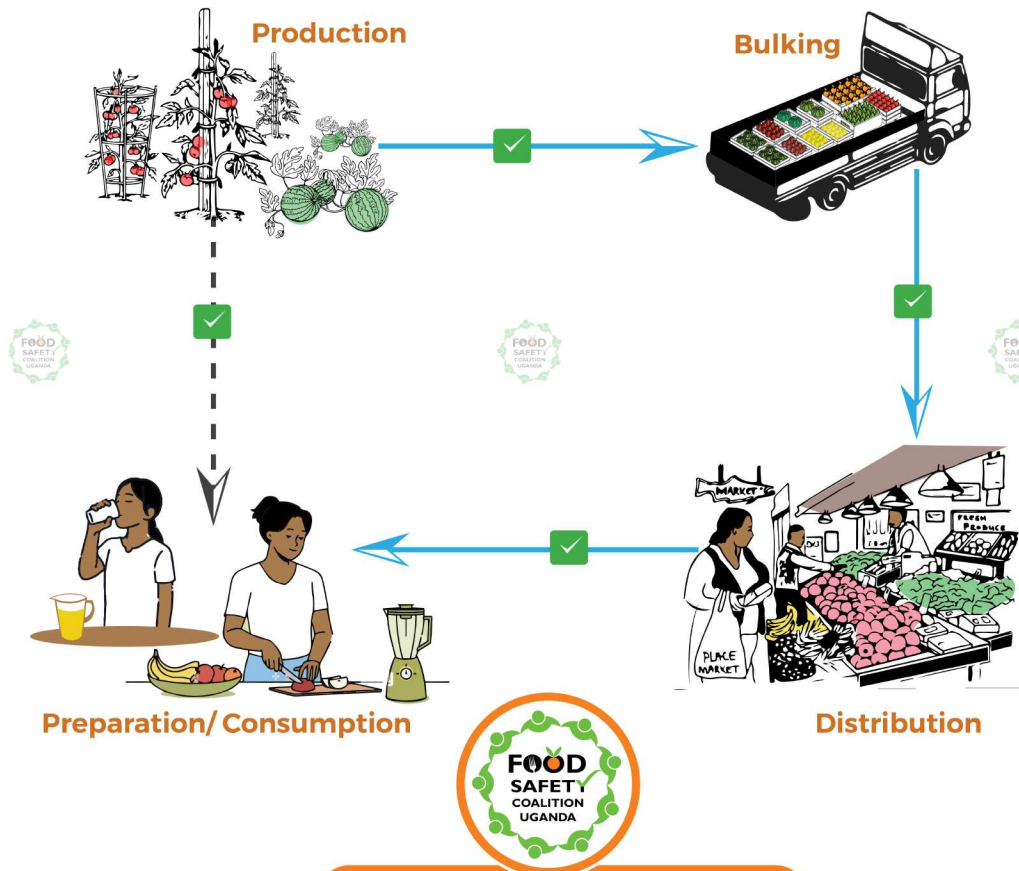




# Fruit and Vegetable Safety

## FRUITS & VEGETABLES VALUE CHAIN



## Acronyms and Abbreviations

DALYs	Disability Adjusted Life Years
DCIC	Department of Crop Inspection and Certification
DCP	Department of Crop Protection
DGAL	Directorate of Government Analytical Laboratory
FoSCU	Food Safety Coalition Uganda
GAP	Good Agricultural Practice
HHP	Highly Hazardous Pesticide
IPM	Integrated Pest Management
MAAIF	Ministry of Agriculture Animal Industry and Fisheries
MDAs	Ministries Departments and Agencies
MoH	Ministry of Health
MTIC	Ministry of Trade Information and Cooperatives
NARIs	National Agricultural Research Institutes
NARO	National Agricultural Research Organisation
UBOS	Uganda Bureau of Statistics
UIRI	Uganda Industrial Research Institute
UNBS	Uganda National Bureau of Standards
USD	United States Dollar
WHO	World Health Organization

The World Health Organization (WHO) recommends increased consumption of fruits and vegetables, with a minimum daily intake of 400 g of fruits and vegetables for a healthy lifestyle (Lee et al., 2019). In Uganda, production of fruits and vegetables is of high cultural significance, for household food security and nutrition (Whitney et al., 2018). They are widely grown across Uganda, for both commercial and subsistence, with their demand and consumption ever increasing. The major fruits include pineapple, mango, watermelon, passion fruit, citrus and avocado, and vegetables include onions, tomatoes, cabbage, pepper, and indigenous vegetables (Dijkxhoorn et al., 2019).

However, irresponsible production and handling practices by different actors compromise the quality and safety of the horticultural produce along nodes of different fruit and vegetable value chains. Unsafe fruits, vegetables, and their products contribute to the burden of food-borne diseases. In 2015, the WHO Food-borne Disease Burden Epidemiology Reference Group (FERG) report estimated that food-borne hazards such as bacteria, viruses, parasites, toxins, and chemicals were responsible for approximately 600 million cases of illnesses, 420,000 deaths and 33 million Disability Adjusted Life Years (DALYs) based on child and adult mortality. These effects are more damaging to the vulnerable groups such as the malnourished, children, pregnant women, and the elderly. They also perpetuate the cycle of poverty because of their debilitating effects on agricultural development, health, and productivity (WHO, 2015).

It thus justifiable regularly synthesize existing information on food safety to inform efforts aimed at curbing unsafe practices, promoting success stories and lessons learned to further develop Uganda's horticulture industry, to increasingly reap the nutritional and economic benefits of its products. It is against this background that Food Safety Coalition Uganda (FoSCU) undertook a desk-review assessment, with the objectives to:

- i. Understand the process and actors involved in Uganda's fruit and vegetable supply chain.
- ii. Synthesize the commonly reported unsafe practices and associated food safety hazards in these value chains.
- iii. Develop practical recommendations towards improving food safety in Uganda's fruit and vegetable value chains.



## Approach

FoSCU undertook a desk review of documented information on Uganda's horticulture subsector, with emphasis on fruits and vegetables. This review was informed by document review checklist, that included but not limited to:

- Scientific research papers
- Review articles
- Local newspaper articles
- Expert opinions
- Research reports
- Intervention reports
- Professional blogs
- Policies (including Strategies and Plans)
- Legislation

## Results

### → Process and Actors

According to Dijkxhoorn et al (2019) Uganda's generic fruit and vegetable value chain involves the following stages/nodes and key actors: production (input suppliers, farmers), bulk marketing (rural assemblers, urban wholesalers, brokers/buying agents, local processors and exporters), retail marketing (rural retailers, roadside kiosks, open air markets, restaurants/hotels, schools, supermarkets), consumption (rural, domestic urban, international).

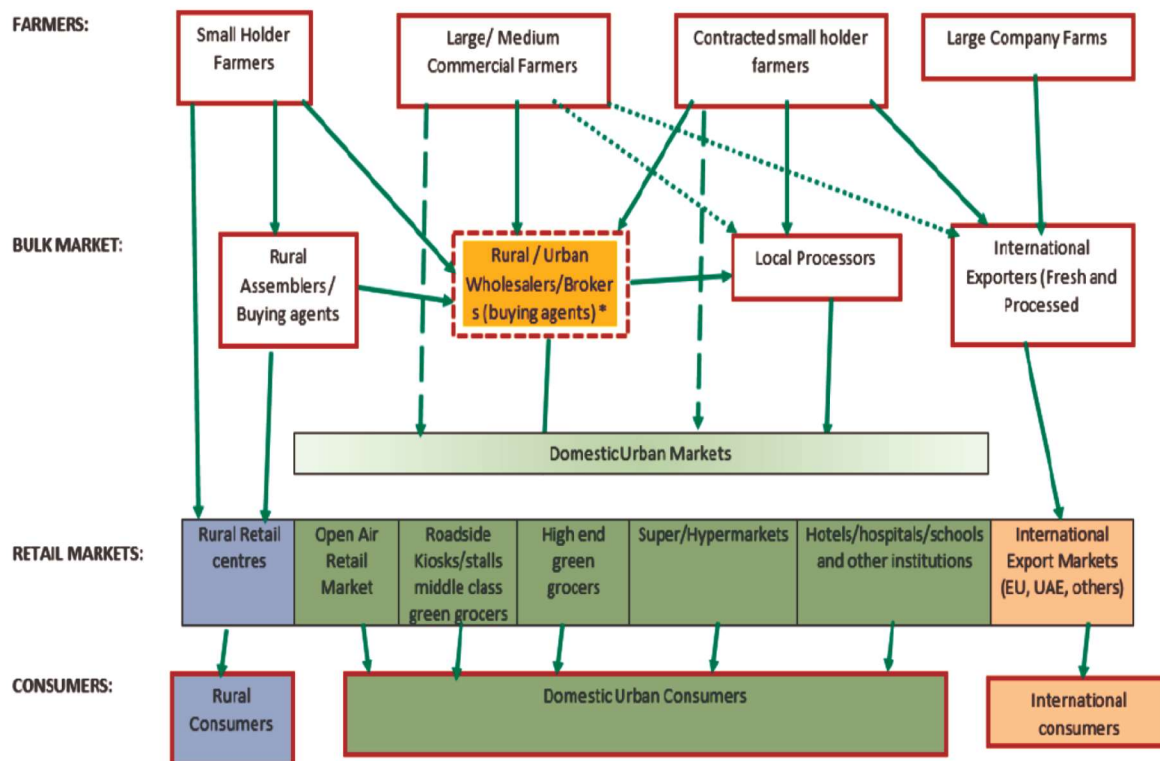




Figure 1: Generic overview of Uganda's fruit and vegetable value chain (Dijkxhoorn et al., 2019 as adapted from RS, 2017)

→ Unsafe Practices and associated hazards

Hazard type	Exposure Factors/Unsafe Practices
<p><b>Physical</b></p> <p>e.g. soil particles, stones, glass, metal pieces.</p>	<ul style="list-style-type: none"> <li>• Use of inappropriate technologies in juice making</li> <li>• Use of non-food grade ingredients and tools during juice processing</li> <li>• Poor hygiene and sanitation within and outside the fruit and vegetable pack houses</li> </ul> 
<p><b>Biological</b></p> <p>e.g. pathogenic bacteria, fungi</p>	<ul style="list-style-type: none"> <li>• Microbial infection through mechanical injuries resulting from:               <ul style="list-style-type: none"> <li>- Poor harvesting techniques of the farm</li> <li>- Inappropriate transport means on bumpy roads</li> <li>- Improper stacking</li> <li>- Loading/offloading by head</li> </ul> </li> <li>• Heat accumulation during transportation of big volumes of fruits and vegetables (F&amp;Vs) in inappropriate vehicles</li> <li>• Spreading fresh F&amp;Vs on wet &amp; dirty ground and stalls</li> <li>• Sprinkling dirty water on F&amp;Vs to rehydrate them.</li> <li>• Covering F&amp;Vs with wet &amp; dirty materials/sacks</li> <li>• Unhygienic storage and preparation facilities</li> </ul>
<p><b>Chemical</b></p> <p>e.g. residues of pesticides, nitrates</p>	<ul style="list-style-type: none"> <li>• Use of highly hazardous pesticides (HHP)</li> <li>• Exceeding recommended mixing rates</li> <li>• Application of wrong pesticides</li> <li>• Pesticide and fertilizer overuse (high application frequency)</li> <li>• None-adherence to recommended pre-harvest interval.</li> <li>• Post-harvest chemical treatment of some fruits/vegetables e.g. tomato</li> </ul> 

## Recommendations

1. Prioritization and dissemination of research and innovations on: i) sustainable fruit and vegetable production and protection alternatives, especially tailored Integrated Pest Management (IPM) packages as the most realistic approach towards minimizing the concern of chemical food safety hazard; ii) safe and low-cost fruit and vegetable post-harvest management innovations- led by public agricultural research institutions such as NARO, NARIs.
2. Deliberate efforts to organize and build technical capacity of fruit and vegetable farmers in Good Agricultural Practices (GAP), IPM, and sound lifecycle pesticide management- spearheaded by MAAIF (DCP and DCIC) with supplementary efforts from the private sector and CSOs working in agriculture.
3. Banning or severely restricting HHPs, expediting and prioritizing registration of biopesticides, and better regulation of pesticide trade and distribution in the country, as a means to tackle access and unsound use of chemical pesticides in the fruit and vegetable sub-sector.
4. Strengthening the country's food testing capacity by equipping and supporting efforts to accredit existing laboratories ones under UNBS, DGAL, UIRI, and private ones such as Chemiphar.
5. Acquisition of appropriate post-harvest technology- through relevant agricultural development programmes and Public-Private-People Partnership (4P) arrangements.
6. Dedicated capacity building of food safety human resources through training, logistical facilitation, and recruiting sufficient numbers.
7. Harmonization of the currently fragmented food safety legislation and institutional mandates.
8. Extensive food safety awareness creation campaigns targeting farmers, traders, and consumers.

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***For more information, watch these videos:***

1. Food safety in fruits and vegetables value chain: <https://youtu.be/QQ7G1vUicYc>
2. Food safety hazards and tips: <https://youtu.be/SXZvO4zAi7g>



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