Biotechnology and Novel Foods for Improved Nutrition in LMIC contexts

Atul Upadhyay
President
Nepal Food Scientists and Technologists Association
Introduction

• **Biotechnology** refers to the use of living organisms or their products to modify human health and the human environment.

• **Novel foods** include those produced through new methods like genetic modification, biofortification, and fermentation technology.

• **Importance in LMIC contexts:** These innovations are crucial for addressing nutritional deficiencies and ensuring food security in regions facing high levels of malnutrition and food loss.
Promising Technologies and Innovations

- Biocontrol Agents: Aflasafe in Africa

*Bandyopadhyay et al, 2016*
Promising Technologies and Innovations

- Ag Component
- Demand creation; BCC
- Market component (Branding)

• Biofortification: Orange-fleshed sweet potato

Pic Source: The Gaurdian

Hotz Christine et al., 2012
Novel Foods

• Insect farming: Black Soldier Fly

Pic Source: Business Ideas English

Tanga et al., 2021

THE CONTRIBUTION OF INSECTS TO FOOD SECURITY, LIVELIHOODS AND THE ENVIRONMENT

- Mass-production technologies
- Food & Feed safety
- Legislation
- Consumer acceptance & education
Novel Foods

- Microalgae: Spirulina

High protein content: 460–630 g kg⁻¹, dry matter basis

Matondo et al., 2016

Pic Source: Moe O Thwin
Challenges and Barriers

- **Regulatory Hurdles**: Regulatory frameworks vary widely across regions, creating barriers to approval and adoption.
- **Infrastructure Deficiencies**: Many LMICs lack the necessary infrastructure for cold chain logistics, processing facilities, and storage.
- **Public Perception and Acceptance**: There is often skepticism and cultural resistance towards genetically modified and novel foods.
- **Economic Constraints**: High initial costs of technology implementation and lack of financial incentives pose significant barriers for small-scale farmers and businesses.
Stakeholder Collaboration

1. **Public-Private Partnerships**: Partnerships can pool resources, expertise, and funding to drive biotechnology initiatives.

2. **Community Engagement**: Educating and involving local communities is essential to building trust and acceptance of new technologies.

3. **Capacity Building**: Investing in training programs for farmers, processors, and distributors can enhance their ability to implement and maintain new technologies.
Research and Development Needs

- **Enhanced Crop Varieties**: Developing genetically modified crops with superior storage and nutritional qualities can ensure stable food production in changing climate conditions.

- **Advanced Preservation Techniques**: Cost-effective and sustainable preservation methods, such as low-cost solar dryers, can extend the shelf life of perishable foods and reduce spoilage.

- **Consumer Behavior Studies**: Understanding consumer attitudes towards genetically modified and novel foods is essential for developing strategies to increase acceptance.

- **Integrated Systems Approach**: Developing models that integrate various technologies and practices to address FLW holistically can maximize the impact.
# Conclusion

**Potential of Biotechnology and Novel Foods:**
- Biotechnology and novel foods offer significant potential to improve nutrition and reduce food loss and waste in Low- and Middle-Income Countries (LMICs).

**Key Strategies for Success:**
- **Addressing Challenges and Barriers:**
  - Overcoming regulatory and public acceptance hurdles.
  - Ensuring ethical considerations are met.
- **Leveraging Collaborations:**
  - Forming partnerships between governments, private sector, NGOs, and research institutions.
  - Sharing knowledge and resources to foster innovation and implementation.
- **Focusing on Targeted Research and Development:**
  - Prioritizing research that addresses specific nutritional deficiencies and food security issues in LMICs.
  - Developing scalable and sustainable biotechnological solutions.

**Comprehensive and Inclusive Approach:**
- Involving all stakeholders, including local communities, in the planning and implementation process.
- Ensuring equitable access to the benefits of biotechnological advancements.

**Path Forward:**
- By taking a comprehensive and inclusive approach, stakeholders can drive meaningful progress towards improved nutrition and food security in LMICs.
- Emphasizing the importance of continuous innovation and adaptability to address emerging challenges.
Thank you
Reference

- R Bandyopadhyay et al., 2016, World Mycotoxin J 9 (5), 771-78.
- Hotz Christine et al., 2012, J Nutrition, 142(10), 1871-1880
- Chrysantus M Tanga et al., 2021, Current Opinion in Insect Science, 48, 64-71
- Khuabi Matondo et al., 2016. International Journal of Pediatrics Volume, Article ID 1296414,