

KENYA MARINE AND FISHERIES RESEARCH INSTITUTE

POLICY BRIEF

KMF/GOK/2026/AOUA/C2.1 (ii)

*Enhancing Nutrition and Food Security through
Improved Nile Tilapia Production in Lake Victoria, Kenya*



February 2026

Both wild and cage-cultured tilapia provide valuable nutrition, wild fish deliver significantly higher levels of essential omega-3 fatty acids (EPA and DHA)

AUTHORS

Safina Musa

KMFRI Headquarters

P.O. Box 81651 – 80100, Mombasa

Tel: +254 (041475151/4)

Email: kmfridirector@gmail.com

KMFRI Sangoro Station

P.O. Box 136 – 40111, Pap-Onditi

Tel: +254 (0) 723 710487520

Email: kmfrisangoro@gmail.com

Executive Summary

Nile tilapia (*Oreochromis niloticus*) is a critical source of protein and essential nutrients for millions of people in Kenya and across Sub-Saharan Africa. As cage aquaculture expands rapidly in Lake Victoria to meet rising fish demand, understanding the nutritional implications of farmed versus wild fish is essential for guiding policy and aquaculture development.

This study demonstrates that while both wild and cage-cultured tilapia provide valuable nutrition, wild fish deliver significantly higher levels of essential omega-3 fatty acids (EPA and DHA), selenium, and certain amino acids critical for human health. These nutrients are essential for brain development, immune function, and cardiovascular health, particularly for vulnerable populations such as pregnant women, infants, and low-income households.

Feed composition and aquaculture management practices were identified as the primary determinants of nutritional quality in farmed tilapia. Strategic improvements in feed formulation and aquaculture practices can significantly enhance the nutritional value of farmed fish while maintaining production efficiency.

Policy interventions that promote nutrition-sensitive aquaculture and sustainable fisheries management can improve food and nutrition security while supporting economic growth.

Policy Context

Fish contributes more than 20% of animal protein intake for many populations in East Africa and plays a vital role in addressing micronutrient deficiencies. With wild fisheries under increasing pressure, aquaculture—particularly cage culture in Lake Victoria—has become an essential component of Kenya's food system.

However, rapid aquaculture expansion without adequate nutritional considerations risks reducing the quality of fish available to consumers. Ensuring that aquaculture contributes not only to food quantity but also to nutritional quality is essential for achieving national food security and public health goals.

Key Scientific Findings

1. Wild Tilapia Provides Superior Omega-3 Fatty Acid Nutrition

Wild tilapia contributed substantially higher levels of omega-3 fatty acids, particularly DHA and EPA, compared to cage-cultured fish.

Key findings include:

- Wild fish provided up to **282% of adult daily omega-3 requirements** per 100 g serving
- Cage-cultured fish provided only **60–64% of adult requirements**
- For pregnant and lactating women, wild fish provided up to **70% of daily requirements**, compared to only **15% from farmed fish**

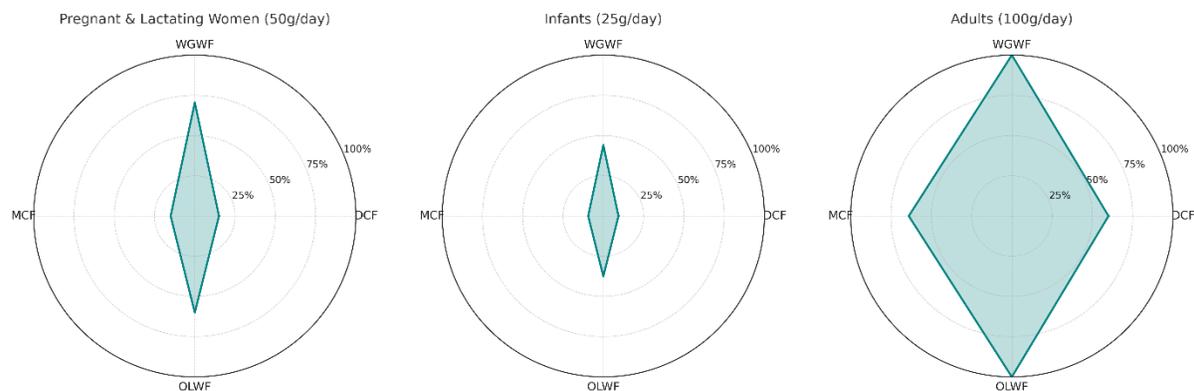


Fig. 1. Potential contribution to RDI^a of both docosahexaenoic acid (DHA) and eicosapentaenoic acid (EPA) from a standard serving^b of fish for PLW^c infants (7–23 months). And adults (>18 years)

These differences are primarily due to natural diets rich in algae and aquatic organisms, which contain omega-3 fatty acids absent in plant-based aquaculture feeds.

Omega-3 fatty acids are critical for:

- Brain development in infants
- Maternal and fetal health
- Cardiovascular health
- Cognitive function

2. Wild Fish Provide Higher Levels of Essential Micronutrients

Wild tilapia showed significantly higher contributions to essential micronutrient intake:

Per 100 g serving, wild fish provided:

- Up to **80% of selenium daily requirements**
- Up to **18% of magnesium requirements**

- Up to **15% of phosphorus requirements**
- Up to **14% of zinc requirements**

These nutrients are essential for immune function, growth, and antioxidant protection.

Farmed fish showed lower mineral contributions due to reduced bioavailability from plant-based feeds and absence of natural dietary sources.

3. Feed Composition is the Primary Determinant of Farmed Fish Nutritional Quality

Farmed fish showed:

- Higher saturated fat levels
- Lower omega-3 fatty acid content
- Higher omega-6 to omega-3 ratios

These patterns reflect heavy reliance on plant-based feeds lacking marine-derived nutrients.

Feed composition directly influences:

- Fatty acid profiles
- Amino acid composition
- Micronutrient content
- Overall nutritional value

Improving feed formulation offers a clear opportunity to enhance farmed fish nutritional quality.

4. Both Wild and Farmed Tilapia Remain Valuable Protein Sources

Despite nutritional differences, both wild and farmed tilapia:

- Provide high-quality protein
- Meet or exceed recommended amino acid requirements
- Support food and nutrition security

Farmed tilapia remains an essential component of national food supply due to its scalability and accessibility.

Policy Implications

Without targeted interventions, continued expansion of cage aquaculture may reduce the nutritional quality of fish available to consumers.

However, aquaculture also presents a major opportunity to improve food security if production systems are optimized to enhance nutritional value.

Policy action is needed to ensure aquaculture development supports both food quantity and nutritional quality.

Policy Recommendations

1. Improve Aquaculture Feed Formulation

Policymakers should promote the use of nutritionally enhanced feeds by:

- Increasing inclusion of omega-3 sources such as algae-based oils
- Improving amino acid balance, particularly methionine
- Supporting research into locally available nutrient-rich feed ingredients
- Establishing nutritional standards for aquaculture feeds

2. Integrate Nutrition Objectives into Aquaculture Policy

National aquaculture strategies should explicitly include nutrition objectives by:

- Prioritizing production systems that enhance nutritional quality
- Supporting nutrition-sensitive aquaculture development
- Incorporating fish into national nutrition programs

3. Protect Wild Fisheries as Critical Nutritional Resources

Wild fisheries remain essential sources of highly nutritious fish.

Policies should strengthen:

- Sustainable fisheries management
- Habitat protection
- Fishing effort regulation
- Conservation of key fish habitats

4. Improve Aquaculture Site Selection and Environmental Management

Proper site selection and environmental management can improve farmed fish quality by:

- Reducing eutrophication
- Improving water quality
- Supporting healthier fish growth

5. Promote Tilapia Consumption in Public Health Programs

Tilapia should be integrated into:

- School feeding programs
- Maternal and child nutrition programs
- Public nutrition campaigns

Expected Policy Outcomes

Implementation of these recommendations can:

- Improve national nutrition and public health
- Increase nutritional value of farmed fish
- Enhance food security
- Support sustainable aquaculture growth
- Strengthen resilience of food systems

Conclusion

Tilapia plays a critical role in food and nutrition security in Kenya and Sub-Saharan Africa. While wild fish provide superior omega-3 fatty acid and micronutrient levels, aquaculture offers enormous potential to meet growing demand.

By improving feed formulation, protecting wild fisheries, and integrating nutrition into aquaculture policy, policymakers can ensure aquaculture contributes to both food security and improved public health.