



**FOOD PROCESSING
and its Contribution in providing Food
Safety and Nutrition
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What is Food Processing

- Food processing as a scientific and technological activity covers a broader area than food preparation and cooking.
- Processed Food is any food including any raw agricultural commodity that has been subjected to washing, cleaning, milling, cutting, chopping, heating, pasteurizing, blanching, cooking, canning, freezing, curing, dehydrating, mixing, packaging, or other procedures that alter the food from its natural state.
- Processing also may include the addition of other ingredients to the food, such as preservatives, flavors, nutrients, and other food additives or substances approved for use in food products.

Broad Impacts of Food Processing on Food

- 1) safety - controls toxicological and microbiological hazards
- 2) nutrition - maintaining nutrient levels in food ingredients and formulating foods with nutritional profiles that contribute to consumer interest in healthful diets;
- 3) quality - providing sensory characteristics such as taste, aroma, palatability and appearance;
- 4) value - providing characteristics of consumer utility and economic advantage, involving attributes such as convenience, packaging and shelf-life.

Reference FAO

Food Processing contribution to Food Safety & Nutrition

Benefit	Example(s)
Lower postharvest food losses	Food processing techniques such as milling, grinding, canning, preserving, freezing, drying and packaging prevents food loss due to rodents, insects, and microbial spoilage
Safety	Pasteurization reduces microbial pathogens Packaging reduces risk of contamination Plant breeding results in reduction of naturally occurring toxicants
Preservation and availability	Modified atmosphere packaging of apples and other fruit leads to extended freshness
Health and wellness, improved nutritional status	Fortification of orange juice with calcium provides key mineral for bone health Enrichment of flour with B vitamins decreases risk of nutrient deficiency diseases Processing of tomatoes increases bioavailability of lycopene
Convenience	Processing allows for snack foods and beverages that require limited preparation and frozen entrees to be delivered in a form ready for microwave heating
Choice	Gluten-free and lactose-free foods provide more choice for consumers with celiac disease and lactose intolerance, respectively
Quality	Blanching and freezing of vegetables immediately after harvesting ensures peak nutritional values Processing of soybeans improves their flavor

Food Processing contribution to Food Safety & Nutrition

Food product, ingredient, or technology	Potential benefit or application
Oils from soybean cultivar (28,29)	Reduced saturated fatty acids and higher (n-3) fatty acids (stearidonic acid)
"Super broccoli" cultivar (30)	High in isothiocyanate sulforaphane
Resistant starches and fibers (31–34)	Weight management, satiety
Glucan (35,36)	Partial salt replacement in meat
Oligosaccharide prebiotics in yogurt (37)	Stimulate growth of healthful bacteria in the gastrointestinal tract
Lactobacillus acidophilus probiotics in yogurt (38–40)	Addition of healthful bacteria to gastrointestinal tract
Whole grain-rich foods; foods enhanced with bran fractions (41,42)	Weight loss, satiety, cholesterol lowering
Grains biofortified with zinc and β -carotene (43,44)	Improved nutriture of individuals in underdeveloped countries
Low-gluten foods (45)	Increased choices for patients with celiac disease
Foods without allergens or with allergens labeled (46,47)	Increased choices for patients with allergies
Fats that help with cell signaling and satiety (48)	Energy metabolism control
Low-sodium soy product tempeh and meatless entrees (49,50)	Low-cost nutritious food for vegetarians and children participating in National School Lunch Program
Nanoparticles and enzyme technology (51–53)	Enhanced bioavailability of lycopene and phenolics
Removal of aflatoxins and fumonisins (54,55)	Improved food safety

Food Irradiation for Safety

Table 2: Applications of food irradiation

Dose range	Effects	Examples
<i>Low dose (Up to 1 kGy)</i>	Sprout inhibition	Onions, Potatoes
	Delay in ripening	Fruits
	Quarantine treatment	Fruits, fresh produce
	Insect disinfestation	Cereals, legumes and pulses
	Pest disinfestation	Fresh produce, dried products
	Parasite inactivation	Pork (Trichinella)
<i>Medium dose (1-10 kGy)</i>	Reduce spoilage organisms thereby extending shelf life	Fruits and vegetables
	Eliminating vegetative pathogenic micro-organisms	Meats, dried fish, meat products and spices
<i>High dose (beyond 10 kGy)</i>	Reduce micro-organisms to the point of sterility	Hospital diets, Spices, emergency rations, foods for severely immune compromised patients, foods for astronauts

Reference: Bhabha Atomic Research Centre publication on Radiation in Food Processing

Food Fortification for Nutrition

Fortification is the addition of key vitamins and minerals such as Iron, Iodine, Zinc, Vitamins A & D to foods for improving their nutritional content

Why we need Fortification in India?

- Deficiency of micronutrients or micronutrient malnutrition, also known as hidden hunger, is a serious health risk for the country.
- One of the strategies to address this problem is fortification of food.
- This method complements other ways to improve nutrition such as diversification of diet and supplementation of food.



KEY POINTS

- Processed Foods and their benefits on health and Safety are well established
- Our complex food system can change over time but advances in food processing, science and technology will continue to provide a safe, nutritious, and abundant food supply to meet current and future needs.
- Collaborative efforts between food science, nutrition science and behavioral economics are needed to make positive differences in our food supply and the overall health of Indian consumers.
- We all need to work together to improve the health of current and future generations.

Thank you !
