



Linking Fish to Food and Nutrition Security: Swot Analysis of Traditional Fish Processing in Nigeria

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Abstract

Globally, there is a growing awareness on the role of fish in the food and nutritional security discourse. In sub-Saharan Africa, post-harvest losses occur predominantly in small-scale fisheries, thus limiting to role of fish in enhancing food security. Women dominate traditional fish processing and are key to reducing post-harvest losses thus deepening availability, affordability and choice of fish products for consumers. However, post-harvest practices are characterized by low efficiencies that undermine efforts to reduce production losses. Therefore, predicated on the need to prioritize a paradigm shift to sustainable supply of safe and improved fish quality in domestic markets, a Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis was conducted to give a 'snapshot' of traditional fish smoking. Findings provided information on the current state of affairs, highlighting the constraints and possible strategies to enhance the role of processed fish in food security and improve livelihood. Based on these, policies and interventions were recommended to re-position traditional fish processing practices with consideration for gender equitable participation.

Keywords: SWOT analysis, strategies, traditional fish processing, Nigeria, gender participation

Introduction

In West Africa, about 80% of the fish is consumed smoked from and the remaining 20% is consumed either as fresh, salted, sun dried or fried (INFOFISH, 2008; Entee, 2015). Under-nutrition is a huge problem and magnitude of undernourished people

in sub-Saharan Africa is only preceded by South Asia (FAO, 2016). Nutritional problems prevail mainly due to shortage and high cost of high-quality animal protein needed for growth and development compared to plant proteins because of their relative cheapness. Nigeria's mass market is highly price - sensitive and demands more low - priced animal products (Fakoya, 2015) and for the masses estimated at 65-70% of the entire population, fish is the commonest and cheapest animal protein, effectively displacing beef as the major animal protein source.

Fish are a good source of animal protein however their role as a source of vitamins and minerals in developing countries is often overlooked (Roos et al., 2007) precisely where they could have the most significant impact. By 2025, Nigeria will require at least 4.32 million metric tonnes (m.t) of fish (FDF, 2008). Meeting the projected total demand will require urgent interventions to fill the void which will continue to widen as the population increases. A serious dilemma to the availability of fish as an affordable source of animal protein is the prevailing fish supply deficit and significant post-harvest losses. Presently, the range of value-added fish products are limited and borne out of the desire to preserve fish against deterioration of fish quality and spoilage. Traditionally, fish processing is the domain task of women in Africa, Nigeria inclusive but is regarded with contempt and excluded largely in the food and nutrition schemes (Akintola & Fakoya, 2017). Therefore, nutritional security is vaguely addressed and women's knowledge is widely ignored by development planners and decision-makers.

Against this background, this paper aims to contribute to literature on the fish to food and nutrition security nexus through exposition on fish smoking, the most dominant traditional fish processing technology. Specific objectives included fish

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supply-demand scenario in Nigeria; contextualizing fish in food and nutritional security debate, description of governance structure in traditional fish processing and a Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis to give a rapid assessment of the internal and external factors affecting traditional fish smoking and key determinants to improve food and nutrition security and livelihood outcomes.

Contextualization of the major global drivers which affect supply, availability and consumption of fish to consumers highlight the poor understanding of natural fluctuations in the productivity of capture fisheries; poor fishery management regimes characterized by absence of an ecosystem – based approach, low level technology of fishing gears, oil pollution, unsustainable fishing practices and water hyacinth invasion. The export-oriented industrial fisheries contributes less than 10% to fish supply while achieving higher growth rates in aquaculture is constrained by its heavy reliance on imported feeds (FMARD, 2016). Also of importance but not adequately addressed are greenhouse gas emissions and climate change, which potentially affect the fisheries, the supply chain management and post-harvest losses.

Trends in fish supply and demand scenario suggest a deficit. Nigeria is the largest fisheries producer in sub-Saharan Africa with an annual output of more than 1 000 061 mt from the small-scale fisheries, industrial fisheries and aquaculture sub-sectors. Domestic fish production is short of demand and is supplemented by 1 038 612 mt fish import (FAO, 2018). Though, it is opined that fish supply could be higher from gross under-estimations of the small-scale fisheries and unreported informal fish trade within the African region (Falaye, 2008).

Post-harvest fish losses occurs along the entire value-chain from harvest to consumption and the losses can be both quantitative and/or qualitative (Bene et al., 2016). In small-scale fisheries, accurate estimation of post-harvest losses is problematic and exceed 30% of the catch (Bene and Heck, 2005; Bolorunduro et al., 2005). Higher prevalence of fish losses occur in the early and middle supply chain stages characterized by less developed fishing operations, poor distribution network and general weak market infrastructure (Bene & Heck, 2005).

Global per capita fish consumption increased to 19.7 kg in 2013 from an average of 16.4 kg in 2005 and

18.9 kg in 2011 (Adeniyi et al., 2012; Kwarazuka, 2010; FAO, 2014) while per capita fish consumption in Africa stagnated and declined particularly in the last decade. Rising populations, changes in food habits, income growth and urbanization will contribute to greater consumption and growing demand for fish in Sub-Saharan Africa (FAO, 2016).

Food and nutritional security are important to the achievement of the post-2015 Sustainable Development Goals. Nutritional insecurity results in malnutrition which can take the form of under-nutrition, over-nutrition, hunger or micronutrient deficiencies (Fanzo, 2012). In Nigeria, plant protein constitutes a larger proportion of average protein intake. Proportions of fish in animal (3.6g per capita/ day) and total proteins (13.3g per capita/ year), respectively are below recommended limits (FAO 2018).

Africa has the highest prevalence of iron deficiency anaemia, folate, vitamin A and zinc deficiencies among pre-school children in the world (Fanzo, 2012; Kwarazuka, 2010). Nigeria's Anthropometric related indicators in pre-school aged children indicated that approximately 25% were underweight in sub-Saharan Africa as compared to other regions of the world (Fanzo, 2012) while in 2013, the prevalence rate was 29 % in Nigeria (Akintola & Fakoya, 2017). In most developing countries, under-nutrition average children is a consequence of direct introduction to regular household diets made of cereal or starchy root crops which are poor in micronutrient density (Tariku et al., 2017) and in intra-household allocation of fish and animal source foods where children are less prioritized (Kwarazuka, 2010; Gordon et al., 2013).

Nutrient –dense fish is well documented as a food-based approach to solve under-nutrition in Asia and Africa (Kwarazuka, 2010). Fish is an excellent source of high quality animal protein and essential fatty acids, especially long-chain polyunsaturated fatty acids (LCPUFA), micronutrients and vitamins (Kwarazuka & Bene, 2011; Beveridge et al, 2013) which even in small quantities can have a significant positive nutritional impact on the traditional, high carbohydrate diets that are characteristic of many African countries and potentially contribute to reducing micronutrient deficiencies (Falaye, 2008; Thilsted et al., 2014).

Traditional fish processing activities include salting/brining, fermentation, sun-drying, frying, boiling, smoking or any combination of these processes

(Abolabga & Nuntah, 2011; Adeyeye & Oyewole, 2016). Smoking is the predominant traditional fish processing method and is usually carried out in different types of ovens or kilns which range from traditional open fire, box, mud, brick, half-drum to full- ovens (Odulate et al., 2012).

Akintola & Fakoya (2017) gave a succinct description of the governance structure and gender relations in traditional fish processing in Nigeria. Fish processors were identified on the basis of the type and scale of operations as producer-processors, processors- sellers, sellers and commission agents or brokers. A sub-group of fish market women or smoker fish mummies constitute large – scale processors who control smoked fish markets and hire poorer women with little bargaining power or are employed by certain exporter (PIND, 2011). Access to fish is subject to power relations along the value-chain and mediated differential access to economic and social capital.

From the SWOT analysis the strengths identified were that smoked fish have wide acceptance for local consumption (Abolabga & Nuntah, 2011; Tonye & Francis, 2014) and are sold to generate income which improves a household's ability to buy other staple foods. Smoking/drying also relatively increases crude protein, crude lipid, crude fiber and ash content of fish and meat products (Adeyeye, 2016) and dried fish provides a concentrated source of micronutrients (Thacher et al., 2015). Fish processing and marketing require low skills and little capital. Consequently, these nodes are source of livelihoods and income to women. Smoking is also used to add value to the fish and smoked fish products command higher prices than fresh fish (PIND, 2011; Odulate et al., 2012) which may be up to six times the price of fresh fish (Chemonics International 2017). The weaknesses include lack of standardization and hygiene in basic operations. Slow, time-consuming and labour –intensive; charring or burning of fish from uncontrolled heat (Ibrahim et al 2011; Egesi, 2016).

ii. Insect infestations, particularly Dermestes beetles (Akinwunmi et al., 2007; Oke et al., 2014; Ajao et al., 2018) and microbiological contamination by Aflatoxigenic fungi (Adeyeye and Oyewole 2015; Adeyeye 2016) are also major issues. Stings, minor cuts, and scrapes and more serious occupational hazards from long, accumulated exposure to fish smoking causing impairment of vision, respiratory

ailments and high risk of cancer and non-cancerous diseases from smoke particles. Lack of basic infrastructure and social amenities, poor capacity building and needs identification because of remote and isolated locations of fishing communities are other weaknesses. There is also poor access to institutional or formal credit sources (Omotoso & Daramola, 2005) and many women are not organized into cooperative societies or are members merely on paper (Ibrahim et al., 2011; Madugu & Edward., 2011; Odebiyi et al., 2013, Tonye & Amiye, 2014; Cliffe & Akinrotimi, 2015).

The opportunities were from the fact the domestic smoked fish demand as estimated to be as large as the fresh fish market (PIND, 2011) and there was also high demand from increasing number of African- Caribbean diaspora especially in the United States and Europe. The low entry barriers, opportunity to set up micro-enterprises and empowerment programs are making fish processing attractive to a large number of women and youths and added. income streams from processing fish and by-products into higher – valued fish products. However, participatory evaluation of technology with end-users can help to improve smoking kiln efficiency overtime.

The threats include the high rate of deforestation from high demand of firewood has grave consequences on the fisheries and livelihoods of fisherfolks (Olorok, 2003; Ikurekong et al., 2009; Ifejika et al., 2012). There are also no set limits or standards for traditional fish smoking, sun –drying or salting in the inland fisheries (Fish Quality Assurance) Regulations (1995) and low adoption rates of improved kilns owing to their high cost and complexity of construction (Odediran & Ojebiyi, 2017; Akintola & Fakoya, 2017).

To improve the traditional smoked product operational considerations like Pre-drying and temperature control must be ensured to prevent fragmentation, case hardening and PAHs accumulation. Tray ovens and hanging fish from metal rods for easier arrangement will be able to ensure increased processing capacity and higher fuel efficiency. Low-cost, washable packaging materials of adequate strength can be used to prevent contamination. Socio-economic considerations would be include empowerment schemes such as zero-interest credit, loans and microfinance, savings, insurance and other services for the workers. Capacity- building

in health, hygiene measures, environment record keeping, workings of co-operatives and marketing strategies with focus on gender transformative and social – equitable approaches. Through participatory action research (PAR) and value - chain analysis (VCA), women can be included in fisheries governance and manufacture of culturally appropriate processing technology. Basic infrastructures and social amenities must be provided to improve livelihoods and alleviate poverty in fishing communities. Establishing guidelines and monitoring on sanitary and hygiene standards in fish processing and storage is very essential in Nigeria. Development of higher value –added fish products such as *kilishi* a spiced, sun-dried fish snack developed locally can be propagated.

Environmental considerations like Establishing participatory zoning to curb tree logging and enhance carbon stocks, establishing community woodlots for supply of firewood and encouraging use of affordable renewable energy sources or new technologies that fit into the available labor supply is also essential.

Traditional fish processing can be a source of income to poor fishers in Nigeria, if the opportunities are exploited building to be strength like wide acceptance of smoked fish and high demand. Streamlining and improving processing technology is also essential.

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