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SOCIO ECONOMIC FACTORS INFLUENCING SMALLHOLDER MAIZE FARMING IN MIGORI COUNTY, KENYA

BY

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Abstract

Maize is the main staple food crop in Kenya and is of vital concern to agricultural policy decisions, food security and overall development of the sector and the economy. It is also the dominant staple food crop in the study area. However, there has been a declining trend in maize production among farmers in Migori County, a tobacco growing zone, threatening household and national food security. This paper examines socio economic factors influencing smallholder maize production in Migori County. A survey was conducted and the target population included all smallholder maize farmers in tobacco growing zones of Migori County. A multistage sampling technique was used. A sample of 165 maize farmers was selected using systematic random sampling. Descriptive statistics such as measures of central tendency, cross tabulation, tables, and bar graphs as well as regression were used to analyze data. Results show that farmer's age - a proxy for experience, resource base as captured by size of cattle herd, total cropped area and competition from tobacco production influence maize production. Efforts to improve maize production in Migori County should improve resource base of farmers, pay attention to their experience and consider competition for scarce production resources.

***Keywords**: Smallholder, Maize Production and Tobacco Farming.*

1 INTRODUCTION

Maize is the main staple food crop in Kenya and is of vital concern to agricultural policy decisions, food security and overall development of sector and the economy. Maize production in Kenya is a highly relevant activity due to its importance as it is a dominant food crop (Mantel & Van Engelen, 1994). The maize subsector is faced by four main challenges namely: low productivity; low value addition; under-developed and inefficient factor and product markets and inefficient land use (Olwande, 2012). Efforts to

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increase maize production must take note of these challenges and endeavor to institute mitigating measures.

The Kenyan government policy objective for the maize sub-sector is to encourage increased production so that self-sufficiency and food security can be achieved. This is critical since over 85 percent of the rural population derives its livelihood from agriculture, most of who engage in other cash crop production such as tobacco ignoring maize production yet it accounts for roughly 20 percent of gross farm output from the small-scale farming sector (Jayne, *et al.*, 2001). Nearly all agricultural households plant maize and small-scale production dominates over 70% of total maize production (Olwande, 2012). However, there is stagnation in maize production and productivity in Kenya as evidenced by the increasing gap between production and consumption and the increasing frequency of supply shortages.

The incidence and intensity of hunger and malnutrition has increased significantly and per capita supply of the main staples has been declining since the early 1980s. Chronic under-nutrition is the most common form of malnutrition in Kenya and is mainly associated with insufficient dietary intake because households lack adequate resources (income) to secure basic food requirements. In 1994, the prevalence of chronic under nutrition among children under five years had risen to 34 percent a level that is 15 times higher than that expected in a healthy, well- nourished population. The observed trend of under-nutrition at the national level corresponds with the decline in per capita food availability, declining economic performance especially in small-scale agriculture, and rising levels of poverty. Chronic under-nutrition does not affect all children uniformly in the country and the national estimates shows regional variations.

Maize is also the dominant staple in Migori County. However, there has been a declining trend in maize production among farmers in Migori County, a tobacco growing zone, threatening household and national food security. To make matters worse, almost all the arable land is under cultivation in Migori County making future increase in maize production to depend on yield improvement rather than expansion in area under production (Karanja and Oketch, 1992). Similarly, although Migori County is home to tobacco production, many farmers live in abject poverty and are vulnerable to food insecurity thus making many to question whether switching from maize to tobacco is worthwhile. In addition, children in Migori County were the most vulnerable to malnutrition with half of them suffering from

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chronic under nutrition (Horizon, 2011). This paper examines socio economic factors constraining smallholder maize production in the tobacco growing regions of Migori County.

2 MATERIALS AND METHODS

2.1 Study Area

The study was carried out in Migori County which is in Nyanza Province of Kenya. It has a total population of 917,170 and covers an area of 2,597 km^2. The presence of Lake Victoria, Migori and Kuria rivers and the relatively good weather patterns in Migori County have allowed the soils in the region to be well drained making the county a conducive environment for agriculture.

Fig 1: Map of Migori County

2.2 Data sources and collection

Data was collected through a farm household survey. Primary data was used in the study with a bit of supplementation from secondary sources. The data collected included quantities of maize and other food crops produced, inputs used and other socio-economic characteristics of respondents. All smallholder

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maize farmers in Migori County were targeted. A sample of 165 respondents was selected based on the formula provided by (Cochran, 1977) for calculating the sample size from a population which is estimated to be greater than 10,000. Multistage random sampling was used within the study area and respondents selected using systematic random sampling. The unit of analysis was the farm household. The divisions where tobacco is grown were first delineated before respondents being selected in proportion to the number of farmers in the division. A mixture of interviews and administration of structured questionnaires were used to retrieve data from respondents. Key informants were also interviewed to form an opinion on the issue under study. Questionnaires were preferred because they can be used to gather data quickly from geographically dispersed population.

2.3 Methods of Data Analysis

2.3.1 Theoretical model

This study was based on the theory of production. Producer's objective in a classical sense is to maximize output so as to reap more profits (Varian, 1992; Jehle et al. 1998 and Mas Collel, 1995). Such behavior can be modeled using a production function approach, profit function approach, cost function approach, or through mathematical optimization and dynamic programming. Given price taking, profit maximizing and a model of the physical production process, it is possible to derive a model of producer output and input decisions. However, it is important to note that some small scale farmers producing maize on a subsistence basis may be driven by other objectives other than maximization of profits.

It was assumed that farmers optimized their output subject to the cost of inputs employed in the production process. The myriad of possible inputs are usually grouped into five: raw materials, machinery, labor services, capital goods and land. These inputs can either be variable or fixed where resource allocations and distributive efficiencies in the mix of input investment vary from one farmer to the other and according to available technology. According to (Varian, 1992) and Wanzala *et al*. (2009), if the aggregate production possibilities set by farmers is Y then the aggregate production possibilities set is the sum of the individual production possibility sets and can be written as $Y = \sum_{j=1}^{m} y_j$ where each production plan y_j is in Y. Hence, Y represents all

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production which is achieved from each production plan y_j distributed among farmers j= 1, 2, 3, 4…m. Since a huge chunk of maize production is consumed within the household production function approach to analyzing farmers' production decision is appropriate.

2.3.2 Empirical model

The functional forms that may be chosen to model producer behavior include: Cobb-Douglas (Strauss, 1986; Varian, 1992), Translog (Christiansen et al., 1973) and CES production functions. The Cobb-Douglas production function is given in (2.1) as: -

$$y = A\prod_{i=1,n} x_i^{\alpha_i} \qquad (2.1)$$

Where A is a scalar for productivity, α_i, is a parameter for each factor used and the sum of α_i is the scale parameter, s. This functional form is attractive because of the simplicity of cost shares functions *($S_i = x_i w_i/c(y,w) = \alpha_i$)*, unit elasticity of substitution, simple estimation and embodiment of technological progress in the model(Yanikkaya, 2004). The study considered a farm that is producing a non negative output Q hence having a flow of the output being produced from the inflow of 13 variable inputs X_i (i =1, 2, 3...9 and j= 1, 2, 3 & 4). The production function which specifies the maximum output obtainable from the input mix can be written as;

$$Q = f(x_1, x_2 x_3, \ldots\ldots, x_n) \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2.2)$$

The general form of the estimated Cobb-Douglas production function is given by (2.3);

$$Q = \beta_0 \prod_{i=1}^{9} X_i^{\beta_i} e^{\left(\lambda_j \sum_{j=1}^{4} Z_j + \mu\right)} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2.3)$$

Where Q is the maize production in tonnage, Xi's are the input variables in maize farming while Z_j's are the qualitative variables. When the model is log transformed it becomes (2.4);

$$LNQ = LN\beta_0 + \sum_{i=1}^{9} \beta_i LNX_i + .\lambda_j \sum_{j=1}^{4} Z_j + \mu \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2.4)$$

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Where: X_1 = total cropped area in acres; X_2 = labor in man hours; X_3 = capital in Kshs; X_4 = age in years; X_5 = fertilizers(tones); X_6 = poultry number; X_7 = number of cattle; X_8 = area under tobacco production(acres); X_9 = household size; z_1 = gender of the household head; z_2 = occupation of the household head; z_3 = division of residence; z_4 = education level and μ = error term.

Descriptive statistics such as comparison of means, cross tabulation, tables, and bar graphs were used to give a general description of the socio-economic profile of respondents. Regression analysis was used to determine the factors influencing production of maize. SPSS software was used to analyze the data.

3 RESULTS AND DISCUSSION

3.1 Socio-economic Characteristics of the Sample

This section presents the discussion of various indicators of the household socio economic profile of the respondents. The major indicators as discussed include; farm size, poultry, sheep, cows, household size, age, tobacco area and maize acreage (table 1).

Table 1: Sample Characteristics

Variables	N	Minimum	Maximum	Mean	Std. Deviation
Age of Respondents	165	20.0	88.0	41.4	13.0
No. of Household Members	165	1.0	18.0	5.1	3.0
Total Farm Size in Acres	165	0.3	38.3	5.0	4.4
Tobacco Area in Acres	165	0.0	5.0	1.1	0.8
Maize Area in Acres	165	0.0	37.5	2.3	3.2
Number of Bullocks	160	0.0	8.0	1.6	1.8
Number of Local Breed Sheep	165	0.0	20.0	1.1	2.6
Number of Local Breed Goat	163	0.0	20.0	1.2	2.5
Number of Cows	165	0.0	22.0	2.6	3.7
Number of Layers	165	0.0	87.0	12.4	13.1

Source: Author's Survey Data, 2013

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The youngest farmer in the study area was 20 years while the oldest was 88 year with an average age of farmers being 41 years. This shows that the population of Migori County is relatively young. The average household size was 5. However, some households reported as high as 18 members which was attributed to polygamous tendencies among some families.

The average farm size was 5 acres with some households owning as low as 0.3 acres and as high as 38 acres. This definitely demonstrates how land is a scarce resource in the county and continues to experience more pressure from the surging population. Despite growing tobacco on an average of 1.1 acres of land, farmers in Migori County find it necessary to allocate slightly more land area to maize on average 2.3 acres. This shows how maize is key a food security crop in the county.

The results also show that an average household in the county owns 4 heads of cattle, 1 sheep, 1 goat and 12 poultry animals. However, there were reported cases of some households who owned no livestock or owned above the average number. The general implication of this is that majority of households had a poor resource endowment which could alter acquisition of inputs.

Figure 2 shows the highest level of education attainment across the study area. Results show that about 89 percent of respondents did not go beyond primary school implying that they are either semi illiterate or totally illiterate.

Figure 2: Education Level

Source: Author's Survey Data, 2013

This could derail adoption of new production techniques because of poor understanding and interpretation extension messages.

Tobacco is a cash crop and is expected to give high returns to farmers. Incidentally, about 83% of the farmers in the study area grew tobacco on their farms (Figure 3) implying that tobacco and maize have to share the available land. However, when asked about the type of house they stayed in a majority of

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respondents (68%) resided in semi permanent houses while 19% of respondents stayed in grass thatched houses (Figure 4) implying that despite growing tobacco they continued to wallow in poverty.

Figure 3: Number of Farmers who Grew Tobacco

Source: Author's Survey Data, 2013

Figure 4: Type of Houses

Source: Author's Survey Data, 2013

When asked about the profitability of tobacco farming, 73 %(table 2) of respondents considered it to be unprofitable which is contrary to the view of the establishment and pronouncements by the industry that tobacco farming in South Nyanza region is profitable. A general view among farmers was that returns from tobacco growing were not commensurate with the efforts that they were putting in its production and tobacco companies were exploiting their cheap labor and using dirty tactics that keep farmers perpetually indebted to them.

Table 2: Profitability of Growing Tobacco

Response	Frequency	%
No	120	73
Yes	45	27
Total	165	100

Source: Author's Survey Data, 2013

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3.2 Regression results

Table 4 shows regression results for maize production among smallholder farmers in tobacco growing area of Migori County. It indicated that the goodness of fit of the model was satisfactory. This is supported by R^2 value of 0.602 implying that 60.2% of the variation in Maize production was explained by the model.

Table 4: Regression Results

Variables	Coefficients	Std. Error	t	P- Value
(Constant)	-2.795	1.825	-1.531	.129
LN (Age)^2	.278*	.124	2.248	.027
LN Cattle	.235*	.086	2.743	.007
LN Labour	.038	.133	.287	.775
LN Capital	-.135	.098	-1.382	.170
LN Fertilizer	.081	.096	.837	.405
LN Household Size	-.085	.095	-.890	.376
Gender of Household Head	.293	.167	1.754	.083
LN Area under Tobacco	-.262*	.130	-2.016	.047
LN Total Cropped Area	.729*	.104	6.990	.000
Residential Division	.029	.025	1.164	.247
LN Poultry	.116	.074	1.556	.123
Highest level of education	-.015	.099	-.150	.881
Occupation of Household Head	.183	.134	1.366	.175

R= 0.776; R^2 =0.602; Adjusted R^2=0.549; F= 11.290; * Significant at 5%

Source: Author's Survey Data, 2013

Age of the farmer was significant and positively influenced maize production in Migori County. The implication for this is that as farmers advance in age, they gain more experience in maize production. Efforts to increase maize production should therefore pay attention to experience of stakeholders since it informs their decision on production. This is consistent with findings by Mignouna et al. (2010) that experience provides benefits of hindsight that is useful in decision making.

Similarly, the size of cattle herd and cropped area which were indicators of asset base of farmers were highly significant and positively affected the quantity of maize produced. This implies that better endowed farmers resource wise are likely to do better in maize production in Migori County since they can use such endowments to access essential production inputs.

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Area under tobacco negatively and significantly affected smallholder maize production. This clearly indicates that tobacco production in Migori County competes for land, a scarce resource, with maize. Therefore despite misgivings by farmers, tobacco represents a big threat to maize production in Migori County. Tobacco farming seriously competes for the meager piece of land with maize production yet it degrades the environment and its returns were not commensurate with the farmer's effort. Similarly, residents depend on wood fuel for curing tobacco despite a small proportion of land allocated to tree planting. This leads to environmental degradation and fluctuations in the amount of rainfall received exposing the county to crop failure.

However, gender, geographical location, education and occupation were not critical determinants of maize production in the county. This is inconsistent with Mignouna et al. (2010), and a number of previous studies which found education to be significant.

4 CONCLUSION AND RECOMMENDATIONS

It is concluded that smallholder maize production is affected by farmer's age - a proxy for experience that provides benefits of hindsight in decision making. This calls for acknowledging farmers experience when formulating strategies for improving maize production.

Resource base as captured by size of cattle herd and cropped area are critical drivers of maize production in Migori County. It is therefore important to empower farmers' resource wise to improve their chances of increasing maize production. This could be done by creating both off-farm and on-farm income generating opportunities that would improve their purchasing power to facilitate access to production inputs. In addition, maize production faces stiff competition from tobacco farming which is also detrimental to the environment, health of farmers and seems to keep majority of farmers in a perpetual cycle of poverty. Measures should therefore be taken to improve the beneficial effect of tobacco on farmers while managing its deleterious effect on the environment and the farmers.

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