Devolved Subsidized Farm Inputs and Households' Food Security in Makueni County, Kenya

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ABSTRACT

Devolution of agriculture and extension services in Kenya has been implemented for over five years, yet food insecurity has persisted in some counties. Makueni County is one of the food insecure Counties with a prevalence above 78%. The gap in knowledge on the role of devolved subsidized farm inputs on household food security prompted the desire to undertake the study. The study adopted a descriptive research survey design. The study population was 150,697 households. The target population was household heads and ward agricultural extension administrators. A sample size of 388 respondents was selected. Simple random and purposive sampling methods were used, and data was collected through Key Informant Interviews (KII) and questionnaires. Quantitative data was analyzed using descriptive statistics (percentages and mean) and inferential statistics (correlation, Linear regression, and chi-square), while qualitative data were analyzed using content analysis. Results of the study showed a positive association between subsidized farm input and household food security (R=.258; P= .05). 79% of respondents agreed that subsidized farm inputs increased food security. However, out of the 72 % that were knowledgeable about different subsidized farm inputs, only 62% had accessed them. It was therefore concluded that devolved agricultural extension services have made a positive contribution to household food security. It was further recommended that combining research and development in the implementation of subsidy programs and development of local agriculture trainers who can reach out effectively to the entire community can improve households' food security in the study area.

Keywords: Devolution, Agricultural, Training, Household, Food security, Extension, Subsidized

BACKGROUND INFORMATION

Food security dimensions vary from global, regional, national, household and down to an individual level (FAO, 2020). Food availability comprises the physical presence of food due to domestic production, purchase, and food aid. The production, distribution and exchange of food can be affected by ownership and utilization of land (Kaynakçı & Boz, 2019). The availability of food at the household is influenced by unsustainable farming practices, poor harvesting and storage technology as well as processing, transportation, and packaging of produce(Shahbaz & Ata, 2014). The ability to access food is influenced by income, land, education, gender, and age of household members and especially the head who determines food purchases. Household accessibility to food is assured if it's done in a sustainable and socially acceptable manner (Agunga, 2013).

A subsidy program in agriculture involves farmers support to acquire farm inputs in a more precisely economical way lower than the market price(Gewa et al., 2021). According to Morris Henley, & Dowell, (2017), majority of industrialized nations developed agricultural aid regulations during the 1930s to reduce the unreliable nature of farm input costs and to increase or maintain farm profits. In nations that export food, like France, agrarian subsidies are routinely used to increase farm profits, either by directly paying farmers or lowering market prices for farm inputs. Increased planting seeds and fertilizer costs in Africa have had a significant detrimental impact on both urban and rural households, raising awareness among policymakers of the need to increase the productivity of main food crops (Klimczuk & Klimczuk-Kochańska, 2019).

Since the launch of devolution in Kenya, County Governments have initiated different programs and strategies to improve agricultural food production depending on their specific needs and strengths (Alliance for Green

Revolution in Africa, 2018). Counties like Murang'a have improved dairy farming through the establishment of milk processing plants, providing cooling facilities, improving fodder quality for animals and value addition for milk and meat thus increasing household food security and production (Kiambi et al., 2018; Odero-Waitituh, 2017). To enhance household food security, Wajir County initiated irrigation for crop farming, boreholes, and adoption of solar and wind- powered water pumps for irrigation, recruitment of agricultural extensions officers, establishment of agricultural mechanization services center, the supply of seeds to farmers, revolving fund for farming groups, the value chain for fruits, construction of grain stores, construction of livestock market yards and establishment of revolving fund for livestock pasture and marketing groups (Kiprono & Ibanez Llario, 2020).

The Global Household food security Index established on affordability, accessibility, and value of food products ranked Kenya 87th out of 113 countries as food insecure (Claire , Kayitakire, Saisana, 2017; Izraelov & Silber, 2019). In Makueni County, various agricultural and extension efforts have been made to enhance household food security. These include the establishment of six value chains; grain ,fruit, crop, horticulture, dairy, meat, and poultry value chains as well as dispensation plants in order to increase household income (Makhanu, 2019). Despite these efforts Ambale, Kiptui,&Saina,(2018), indicate that in 2018 only 21.8 percent of households were food secure in Makueni County. This justified the need to conduct this study in a bid to generate results that could guide policy makers as well as future studies on the influence of devolved agricultural extension services on household food security.

Musyoki & Wangari, (2016) narrates the Kenyan national government and county governments intended to offer incentives to encourage value-addition and establish agro-processing industries. The ministry advocated empowering farmers through establishing a reserve to support small scale farmers in agro-processing. It is also planned to promote research and adoption of appropriate technology (Nyanjom, 2015). According to Muema et al., (2018), the County Government of Makueni had already established four value chain systems including, fruit, dairy, indigenous chicken, and green grams. Although the County government reports on the already established strategies, this study will examine how farmers have been empowered through the devolution of agriculture and extension services to increase household food security.

LITERATURE REVIEW

Subsidized farm input programs often face inefficiencies due to high administrative costs, government monopolies, and political interference (Kacianka et al., 2017). In many cases, the removal of such subsidies and the liberalization of input markets have led to declines in agricultural productivity (Kabir, 2016). To address these challenges, various governments have reintroduced farm input support programs aimed at reducing the cost of agricultural inputs through organized supply chains. While some studies suggest that these initiatives can offer national benefits and provide a reasonable return on investment as a strategy to enhance food security (World Bank, 2017), there remains limited empirical evidence on their direct impact on domestic food security, particularly at the household level. This research gap suggests the need for further studies to assess the effectiveness of subsidized farm input programs in improving food availability and accessibility in the household.

METHODOLOGY

The study was carried out in Makueni County. Makueni County is in the former Eastern province. The area is suitable for the study because it has continually remained food insecure despite the efforts made by the County government with respect to the devolution of agricultural extension services to enhance household food security. The study assumed a descriptive survey research design. The study population was 150,697 people from five sub-counties, namely Kathonzweni, Kibwezi, Makindu, Makueni and Mukaa. The study adopted simple random and purposive sampling methods. The research instruments were Key Informant Interviews (KII) and questionnaires that were tested for reliability from pilot the study at the resultant correlation coefficient of alpha = 0.7. The test of normality was computed for Likert type questions. Non-normal data was normalized by transformation of the data using logarithm to base 10 values before they were used. Quantitative data was analyzed using descriptive statistics (percentages and mean) and inferential statistics (Linear

regression and chi-square), Linear regression analysis was used in comparing the role of dependent variable as household food security versus independent variable subsidized farm inputs. Computations of chi-square were used to examine responses on the research questions whether there was any relationship between devolution of agricultural extension services including subsidized farm inputs and household's household food security. Additionally qualitative data were analyzed using content analysis. The study hypotheses were tested at a significant level of (P 0.05).

RESULTS AND DISCUSSION

Influence of Subsidized Farm Inputs on Household Food Security

The influence of subsidized farm inputs on household food security was investigated and a summary of respondent's views represented in Table 14.

Table 1: Subsidized Farm Inputs and Household Food Security

Statement	1%	2%	3%	4%	5%	Likert Mean
Subsidized farm input especially fertilizer and maize planting seeds have led to increased household food security	3	79	11	6	7	3.99
The county government of Makueni has distributed fertilizers, hybrid maize seed, and sorghum seed and land ploughing services at lower rates to farmers.	4	72	9	16	2	3.78
There is a farmer's empowerment program that provide farmers with subsidized farm inputs such as fertilizers and credit opportunities	7	68	32	22	17	4.16
Farmers in Makueni County have benefited from subsidized hybrid seeds and pesticides	2	6	25	11	5	3.79
Mean Likert Mean						3.93

The study outcome indicates 79% of study participants agreed that subsidized farm input especially fertilizer and maize planting seeds have led to increased household food security, also 72% of respondents approved that the county government of Makueni has distributed fertilizers, hybrid maize seed, and sorghum seeds and land ploughing services at lower rates to farmers, crop insurance, climate-smart agriculture, farming inputs support with a major focus on household food stability. While 68% of participants established that there is a farmer's empowerment program that provides farmers with subsidized farm input such as fertilizers and credit opportunities. Further, 62% of the respondents agreed that farmers in Makueni County have benefited from subsidized hybrid seeds and pesticide agricultural training leading to improved food production in Makueni County. The mean score of the replies was 3.93 signifying that majority of study participants supported that subsidized farm inputs increase food security.

The outcome of this study agreed with Lamech & Hulst, (2021) that agriculture input subsidies boost household food security. This is because household food security and production are often said to be correlated with farmer poverty levels throughout most African countries. The findings are also in line with those of Kinuthia, (2020) who examined the influence of subsidized farm inputs on household food security in Kenya and Tanzania and established a positive correlation between household food security and subsidized farm inputs.

Inferential Analysis of Subsidized Farm Inputs and Household Food Security

The means, and standard deviations for subsidized farm inputs and household food security were analyzed and represented in the summary of the outcome in Table 15

Table 2: Subsidized Farm Inputs and Household Food Security

	N	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Food security	364	4.32	.33	-.57	.13	1.90	.26
Subsidies	364	4.21	.38	-.18	.13	.42	.26

1 Strongly disagree; 2 Disagree; 3Moderately agree; 4 Agree; 5 strongly agree

The mean and standard deviations for subsidized farm inputs were (M=4.21; SD=.38) as per the study outcome. A consensus was established that in Makueni County farmers benefited from subsidized farm inputs programs. In the study area subsidized farm input information was shared among farmers through agricultural meetings, farmers peer exchange and agricultural institutions exchange programs.

In the study subsidized farm inputs and household food security research variables' error distributions are further tested for normalcy using skewness and kurtosis in Table 15. (Thakur, 2021) state that a variable's distribution is regarded as normal if its kurtosis and skewness values fall within the range of -2.0 and +2.0. Table 15 demonstrates that the levels of skewness and kurtosis for the variables subsidized farm inputs and household food security were within the obtained range. Therefore, the normality test was successful.

Table 15 also demonstrates the availability of subsidized farm inputs in Makueni County and an improvement in household food security, but it is unable to reveal how subsidized farm inputs affect household food security. Furthermore, there is some disagreement as to whether there was a correlation between them because the mean for household food security was greater than that for subsidized farm inputs. Therefore, a straightforward linear regression analysis was done as represented in the model below

$$y = \beta_0 + \beta_1 x_1 + \varepsilon \qquad\qquad (4.3)$$

Household food security was the response variable y, while subsidized farms inputs were the explanatory variable. The term ε "residual" or "error" denoted the difference between the observed values of household food security and the values that the model attempted to approximation. Model 4.3 preliminary testing was justified. Thus, the influence of subsidized farm inputs in ensuring household food security was investigated. The influence was examined at a 5% level of significance. As shown in Table 16.

Table 3: Regression Statistics for Subsidized Farm Inputs and Household Food Security

Model	Unstandardized coefficient		Standardized coefficient		
	B	Std. Error	Beta	t	Sig
(Constant)	3.268	.208		15.700	.000
Subsidies Best line fit	.248	.050	.258	4.994	.000
R=.258[a]					
R²=.067					
Adjusted R² =.064					
F$_{ratio}$ = 24.942					
P<.05[b]					
Dependent variable: Food Security					
Predictors: (Constant), Subsidized Farm Inputs					

The outcome in Table 16 demonstrates a marginally positive association between subsidized farm inputs and household food security (R=.258; p.05). A portion of household food security was measured with an R-square of .067, which was explained by subsidized farm inputs. It revealed that differences in subsidized farm inputs initiatives were responsible for around 6.7% influence on household food security. The model's generalizability was indicated by the adjusted R-square. If not identical, it should be as close to the R-square as possible. The study's deviation from the final model was minimal. i.e. .003, or.3%.

This suggested that the model might have accounted for about .3% less variance in outcomes if it had been resulting from the entire population (F ratio = 24.942; p .05). The linear regression model was statistically significant. According to standardized beta coefficients, household food security increased by about .258 units for every standard deviation rise in subsidized farm input habits. Table 16 and model 4.3 offered the ideal simple linear regression equation.

$$y = 3.268 + .248x \hspace{4cm} (4.4)$$

The linear regression model 4.4 found a statistically positive correlation between the variance in household food security and subsidized farm inputs (R =.258; p.05). 6.7% of the model was explained by subsidized farm input variation. The degree of household food security was around 3.268 units lower without subsidized farm inputs and increased by .248 units for every unit of subsidized farm input, according to the linear regression model 4.4. Morris et al., (2017) acknowledged that the provision of subsidized farm inputs reduces farmers' stress on accessing resources required in farm production, hence increasing produce.

Additionally, this study used linear regression models to show how subsidized farm inputs contribute to household food security in numerical terms. However, the model of analysis and the measurable contribution of subsidized farm inputs and resources were not mentioned in Public Policy Statements (2007). In their article on household food security, Mugi-Ngenga et al.,(2015) noted that different support from the state department to farmers through offering affordable farm inputs through subsidy programs supports farmers to reduce input expenses hence improved return. Although Mugi-Ngenga et al., (2015) results were quiet on the ideal employed and did not reveal the measure of contribution of subsidized farm inputs to household food security, this study was clear on the analysis model and demonstrated the influence of subsidized farm inputs to household food security.

The current study's findings concur with a report on household food security by Kinuthia, (2020) which noted that availability of subsidized farm inputs among small scale farmers led to improvements in household food security in Australia. These experts have a special network of food producers and work together to promote and manage the use of modern technology in accessing farm inputs to increase food production. Although Holden & Lunduka (2013) failed to demonstrate the model used to associate subsidized farm inputs and household food security, this study used regression models.

Izraelov &Silber, (2019) noted subsidized farm inputs in relation to weak marketing infrastructure, limiting access to markets, and increased transaction costs, price swings, and volatility, as well as higher prices with significant food poverty. Njora, & Yilmaz, (2021) complement the findings of the present study, which found that subsidized farm inputs greatly increased household food security. However, the subsidized farm inputs dimensions in the two-research varied. Additionally, Njora & Yilmaz, (2021) did not demonstrate the significance of subsidized farm inputs metrics to household food security.

In Makueni County, this study indicated that subsidized farm inputs had a significant influence on household food security. In line with Raidimi & Kabiti, (2019) study that linked increased produce among small-scale farmers to available farm inputs subsidy programs. Furthermore, Raidimi and Kabiti, (2019) used correlation models in the same way as the present study. Therefore, the study rejects the null hypothesis that subsidized farm inputs have no influence on household food security in Makueni County, Kenya

Thematic Analysis of Qualitative Findings on Subsidized Farm Inputs on Household Food Security in Makueni County, Kenya

The study interviewed agriculture officers on the influence of subsidized farm inputs on household food security in Makueni County, Kenya. Where majority of interviewees agreed that subsidized farm input influenced household food security. The agriculture officer, P4, observed.

Subsidized farm inputs have helped farmers to acquire and access seeds, fertilizers, and pesticides easier. Even the poor farmers can have something to plant. Although other natural conditions like drought and short rains hinders our efforts, there is tangible evidence on the increased produce by different farmers (P4, Female, 2022).

The earlier studies did not adequately investigate these substantively. Shahbaz & Ata, (2014), examined the impacts of fertilizer subsidies on household food stability and established a positive association as this study. Even though this study investigated the influence of subsidized farm input and established a positive contribution, food insecurity and poverty remain pervasive among smallholder farmers. This prompts the desire to further examine more dynamics related to subsidy programs.

CONCLUSION

Subsidized farm inputs made a moderate contribution to household food security from the study results. The outcome showed that farmers in the study area had benefited from subsidized farm inputs such as fertilizers, hybrid maize seeds, sorghum seeds, land ploughing services, pesticides, crop insurance, and credit opportunities. Regression analysis showed a positive association between subsidized farm input and household food security (R=.258; P .05). The person chi-square statistics yielded a p-value of 0.453 which is higher than the commonly used significance level of 0.05. The critical chi-square value for 1 degree of freedom at a 5% significance level is 3.63. Therefore, since the chi-square statistic 4.53 was slightly higher than the chi-square critical value we reject the hypothesis that subsidized farm inputs have no influence on household food security.

RECOMMENDATIONS

The study recommended:

i. Engagement of all stakeholders in development and implementation of agricultural subsidy programs to capture farmers' interests and meet their specific farm needs and requirements.
ii. Combine science and indigenous knowledge in the implementation of subsidy services. To enable farmers to utilize local knowledge and improve it through modern farming technology to use farm-friendly inputs such as manure.

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