

Making fish smoking safe and sustainable

A simple yet efficient new technique to smoke fish prototyped recently holds great promise for effective and sustainable postharvest fish processing

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In a bid to revolutionize fish processing methods and promote sustainability, a pilot study of a prototype fish drum oven was recently carried out. The study used innovative technology to address the limitations of traditional fish smoking techniques while ensuring the preservation of nutritional value and product quality. Based on Participatory Approach Research (PAR), the study was part of the Project ID 57 of the Gendered Design in Science, Technology, Engineering, Arts and Mathematics (STEAM) programme being carried out by Carleton University in Ottawa, Canada in Low Medium Income Countries (LMIC) with support from the International Development Research Centre, Canada.

Traditional fish smoking methods have long been employed in Lagos and other coastal regions in Africa, but they often come with significant challenges. Traditional ovens, dryers or kilns do not only consume high volumes of firewood but also make work harder and more time-consuming, produce suboptimal product quality and are associated with many health hazards. Despite the issues that characterize traditional or local fish smoking technologies, most women smokers in the small-scale fisheries value chains are still culturally bound to these outdated techniques. The biases against the uptake, replication and scaling up of modern or improved fish smoking technology can also be traced to lack of innovation in design, construction, and technology transfer among researchers, technologists, and end users.

The prototype drum oven used in the study was a gender-responsive intervention, and although similar to local drum oven technology, its design features are modern and appealing. The fish drum oven is a specially designed apparatus that utilizes a combination of heat and smoke to process fish. It consists of a drum-shaped chamber and stainless-steel trays, with an inbuilt temperature gauge and a smoke control mechanism in the form of an oil collector which acts as a screen to prevent smoke exposure to the

fish being dried, and, at the same time, prevents fat dripping into the fuel.

The prototype was developed to promote the use of carbonized biomass briquette (CBB), a renewable, biodegradable, smokeless energy source that can reduce carbon footprints and mitigate deforestation by offering an eco-friendly substitute for wood-based fuels, such as charcoal and firewood and coal. The prototype thus contributes to the green economy in fishing communities, farming communities as well as urban communities. Since CBB is made from organic materials, when used in fish smoking, it produces no flames and little or no smoke or soot. This also means that the emission of noxious chemicals such as Polycyclic Aromatic Hydrocarbons (PAHs), dangerous for the health of women smokers and consumers of smoked fish, are substantially reduced.

The construction materials, which are hygienic and food-grade, as well as fabrication skills used to build the oven are locally sourced and materials. Its circular design ensures that there are no dead zones and that the heat distribution within the drying chamber is uniform. The even cooking ensures consistent texture, appearance, and taste across all samples. The major components of the oven are detachable, and the wheels at the base make the oven portable and ideal for use in any location, including social gatherings or events. The oven may be used to smoke and dry not just fish but many other types of food, such as poultry, beef, and mutton. When used in combination with CBB, it can be safely used within the home during inclement weather.

Operable by a single person alone, the oven does not require special skills or technical experience to load the raw fish and offload the smoked product. Although the oven is manually operated, its use is neither physically exhausting nor time-consuming. Since monitoring the process is no longer required, women fish processors can enjoy more free time to engage in other activities. The compact size of the



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The positive outcomes of the pilot research suggest that the prototype fish drum oven holds great potential for the small-scale or artisanal fishing communities where traditional drum ovens are widely used. The adoption of

this technology could enhance the quality of smoked fish products, increase profitability for fish smokers, and contribute to sustainable postharvest fisheries. However, further research and investments are needed to refine the technology, optimize production processes, and address any challenges that may arise during scale-up. ❏