



**IUFoST**

Strengthening Global Food Science  
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*The Global Focus of Food Science Excellence*



# **Investing in Capacities and Competencies to Upgrade Performance of the AgriFood Production Sector in Africa**

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In the developed economies of the world, there is a vast array of diverse safe, nutritious foods that is made possible by developments in food processing and preservation technologies.

Regrettably, advances in food processing and preservation have not been advanced in Africa to impact food availability, stability, safety and nutrition as in the developed world. This underscores the need for building capacities and competencies in food processing and preservation in Africa.

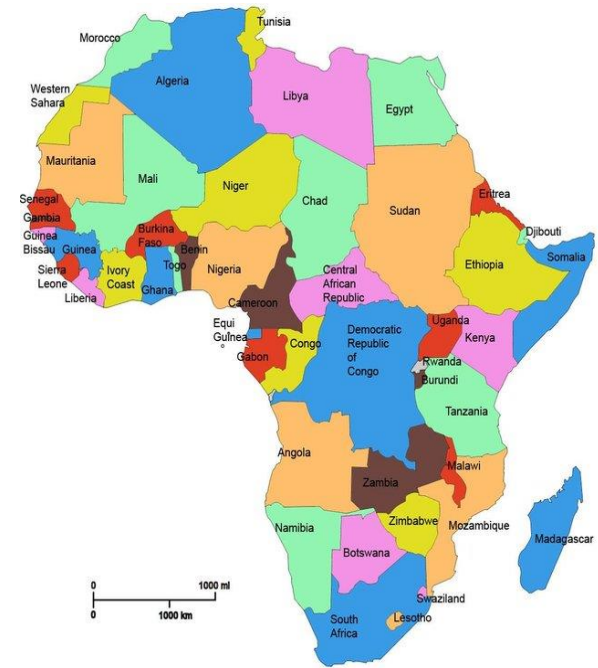


Sub-Saharan Africa bears the highest burden of food and nutrition insecurity and food-borne illnesses due to unsafe foods. Protein-energy malnutrition in children and micronutrient deficiencies (the hidden hunger), especially vitamin A, iodine, iron and zinc, are widespread with devastating consequences on productivity, intellectual development, and maternal and infant health. Some SSA countries such as Niger, Nigeria & Chad are among those with the highest under-5 mortality in the world (>100 per 1000). The annual economic loss from deaths due to food-borne diseases in SSA is estimated at about \$39 billion.





- Agricultural production is very inefficient in sub-Saharan Africa (SSA) and productivity (crop yield per hectare and output per unit animal) is very low compared to developed countries
- Small, resource-poor farmers account for the bulk of food production in many parts of SSA
- African countries rely heavily on food importation to feed their people. Sub-Saharan Africa spent \$43 billion on food importation in 2019 with Nigeria, Angola, the Democratic Republic of Congo and Somalia accounting for most of SSA's food imports (Fox & Jayne, 2020).



Fox, L., & Jayne, T. S. (2020). Unpacking the misconceptions of Africa's food imports.  
<https://www.brookings.edu>.

## Africa's Vast Dietary Diversity

Made up of 54 countries with a total population of 1.46 billion, Africa, the second largest continent in the world, has the largest number of countries, with each country made up of a large number of tribes and ethnic groups. **There is a vast dietary diversity in the different parts of Africa and failure to develop capacities and competencies to upgrade African traditional food processing technologies and traditional foods as has been done in India, Japan, South Korea etc. is responsible for Africa's continued dependence on food importation to feed the people.**



# **African Traditional Food Processing: An Art**

African traditional food processing techniques are an art. They are useful skills acquired empirically, based on observation and experience over centuries, rather than theory, and passed on from parent to child over generations. Unfortunately, this vital body of indigenous knowledge is often undervalued. Indeed, a considerable part of this indigenous knowledge has been lost due to lack of documentation.



Roasting in traditional processing of cassava to qari

## Scientific Understanding of African Traditional Food Processing

Unlike electronics, computers, digital technology and modern and emerging food processing technologies such as canning, high pressure processing, pulsed electric fields, ultrasound and 3-D printing, **African traditional food processing techniques far preceded any scientific understanding of their inherent nature, strength and weaknesses.** It is just in the last few decades that some understanding of the science behind some of Africa's traditional food processing techniques such as detoxification of cassava in *gari* processing, lactic acid fermentation of a variety of African fermented foods and beverages, and coagulation of milk in West African cheese-making have emerged through research.





# Weaknesses of African Traditional Food Processing Technologies

- Characterized by labour-intensive, time-consuming, manual operations with limited capacity
- Still largely carried out in the home and the informal sector
- Lack of government regulation
- Invariably, the quality of the products are poor and require substantial improvements
- Women are largely involved in traditional food processing, subjecting them to considerable drudgery and, in some cases, exposing them to occupational hazards
- IUFoST 2010 Cape Town Declaration calls for “adaptation and improvement of traditional foods and processes, while respecting the traditional, ethical, cultural and religious aspects involved”
- Reducing the drudgery of traditional food processing through the introduction of simple machines would make life a lot easier for women with attendant benefits for the well-being of the family and the society at large



# Mechanization of Traditional Food Processing

**Traditional gari roasting  
over a wood fire**



**Mechanized roasting of gari using an  
electrically heated garifyer**





**Cassava peeler**



**Cassava grater**



**Hydraulic press**

# Strengthening Industry-Academia Partnership



- Industry-academia partnership is very weak constraining the commercialization of food research findings from African universities and research institutes and minimizing their impacts on the society.
- Strong industry-academia partnership is critical for building capacities and competencies for upgrading the performance of the agrifood production sector in Africa.
- Establishment of modern food pilot plants through public-private partnership will promote the commercialization of food research findings and strengthen agrifood production.

Sections of Cornell Pilot & Dairy Plants Courtesy Prof. Syed Rizvi



# Extrusion Processing for Upgrading Traditional Foods

**Extrusion processing** offers great prospects for upgrading African traditional cereal and legume food products including weaning foods and snacks such as *kokoro*, a maize-based snack that is very popular in South West Nigeria





## Promotion of Small and Medium Food Enterprises

- Small and medium enterprises (SMEs) are important component of the food processing sectors of the economies of the developed countries, particularly in Europe and Japan, both in terms of number of companies and manufacturing value-added. It is instructive that about 90% of the total number of food processing companies in the EU are SMEs underscoring the critical role that small and medium enterprises play in terms of production and employment, even in the most developed economies.
- Rural development and agro-industrialization are closely linked with the promotion of food SMEs that involve lower capital investment and that rely on locally produced raw materials and home-grown, improved traditional technology.

# **Promotion of Small and Medium Food Enterprises (Cont'd)**

Unfortunately, rapid growth and development of food SMEs in Africa are hampered by:

- inadequate electricity supply,
- use of inefficient or inappropriate technologies,
- poor management,
- inadequate working capital,
- limited access to banks and other financial institutions,
- high interest rates and low profit margins, and
- lack of spare parts for equipment maintenance and repair.
- Removing these constraints will promote value addition and the agrifood production sector in Africa.

**Food safety has to do with reducing the risks that food systems carry to nutrition and health by ensuring safe, wholesome food supply through control of **food-borne diseases**.**

### **Major Food Safety Concerns in SSA**

- Food-borne diseases due to **bacteria** (*Campylobacter*, *E. Coli*, *Salmonella*, *Staphylococcus*, *Listeria monocytogenes*, etc), **viruses** (norovirus, hepatitis A) and **parasites** (*T. solium*, *Ascaris*, *Trichinella*, intestinal flukes)
- Zoonotic infections (**anthrax**, **lassa fever**, **ebola**, **covid-19**)
- Mycotoxin contamination (**aflatoxin**, **citrinin**, **ochratoxin**, **fumonisin**, **trichothecenes**, etc)
- Naturally-occurring toxicants (e.g. **cyanide** in cassava)
- Indiscriminate use of agro-chemicals
- Exposure to pesticide residues
- Antimicrobial resistance

# **Investment in Capacities and Competences in Food Safety**

**Investment in capacities and competencies in food safety is particularly important because of the adverse consequences of unsafe foods:**

- **No food security without food safety**
- **Poor health and nutrition; increase in morbidity and mortality**
- **Aggravation of poverty- SDGs 1, 2 & 3 (no poverty, zero hunger, good health & well-being)**
- **Lack of access to export markets that are subject to international regulatory requirements of the World Trade Organization (WTO) etc**
- **Adverse effects on the hospitality & tourism industry that can be a major source of foreign exchange for African countries.**



# WHO Estimates of the Global Burden of Foodborne Diseases (2007-2015)

- This extensive study looked at 31 global foodborne hazards that caused **600 million** foodborne illnesses and **420,000 deaths** in 2010
- **Highest burden of foodborne diseases per population observed were in Africa followed by South-East Asia and the Eastern Mediterranean**

## Need for Regulation

- Regulation is crucial to ensuring a safe and sustainable food supply, protecting consumers from being misled, and promoting domestic and international trade by reducing uncertainty and commercial risks.
- Good science is critical to regulatory decision making and investing in science will provide solutions to the public health threats posed by globalization of food supply.
- Lack of regulations that cover the informal food sector and poor capacity to enforce regulations adversely affect food safety in most African countries.
- Standards and regulations for traditional foods have not been developed in most African countries.
- There are guidelines developed by the Codex Regional Committee for Africa for preventing food hazards and protecting consumers from food-borne illnesses.

# **Food Safety Curricula Benchmarking in Higher Education**

In addition to the core Food Science and Technology courses in:

- Food Microbiology
- Food Hygiene and Sanitation
- Food Chemistry
- Food Analysis
- Food Standards and Quality Management
- Food Processing
- Sensory Science and Consumer Evaluation

## **Food Safety Curricula Benchmarking in Higher Education (cont'd)**

Curricula should include specialty courses in:

- Food Hazards and Hazards Analysis
- Food Safety Management System
- Food Fraud
- Food Laws and Regulation
- Food Certification
- Food Traceability



# Traceability

- Traceability has become an important feature of the global food supply chain with the growing food safety concerns and the globalization of food production and distribution
- Traceability helps to minimize the production and distribution of poor quality and unsafe foods
- Traceability is a tool to comply with legislation and to meet food safety and quality requirements of international trade in a transparent manner within food chains and increase consumer confidence

## **Traceability Challenges for SSA**

- Small farmers that account for the bulk of food production in SSA who want access to international markets lack the necessary resources to trace their products from the farm gate to the market
- This underscores the need for small, resource-poor farmers in SSA to be organized into cooperatives to be able to adopt new technological innovations including the use of ICT
- Regrettably, the use of ICT in agriculture in SSA is constrained by poor awareness of the impact that ICT can make, and the lack of the requisite software and technological infrastructure



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