

Food Safety in the Banana and Plantain Value Chain

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SUMMARY

Bananas and plantains are vital to food security and economic stability in sub-Saharan Africa, yet their safety and quality are often compromised throughout the value chain from cultivation to consumption. This review examines key food safety challenges and proposes strategies to enhance the safety and sustainability of banana and plantain production and trade. Pathogens such as *Colletotrichum musae*, *Fusarium oxysporum*, and *Aspergillus niger* proliferate under moist postharvest conditions, leading to spoilage and potential mycotoxin contamination. By improving postharvest management, enforcing regulations, and promoting behavioral change, stakeholders can build a more resilient and trustworthy food system. Safe banana and plantain products will not only protect consumers but also open new opportunities for regional and international trade. Implementing regular food safety training, promoting the use of solar-powered cold rooms, strengthening policy enforcement, encouraging public campaigns, and processing plantain into chips, flour, and puree under hygienic conditions can reduce losses and enhance food safety compliance.

INTRODUCTION

Banana and plantain are not just staple foods; they are vital sources of income and nutrition for millions of households in sub-Saharan Africa. However, the safety and quality of these fruits are often compromised along the value chain from cultivation and harvesting to transportation, ripening, and marketing. Understanding and managing food safety hazards in this chain are essential for consumer health, market competitiveness, and sustainable livelihoods. The banana and plantain value chain is complex and highly perishable. Postharvest handling, poor infrastructure, and limited awareness of safety standards contribute to the contamination of fruits by microbes, chemical residues, and spoilage agents. According to Olayemi and Adegbola (2022), over 30% of harvested banana and plantain in West Africa are lost or downgraded due to unsafe handling and improper storage practices.



The major practices that continually affect banana and plantain were excessive pesticide use, coupled with inadequate knowledge and enforcement, results in residue accumulation exceeding Codex standards. The use of calcium carbide and other unsafe chemicals for fruit ripening alters the taste, texture, and nutritional quality, posing health hazards. Exposure to dust, flies, and open-air contaminants in markets increases microbial load. Lack of cold chain systems accelerates deterioration. Income levels, education, access to technology, and market distance influence the quality and safety of bananas and plantains. Traders often prioritize short-term profit over safe handling due to inadequate facilities or awareness. Ensuring food safety in the banana and plantain value chain is not just a health issue it is an economic and developmental necessity.

Key Food Safety Challenges in the Value Chain

- 1. Microbial Contamination:** Pathogens such as *Colletotrichum musae*, *Fusarium oxysporum*, and *Aspergillus niger* thrive in moist postharvest conditions, leading to spoilage and potential mycotoxin contamination (Adebayo & Yusuf, 2023).
- 2. Chemical Residues:** Farmers often use pesticides beyond recommended limits. Inadequate knowledge and lack of enforcement result in residue accumulation exceeding Codex standards (FAO, 2022).
- 3. Artificial Ripening Agents:** The use of calcium carbide and other unsafe chemicals for fruit ripening alters the taste, texture, and nutritional quality, posing health hazards (Ehiowemwenguan & Emoghene, 2021).
- 4. Poor Market and Storage Conditions:** Exposure to dust, flies, and open-air contaminants in markets increases microbial load. Lack of cold chain systems accelerates deterioration (Owolabi & Oke, 2022).

Socioeconomic and Behavioral Factors

The quality and safety of banana and plantain are strongly influenced by socioeconomic determinants such as income levels, education, access to technology, and market distance. Traders often prioritize short-term profit over safe handling due to inadequate facilities or awareness. Alamu and Adesokan (2023) observed that market women commonly store overripe plantains in unsanitary environments, unaware of the microbial risks involved.

Recommendations for Safer Value Chains

- 1. Training and Awareness:** Implement regular food safety training for farmers, traders, and market vendors on hygienic handling, pesticide application, and safe ripening methods.
- 2. Infrastructure and Technology:** Promote the use of solar-powered cold rooms, hermetic storage, and edible coating technologies to extend shelf life safely.
- 3. Policy Enforcement:** Strengthen the monitoring capacity of agencies like NAFDAC and SON to regulate chemical use and market sanitation.
- 4. Consumer Education:** Encourage public campaigns on identifying safely ripened fruits and the dangers of chemically ripened produce.
- 5. Value Addition:** Processing plantain into chips, flour, and puree under hygienic conditions can reduce losses and enhance food safety compliance.

CONCLUSION

Ensuring food safety in the banana and plantain value chain is not just a health issue it is an economic and developmental necessity. By improving postharvest management, enforcing regulations, and promoting behavioral change, stakeholders can build a more resilient and trustworthy food system. Safe banana and plantain products will not only protect consumers but also open new opportunities for regional and international trade.

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