**Project Title:** Development of novel nutrient-rich fish products for food and nutritional security

**Annual Report Period Covered:** July 2020 – Dec 2021

**KCSAP livestock Applied**
- **Value chain:** Aquaculture
- **Duration:** 18 Months
- **Start Date:** Oct 2020

**Lead Institution:** Kenya Marine and Fisheries Research Institute

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**Background**
Development of nutrient rich ingredients from fish contributes to food and nutrition security by ensuring the nutrient requirements for optimal growth and development especially for pregnant and lactating mothers, and infants as the first 1000 days is the most critical days of their life (Longley et al., 2014; WorldFish, 2017; Gibson et al., 2020). Poor nutrition emanating from chronic malnutrition and micronutrient deficiency in infants in the first 1000 days results in permanent and irreversible effects (Victora et al., 2008) with a cost on health and performance of affected individuals (Grantham-McGregor, 2007). Fish are an important source of essential amino acids, long chain polyunsaturated fatty acids, micronutrients such as vitamins A, B12 and D, and minerals essential for cognitive development of children and for adult health (Golden et al., 2016; FAO, 2018). In addition, fish is recognized for its importance in enhancing the bioavailability of nonheme iron and zinc from plant-based calorie-dense foods such as rice consumed in the same meal (Beveridge et al., 2013).

Increasing awareness of the health benefits of eating fish has resulted in increased demand for fish especially Nile tilapia in Kenya (Githukia et al., 2014). Aquaculture is recognized for its role in supporting one of the Kenyan Government’s “Big Four Agenda” on Food and Nutrition Security (Obiero et al., 2019). However, many Kenyans especially the pregnant, lactating mothers and babies consume lower fish servings than the World Health Organization (WHO) recommended levels which deprives them of the vital nutrients needed for proper growth and development (World Fish, 2017). The aim of this project is to develop nutrient rich fish products that will contribute to food and nutrition security among the pregnant, lactating and children under 2 years old. The nutritional content of the developed products will be assessed and inclusion levels determined to advise policy makers on the outcomes for the purposes of improving fish consumption for better health.

**Objectives**
(i) To develop three novel fish-based nutritious products to address nutrients gaps, and for income generation.
(ii) To assess the nutritional content of the developed fish-based products.
To determine inclusion levels of three developed fish-based nutrients in the diets of women of reproductive age and children under 2 years old.

**Expected Outputs**

**Output 1:** At least three (3) fish-based products developed.

**Output 2:** Nutrient content of the developed fish products determined.

**Output 3:** Inclusion levels of three developed fish-based nutrients determined in the diets of women of reproductive age and children under 2 years old.

**ANNUAL REPORT**

1 **ACHIEVEMENTS**

1. **Objective 1.** To develop three novel fish-based nutritious products to address nutrients gaps, and for income generation.

   **Activity 1.1:** Collection of fish samples and processing of the fish sourced from both wild and captured fisheries into the fish-based products.

   **Achievement 1.1:** (Briefly give the achievements against what was planned)


   **Activity 1.2. Determine the nutritional composition of the three fish products**

   The nutritional composition of the three products will be determined during laboratory to determine the inclusion levels of each product for different consumer groups. In children, inclusion levels are dependent on age while in pregnant and lactating women it is based on weight and age.

   The inclusion levels will include energy (kcal/100g), proteins (g/100 g), Fatty acids i.e. Omega-3, and Omega-6 (g/100 g) fats, (g/100 g), ion (mg/100g), zinc (mg/100g), calcium (mg/100g) in each fish-based product. It is expected that the nutritional content of the fish products will differ depending on the species included and the parts of the fish used.

   **Achievement 1.2**

   The achievement will be realized once the sample results are out.

2. **Objective 2:** To assess the nutritional content of the developed fish-based products.

   **Activity 2.1:** Laboratory analysis of nutritional composition of fish-based products

   **Achievement 2.1:** Not yet achieved

3. **Objective 3**

   To determine inclusion levels of three developed fish-based nutrients in the diets of women of reproductive age and children under 2 years old.

   **Activity 3.1** Inclusion levels of fish based diets in diets determined.

   **Activity 3.2** Prepare fish based products using the inclusion levels.

   **Activity 3.3** Determine the shelf life and nutritive quality of the prepared fish based products.
Achievement 3.1: Not yet achieved

II Other achievements: None

III Constraints and how they were overcome: Delays in the procurement process for the sample analysis - the samples have since been sent for analysis.

IV Summary of funds received, accounted for and balance

<table>
<thead>
<tr>
<th>Project Amount (KES)</th>
<th>Amount Received (KES)</th>
<th>Amount accounted for (KES)</th>
<th>Balance (KES)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4,999,147</td>
<td>3,051,212</td>
<td>2,589,195</td>
<td>462,017</td>
</tr>
</tbody>
</table>

IV Way Forward
Laboratory analysis of nutritional composition of fish-based products and determination of inclusion levels.