

Introduction to Food Quality and Safety

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Key concepts, terminology, and practical frameworks for understanding how food quality and safety are defined, measured, and managed.

1. Definitions

Term	Meaning
Food Quality	The set of attributes (sensory, nutritional, functional, shelf?life, appearance, etc.) that satisfy consumer expectations and regulatory standards.
Food Safety	The assurance that food will not cause harm to the consumer when prepared and eaten as intended. Involves control of biological, chemical, and physical hazards.
Food Integrity	The degree to which a food product is authentic, unadulterated, and traceable throughout the supply chain.
Hazard	Any biological, chemical, or physical agent that can cause illness or injury.
Risk	The probability that a hazard will cause adverse health effects under specific conditions of use.

2. Pillars of Food Quality

1. **Sensory Quality** – taste, aroma, texture, appearance, and mouthfeel.
2. **Nutritional Quality** – macro? and micronutrient content, bioavailability, and compliance with labeling claims.
3. **Functional Quality** – performance in processing (e.g., emulsification, gelation).
4. **Shelf?Life Quality** – stability of sensory, nutritional, and safety attributes over time.
5. **Legal/Regulatory Quality** – compliance with food laws, standards, and labeling requirements.

Quality is consumer?driven; safety is health?driven. Both must be managed simultaneously.

3. Major Food Safety Hazards

Category	Typical Sources	Control Measures
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Biological	Bacteria (Salmonella, Listeria, E. coli), viruses (Norovirus, Hepatitis A), parasites (Giardia)	Hygienic design, heat treatment, pasteurization, HACCP, sanitation, proper storage temperatures
	Pesticide residues, veterinary drug residues, food additives, heavy metals, allergens	Good Agricultural Practices (GAP), Good Manufacturing Practices (GMP), monitoring, validated cleaning agents
Chemical		
Physical	Metal fragments, glass shards, stones, plastic pieces	Metal detectors, X-ray, sieving, visual inspection, equipment maintenance

4. Food Safety Management Systems

System	Core Elements	Typical Industries
HACCP (Hazard Analysis & Critical Control Points)	1?? Conduct hazard analysis 2?? Identify Critical Control Points (CCPs) 3?? Set critical limits 4?? Monitor CCPs 5?? Establish corrective actions 6?? Verify system 7?? Document & record	All food processing, catering, retail
ISO 22000	Integrated food safety management, combines HACCP with ISO management system principles (plan?do?check?act)	Large manufacturers, multinational supply chains
GFSI?Recognized Schemes (e.g., BRC, SQF, IFS)	Auditable standards, continuous improvement, supplier assurance	Retail, foodservice, export?oriented producers
Food Defense	Protection against intentional contamination (adulteration, bioterrorism)	High?value or high?risk foods, public institutions

5. Quality Assurance (QA) vs. Quality Control (QC)

Aspect	Quality Assurance (QA)	Quality Control (QC)
Focus	Processes that prevent defects (design, SOPs, training)	