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The Global Focus of Food Science Excellence



Mobilizing Food Science in Support of Food Regulatory Development 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. Weak regulatory institutions are a major constraint. This underscores the need for mobilizing Food Science in support of food regulatory development in Africa.



The Nature and Magnitude of the Problem

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.



Food safety has to do with reducing the risks that food systems carry to nutrition and health by ensuring safe, wholesome food supply from farm to table 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 etc**)
- Mycotoxin contamination (**aflatoxin, citrinin, ochratoxin, fumonisins, trichothecenes**, etc)
- Naturally-occurring toxicants (e.g. **cyanide** in cassava)
- Indiscriminate use of agro-chemicals
- Exposure to pesticide residues
- Heavy metal contamination
- Antimicrobial resistance

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

- 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 about 1.5 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.**



Strengthening Food Regulatory Development in Africa

- A robust education system and building competencies of food safety practitioners;
- Curriculum development, international accreditation and benchmarking of food safety programmes in our universities and other tertiary education institutions to ensure that training and skill acquisition in Africa are comparable to developed countries;
- Investing in innovation, food research and development, and food regulation;
- Adoption of good agricultural practices, good hygienic practices, good manufacturing processes, and Hazard Analysis Critical Control Points (HACCP);
- Institution of food safety risk assessment, science-based safety standards and quality assurance;
- Government regulatory agencies in African countries should be strengthened and empowered to develop and enforce food safety regulations and quality standards for all foods.

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.

Investment in Capacities and Competencies 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**
- **Adverse effects on the hospitality & tourism industry that can be a major source of foreign exchange for African countries.**

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 digitalization and 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

Africa's Abysmally Poor Investment in Research and Development (% GDP) World Bank Group 2025

Country	R & D Expenditure (% of GDP)
Mauritania	0.01
Angola	0.03
Cote D'Ivoire	0.07
Ethiopia	0.27
Nigeria	0.28
Ghana	0.38
Algeria	0.44
South Africa	0.61
Egypt	1.02
Germany	3.15
United States	3.45
Korea Republic	4.94
Israel	6.35

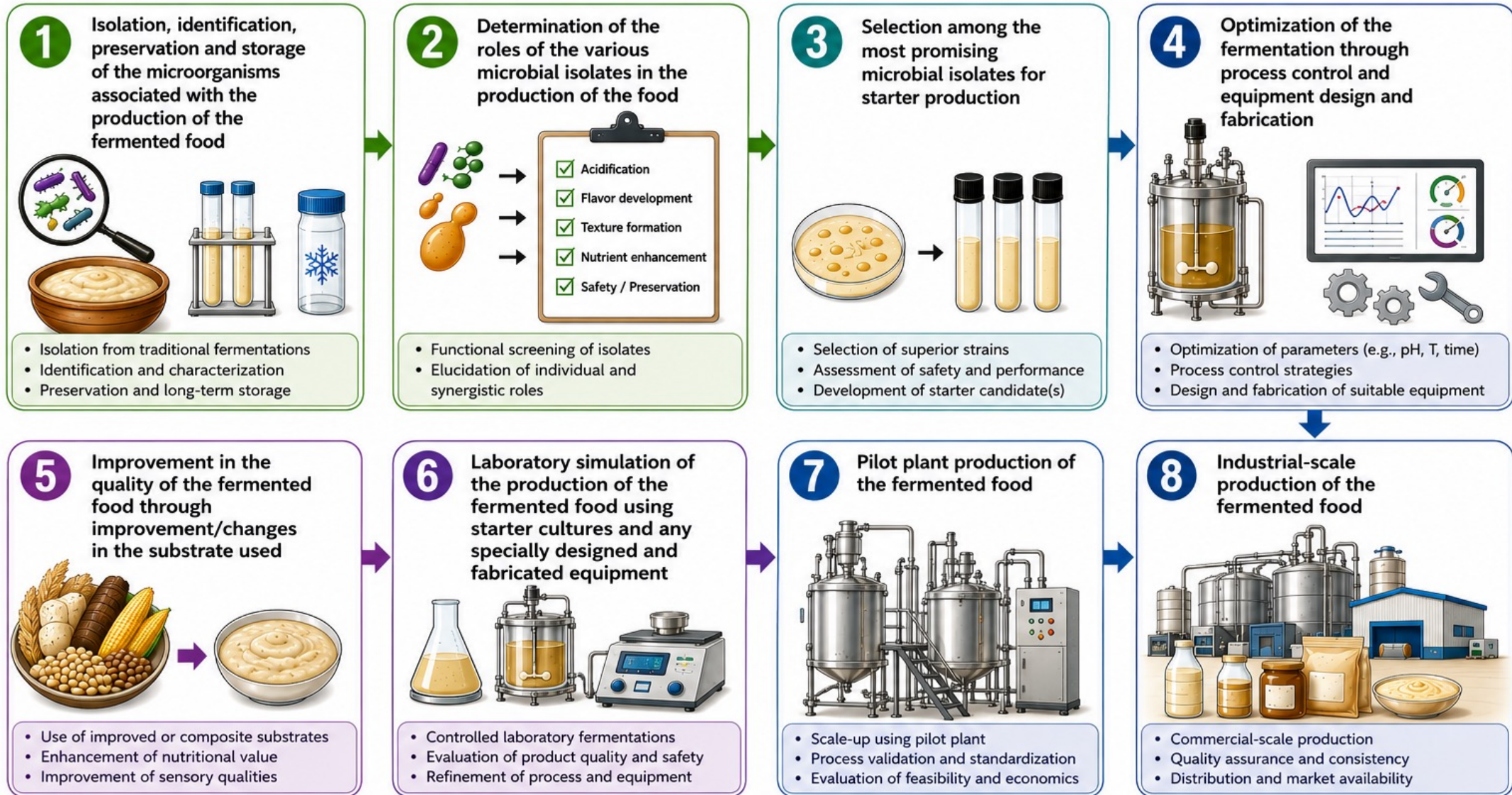
Re-developing African Traditional Foods

- The main challenges of African traditional foods have to do with engineering and technology, food safety and quality assurance, and marketing.
- The future of African traditional foods in global food systems lies in re-developing African traditional foods for improved quality, safety and industrial production. Critical components are:
- Innovation, research and development including:
- Mechanization of the manual operations;
- Adoption of appropriate modern food processing technologies such as extrusion processing, especially for cereal-and legume-based products, when cooking or gelation, and shaping are required;
- Adoption of efficient, environmentally sustainable, modern packaging systems.

Selected Traditional Fermented Foods of SSA

Fermented Food Country/Region	Raw material (Substrate)	Associated Microorganism
Gari (Nigeria)	Cassava pulp	<i>Leuconostoc mesenteroides</i>
Fufu (West & Central Africa)	Whole cassava roots	<i>Lactobacillus plantarum</i>
Ogi (West Africa)	Maize, sorghum, millet	<i>Lactobacillus fermentum</i>
Injera (Ethiopia)	Teff	<i>Pichia fermentans</i>
Iru/dawadawa (West & Central Africa)	African locust bean, soybean	<i>Bacillus licheniformis</i>
Burukutu/pito/otika/dolo (West Africa)	Sorghum, millet, maize	<i>Saccharomyces cerevisiae</i>
Obushera (Uganda)	Sorghum, millet	<i>Lactobacillus fermentum</i>
Mursik (Kenya)	Milk	<i>Lactobacillus kefir</i>
Lanhoun (Benin)	Fish	<i>Bacillus licheniformis</i>

THE EIGHT STAGES IN RE-DEVELOPING AFRICAN TRADITIONAL FERMENTED FOODS



SCIENCE



TRADITION



INNOVATION



QUALITY



SUSTAINABILITY

Harnessing Africa's microbial heritage and modern technology to deliver safe, nutritious and marketable traditional fermented foods.

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



Aworh, O.C. Re-developing African traditional foods for industrial production, improved quality and safety. *npj Sci Food* 10, 165 (2026). <https://doi.org/10.1038/s41538-026-00788-6>



— • RE-DEVELOPING • —

AFRICAN TRADITIONAL FOODS

for Industrial Production,
Improved Quality and Safety

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 Starter cultures for
controlled fermentations

 Food safety
and risk assessment

 Standards and regulations
for food packaging

 Appropriate technologies
and innovation

Innovation • Research • Development • Safety • Quality • Sustainability





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Despite a great diversity of lesser-known indigenous crops, wild food plants, and traditional foods with unique nutritional and nutraceutical properties that are part of the continent's rich biodiversity and cultural heritage, Africa remains the most food insecure continent where poverty, hunger and malnutrition are widespread. New initiatives and approaches are required in addressing the challenges of food and nutrition insecurity in Africa. Re-developing African traditional foods through innovation, research and development, and the institution of food safety risk assessment and science-based safety standards and quality assurance will promote food and nutrition security, food safety, and wellness in Africa.

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