

American Journal of Agriculture (AJA)



**THE INFLUENCE OF SELECTED SOCIO-ECONOMIC
FACTORS ON FARMERS' AWARENESS OF
DEVOLUTION OF AGRICULTURAL EXTENSION
SERVICES IN KITUI COUNTY, KENYA.**

*Onesmus Kyambo
Dr. Julius Kilungo
Dr. Dorothy Akinyi Amwata*



THE INFLUENCE OF SELECTED SOCIO-ECONOMIC FACTORS ON FARMERS' AWARENESS OF DEVOLUTION OF AGRICULTURAL EXTENSION SERVICES IN KITUI COUNTY, KENYA

^{1*}Onesmus Kyambo

Post Graduate Student: School of Agriculture and Veterinary Sciences
South Eastern Kenya University

*Corresponding Author's E-mail: okyambo@seku.ac.ke

²Dr. Julius Kilungo

Senior Lecturer: School of Agriculture and Veterinary Sciences
South Eastern Kenya University

³Dr. Dorothy Akinyi Amwata

Senior Lecturer: School of Agriculture and Veterinary Sciences
South Eastern Kenya University

ABSTRACT

Purpose: Agriculture is the main stay and driver of Kenyan rural economy. Despite the critical role of agriculture in Kenya, poor access to extension support services persist. This study sought to assess the influence of selected socio-economic factors on farmers' awareness of devolution of agricultural extension services in Kitui County.

Methodology: The study used an *ex post facto* descriptive survey design. A total sample of 99 farmers drawn from the population of 222,781 households in 40 wards (GOK – Economic Survey 2019.) was selected from Kitui County using a stratified random sampling approach. Questionnaires were administered to the sampled farmers. Data analysis was carried out using descriptive, inferential statistics (binary logistic regression).

Findings: This study established that older farmers were aware about devolution of agricultural extension services. This study also found that male farmers were more aware about devolution of agricultural extension services as compared to their female counterparts. Moreover, educated farmers were more aware about devolution of agricultural extension services as compared to their less educated counterparts. Family heads from wealthier households (with greater income) were more aware about devolution of agricultural extension services as compared to their counterparts from low income households. The respondents that had larger sizes of land were more likely to be more aware of about devolution of agricultural extension services as compared to household heads with smaller sizes of land.

Unique Contribution to Practice and Policy: This study recommends that more campaigns and sensitization should be made in the vast Kitui County to create awareness about the devolution of agricultural extension services and encourage more women smallholder farmers to take advantage of this service especially through organised groups. Key campaigns should especially be implemented through women groups, since women farmers had the least awareness of the devolution of agricultural extension services.

Keywords: *Devolution, socio-economic factors, awareness, agricultural extension.*

1.0 INTRODUCTION

1.1 Background Information

Agriculture is the means of livelihood and the main frame of rural life in developing countries (World Bank, 2021). Agriculture contributes approximately 30 percent to the Gross Domestic Product (GDP) in sub-Saharan Africa. More than 90 percent of the rural population depends on rain-fed agriculture for income and food in developing countries. Agriculture sector contributes about 40 percent of the GDP and provides livelihoods to about 80 percent in East Africa (IFPRI, 2004; Amwata, 2020). In Kenya, approximately 75 percent of rural population agriculture is rain-fed and implemented mainly for subsistence. Agriculture sector accounts for 30 percent of GDP and 80 percent of the national rural employment (GOK, 2010). Agriculture Sector Growth and Transformation Strategy (GOK, 2019) holds that agriculture is a key source of livelihood and a vehicle for steering economic growth in Kenya and sub-Saharan Africa.

Most agricultural policy debates in Kenya; there is a consensus that agricultural extension is the key to improving agricultural productivity. The term ‘agricultural extension’ is contextualized here to mean the entire set of organizations that support and facilitate people engaged in agricultural production to solve problems and to obtain information, skills and technologies to improve their livelihoods and well-being (GOK, 2012). This can include different governmental agencies, private sector actors, Non-Governmental Organizations (NGOs), producer organizations and farmer organizations. Extension was originally conceived as a service to ‘extend’ research-based knowledge to the rural sector in order to improve the lives of farmers. The current understanding of extension goes beyond technology transfer to facilitation; training to learning, and it includes assisting farmer groups to deal with marketing as well as partnering with a broad range of service providers (Davis, 2008). The importance of agricultural extension in relation to the fight against poverty has been underscored in the Strategy for Revitalizing Agriculture (SRA) (GOK, 2017), where the declining effectiveness of the public extension service has been identified as one among the factors impeding agricultural growth in Kenya. In this regard, SRA has suggested reform of the extension systems to create more effective linkages between research, extension and farmers, who are the ultimate beneficiaries. Thus, extension is one of the six SRA first-tracked areas requiring urgent action. Inefficient public extension system has triggered a debate in the developing countries that is calling for a greater role by the private sector (Bukonya, 2010). The debate is anchored on the premise that the private sector is more efficient in extension services delivery.

Prior to ushering in the devolved government in 4th March 2013, the agriculture sector has been managed in at least ten (10) separate sub-sectors namely crops, livestock, fisheries, land, water, cooperatives and marketing, environment and natural resources, regional development; and development of arid and semi-arid land (ASAL). With the enactment of the Kenyan Constitution in the year 2010, agricultural sector particularly extension service was devolved to lower administrative levels in order to take the services closer to people and ensure effective service delivery (GOK, 2011). The extension service in Kenya has suffered in various ways that is inadequate funding, staffing and limited farmer involvement in planning as reflected in Train and Visit (T&V) extension system (Rivera, 2004). In the devolved system, county governments have the mandate to provide extension services and authority to levy taxes on the services they provide (GOK, 2011). With the reduced role of the central government in financing the extension services, farmers are required to contribute towards

funding the extension program through paying for the extension services. Among the preliminary factors for the extension to work effectively in the new structure include farmer awareness and access to information on the devolved extension framework as well as affordability of the extension service (Ragasa et al., 2015). Farmers' awareness helps them understand the extension structure and the contribution is expected from them.

1.2 Statement of the Problem

Empirical evidence supports the existence of a relationship between decentralization and service delivery (Ahmad et al., 2008; Besley et al., 2007; Freinkman & Plekhanov, 2009; Kannan, 2013). However, these studies focus mostly on developed or developing countries of Asia and Latin America. The link between devolved governance with administrative decentralization and public service delivery in the context of sub-Saharan Africa is scarcely explored. To date, only few studies have evaluated the impact of decentralization on service delivery in the context of Sub-Saharan Africa (Balunywa et al., 2014; Tshukudu, 2014). Of great interest to this study is the fact that across the multiplicity of agricultural extension service providers in Kenya, the overriding problem is inadequate local stakeholder consultation in developing and designing the extension program. Research on farmer awareness has concentrated on issues such as climate change (Mandleni & Anim, 2011) and crop insurance (Oyinbo et al., 2013). To the best of my knowledge no study has focused on selected socio-economic factors on farmers' awareness of devolution of agricultural extension services. Thus, this study sought to investigate extension devolution awareness level among the farmers in Kitui County as well as factors that would influence the awareness. The results will inform policy makers on strategies to make information available to farmers, which is crucial for their participation in development program within the devolved administration structure.

1.3 Objective of the Study

The specific objective of the study was to assess the influence of selected socio-economic factors on farmers' awareness of devolution of agricultural extension services in Kitui County.

1.4 Hypothesis

The following hypothesis guided the study.

H₀₁: There is no significant influence of socio-economic factors on farmers' awareness of devolution of agricultural extension services in Kitui County.

2.0 LITERATURE REVIEW

2.1 Farmers' Awareness of Devolution of Agricultural Extension Services

Devolution in Kenya which involves decentralization of agricultural extension services from central government to county governments took effect with promulgation of the Constitution of Kenya in 2010. Devolution refers to the distribution of powers (political, administrative and fiscal) to semi-autonomous territorial and sub-national units (Kibua & Mwabu, 2008). Among the objects and fundamentals of devolution in Kenya is enhancing participation of people in making decisions affecting them and the recognition of communities' rights to manage their own affairs and further their development (GOK, 2011). This dimension of public participation is administrative centric and relates to the involvement of the public in decision making related to service delivery (Yang & Callahan, 2005), such as agricultural extension service. However, little is known on local communities' awareness and

understanding of extension devolution. The awareness is pertinent in the realization of the benefits of devolution related to community participation and the establishment of appropriate agricultural extension institutions. Achieving the goal of devolution requires vitalization of local community's role not only in raising resources but also in demanding participation in planning and accountability from their leaders (Kukamba, 2010).

Literature shows that farmer awareness on issues affecting agricultural production is critical. In India, about 60 percent of farmers were found to know little or nothing about the interactions between climate change and agriculture (Chakravarty, 2012 & Laary 2012) found that some farmers in Ghana were unaware of hazardous and inappropriate agrochemical products banned by government authorities, thus continued to use and handle them without protective measures. A study conducted by the Institute of Economic Affairs on Constituency Development Funds (CDF) program, reported that communities were unaware of the costs of projects and disbursed amounts (IEA, 2006). Further, communities were not aware of the Local Authority Service Delivery Action Plan (LASDAP), a framework that requires that local authorities to constructively engage local communities on matters of planning and development (LRFT, 2009). Other studies have documented the link between education and farmers awareness. Bayard et al., (2007), Mandleni & Anim (2011) found a negative relationship between education and farmer awareness to climate change. They noted that, educated farmers that had alternative income were not concerned with agricultural issues. However, according to Deressa et al., (2009 & 2010), education increases probability of climate change awareness. On the same note, access to formal extension has also been found to significantly affect awareness (Hassan & Nhemachena, 2008; Apata et al., 2009). Even though several studies have looked at the role of extension services in improving agricultural productivity, few have taken into consideration the context of devolution.

2.2 Theoretical Framework

Active participation of the rural population is an essential factor for real and sustainable rural development to occur (Uphoff et al., 1979). Furthermore, involvement of appropriate levels of government in decision-making, implementation, and evaluation of development programs is another essential factor contributing to the success of rural development. The complexity of developmental problems cannot be fully addressed, using the conventional top down extension approach. Successful rural development requires the transfer of authority or decentralization of specified planning, financial, and management functions to different levels of government in a territorial hierarchy under the jurisdictional authority of the central government (Cheema and Rondinelli, 1983). This demands the participation of rural people and the development of appropriate extension capacity, at different levels, especially at the local levels.

The decentralization of program planning, management and financial functions could help ensure that extension systems are more effective, efficient and responsive to the needs of the rural people. However, decentralization of a national agricultural extension system is an intricate process and requires not only strong commitments and careful planning, but it is also an enormous effort that demands the understanding and coordination of all parties involved to ensure successful implementation. For example, Trinidad's efforts to decentralize its extension system illustrate some of the things that can go wrong, when key planning and management functions are not fully considered (Seepersad and Douglas, 2002). A World Bank study of decentralization efforts in developing countries during the early 1990s found

that only six out of nineteen countries showed varying levels of success towards decentralizing their extension systems. `Colombia, Jiangxi (China), the Philippines, and Nusa-Tenggarra-Timor (Indonesia) were relatively highly decentralized, while Poland and Tunisia showed some evidence of decentralization (World Bank, 2000).

There are three major factors involved in the decentralization process:

- 1) transferring specific decision-making functions to local people, starting with simple managerial functions such as program planning and implementation, then priority setting and fund allocation, and ending with a more complex set of functions including accountability and financing/co-financing;
- 2) public participation factor, reflecting the degree of authority that is transferred to rural people starting with advisory capacity in program planning and implementation, and ending with the assumption of total control over selected financial planning and the accountability functions; and
- 3) local government involvement, which indicates the level of government or local institutions, including private firms and NGOs, that assume control over specific functions, starting with provincial and regional levels, and ending with district, county and/or municipal levels.

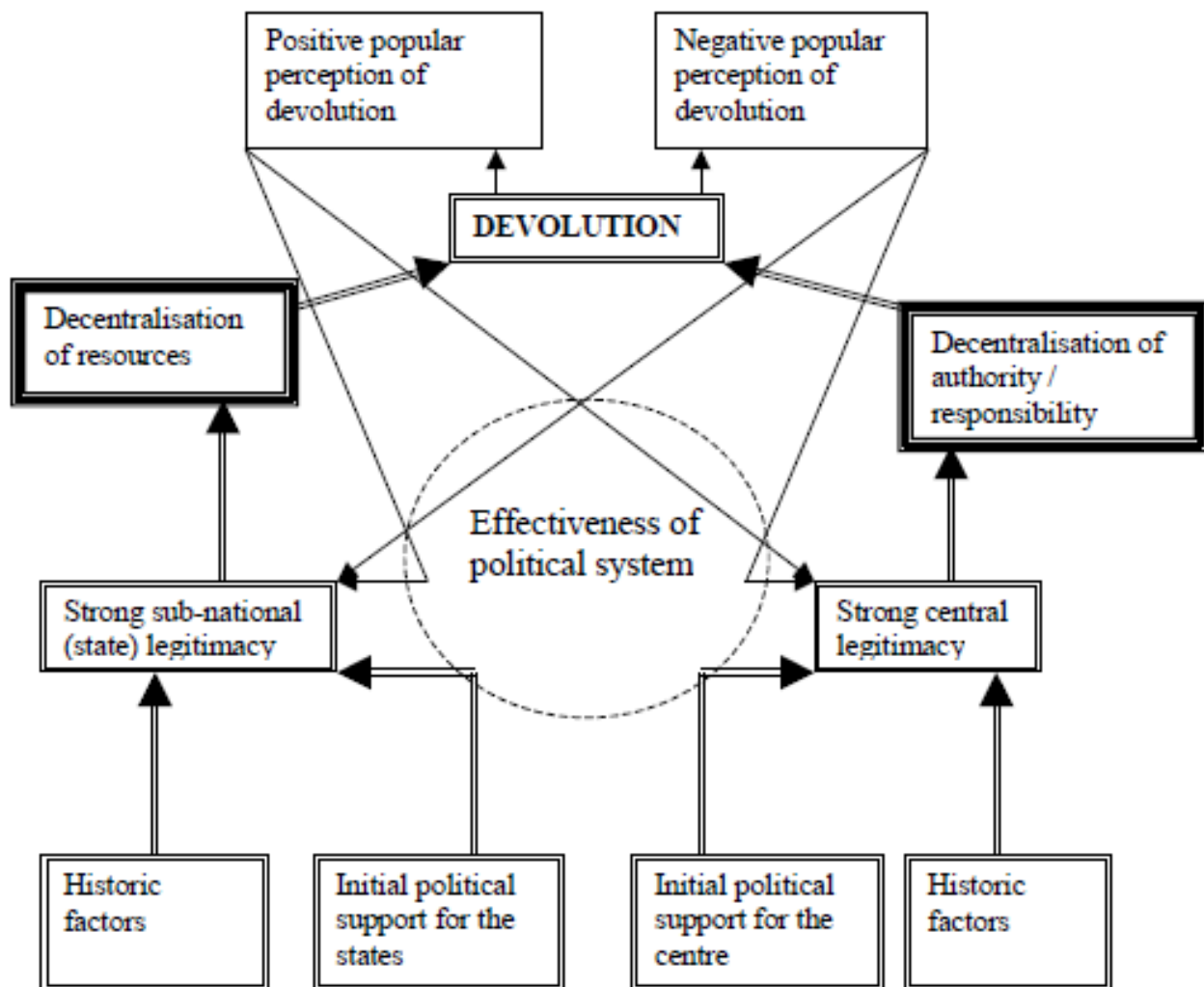


Figure 2.1: The Complexity of Devolution

SOURCE:<http://www.tegemeo.org/index.php/component/easyblog/entry/how-has-dev>

Beginning at the bottom of the diagram, the legitimacy of sub national and national government is determined for the most part by processes of history and respective political support of the former culture language, and religion have traditionally been the factors behind a strong regional identity and determine the legitimacy of sub national claims.

3.0 RESEARCH METHODOLOGY

3.1 Research Design

The study used an *ex post facto* descriptive survey design. This design was appropriate for the study because it enables the description and exploration of the effect of devolution of agricultural sector on the delivery of extension services in the selected study area. This type of design involves data collection after a naturally occurring event. It involves collection of information from a sample that has been drawn from a population that has received a natural treatment not designed by researcher (Fraenkel et al., 2012). The study attempts to describe the factors that affect the devolution of extension service. This design was appropriate for the study since it facilitates the collection of information from a sample of a population in order

to describe their characteristics as they relate to the facts (Kerlinger, 1979). In this study, the characteristics of the sampled extension agents were described and their delivery on delivery of services clearly documented. In addition, the design provides accurate descriptive analysis of characteristics of a sample which can be used to make inferences on the population.

3.2 Study Area

Location of Kitui County

Kitui County is one of the 47 counties in Kenya located between latitudes 0°10' and 3°0' south and longitudes 37°50' and 39°0' east in the lower eastern region about 160 km east of Nairobi City. This is the sixth largest county in the country after Turkana, Marsabit, Garissa, Wajir and Tana River. The county borders TaitaTaveta to the South, Makueni to the West, Machakos to the Northwest, Tana River to the East, Embu and TharakaNithi to the North. Kitui is made up of 8 sub-counties namely; Kitui Central, Kitui East, Kitui Rural, Kitui South, Kitui West; Mwingi Central, Mwingi West and Mwingi North. The Sub-counties are further sub-divided into 40 wards and 247 villages. The estimated area of the county is 30,496.4 square kilometres, out of which 6,369 square kilometres is part of Tsavo East National park. The county has a population of 1,136,187 according to 2019 census comprising 222,781 households (Kitui County Government, 2021).

3.3 Population of Study

The population under study comprised of extension officers and farmers in Kitui County. The accessible population was all the extension officers in southeastern region who here by form the accessible population for the study.

Sample size determination

$$S = \frac{N(CV)^2}{(CV)^2 + (N-1) e^2}$$

Note:

S = sample size;

N = population size;

CV = Coefficient of variation which is $\leq 30\%$;

E = margin of error which is fixed between 2-5%).

The study sample was be calculated at 20% coefficient of variation and 2% margin of error (Nassiuma, 2000). Twenty percent coefficient of variation was used to ensure that the sample was wide enough to justify the results being generalised for the Kitui County. Higher coefficients of variation were not used to avoid very large samples due to limitation of research funds. Two percent margin of error was used because the study was an ex-post facto survey, whereby the independent variables could not be manipulated hence necessitating relatively higher margin of error.

$$\begin{aligned} S &= \frac{222781(20)^2}{(20)^2 + (222781-1) 4} \\ &= 99 \end{aligned}$$

A calculated sample size of 99 farmers from 222,781 households was selected from Kitui County using stratified random sampling approach. This sample size of 99 farmers provides a

reasonable sample for subsequent sound data analysis. An extra 9 farmers were necessary to cater for natural attrition.

3.4 Instrumentation

A questionnaire was designed and used as the main instrument of data collection.

3.5 Data Analysis Procedures

The collected data was exported into STATA program version 16.0 for subsequent analysis. Before the actual analysis, data was cleaned of any outliers and entry errors. In this study, descriptive and inferential statistics through econometric model were used to analyze data. The inferential modeling binary logistic regression was used.

3.6 Binary logistic regression

This regression modelling was used to assess the influence of selected socio-economic factors on farmers' awareness of devolution of agricultural extension services.

Logistic regression is a method for modeling in situations for which there is a binary response variable. The predictor variables can be numerical or categorical (including binary). Letting Y be the binary response variable, it is assumed that $P(Y = 1)$ is possibly dependent on \bar{x} , a vector of predictor values. The goal is to model:

$$p(\bar{x}) \equiv P(Y = 1 | \bar{x}).$$

Since Y is binary, modeling $p(\bar{x})$ is really modeling $E(Y | \bar{x})$, which is what is done in OLS regression, with a numerical response.

If we model $p(\bar{x})$ as a linear function of predictor variables, e.g.,

$$\beta_0 + \beta_1 x_1 + \dots + \beta_p x_p,$$

Then, the fitted model can result in estimated probabilities which are outside of $[0,1]$. What tends to work better is to assume that:

$$p(\bar{x}) = \frac{\exp(\beta_0 + \beta_1 x_1 + \dots + \beta_p x_p)}{1 + \exp(\beta_0 + \beta_1 x_1 + \dots + \beta_p x_p)},$$

Where, x_1, \dots, x_p may be the original set of explanatory variables, but the predictors may include transformed and constructed variables.

It can be noted that:

$$\log\left(\frac{p(\bar{x})}{1 - p(\bar{x})}\right) = \beta_0 + \beta_1 x_1 + \dots + \beta_p x_p.$$

$\log(p(\bar{x})/[1 - p(\bar{x})])$ is called the *logit*. The model for the logit is linear in the predictors. Therefore:

$$\hat{\beta}_0 + \hat{\beta}_1 x_1 + \dots + \hat{\beta}_p x_p$$

Is, the corresponding estimate of $p(\bar{x})$ will be between 0 and 1.

The unknown parameters (the coefficients, $\beta_0, \beta_1, \dots, \beta_p$) are typically estimated by maximizing the likelihood,

$$\prod_{i=1}^n \{p(\bar{x}_i)^{y_i} [1 - p(\bar{x}_i)]^{1-y_i}\},$$

Which is just an expression for:

$$P(Y_1 = y_1, \dots, Y_n = y_n | \bar{x}_1, \dots, \bar{x}_n).$$

(The males are determined numerically, by maximizing the log likelihood.)

4.0 RESULTS AND DISCUSSION

4.1 Age of the sampled farmers

The results in Table 4.1 shows that 12.2 percent of the respondents were aged 40 years and below and 87.8 percent were more than 41 years. The youngest sampled farmers were 30 years old while the oldest was 70 years. An average farmer in this study was aged 49.43 years.

Table 4.1: Distribution of respondents by age

Age bracket (Years)	Frequency	Percentage	Cumulative percentage
21-30	3	3.1	3.1
31-40	9	9.2	12.2
41-50	43	43.9	56.1
Above 51	43	43.9	100.0
Total	98	100.0	

Note: Minimum = 30 years; Maximum = 70 years; Mean = 49.43; Standard deviation = 9.043.

These results show that the respondents were within the active and productive age group and thus can participate in agricultural production. Age of a farmer may influence productivity and incomes from their farming enterprises. Young farmers may realize higher productivity and incomes due to their ability to adopt new technologies and innovations (although sometimes they may have lower farming experience). Age is said to be a primary latent characteristics in the adoption decision provided by the extension workers. Age is also a major factor in agricultural productivity. Age was found to positively influence the adoption of sorghum in Burkina Faso (Adesina & Baidu-Forson, 1995). It is also believed that the age of a household head is crucial for his or her decision making in determining what and how to produce on a given piece of land and season.

4.2 Level of Education of the farmers

Evidence from most literature has proved that education and new technology use is directly correlated (Hassan, 1998). The results from this study indicated that the farmers had varying level of formal education as depicted in Figure 4.1.

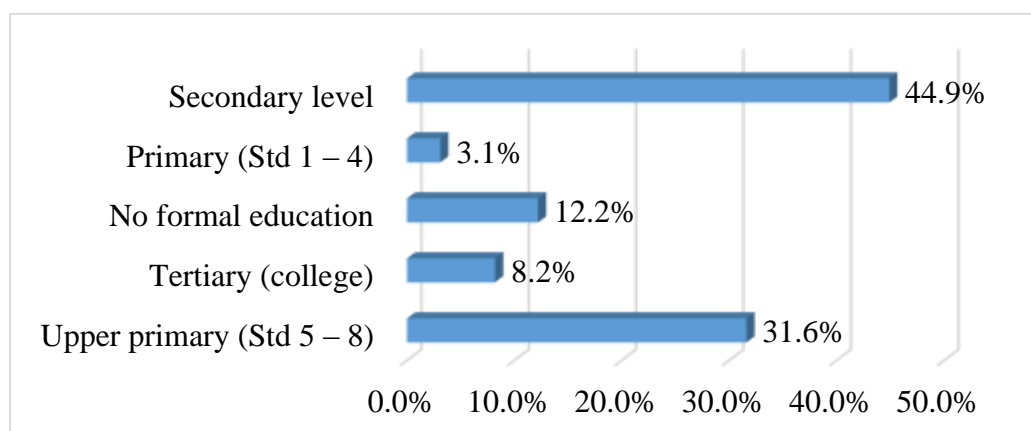


Figure 4.1: Level of Education of the farmers

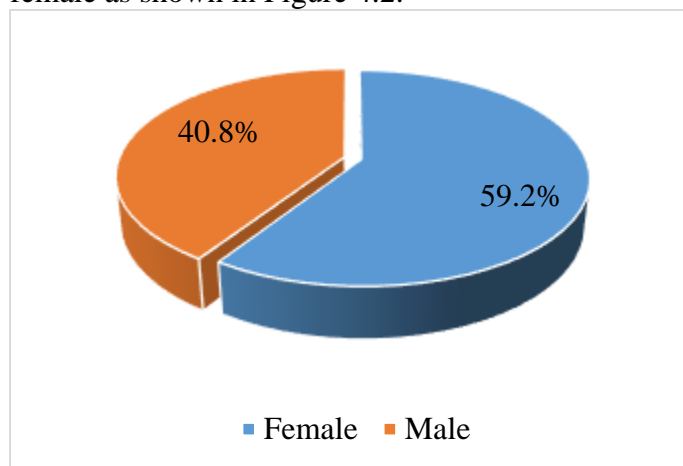
Most of the respondents had less than tertiary level of education. An majority (44.9 percent) of the respondents had secondary level of education. About 31.6 percent of the respondents

had upper primary (Standard 5 – 8) level of education. About 12.2 percent of the respondents had no formal education. A few respondents had tertiary (8.2 percent) and lower primary (3.1 percent) level of education.

These results imply that majority of the farmers may lack adequate technical education which is a prerequisite to better modern farming. In addition to this, the level of education of the household head can influence the kind of decision that may be made on behalf of the entire household with regard to both crop and livestock farming. More educated farmers are likely to make better decisions as well as quickly adopt new technologies in farming as compared to their less educated counterparts.

4.3 Gender of the Respondent

On the issue of gender, the results of the study showed that majority of the farmers were female as shown in Figure 4.2.



4.2: Gender of the Respondents

About 59.2 percent of the respondents were female while 40.8 percent were male. Gender of household is an important factor in the household decision making. Past studies have indicated that male farmers tend to focus on income generation, while female farmers focus on food crops (Kidula, 2005). This may imply that farming related decisions such as application of new technologies, how to seek and use financing, type of breeds/varieties to be kept or planted and crops/animal husbandry practices to be implemented may be dominated by female gender.

4.4 Income of the farmers

The distribution of farmers' incomes is summarized in Table 4.2.

Table 4.2: Distribution of respondents by monthly incomes

Income brackets	Frequency	Percentage
0-9,999	36	36.7%
10,000-19,999	44	44.9%
20,000-29,999	6	6.1%
30,000-39,999	7	7.1%
40,000-49,999	3	3.1%
60,000-70,000	2	2.0%
Total	98	100.0%

Note: mean = 13,206.52; Standard Deviation = 1,277.84; Minimum = 1,000; Maximum = 70,000

Most of the farmers had monthly incomes of 10,000-19,999 brackets as represented by 44.9 percent of the total responses. This was closely followed by farmers whose monthly incomes were Kshs. 0 – 9,999 as represented by 39.1 percent of the total responses. There were very few farmers whose monthly income was in the range of Kshs.20, 000-29,999 (6.5 percent), Kshs. 30,000-39,999 (7.6%), Kshs. 40,000-49,999 (3.3 percent) and Kshs. 60,000-70,000 (2.2 percent). This implies that majority of the farmers have limited income which may affect their farming enterprises.

Income availability enhances adoption of new farming technologies (Wongnaa, 2016). Any new technology requires some income. Likewise, the frequency of access of extension services and productivity may be affected positively by the income of the respondents.

4.5 Household Farm size

The results of the study indicated that 48.0 percent of the respondents were smallholder farmers with 0 - 5 acres of land. About 36.7 percent of the respondents had 5 – 10 acres of land. There were very few farmers with more than 10 acres of land. Majority of the respondents in this study were smallholder farmers as shown in Table 4.3.

Table 4.3: Size of farm

Farm size (acres)	Frequency	Percentage
0-5	47	48.0%
5-10	36	36.7%
10-15	9	9.2%
20-25	2	2.0%
25-30	2	2.0%
45-50	2	2.0%
Total	98	100.0%

Land as a major factor in agricultural production has been used in several studies. Farmers with large farms adopt more advanced farm practices than smallholder farmers (Amudavi, 1993). World Bank (2003) defined smallholder farmers as those farmers that operate less than two hectares of land (4.942 acres) and have low resource base. In addition, Narayan & Gulati (2002), defined smallholder farmer as “a farmer, practicing a mix of commercial and subsistence farming or either, where the family provides the majority of labour and the farm provides the principal source of income.”

Test of Hypothesis H_{01}

This study was interested in examining the factors that influence farmers’ awareness of devolution of agricultural extension services. To achieve this, a null hypothesis, “ H_{01} : Selected socio-economic factors do not significantly influence farmers’ awareness of devolution of agricultural extension services” was formulated and tested using binary logistic regression. Table 4.4 shows the influence of selected socio-economic factors on farmers’ awareness of devolution of agricultural extension services.

Table 4.4: Influence of selected socio-economic factors on farmers’ awareness of devolution of agricultural extension services

Awareness of devolution of agricultural extension services	Coef.	Std. Err.	Z	P>z
Household head age	-1.956	0.241	-8.116	0.000* *
Household head gender (male = 1)	0.121	0.047	2.574	0.000* *
Household head level of education (years)	1.763	0.587	3.003	0.000* *
Household income (Kshs.)	0.981	0.074	13.257	0.000* *
Engagement in off and non-farm activities (Yes = 1)	0.189	0.147	1.286	0.128
Diversification (index 0-1)	0.121	0.123	0.984	0.154
Land size (log)	0.443	0.071	6.239	0.000* *
_cons	2.385	0.632	3.773	0.000

N = 98, Log Likelihood = 108.20, LR chi2 (7) = 29.63, Prob> chi2 = 0.000, Pseudo R²=0.378

** Significant at 5 per cent level.

Results in Table 4.4 reveal that the coefficient for household head age, household head gender, household head education, household income and land size were statistically significant at 5 percent level. The log likelihood for the fitted model of 108.20 and the likelihood ratio chi-squared value of 29.63 indicate that the study parameters are jointly significant at 5 percent level ($p < 0.05$). Pseudo R² of 0.378 meet the statistical threshold of 5 percent confirming that awareness of devolution of agricultural extension services by the smallholder farmers in the study area was well attributed to the selected set of independent variables.

The coefficient of household head age (-1.956) was observed to have a significant and negative influence on awareness of devolution of agricultural extension services at 5 percent

level ($P < 0.05$). The negative sign on the variable imply that farmers' awareness of services such as extension decreases with age. This therefore suggests older farmers were more likely not to be aware about devolution of agricultural extension services.

The coefficient of household head gender (0.121) was observed to have a significant and positive influence on awareness of devolution of agricultural extension services at 5 percent level ($P < 0.05$). The positive sign on the variable imply that farmers awareness increase when the household head is a male (as compared to female). This therefore suggests that male farmers are more likely to be aware about devolution of agricultural extension services as compared to their female counterparts.

The coefficient of household head education (1.763) was observed to have a significant and positive influence on awareness of devolution of agricultural extension services at 5 percent level ($P < 0.05$). The positive sign on the variable imply that farmers' awareness increase when the household head has more years of formal education. This therefore suggests that more educated farmers are more likely to be aware about devolution of agricultural extension services as compared to their less educated counterparts.

The coefficient of household income (0.981) was observed to have a significant and positive influence on farmers' awareness of devolution of agricultural extension services at 5 percent level ($P < 0.05$). The positive sign on the variable imply that heads from wealthier households (with greater income) are more likely to be aware about devolution of agricultural extension services as compared to their counterparts from low income households.

The coefficient of household land size (0.443) was observed to have a significant and positive influence on awareness of devolution of agricultural extension services at 5 percent level ($P < 0.05$). The positive sign on the variable imply that households with large sizes of land were more likely to have their heads aware about devolution of agricultural extension services as compared to household heads with smaller sizes of land.

5.0 DISCUSSIONS

5.1 Influence of socio-economic factors on farmers' awareness of devolution of agricultural extension services

This study established that age influences awareness on devolution of the agricultural extension services. For instance, the older farmers were more likely not to be aware about devolution of agricultural extension services. The results are consistent with Asres et al., (2013) who found a positive and significant influence of age on the probability of participation in the agricultural extension programmes which was against the notion that older farmers are usually reluctant to accept new information and ideas as reported by Asres et al., (2013) and Genius et al., (2006). The results however disagrees with Danso-Abbeam et al., (2018) whom in their study that aimed to find out the factors that affect the awareness of extension service delivery for use in GAP among banana growers in Chitwan, Nepal noted that age is not an important factor that significantly affected the farmers knowledge of availability of agricultural extension services for application in GAP. However, education and training had a significant effect on knowledge of GAPs. The results from this study are also inconsistent with Tiwari et al., (2008) as well as Mendola (2007) that found that older farmers with more experience in farming business have higher likelihood of participating

having awareness about existence of beneficial extension programmes to optimize their farm productivity and income.

Male farmers are more likely to be aware about devolution of agricultural extension services as compared to their female counterparts. The results from this study agrees with Ragasa et al., (2012) that found that due to differences in awareness levels, female headed households and plot managers are less likely to get extension services and less likely to access quality services than their male counterparts after controlling for plot, household, and village level characteristics.

More educated farmers are more likely to be aware about devolution of agricultural extension services as compared to their less educated counterparts. The results of this study are consistent with Catherine et al., (2012) who found that education creates a favourable mental attitude for greater awareness about the extension services in an area. Level of education is also attributed to acceptance of new practices, especially information-intensive and management-intensive practices and has been observed to have positive effects on extension access. According to Girma et al., (2019), education of a farmer have a positive effect on the probability of seeking agricultural extension services and by extension adoption of improved technologies in agriculture. Consequently, more educated farmers are likely to be better informed of the advantages and disadvantages of alternative technologies (Doss & Morris, 2001). Formal education was found to have positive effect on farmers' awareness on the extension devolution. A higher level of education is expected to increase farmers' ability to process and use information (Turyahabwe et al., 2017; Saikia et al., 2013).

Heads from wealthier households (with greater income) are more likely to be aware about devolution of agricultural extension services as compared to their counterparts from low income households.

The results of this study are consistent with Kidanemariam et al., (2015) who found that asset holdings was a key factor influencing awareness of farmers on matters to do with agricultural extension services and whether the household is able/willing to participate or not in the extension program.

This study also agrees with Muatha et al., (2017) who found that household income was found to have a significant positive effect on farmers' awareness on agricultural extension devolution. In their study, majority of the respondents with more income were more aware about agricultural extension devolution. The results are also consistent with the observation of Munyua and Stilwell (2009) that people with higher income are likely to be more aware of new developments in different economic sectors.

Households with large sizes of land were more likely to have their heads aware about devolution of agricultural extension services as compared to household heads with smaller sizes of land. This study agrees with Khonje et al., (2015) and Sodjinou et al., (2015) whom in their separate studies indicated that household size affect farmers' access to agricultural services in developing countries as well as their level of awareness about extension matters. However, this study disagrees with Asante, et al., (2006) whom in their study on factors affecting smallholders' access to agricultural services in northern Ghana found no correlation between household size and access and awareness of agricultural extension services.

5.3 Findings on smallholder farmers' awareness of devolution of agricultural extension services

An overwhelming majority of the respondents were aware that agriculture extension service was devolved to the county governments. Majority of farmers got to know about devolution of agricultural extension services from farmers' groups (70.5 percent) and meetings (56.8 percent). Majority of the sampled households were using extension services on either crop or livestock production with most of them receiving the services from a public agent (government extension officers) as represented by 35.4 percent of the total responses. Due to great shortage of extension staff in the study area, most farmers were served through agents who were on their own extension program as represented by 70.6 percent of the total responses. The most popular channel used in delivery of information to the farmers was field day/demonstration as represented by 75.8 percent of the total responses. Most farmers' choice of service provider was attributed to distance with most farmers preferring providers who were located near them as represented by 79.4 percent of the total responses. Most farmers were satisfied with the timeliness, adequacy, professionalism and relevance of information received on agricultural extension service. Although most farmers who received extension services had applied all the recommendations made by the extension worker/s, some (14.0 percent) did not due to their sizes of their farms, income, education levels and the relative advantage of the recommendation.

The most applied agricultural extension recommendation was good agronomic practices. Some of the extension recommendations were not applied by farmers due to non-availability of associated technology, being time demanding, being uninterested, lack of enough understanding of the technology and implementation cost. A majority of the respondents indicated that they preferred extension information packaged in form of print media (brochures, pamphlets and leaflets) as represented by 53.1 percent of the total responses. Majority of the respondents preferred if extension information could be packaged in vernacular language as represented by 84.7 percent of the total responses. The average expenditure on livestock and crop extension services was Kshs. 7,307.69 and Kshs. 8,492.31, respectively. The major cost area in livestock and crop extension is transport both for farmer to the service provider's office and the service provider to the farm.

The coefficient for household head age, household head gender, household head education, household income and land size were statistically significant at 5 percent level implying that they were important factors that influence farmers' awareness of devolution of agricultural extension services.

The coefficient of household head age (-1.956) was observed to have a significant and negative influence on awareness of devolution of agricultural extension services at 5 percent significant level ($P < 0.05$). Therefore, farmers' awareness decreases with household head age.

The coefficient of household head gender (0.121) was observed to have a significant and positive influence on awareness of devolution of agricultural extension services at 5% level ($P < 0.05$). Therefore, farmers' awareness increases when the household head is a male (as compared to female).

The coefficient of household head education (1.763) was observed to have a significant and positive influence on awareness of devolution of agricultural extension services at 5% level

($P < 0.05$). Therefore, farmers' awareness increases when the household head has more years of formal education.

The coefficient of household income (0.981) was observed to have a significant and positive influence on farmers' awareness of devolution of agricultural extension services at 5% level ($P < 0.05$). Therefore, household heads from wealthier households (with greater income) are more likely to be aware about devolution of agricultural extension services as compared to their counterparts from low income households.

The coefficient of household land size (0.443) was observed to have a significant and positive influence on awareness of devolution of agricultural extension services at 5% level ($P < 0.05$). Therefore, households with large sizes of land were more likely to have their heads aware about devolution of agricultural extension services as compared to household heads with smaller sizes of land.

6. Conclusions

An overwhelming majority of the respondents were aware that agriculture extension service was devolved to the county governments. Household head age, household head gender, household head education, household income and land size were important factors that influenced farmers' awareness of devolution of agricultural extension services. Male and young farmers who are more educated and wealthier households (with greater income) were more likely to be aware about devolution of agricultural extension services as compared to their counterparts from low income households. Households with large sizes of land were also more likely to have their heads aware about devolution of agricultural extension services as compared to household heads with smaller sizes of land.

6.2 Recommendations

In view of the findings and the conclusion drawn above, this study makes the following recommendation:

More campaigns should be made in the vast Kitui County to create awareness about the devolution of agricultural extension services and encourage more smallholder farmers to take advantage of the devolved services.

REFERENCES

- Ahmad, E.M., Brosio, G., & Tanzi, V. (2008). Local service provision in selected OECD countries: Do decentralized operations work better? Working Paper, No. 08/67. Washington, D.C: International Monetary Fund.
- Amudavi, D. M., (1993). Influence of socio-economic factors on adoption of maize related technology: the case of smallholder farmers in Hamisi division, Kenya.
- Amwata, D., A (2020). Situational analysis of the agriculture sector in Kenya. Ministry of Agriculture, Livestock and Fisheries. Nairobi, Kenya.
- Adesina, A. A., & Baidu-Forson, J. (1995). "Farmers' perceptions and adoption of new agricultural technology: evidence from analysis in Burkina Faso and Guinea, West Africa". *Agricultural economics*, 13(1), 1-9.
- Asante, F, Asuming, B S.; Sarpong, D.B.;. (2006). Institutional Bottlenecks of Agricultural Sector Development: The Case of Research and Extension Provision in Ghana. Accra: University of Ghana .Availableat:http://www.interreseaux.org/IMG/pdf/Ghana_Research_and_Extension_Provision_OCDE.pdf. (Accessed: 2014-10-04).
- Apata, T. G., Samuel, K. D., & Adeola, A. O. (2009). *Analysis of Climate Change Perception and Adaptation among Arable Food Crop Farmers in South Western Nigeria* (No. 1005-2016-79140).
- Asres E., Makoto N., Kumi Y.,& Akira I. (2013). Effect of agricultural extension program on smallholders' farm productivity: evidence from three peasant associations in the highlands of Ethiopia. *J Agric Sci*. 2013; 5(8):163–81.
- Balunywa, W., Nangoli, S., Mugerwa, G. W., Teko, J & Mayoka, K. G. (2014). "An analysis of fiscal decentralization as a strategy for improving revenue performance in Ugandan Local governments". *Journal of Research in International Business and Management*, 4(2), 28-36.
- Bayard, B., Jolly C.M., & Shannon, D.A. (2007). 'The economics of adoption and management of alley cropping in Haiti', *Journal of Environmental Management*, 85:62-70.
- Besley Pande and Rao (2007) Can Labor Regulation Hinder Economic Performance? Evidence from India *Quarterly Journal of Economics*, 19(1), 91-134.
- Bukenya, C. (2010), "Meeting farmer demand: an assessment of extension reform in Uganda", PhD dissertation, Wageningen University, Wageningen, available at: <http://edepot.wur.nl/15663> (accessed 21 January 2011).
- Catherine R, Guush B, Fanaye T, & Alemayehu S.,T. (2012). Gender differences in access to extension services and agricultural productivity. ESSP Working Paper; 49:1-16.
- Chakravarty, R. (2012). 'Farmers' awareness program on climate change', National Initiative on Climate Resilient Agriculture (NICRA) project, National Research Institute (Deemed University) ICAR, Karnal-132001, India.
- Cheema, G.S. & Rondinelli, D.A. (Eds). (1983). Decentralization and development: Policy implementation in developing countries. Beverly Hills; London; New Delhi: Sage Publications.
- Danso-Abbeam, G., Ehiakpor, D.S. & Aidoo, R. (2018). Agricultural extension and its effects on farm productivity and income: insight from Northern Ghana. *Agric & Food Secur* 7, 74 (2018). <https://doi.org/10.1186/s40066-018-0225-x>
- Davis, K.E. (2008). 'Extension in Sub-Saharan Africa: Overview and assessment of past and current models, and future prospects', *Journal of International Agricultural and Extension Education*, 15(3):34-46.

- Deressa, T.T., Hassan, R.N.& Ringler, C. (2010). 'Perception and adaptation to climate change to climate change in the Nile Basin of Ethiopia', *Journal of Agricultural Science*, Cambridge University Press pages 1-9.
- Deressa, T.T., Hassan, R.N., Ringler, C., Alemu, T. & Yesuf, M. (2009). 'Determinants of farmers' choice of adaptation methods to climate change in the Nile Basin of Ethiopia',
- Doss, C. & Morris, M. (2001). How does gender affect the adoption of agricultural innovations? The case of improved maize technology in Ghana *Agricultural Economics*, 25 (1) (2001), pp. 27-39, 10.1016/S0169-5150(00)00096-7
- Fraenkel, J. R., Wallen, N. E., & Hyun, H. H. (2012). *How to design and evaluate research in education* (8th ed.). New York: Mc Graw Hill.
- Freinkman, L. & Plekhanov, A. (2009). Fiscal decentralisation and the quality of public services in Russian regions. Working Paper No. 111.
- Girma.R, Newton, K., Wickliffe, K. E., Dugger, D. L., Maltzman, A., M., Dohse, M., & Dixit, V. M. (2019). Cleavage of RIPK1 by caspase-8 is crucial for limiting apoptosis and necroptosis. *Nature*, 574(7778), 428-431.
- Genius MG, Pantzios CJ, & Tzouvelekas V. (2006). Information acquisition and adoption of organic farming practices. *J Agric Res Econ*. 2006;31(1):93–113.
- (GOK) Government of Kenya (2019). Economic surveys. Nairobi, KNBS. 2019 Kenya Population and Housing Census: Volume II
- (GOK) Government of Kenya (2017). Kenya Climate Smart Agriculture Strategy-2017-2026. Ministry of Agriculture, Livestock and Fisheries, Nairobi, Kenya
- (GOK) Government of Kenya (2012). Vision 2030. Development Strategy for Northern Kenya and Other Arid Lands, 114 p.
- GOK (Government of Kenya, (2011). 'Interim report of the task force on devolved government: A report on the implementation of devolved government in Kenya', Task force on devolved government (TFDG) consultation document.
- GOK, (Government of Kenya, (2010). Agriculture Sector Development Strategy: 2010-2020. <http://www.the-star.co.ke/news/article-118978/lets-get-devolution-right-agriculture#sthash.0jE3rQvt.dpuf>.
- Hassan, E. (1998). Adoption and performance of maize in Kenya in CAB, London.
- Hassan, R & Nhemachena, C. (2008). 'Determinants of African farmers' strategies for adaptation to climate change: Multinomial choice analysis', *African Journal of Agricultural and Resource Economics*, 2(1):83-104.
- IEA (Institute of Economic Affairs) and Kenya National Commission on Human Rights (2006), 'Kenyan's Verdict: A Citizens Report Card on the Constituencies Development Fund (CDF)', IEA Research Paper No. 7.
- International Food Policy Research Institute (2004). Assuring food and nutritional security in Africa by 2020. www.jsd-africa.com/js retrieved on 10th February 2018
- Kannan, G., (2013). Pricing and allotment in a sea-cargo supply chain with reference effect: a dynamic game approach. *Discrete Dynamics in Nature and Society*, 2013.
- Kerlinger, F.N. (1979). *Behavioral research: a conceptual approach*. Holt Rinehard and Winston publishers, Orlando USA.
- Khonje, M., Manda, J., Alene, A.D., & Kassie, M., (2015). Analysis of adoption and impacts of improved maize varieties in Eastern Zambia. *World Dev*. 66, 695–706.
- Kibua, T.N.& Mwabu, G. (2008). 'Decentralization and Devolution in Kenya: New Approaches', University of Nairobi Press, Nairobi.

- Kidanemariam, G. E., Erik M., Miet M., Jozef D., & Hans, B. (2015). Extension participation, household income and income diversification: a system equations approach. Retrieved from <https://www.researchgate.net/publication/280934521>
- Kidula L. L. (2005). Influence of women involvement in sugarcane contract farming on sustainable food crop production in Mumias Division of Butere District. Unpublished, MSc. Thesis, Egerton University, Njoro.
- Kitui County Government (2021). Overview of Kitui County Sub-Counties, Wards and Villages. Retrieved from <https://kitui.go.ke/countygovt/about-kitui/>
- Kukamba, U. (2010). 'Local government citizen participation and rural development: reflection on Uganda's decentralization system', *International Review of Administrative Sciences*, 76(1): 171-186.
- Laary, J. K. (2012). 'Dry-season farming and agrochemical misuse in Upper Region of Ghana: Implication and way forward', *Journal of Agricultural, Food and Environmental Sciences*, 5(1):1-10.
- LRTF /Legal Resources Trust Foundation (2009). 'Proposed "Who pocketed My Money? LASDAP, Whose Priority?" A report on LATF/LASDAP in Kenya: the Place of Citizens Participation in a Local Service Delivery Enterprise. Nairobi: LRTF.
- Mandleni, B., & Anim, F.K. (2011). 'Climate change awareness and decision on adaptation measures by livestock farmers', 85th Annual Conference of the Agricultural Economics Society, Warwick University.
- Mendola M. (2007). Agricultural technology adoption and poverty reduction: a propensity score matching analysis for rural Bangladesh. *Food Policy*. 2007;32(33):372-93.
- Muatha I.T., Otieno, J.K. & Nyikal, R.A. (2017). Determinants of smallholder farmers' awareness of agricultural extension devolution in Kenya. *African Journal of Agricultural Research*. Vol. 12(51), pp. 3549-3555.
- Munyua H, & Stilwell C (2009). A mixed qualitative-quantitative participatory methodology: A study of the agricultural knowledge and information system (AKIS) of small-scale farmers in Kirinyaga District, Kenya. *Library Manage*. 31(1):5-18.
- . Narayanan, S. & A. Gulati. (2002). *Globalization and the smallholders: A review of issues, approaches, and implications*. Markets and Structural Studies Division Discussion Paper No. 50. Washington, D.C.: International Food Policy Research Institute.
- Nassiuma D. K. (2000). *Survey sampling: Theory and methods*. Njoro, Kenya: Egerton University Press.
- Oyinbo, O., Abdulmalik, R.O., & Sami, R.A. (2013), 'Determinants of crop farmers' participation in agricultural insurance in the federal capital territory, Abuja, Nigeria', *Greener Journal of Agricultural Sciences*, 2(3):21-26.
- Ragasa, C., Guus, B., Fanaye, T., & Alemayehu, S.T. (2012). Gender differences in access to extension services and agricultural productivity: ESSP II working paper. International Food Policy Research Institute, IFPRI
- Ragasa, C., Ulimwengu, J., Randriamamonjy, J. & Badibanga, T. (2015). Factors Affecting Performance of Agricultural Extension: Evidence from Democratic Republic of Congo. *The Journal of Agricultural Education and Extension*. 22. 1-31. 10.1080/1389224X.2015.1026363.
- Rivera, W.M, (2004). 'Demand-Driven Approaches to Agriculture Extension, Case Studies of International Initiatives', *Agriculture and Rural Development Discussion Paper* 10.
- Saikia P, Krishnan M, Ananthan PS, Immanuel S, & Hazarika D. (2013). Delivery Competence and Penetration of Extension Services among Fish Farmers of Assam. *Indian J. Agric. Econ*. 68(3):402-411.

- Seepersad, J., & V. Douglas (2002). Decentralization of the Extension Services in Trinidad Extension Case Study. In Rivera, W. & Alex, G. (eds.). Decentralized Extension Systems: Case Studies of International Agriculture and Rural Development Discussion Paper 8. Washington, DC: World Bank.
- Sodjinou, E., Glin, L.C., Nicolay, G., Tovignan, S., & Hinvu, J., (2015). Socioeconomic determinants of organic cotton adoption in Benin, West Africa. *Agric. Food Econ.* 3, 1–22.
- Tiwari KR, Sitaula BK, Nyborg LP, & Paudel GS. (2008). Determinants of Farmers' adoption of improved soil conservation technology in a middle mountain watershed of Central Nepal. *Environ Manag.* 2008;42(2):210–22.
- Tshukudu, T. T. (2014). Decentralization as a Strategy for improving Service delivery in the Botswana Public Service Sector. *Journal of Public Administration and Governance*, 4(2).
- Turyahabwe N, Tumusiime D., M, Yikii F., Kakuru W., & Barugahar V. (2017). Awareness, perceptions and implementation of policy and legal provisions on wetlands in Uganda. *Afr. J. Rural Dev.* 2(2):161-174.
- Uphoff, N., T., & Esman, M. J. (1979). *Local Organisation for Rural Development: Analysis of Asian Experience*. Special series on Rural Local Government, 19. Ithaca: Rural Development Committee, Center for International Studies, Cornell University.
- Wongnaa, C., A. (2016). *Economic Efficiency and Productivity of Maize Farmers in Ghana*. Unpublished PhD Thesis, Kumasi Polytechnic, Ghana
- World Bank (2000). *Decentralizing Agricultural Extension: Lessons and Good Practice*. Washington, D.C.: The World Bank.
- World Bank (2021). Overview. Retrieved from <https://www.worldbank.org/en/topic/agriculture/overview>.
- World Bank, (2003). *Reaching the rural poor: A renewed strategy for rural development*. World Bank. Washington, DC.
- Yang, K. & Callahan, K.(2005). 'Assessing Citizen Involvement Efforts by Local Governments', *Public Performance and Management Review*, 29(2):191-216.