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Nutrition Security of Households Utilizing Wooden Lockable Fish Ponds in Peri-Urban Areas of Busia County, Kenya

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***Abstract* – Fish is a source of high quality and low-cost protein for millions of people in the developing countries. There is also the burden of malnutrition that still affects a wider population in the African and Kenyan context. Wooden lockable fish ponds are alternatives to earth fish ponds for rearing fish locally at the household level. The purpose of this study was to determine the nutrition security of households utilizing wooden lockable fish ponds and the objectives were to establish the dietary practices and nutrition status of households utilizing wooden lockable fish ponds in peri-urban areas of Busia County, Kenya. The study area was purposively sampled and random selection was done for the households. Using Yamane method a sample size of 135 households with wooden lockable fishponds were studied. Data collection was done using questionnaire guides, capturing household food and nutrition security status. Data analysis included descriptive statistics and inferential statistics in order to explain the relationship between the various variables in the study. The results showed that use of wooden lockable fish ponds enhanced household nutrition security.**

***Keywords* – Fish Ponds, Nutrition Security.**

I. INTRODUCTION

An estimated 821million people are undernourished globally. Undernourishment and severe food insecurity appear to be increasing in almost all regions of Africa as well as in South America. In Africa, the situation is more pressing in regions of sub-Saharan Africa where an estimated 23.2% of the population may have suffered from chronic food deprivation in 2017 (Food Agriculture Organization (FAO) et. al, 2018) [3]. Kenya falls under this category since food security is projected to decrease seasonally with the depletion of household food stocks. As a result of this, fluctuations in acute malnutrition are expected particularly because of the declining food access. This calls for innovation of sustainable means towards curbing the food and nutrition security status of the Kenyan population. This is because the economic cost of malnutrition is estimated to range from 3%-16% of the Gross Domestic Product of affected countries. On the other hand, decreasing the prevalence of malnutrition can have the reverse effect; a 1% decrease in stunting can increase wages by approximately 1.4% (World Food Programme (WFP), 2015) [10].

Furthermore, according to a study on nutrition status of under five children in cassava consuming communities of Busia in western Kenya by Nungo et al 2012 [7], the results showed that there was overall low consumption of animal foods and vitamin A rich foods which is similar to various studies in Kenya (Bwibo and Neumann, 2003)[6]. This study also sought to establish whether the use of wooden lockable fish ponds has been of any significance in improving the diet diversification of the households thereby improving their food and nutrition security.

This study is significant to the Kenya's vision 2030 which together with other policy frameworks recognizes aquaculture as a source of food security, poverty reduction and employment creation. In addition, in Kenya, the blue economy represents a huge opportunity and potential to achieve economic growth and this study is significant

to this emerging economic frontier. Policy making for food security presupposes that formulators have a proper understanding of how the various food sectors of the economy interrelate. FAO (2009) [2] advocates for policy formulation to safeguard small-scale fisheries that are fundamental for improving rural livelihoods. This is a challenge to stakeholders to provide support to fish farmers in vulnerable provinces where fresh water is abundant in order to generate employment and promote food security in such regions. Therefore, the results of this study are key for policy enhancement for example the food and nutrition security policy since they will be showing at the contribution of fish farming to food security at household level.

II. Materials and Methods

2.1 *Study Area and Population*

This study was carried out in Busia County because wooden lockable fish ponds have been introduced to various households for use in this area by RUDESAT organization. The main economic activity is trade with neighboring Uganda. This study adopted a descriptive cross-sectional design whereby data collection was at a point in time. The study population was the households in Busia County which practice fish farming using wooden lockable fish ponds. Households where wooden lockable fish ponds are used to rear fish were included in the study. Those households where fish farming is not practiced, and where other means other than wooden lockable fish ponds e.g. earthen ponds) are used to rear fish were not included in the study.

2.2 *Sampling Strategy*

The study area was selected purposively because it is where wooden lockable fish pond farmers are located and also the farmers using wooden lockable fish ponds were sampled purposively. Households were randomly sampled to reach a representative sample of the whole population. Yamane Method was used to determine the sample size to be used in the study: a total of 135 households were studied.

2.3 *Data Collection and Analysis*

A self-administered questionnaire was issued. Individual dietary diversity score was used to assess the general dietary intake and frequency of consumption of fish. It was also used to collect individual portion size information as standardized portions which translate to the nutrition security status of the household. Observation checklist: An observation checklist was used to record the types of fish grown in the ponds and to identify clinical signs that indicate malnutrition/nutrition deficiency among the children in the households. Focus Group Discussion was held among the fish farmers to collect data on the effect of use of wooden lockable fish ponds on their household food and nutrition security status.

2.4 *Logistical and Ethical Consideration*

Permission to conduct the study was obtained from Busia County, Ministry of Agriculture, Livestock and Fisheries. Participation in the study was voluntary. The participants were requested to sign a written consent after getting a detailed explanation of the study. The questionnaires did not require the identity of the participants and data collection and analysis was done with confidentiality maintained.

III. Results and Discussion

3.1 *Dietary Practices among Households with Wooden Lockable Fish Ponds*

A 24 hour recall was used to establish dietary intake while food frequency intake over a period of one week and one month was used to establish dietary patterns. In this study women's dietary intake was of interest because many studies have considered dietary intake of children leaving out other members of the household. The mean energy consumption was at 1673.7 kilo calories. This is much below the recommended energy intake. From the 24 hour recall, 56.7% of the households reported having eaten fish either as lunch or supper. The most predominant food item was ugali (89.2%) followed by sweet potatoes (64.2%). The mean protein intake was at 32.98 grams basing on food exchange list and carbohydrate was at 197.83g. Little et al, (2016) [5] on aquaculture as a rapidly growing and significant source of food stated that low prices, awareness of fish as a healthy food source and ease of preparation are some of the main reasons increasing its preference. This explains why more than half of the households ate fish on a daily basis.

Much of the energy was from fats and oils mainly used for cooking. Average fat intake was at 30.65grams constituting more than 30% of the total energy intake. From the study findings most micronutrients intake was below the recommended daily intakes except for vitamin A and calcium. Vitamin A consumption was at 94.6% of the recommended intake and this could be explained by high consumption of dark green leafy vegetables and also orange fleshed potatoes that from both dietary history and also observation, they were available in plenty. Calcium intake was at 88.5% of the recommended intake and this was mainly because of the fish meal and potatoes. Failure in meeting the recommended dietary intake of many micro nutrients could be attributed to limited variety in the diet where the mean dietary diversity score was at 4.118 which is below the recommended dietary diversity score.

Significant number of households (53.2%) reported that proceeds from selling fish supported purchase of food items like rice, milk, sugar and potatoes that contributed to household food security. Many (76.2%) compared rearing of chicken to fish farming using wooden lockable fish ponds as they could even sell one fish per day to enable them put a meal on the table. From focus group discussions data, the report indicated that household food security had been enhanced so much by wooden lockable fish ponds where it was affordable to have a fish meal as well as generate some income through selling.

A 24-hour recall and 7-day dietary diversity scores for women in the household were calculated to determine the households' economic capacity to consume various foods as well as nutrient adequacy. As per the 7-day dietary diversity score, all women reported that having less than half of a total of 15 food groups, with the highest score reported as (5.7; SD 1.1), and least being (2.1; SD 1.2). Overall, the 24-hour recall and dietary diversity scores were lower. These results are in tandem with results from other studies e.g. Akua and Kwamena (2019) [1] in their assessment of food security in fish farming communities in Ghana established that fish farming households have higher nutritional quality and frequency of food consumed with the average food consumption score of 15.5.

3.2 *Relationship between Ownership of Wooden Lockable Fish Ponds and Dietary Diversity Score*

The study findings showed that 23.9% of the women had diversity score of three, 34.1% had a diversity score of four, 40.4% had a diversity score of five and only 1.5% had a diversity score of more than five. IFPRI (2002) [4] points out that agricultural productivity has been said to increase as much as 20% when women are given the

same inputs as men. In this study, many of the women with high dietary diversity score were those with more than one wooden lockable fish pond. Therefore in this study, the wooden lockable fish ponds as a household nutrition intervention has improved household food and nutrition security through increased dietary diversity score, conceptualized as "the number of different foods or food groups consumed over a given reference period".

3.3 *Nutrition Status of Household Members*

The children below five years in the household were used to identify households at nutritional risk. According to UNICEF (2009) [9] anthropometric measurement of children under five years offers cheap and easy method for assessment of health and nutritional status and in prediction of morbidity and mortality within a community. Nungo et al, (2012) [7] established that nutrition status of children in Nambale area of Busia County (mostly 36-47 months) was poor with stunting, underweight and wasting being represented by 26.6%, 13.9% and 10.1% respectively.

In this study, prevalence of underweight by world health organization Standards among those with wooden lockable fish pond was low (13.0%) compared to national average figure of 33.4%. There was smaller proportion of 5.7 % with moderate underweight and 62.0% had normal weights. According to data collected from the focus group discussions, majority (81.2%) of mothers in this region did have formal education. When mothers have access to education and information; the household food security is likely to improve which then translates into improved nutrition, particularly among children. Stunting, an index of chronic under nutrition, was low among the children when compared to findings from prior studies. About 6.9% of children were stunted. A percentage that is far much below the national prevalence and even Busia County prevalence.

About 8.8% of the total children in all households were severely wasted, 14.3% were moderately wasted, 33.8% were at risk of wasting and 63.1% were normal. The above findings indicate an overall improvement in the nutrition status of children in households where wooden lockable fish farming is practiced. However, the middle upper arm circumference results point out that 3.5% of the children had a measurement of less than 11.5 an indication of severe malnutrition while 42.5% had measurement of 11.5 - 12.4cm an indication of moderate malnutrition and 54.1% with a middle upper arm circumference of between 12.5- 13.5 an indication of at risk of malnutrition.

V. CONCLUSION

Urbanization usually modifies dietary patterns in terms of quantity and quality but peri-urban fish farming has shown to have a positive impact on the nutrition security status of the households. A review on contribution of fish on food and nutrition security in East Africa established that the percentage share of fish in animal protein intake in Burundi, Rwanda, Tanzania and Uganda was more than the world average, signifying the crucial role that fish plays in food and nutrition security, in a region characterized by a low consumption of animal proteins, Obiero et al, (2019) [8]. This could be conclusive with this study because besides neighboring Uganda, the use of wooden lockable fish ponds has improved food and nutrition security of households in peri-urban Busia. Food security and nutrition programs should emphasize on the value of fish on improving diet quality and nutrition status of the population at both local and national levels.

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