number of obs = 120
Prob > chi2 = 0.0000
Wald
statistic = 46.52
Pseudo R2 = 0.3122
Log likelihood = -51.238121

**, ***Significant at 5% & 10% respectively

these socio-economic factors need to be considered to successfully promote the willingness of the farmers to adopt CSA technologies.

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