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Effects of gender, education and age on the adoption of agricultural technologies in Ashanti, Northern and Eastern regions of Ghana.

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ABSTRACT

Gender, education and age issues cut across all areas in agricultural production and even though agricultural technologies are gender, education and age neutral, they often become influenced by these factors during project formulation and implementation in farming systems. This happens despite the fact that technology development and transfer should aim at equal opportunities for all people irrespective of gender, age and education. The study was undertaken with the aim of determining gender, education and age impact on the adoption of agricultural technologies. The study revealed that gender has no significant effect on the adoption of agricultural technologies while age correlated negatively with adoption. Education however, correlated positively with adoption of these technologies. The effects of these relationships and their importance to productivity in agriculture were discussed.

INTRODUCTION

The number of people working in the agricultural sector worldwide remains substantial. According to Food and Agriculture Organization (FAO, 2000) about 96.5% of these people live in developing countries. The active agricultural population has appreciated by nearly 60% developing countries over the last 25 years, regardless of increasing urbanization (FAO, 2000)

The same report revealed that in spite of this increase, availability and affordability of food is a major problem in many developing countries. Half of the world's population is still underfed and affected by some form of malnutrition and deficiency diseases which often have tragic health consequences. The report further acknowledges that the target of reducing the number of underfed by half by 2015, a target decided during the World's Summit of Food in 1996 will not be achieved.

Eicher (2003) believes that agriculture is the key sector for achieving the dream of economic advancement and poverty alleviation in Africa. The sector provides 60% of all employment in Africa and constitutes the backbone of most economies. However, recent studies conducted by the World Bank in 2000 on the world poverty singled out Africa as the region of the world in which a number of people are malnourished and live in poverty (World Bank Report 2000). Despite a historical record of scattered successes in various parts of the region, GaabreMadhin and

Haggablade (2004) maintained that the image of Africa as "The Hopeless Continent" prevails. Ghana's economy is basically agrarian, that is against the backdrop that agriculture contributes about 35% to the Gross Domestic Product (GDP) of the country (ISSER, 2010). Besides, agricultural activities constitute the main use to which Ghana's land resources are put.

It is also a source of employment, employing more than half the population in the formal and informal sectors and accounting for almost half of GDP and export earnings, thus a major foreign exchange earner for the country (Osabutey, 2009).

Age is an important factor that influences the probability of adoption of new technologies because it is said to be a primary latent characteristic in adoption decisions. However, there is contention on the direction of the effect of age on adoption. Age was found to positively influence adoption of sorghum in Burkina Faso (Adesiina and Baidu-Forson, 1995), IPM on peanuts in Georgia (McNamara *et al*, 1991), and chemical control of rice stink bug in Texas (Harper *et al*, 1990). In contrast, age has been found to be either negatively correlated with adoption, or not significant in farmer's adoption decisions. In studies on adoption of land conservation practices in Niger (Baidu-Forson, 1999), rice in Guinea (Adesiina and Baidu-Forson, 1995), fertilizer in Malawi (Green and Ng'ong'ola, 1993), IPM sweep nets in Texas (Harper *et al*, 1990), Hybrid Cocoa in Ghana (Boahene *et al*, 1999), age was either not significant or was negatively related to adoption.

A number of studies that sought to establish the effect of education on adoption in most cases relate it to years of formal schooling (Feder and Slade, 1984). Generally, education is thought to create a favourable mental attitude for the acceptance of new practices, especially information-intensive and management-intensive practices (Waller *et al*, 1998; and Caswell *et al*, 2001). According to Rogers (1983) and Ehler and Bottrell (2000), technology complexity has a negative effect on adoption, to reduce the effect of complexity of technology on adoption the most appropriate thing to do is to examine the characteristics of the recipients and work on the technology to meet the educational, gender and age requirements of the clients, and this could only be dealt with through education.

Gender issues in agricultural production and technology adoption have been investigated for a long time. Most of such studies show mixed results regarding the different roles men and women play in technology adoption. Doss and Morris (2001) in their study on factors influencing improved maize technology adoption in Ghana, and Overfield and Fleming (2001) studying coffee production in Papua New Guinea showed insignificant effects of gender on adoption. On the other hand access to funds including credit is envisaged to impact positively on the probability of adoption. For instance, it has been reported that most small scale farmers in Ghana are unable to afford basic production technology such as fertilizers and other agrochemicals resulting in low crop yields due to poverty and limited access to credit (Ministry of Food and Agriculture, 2010).

The Ghanaian agricultural sector is characterized by low level of technology adoption and this according to the Ministry of Food and Agriculture (2010) contributes to the low agriculture productivity in the country. This need to be investigated, given the numerous interventions that have been implemented to promote technology adoption among farmers. These failures require that the factors that influence farmers' decisions to adopt or not to adopt modern agricultural production technologies be identified.

It is against this background that this study was undertaken with the view to determine how gender, age and education relate and impact on the adoption of agricultural technology with their overall effects on agricultural productivity.

The overall objective of study was to determine the effects of age, gender and education on the adoption of agricultural technologies.

MATERIALS AND METHODS

The study adopted the descriptive and explanatory survey research design. Data was collected from farmers within some operational areas of the Council for Scientific and Industrial Research (CSIR) namely Ejura, Kusi and Nyapkala. Ejura is in Ejura Sakyedumasi district of Ashanti region of Ghana and located in savanna ecological zone, Nyakpala is in Tolon-Kumbungu district of the Northern region and located in savanna ecological zone whilst Kusi is located in Kwaebibirim district of the Eastern region and is in forest ecological zone. Examples of crops cultivated in these areas are as follows: Ejura yam, maize and cowpea, Nyakpala yam, cowpea and soybean, Kusi Oil palm, cassava and maize. Some of these improved varieties introduced in these areas include the following: Golden Jubilee, Etubi (Maize varieties), Agbelifia, Esam bankye, bankye hemaa, (Cassava varieties), and Zaayura and Songotra (Cowpea varieties).
Three hundred farmers made up of 225 males and 75 females were randomly selected from population of 446 farmers who produce maize, cassava, oil palm, cowpea and millet. A list of farmers groups in the operational areas was obtained from extension agents, from which the respondents were selected using simple random sampling. Questionnaire was used to solicit responses from the farmers. The list comprised of 172 from Ejura, 128 from Nyakpala and 146 from Kusi. One hundred farmers were randomly selected from each location.
The data were analyzed using (SAS, Institute, Cary, NC). Pearson Correlation Coefficient was used to determine relationships among the variables. Age variable was analyzed as a continuous variable whereas method of farming and education collected as ordinal variables were analyzed as continuous variables. Gender was analyzed as binary variable. Statistical difference was considered significant at a p-value less than 0.05 for a two-tail test.

RESULT AND DISSCUSION

The study results revealed that 43% of the respondents were between the ages of 25 and 45 years which mean there were a number of young people engaged in farming activities.
What is worrying however is that there were a number of ageing respondents between the ages of 46 and 65 constituting 46% engaged in farming activities (Table 1). The implication of this finding is that governments should institute policies that would attract young people into the agricultural sector since their technology adoption behaviors are crucial to improvement in agricultural productivity. Further, 75% of the respondents were males which imply that majority of the people engaged in agricultural activities were males (Table 2).
Majority of the respondents (66%) had basic education. Besides, 25% of the respondents had no formal education as indicated in Table 3.

Table 1: Age of the respondents

Age	Freq	Percentage
25-45		
Ejura	43	14
Nyakpala	35	12
Kusi	51	17
46-65		
Ejura	48	16
Nyakpala	51	17
Kusi	39	13

66 ana above		
Ejura	9	3
Nyakpala	14	5
Kusi	10	3
Total	**300**	**100**

Table 2: Gender of the respondents

Gender	Frequency	Percentage
Male		
Ejura	75	25
Nyakpala	78	26
Kusi	72	24
Female		
Ejura	25	8
Nyakpala	22	7
Kusi	28	10
Total	**300**	**100**

Table 3: Education of the Respondents

Education	Frequency	Percentage
No Education		
Ejura	**20**	**7**
Nyakpala	**45**	**15**
Kusi	**10**	**3**
Basic Education		
Ejura	**68**	**23**
Nyakpala	**53**	**18**
Kusi	**77**	**25**
Secondary		
Ejura	**12**	**4**
Nyakpala	**2**	**1**
Kusi	**7**	**2**
Post-Secondary		
Ejura	**-**	**0**
Nyakpala	**-**	**0**
Kusi	**6**	**2**
Total	**300**	**100**

There was a weak statistically non-significant association between gender and adoption of agricultural technology ($r = 0.16$, $p=0.084$, Table 4).

Table 4: Relationship between gender and the adoption of agricultural technologies in three farming areas in Ghana

Test	ChiSquare	Prob>ChiSq
Likelihood Ratio	5.270	0.0717
Pearson	4.954	0.0840

The results show that gender has limited relationship and does not determine adoption of an agricultural technology by the farmer or not.

In a study conducted by Akudugu *et al* (2012) on the factors that influence farm households' adoption of modern agricultural production technologies in Ghana, they concluded that gender was found to be positively related to the adoption of technology. Doss and Morris (2001) in their study on factors influencing improved maize technology adoption in Ghana, and Overfield and Fleming (2001) on coffee production in Papua New Guinea concluded that gender had no significant effect on adoption of technology. The findings of the present study contradict that of Akudugu *et al* but agree with that of Doss and Morris (2001) and Overfield and Fleming (2001).

Age, on the other hand showed strong negative association with adoption of agricultural technology with older farmers more likely to stick to use of traditional farming methods whereas younger farmers prefer use of modern methods of farming ($r = -0.64$, $p<0.0001$, Table 5).

Table 5: Age and Education by adoption of agricultural technologies in three farming areas in Ghana.

Variable	Correlation	Signif. Prob	Number
Age	-0.64344	<0.0001	300
Education	0.338265	0.0006	300

Age was found to positively influence adoption of sorghum in Burkina Faso (Adesiina and Baidu-Forson, 1995), IPM in peanuts in Georgia (McNamara *et al*, 1991), and chemical control of rice stink bug in Texas (Harper *et al*, 1990). In contrast, age has been found to be either negatively correlated with adoption, or not significant in farmer's adoption decisions. It can be concluded therefore that the relationship between age and adoption of agricultural technology varies with the type of technology being introduced.

A farmer's education level also positively correlated with adoption of agricultural technology ($r = 0.34$, $P=0.0006$, Table 3). Educated farmers tended to prefer modern method of farming whereas farmers with no education were accustomed to traditional methods of farming. Farmers with only Basic level of education preferred to use both traditional and modern methods of farming. Overall, the analyses suggest that although gender did not necessarily influence the choice of farming method. However, level of education and age were strongly associated with the choice of farming method and could influence their decision to adopt a traditional, modern or a mixture of traditional and modern methods of farming.

The finding of the age factor in this study agrees with that of Akudugu *et al* (2012) that the level of education correlates positively with adoption.

The implication of this is that farm households with well educated members are more likely to adopt modern agricultural production technologies than those without. This is because educated members usually are more inclined to adopt modern agricultural production technologies, especially improved crop varieties and livestock breeds and could even serve as agents to educate relatives and friends to adopt these technologies. This is consistent with the literature that education creates a favorable mental attitude for the acceptance of new practices especially of information-intensive and management-intensive practices (Waller et al, 1998; Caswell et al, 2001).
Since gender, age and education issues cut across all areas of concern in agricultural production, there is a need to know how development policies and programmes are likely to affect the economic activities and social relationships among different groups of people in the community. Farmer research needs should clearly be identified with the end users at the centre of these research and affordable packages of farming technologies developed for specific recommended domain.
Although farming technologies are not biased towards one gender, age and education they can be biased towards one sex or education during project formulation and implementation in farming systems if certain socio-economic issues are not critically considered. Technology development and transfer should aim at equal opportunities for people irrespective of gender age and education. It is important to devise technologies that take into account socio-economic needs when designing and transferring agricultural technologies since it could positively or negatively influence adoption of these technologies. (Lubwama, 1999).

CONCLUSION

One group of factors that influence the adoption of modern agricultural technologies is social factors. The social factors that influence probability of adoption of modern agricultural technologies include age, level of education and gender. All these social factors were found to significantly or insignificantly influence the decisions to adopt farming technologies.
It is undeniable fact that agriculture technologies (improved crop varieties) will bring higher benefits in agriculture production in the country. It is therefore imperative that agriculture technologies introduced should meet the needs of small, medium and large scale farmers.
The agriculture extension services in Ghana should well equipped with the relevant techniques required to understand the critical issues concerning age, gender and education on adoption of agricultural technologies
The establishment of an adequate database through research on available agricultural technologies to determine its relevance to farmers is urgently required. It is therefore imperative that researchers and extension staff should evaluate the problem of available technologies with farmers who use them.

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