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ECONOMIC VALUE OF BIOFORTIFIED DRY LAND ARROWROOTS IN MURANGA COUNTY

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ABSTRACT

The general purpose of this inquiry was to investigate the role of biofortified dry land arrowroots in mitigating food security among rural women farmers' households in Muranga County. The study sought to establish economic value of biofortified dry land arrowroots in Murang'a County. The Study was founded on feminist theory. The study methodology included the use of semi-structured questionnaires, focus group discussions and interviewing key informants. The study sampled 120 respondents. The qualitative and quantitative data was analyzed and a report prepared. The study achieved 83% response rate. The Study findings indicated that biofortified dry land arrowroots crops are economically beneficial as women farmers sell surplus crops. Conclusion of the study was that dry land arrowroots have significant economic value among women farmers in Muranga County. The findings however did not generalize in Kenya. The study recommended that the government needed to adopt biofortified dry land arrowroots farming production to address food insecurity in arid and semi-arid lands. The study further recommended studies in other Counties on dry land arrowroots to allow generalization.

Key Words: *Biofortified Dry Arrowroots Farming, Economic Value*

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INTRODUCTION

The last 50 years has shown marked agricultural research in developing countries through bilateral collaborations in food production Valenca *et al*. (2017). Extensive research on staple foods like maize, rice, bananas and arrowroots in countries like Malawi, Mozambique and Zimbabwe have increased production and productivity per acres of land under cultivation to help mitigate food insecurity (Krush *et al*., 2012).

Saltzman *et al*. (2015) laments on little research in biofortification of vegetables, pulses and animal products that essential for food security. In connect the continued rise in prices of non-staple food have made it difficult for the poor to afford adequate dietary supplies for energy needs and necessary nutritional needs leading to hidden hunger according to Bouis *et al*. (2011).

Conversely, Haas, Luna, Lung'aho *et al*. (2017) posit that biofortification has salient benefits in serving underserved rural communities more effectively when compared to nutritional supplements with regard to cost in the long run. The upfront investments in biotechnology and micro-nutrients fixation in seeds help farmers produce biofortified crops at no extra costs. This position contradicts (Valencia *et al*., (2017).

Dry land arrowroots are hardy tuber crops grown in places with scare rainfall and long periods of hot climatic conditions. In 2018, Kenya experienced severe food crisis resulting to maize importation to help lower prices caused by rise in demand, Gitau *et al*. (2019). Hidden hunger represented by nutritional diseases like malnutrition. Hidden hunger is associated with dearth of essential minerals and vitamins in the diet. Essential micro-nutrients are; iodine, iron, zinc and vitamin A. According to Hickey *et al.*, (2012) malnutrition is a threat to the livelihood of millions in Arid and Semi-Arid Lands, ASAL (Hickery *et al*., 2012).

In Muranga County a densely populated County is vastly considered a semi-arid region because of the pockets of dry land areas. Muranga County constitutes Maragwa, Kagema, Mathioya and Gatanga sub-counties. The Land tenure system is based on traditional practices that favour male heirs. Women suffer discrimination in land ownership as far a succession is concerned in spite of the majority of women being engaged in farming in Muranga County.

Statement of the Problem

Food insecurity in Muranga over the years has made many households to experience hunger especially the arid and semi-arid parts in Muranga County. Hunger and malnutrition has affected school children growth and education. Farmers in Muranga have embraced biofortified crops according to Covic *et al.* (2017). Despite biofortification efforts adoption, there is scarcity of research in Muranga on women farmers and the possible implications of biofortified dry land arrowroots.

The Kenya National Bureau of Statistics, (KNBS, 2019) estimate Murang'a County population as 1,056,640. There are 523, 940 Male and 532,669 Female according to the Kenya Population and Households Census (KPHC, 2019). The region is considered to be a dryland and consists of the following sub-counties; Maragwa, Kagema, Mathioya and Gatanga. Farmers in Muranga have been growing crops that are not biofortified consistently leading low food productivity due to insufficient rainfall exposing households to hunger. Bouis and Saltzman (2017) postulate that fortified starchy tubers like sweet potatoes and arrowroots are believed to hold the key to food security.

The depth of information about biofortified food crops grown in Muranga and economic value of dryland arrowroots needed to be established. This inquiry sought to fill this knowledge gap concerning dry land arrowroots farming among women farmers' in Muranga County.

Objective of the Study

The general objective of this study was to examine the role of f biofortified crops in Mitigating Food

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Security in the rural households in Murang'a County; A case of women farmers of dry land arrowroots. The specific objective was to establish the economic value of dry land arrowroots in Muranga County.

LITERATURE REVIEW

Feminist Theory

Feminist theory is described as a movement a philosophy guided by ideology of gender equality, and equal opportunities for women. Feminist Theory help shade light on forces that deliberately oppress, violate and practice inequality against female gender. The Feminist philosophy is multi-disciplinary from anthropology, sociology, economic and political thought in discourse. The theory presupposes that freedom is a necessity in the space where there is gendered labour distribution that reserves certain roles based on gender. Arendt thus suggests that freedom empowers women economically and politically both in public and private spaces. Hannah Arendt (1973) observed that feminist organizations have power in solidarity which is achieved in unity of purpose away from identity and race issues (Arendt, 1968). The feminism movements suffered in the past from the clash of ideologies and identity towards women empowerment. Feminist theory forms a significant basis of women to gain justice, freedom and social equality away from discrimination and abuse that women have experienced in society according to Dill and Kohlman (2012).

According to Ellen Dubois (1999) women have suffered untold injustice and rights violations by society mirrored on duties and resources allocations as dictated by society. Women remain strong economic contributors towards food production, caring for families and providing necessary labour for economic development.

According to Liam and Belinda (2015) in a study on gender and food security in Malawi there was glaring differences in the definition of gender. Gender according to the study is reviewed in regard to roles played by men and women at work and at home. This shows that gender differences and complexities is global and agrees with Arendt that gender in a way is describes division of labour.

The Feminist theory helps explain the gender contribution to food security and describe cultural roles in households. The feminist theory explains the role of women as a pillar towards food justice and food security. Therefore, women farmers in Muranga County roles are catalytic to households' economic empowerment towards food justice. The dryland arrowroots give hope to sustainable crop that meet farmers economic and sustenance needs.

Empirical Studies

The economic contribution of women farmers in food production is scarcely noticed. The customary traditions have maintained land ownership in the hands of men, while women work the land. Empowering women to own land, access inputs, markets information and modern farming methods can greatly influence food security, nutritional security and economic empowerment of households (Muthoni & Wangui, 2013).

Access to education and technology has empowered women to access economic opportunities. Women experience challenges to improve their nutritional status as well as their children's nutritional status. Radhakrishnan and Solari (2015) pointed out the challenges experienced by women as inadequate employment opportunities and gender discrimination in wage payments. In addition, it was noted that women are disadvantaged in accessing information and lack of involvement in decision making. Women have less access to education and tend to drop outs earlier because of early marriages, culture or adolescent pregnancies (Radhakrishnan & Solari, 2015). Generally, women suffer poor health and nutrition. The maternal demands contribute to increased mortality due to poor access to health care. The gender inequalities can be reversed through access to education and technology from evidence adduced by Radhakrishnan exploring South Asian women who immigrated to the United States

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overtaking their male counterparts from the same lower social strata.

Female workers have been the backbone of agriculture and food production in many third world countries due to economic migration of men in search of work. Women are taking up more and more responsibilities including farming and food production. The effects of Men economic migration are seen in Nepal where most households are led by women (Adikari *et al*., 2015). FAO proposes that Women can contribute to higher crop yields by 20-30% thereby reducing global hunger by 17% through improved production (2012). FAO proposes increased engagement of women on agricultural production from policy to implementation for better food production. Women empowerment has a significant effect on food production and household food security from a study in South Africa according to Shauranga, Mudhara and Bogale (2016).

Low food productivity puts a strain on women to seek financial resources to buy food to cover deficit from food production. The drive to seek employment results in lower wage jobs further marginalizing women economically. Women are innovative and learn through social networks that serve as a means of economic empowerment (Ogutu, 2015). The social networks counteract gender inequality, lack of access to household income and opens up economic opportunities like trading. In some communities' women work while their wages are given to their spouses as per cultural norms. Men and women have different spending habits. Men led households differ from women led households. Men prefer purchasing non-food items leading to gender domination in budgets allocation. Women empowerment through budget resources tend to increase spending in nutrition and health often ignored by men (Radhakrisnan & Solari, 2015). It was further noted that women are better savers as a cushion for possible disasters like illnesses, drought or poor harvest.

The role of women in agriculture is not sufficiently documented. The rise of women led households provides an opportunity to understand the contribution of women in economic development and more specifically in food production. Women involvement in agriculture plays a pivotal role in enhancing food security and nutrition adequacy in the community. Generally, women take care of households' nutrition needs. The inquiry on dry land arrowroots in Muranga County provides an opportunity to evaluate its role in nutrition.

METHODOLOGY

This study approach adopted a descriptive survey study design. The study design deployed qualitative and quantitative techniques in data collection. The study targeted women farmers in Muranga County. According to Muranga County (2019) the total land area is 2558 kilometers squared. The area geographically described 00 34' South, 107' South and longitudes 360 East and 370 27' East. Muranga County is surrounded by Nyeri County to the North, Embu County to the North East, Kirinyaga County to the West, Kiambu County to the South, And Machakos County to the East.

The study surveyed women farmers in Muranga County with purposive targeted sampling towards areas with many dryland arrowroot farmers from four sub-counties (Kangema, Mathioya, Gatanga and Maragwa) within Murang'a County. The research study was carried out covering the women farmers engaging in dry land arrowroot farming in order to determine food adequacy and nutritional needs contributed by dry arrowroots farming. The study deployed purposive sampling to collect data as objectively as possible from the target population of women farmers. The researcher utilized stratified sampling technique to select 120 dry land arrowroot farmers from across the four targeted sub-counties. The researcher used semi-structured questionnaires, a camera and notes taking and meeting minutes to collect data for analysis. The key informants were Ministry of Agriculture Official, County government officers and women leaders.

The researcher used women groups with organized structures among the women farmers' self-help groups comprising between 6-12 women for focused group discussions to collect qualitative data for analysis. The data was coded and entered into the computer for computation of descriptive statistics. The Statistical Package for the Social Sciences (SPSS Version 23.0) software was used to run descriptive statistics such as percentages, mean and standard deviation that help describe the data statistically.

RESULTS

Out of the 120 respondents who were targeted for data collection among women farmers; the researcher was only able to administer and collect a total of 100 fully filled questionnaires cumulatively which represented a response rate of 83.3 %. The results established that majority (59%) engaging in dry land arrowroots in Muranga County were aged between 36 to 60 years, 22% are aged above 60 years, 19% were aged between 18 to 35 years, 13% were aged between 21 to 35 years while 6% were aged below 20 years. From the study results, it was clear that majority of those engaging in arrowroots farming in Muranga County were past their youthful age above 35 years. The study established that 36% of respondents had attained secondary school as the highest educational level, 34% had primary school education as their level of education, and 20% had college education as their highest level of education while 10% of respondents indicated that they did not have any form of formal education. The study results indicated that majority of those engaging in dry land arrowroots farming in Muranga County were literate.

Contribution of Dry Land Arrowroots on Household Food Security

Respondents were asked to show their extent of agreement or disagreement to the below statements relating to contribution of dry land arrowroots on household food security. Results were presented in table 1.

Table 1: Contribution of Dry Land Arrowroots on Household Food Security

Statement	N	Mean	Std. Dev
Food security; people never go without food. They have access to food that meets their needs. Do you agree with the statement?	100	3.96	0.95
In your family do you have adequate food in terms of quality and quantity essential for good health? Do you agree?	100	3.86	0.83
Nutritional security: The good food that keeps people health. Fewer cases of anemia and malnutrition	100	3.89	0.76
In your family does your daily diet intake constitute nutritional security in terms of food quality and quantity necessary for health? Do you agree with the statement?	100	3.93	0.88
From your perspective are there cases of reduced school performances.	100	3.52	0.13

The study results in Table 1 indicated that, respondents strongly agreed that food security is achieved when people don't miss food or never go hungry/food health? Throughout the year, mean score of 3.96. This implied the respondents moderately agreed with the statements on food security.

In addition, the study established that respondents strongly agreed that a healthy life is achieved with fewer cases of nutrition related diseases in the community like anemia and malnutrition by the mean score of 3.93. Further, the study established that respondents agreed that nutritional security is when people gain good food that provides for good health. The good food entails balanced dietary needs with sufficient amounts of energy, micro-nutrients and vitamins necessary for health. Nutrition security is achieved through consumption

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of good healthy foods according to respondents as shown by the mean scores of 3.89 and 3.86 respectively. Lastly, it was established that respondents moderately agreed that prolonged hunger leads to physical and cognitive deficits in the long term affecting economic and human development as illustrated by the mean score of 3.52. Fortified Arrowroots farming contributes significantly to food security and economic needs of the respondents studied.

On the contribution of dry land arrowroots on household food security in Muranga County, it was found out that respondents strongly agreed with a mean score of 3.96 food security can be guaranteed when all people receive sufficient, safe and nutritious food which meets their daily dietary needs. In addition, the study established with a mean score of 3.93 that respondents strongly agreed that only if people can satisfy their food requirements using balance food diversity to achieve health. Moreover, the study results reported mean scores of 3.89 and 3.86 that respondents agreed that nutritional security is ability to get good food for good health.

CONCLUSION AND RECOMMENDATIONS

On the objective of contribution of dry land arrowroots on household food security in Muranga County, the study established that food security can be achieved when all women farmers have access to good quality seedlings of dry land arrowroots that can ensure adequate food production and nutritional adequacy throughout the year. The farmers can also benefit from support of agricultural extension officers for better farming methods.

It was concluded that food security can be achieved in the consumption of biofortified crops like dry land arrowroots.

Based on the study findings, the study recommended Women farmers need to be encouraged to adopt dry land arrowroots farming needs to be considered as a potential intervention in mitigating food insecurity and for economic gains.

Areas of Further Research

The results of this study cannot be generalized in all counties in Kenya. Thus, the study recommended that further study in other counties to allow generalization of study results.

Studies ought to be undertaken examining how adoption of drought resistant biofortified food crops helps in alleviating food insecurity among communities living in arid and semi-arid areas in Kenya.

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