

Research Application Summary

Diversification of Indigenous agricultural practices and implications on household food security: practices and lessons from local communities of Baringo County, Kenya

Cheplogoi, S. K., Ombati, J. M. & Udoto, M. O.

Department of Agricultural Education and Extension, Egerton University, P.O. Box 536 - 20115,
Njoro, Kenya

Corresponding Author: shadrack.cheplogoi@egerton.ac.ke

Abstract

This paper examined the indigenous agricultural diversification strategies and their implication on household food security in Baringo County, Kenya. Descriptive survey design was used in the study. A sample of 140 households and 12 Agricultural Extension staff were selected using purposive, proportionate and simple random sampling techniques. Questionnaire, Focus group discussion guide and observation checklist were used to collect data. The findings indicated that a wide range of diversification strategies including knowledge and skill based, enterprise based, diet based, food sources, farming routines and storage based diversification were adopted by households. The study concluded that diversification strategies were mitigation measure against climate change and food insecurity. The study recommended upscaling best practices of diversification to improve household food security.

Key words: Baringo, climate change, diversification, food security, household, indigenous, Kenya

Résumé

Cet article a examiné les stratégies indigènes de diversification agricole et leur implication sur la sécurité alimentaire des ménages dans le secteur de Baringo, au Kenya. La conception de l'enquête descriptive a été utilisée dans l'étude. Un échantillon de 140 ménages et 12 membres du personnel de vulgarisation agricole ont été sélectionnés à l'aide de techniques d'échantillonnage aléatoire raisonné, proportionné et simple. Un questionnaire, un guide de discussion de groupe et une liste de contrôle d'observation ont été utilisés pour collecter les données. Les résultats ont indiqué qu'un large éventail de stratégies de diversification, y compris basées sur les connaissances et les compétences, basées sur l'entreprise, basées sur l'alimentation, les sources de nourriture, les routines agricoles et la diversification basée sur le stockage, ont été adoptées par les ménages. L'étude a conclu que les stratégies de diversification étaient des mesures d'atténuation contre le changement climatique et l'insécurité alimentaire. L'étude a recommandé la mise à l'échelle des meilleures pratiques de diversification pour améliorer la sécurité alimentaire des ménages.

Mots clés: Baringo, changement climatique, diversification, sécurité alimentaire, ménage, indigène, Kenya

Introduction

Food insecurity is a global concern considering that over 690 million people worldwide still go to bed hungry each night (Food and Agriculture Organization [FAO], 2020). Agriculture, which is the main economic activity for most rural households plays an indispensable role in ensuring sustainable food security (Simatimbe *et al.*, 2018; Salami, 2020). However, agriculture being climate sensitive is severely affected by climate change and increasing climate variability which negatively affect agricultural productivity and food production (FAO *et al.*, 2019). Similarly, Gwambene and Liwenga (2016) opined that livelihoods of people who depend on climate sensitive agricultural resources are particularly vulnerable.

The effects of climate change and extreme weather variability has resulted in increased incidences of drought, floods, pests and diseases which curtail the achievement of the fundamental elements of food security (FAO, 2013; Kungu, 2014; Economic Survey, 2015; Government of Kenya [GOK], 2015). United Nations Educational, Scientific and Cultural Organization (UNESCO, 2018) assert that IK is a major resource for adapting to climate change. Mafongoya and Ajayi (2017) indicate that, rural communities have developed a good understanding and knowledge of disaster prevention and mitigation measures based on facts that are known or learnt from experience or acquired through observation and practice. Ihenacho *et al.* (2019) and Concern Worldwide (2020) recommends the application of Indigenous climate smart practices of diversifying crop varieties as solution to climate change and global hunger.

Siambombe (2018) argue that African farmers in particular have developed elaborate techniques for tackling climate change. Among the indigenous practices that communities have adopted to reduce the impacts of climate change is the diversification of agricultural practices which takes various forms like crop diversification (Kihila, 2017). Perroni (2017) also presents intercropping and mixed cropping as a form of diversification whose advantages are to maximize land use while reducing risks associated with single crop failure. This paper therefore examined the indigenous agricultural diversification practices among the rural communities of Baringo County in Kenya and derived lessons from the activities in mitigating food insecurity.

Methodology

Self-administered questionnaire were used to collect data from 140 households, 12 agricultural extension staff sampled through purposive, census, proportionate and simple random sampling techniques. In addition, a focus group discussion was conducted among key informants who were perceived to be experts in indigenous knowledge practices. An observation guide was also used to collect data in the study. The results from the tools were triangulated.

Results and Discussions

Knowledge based diversification strategies. Table 1 summarize the results on the application of both indigenous and scientific knowledge systems as diversification strategy.

Table 1. Agriculture knowledge that households apply on their farms

Knowledge applied in the farm	Frequency	Percent
Modern	5	45.5
Indigenous	3	27.3
Both modern and indigenous	3	27.3

(n=11)

Households according to Table 1 relied on blending both knowledge systems perhaps to reap the benefits associated with the two knowledge bases with regard to technologies and innovations. The study findings are supported by Salami (2020) on the role of indigenous knowledge in sustainable urban agriculture who suggested the need for incorporating a blended mode of both the formal and indigenous knowledge for a better output. Similarly, UNESCO (2018) advocate for the integration of the two knowledge based systems to maximize the benefits from the two systems. Besides, Wang (2015) suggested that the integration of both indigenous and scientific knowledge is needed for sustainable agricultural knowledge and development.

Enterprise diversification Strategies. Table 2 summarizes crop diversification strategies by households in the study site.

Table 2. Diversified crop enterprises

Crop	Households (n = 117)		Extension staff (n = 11)		Observation (n = 19)	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Maize	101	86.3	11	100.0	15	78.9
Beans	90	76.9	10	90.9	10	52.6
Millet	74	63.2	9	81.8	13	68.4
Sorghum	26	22.2	6	54.5	8	42.1
Cassava	12	10.3	5	45.5	-	-
Green grams	9	7.7	5	45.5	-	-
Cow peas	11	9.4	7	63.6	6	31.6
Sweet potatoes	9	7.7	5	45.5	3	15.8
Fruits	7	6.0	5	45.5	-	-
Vegetables	6	5.1	6	54.5	4	21.1

Households according to Table 2 tend to engage in diverse crop enterprises which comprised of a variety of staple cereal and legume food staffs that address household food security. The enterprises also combined vegetables and fruits for balanced diet while crops like sweet potatoes, sorghum, millet and cassava comprised indigenous drought resistant crops. Neudert *et al.* (2020) described diversified livelihoods as the characteristics of households globally. Concern Worldwide (2020) singles out diversification of crop varieties as a climate smart agriculture which is a global solution to hunger. According to FAO (2016), there is a positively and significant association

between crop diversification and food security while Makate *et al.* (2016) indicated that there was a significant positive association between crop diversification and farm income. On the other hand, Snapp and Fisher (2015) findings revealed that a positive correlation existed between crop diversification and dietary diversity. Perroni (2017) further opined that planting multiple crops would maximize land use while reducing the risks associated with single crop failure.

Table 3 reveals that different livestock types were kept by households possibly to generate a variety of livestock products for diet diversity. This agrees with Megersa *et al.* (2013) findings that livestock diversification based on multiple species offered both food production and sufficient choices for off-take for liquidation in times of food shortages. Regassa and Stoecker (2012) indicate that household food security is influenced by the number of livestock species.

Table 3. Livestock kept for producing food by households

Animal	Households (n = 117)		Extension officers (n = 11)		Observation (n = 19)	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Cattle	113	96.6	10	90.9	18	94.7
Sheep	103	88.0	11	100.0	16	84.2
Goats	107	91.5	10	90.9	18	94.7
Chicken	87	74.4	10	90.9	13	68.4
Bees	5	4.3	3	27.3	2	10.5
Camel	-	-	1	9.1	-	-
Pig	-	-	1	9.1	-	-

Diversification of Food Sources. Table 4 provide a summary of the food sources for the households. The varied sources provide alternative options for food security.

Table 4 . Sources of food according to household heads

Food source	Frequency	Percentage
Produced	114	97.4
Bought	105	89.7
Relief	20	17.1
Gathered	40	34.2
Relatives/well wishers	63	53.8

(n=117)

Further, the results in Table 5 indicate that households engaged both crops and livestock routine practices as part of the efforts to mitigate climate change effects and food insecurity. Planting at the onset of rains (45.5%) is a dominant crop related strategy for crops to benefit from early rains and get to the market early enough for higher incomes. The routine practice also reduces incidences of diseases, improve production and lead to increased income through better markets.

Diversification in storage and preservation strategies. Results of diversified storage and preservation strategies are presented in Table 6.

Table 6. Diversified food preservation strategies

Preservation	Households n = 117		Extension Officers = 11		Observation n = 19	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Smoking	115	98.3	9	81.8	12	63.2
Sun drying	117	100.0	11	100.0	15	78.9
Use of Honey	67	57.3	2	18.2	-	-
Salting	116	99.1	4	36.4	13	68.4
Fermenting	98	83.8	2	18.2	4	21.1
Roasting	114	97.4	2	18.2	6	31.6
Frying	112	95.7	-	-	2	10.5
Use of Pepper	113	96.6	-	-	2	10.5
Cold places	-	-	2	18.2	2	10.5
Boiling	78	66.7	-	-	5	26.3
Use of Ash	115	98.3	4	36.4	10	52.6

The findings indicate that majority of households employed drying (100.0%) for food preservation while for practices such as salting, smoking and use of ash, roasting, use of pepper and frying were also employed but varying levels as key strategies for food preservation. This is also in agreement with the data from extension staff and observation guide. The findings support the report of Asogwa *et al.* (2017) that communities practiced diverse indigenous food preservation systems for addressing food shortage. Traditional granaries (69.2%), gunny bags (59.0%) and traditional containers (12.8%) ranked among the most prevalent storage facilities for storing food stuffs (Table 7). These practices increase shelf life of food stuffs to ensure food availability over a long time period. Rankoana (2017) asserted that local community members sustain their future household food security by using indigenous storage means.

Table 7. Diversified Food Storage Facilities

Storage	Households n = 117		Extension staff n = 11		Observation n = 19	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Gunny bags	69	59.0	6	54.5	9	47.4
Granary	81	69.2	4	36.4	14	73.7
Traditional containers (calabash, gourds, skin bags)	15	12.8	9	81.8	17	89.5
Improvised metallic/plastic containers	11	9.4	3	27.3	-	-
Traditional store with crib	-	-	5	45.5	3	15.8
Modern store	8	6.8	2	18.2	-	-

Conclusion

Diversification is a survival mechanisms for climate change and food and nutrition security among the rural communities of Baringo County, Kenya. Diversification takes various forms from knowledge diversification, enterprise and diet, food sources, farming routines and storage and preservation strategies. Diversification is a strategic option for improving household food security status which is critical in the achievement of household food and nutrition security. Diversification is therefore a strategy for reducing risks and uncertainties.

Recommendations

This study recommends policy interventions to upscale some of the best practices on indigenous diversification practices for integration and mainstreaming into the main agricultural extension service for the benefit of farming households.

Acknowledgement

This paper is a contribution to the Seventh Africa Higher education Week and RUFORUM Triennial Conference held 6-10 December 2021 in Cotonu, Benin.

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