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Post-Harvest Losses in India: Causes, Management, and Policy Interventions

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Abstract: -

Post-harvest losses (PHLs) remain a significant constraint on agricultural efficiency and food security in India, with perennial losses reported across cereals, fruits and vegetables, pulses, and other commodities (tomato supply chain studies illustrate systemic loss triggers). Major causes include poor harvesting practices, inadequate storage & cold chain infrastructure, inefficient transport, and fragmented market systems. Effective management through technological and institutional strategies — such as temperature-controlled storage, improved logistics, mechanisation, and extension services — can significantly reduce losses. Policy frameworks (national schemes, FAO-led international strategies, and Sustainable Development Goal 12.3 commitments) underscore the need for coordinated public and private action to mitigate losses and enhance supply chain sustainability.

Keywords: Post-harvest losses, food supply chain, cold chain management, agricultural policy, India, loss mitigation technologies etc.

Introduction:

Post-harvest losses refer to the quantitative and qualitative reduction in food between harvest and consumption stages. In India, despite increased production, inefficiencies across the value chain — especially in perishable commodities — lead to substantial losses (e.g., tomato supply chain analysis highlights losses caused by poor storage, cooling, and transport). These PHLs weaken food security, reduce farmer incomes, and amplify environmental strain by wasting embedded agricultural resources.

Key Characteristics / Features of Post-Harvest Losses

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- **Multi-stage occurrence**: Losses occur from harvesting through handling, storage, transport, and marketing.
- **Commodity-specific variation**: Perishables (fruits, vegetables) typically suffer higher rates than grains.
- **Quantitative and qualitative losses**: Includes food weight loss and deterioration in nutritional/market quality.
- **Smallholder impact**: Small farmers are disproportionately affected due to limited access to technology and infrastructure.

Causes of Post-Harvest Losses

1. **Harvesting and Handling Practices** Traditional harvesting techniques cause mechanical damage and losses before produce enters storage.
2. **Lack of Cold Chain & Storage** Inadequate temperature-controlled facilities accelerate spoilage for perishables.
3. **Poor Transportation & Packaging** Long transport without cooling or protection increases decay and damage.
4. **Market and Institutional Issues** Fragmented supply chains and weak market linkages delay sale, forcing distress sales or degradation.
5. **Policy & Knowledge Gaps** Limited awareness of post-harvest best practices, plus inadequate adaptation of international standards.

Important Components of Post-Harvest Management

1. **Cold Chain Infrastructure** – Cooling, refrigeration, and storage that maintains produce quality.
2. **Mechanised Harvesting & Handling Tools** – Reduces bruising and field losses.
3. **Efficient Packaging & Transportation** – Protects products during transit.
4. **Information & Training for Farmers** – Post-harvest best practices and timing guidance.
5. **Market Linkage and Traceability Systems** – Improve timing and pricing to reduce forced post-harvest delays.

Work Flow (How It Works)

1. **Harvesting** → 2. **Initial Sorting & Grading** → 3. **Pre-cooling/Cold Storage Entry** →
2. **Controlled Transport (Cold Chain)** → 5. **Market / Consumer Delivery** →
3. **Secondary Processing (as needed)**

At each step, technology and supervision are applied to **minimise losses and uphold quality**.

Applications in Various Sectors	
Sector	**Key Application**
Horticulture	Cold chain + modified atmosphere packaging
Grains & Pulses	Improved storage (hermetic bags, silos)
Fisheries	Chill chains and rapid landing-to-market systems
Food Processing	Value addition (drying, canning)

Temperature-controlled chain studies show that such systems significantly reduce losses in the tomato supply chain, offering generalizable lessons for other perishables.

Advantages

- **Reduced waste and higher availability** of food.
- **Improved farmer incomes** through less loss and better pricing.
- **Enhanced food security** without increasing production inputs.
- **Lower environmental footprint** through resource conservation.

Policy Interventions and International Strategies

National Level (India)

India's agricultural policy landscape includes multiple schemes aimed at enhancing cold chain, storage, and processing infrastructure (e.g., Government of India programs aligning with loss mitigation goals). National studies on PHL advocate strengthened technology dissemination and institutional coordination.

International Frameworks

- **FAO Food Loss & Waste Policy Support**: Aligns global efforts under Sustainable Development Goal 12.3 to halve food loss and waste by 2030.
- **Global Initiatives**: International agricultural and policy bodies (e.g., FAO, Champions 12.3) advance knowledge exchange and set reduction targets.

Future Strategies

1. **Digital Technologies & IoT** for real-time monitoring and cold chain optimization.
2. **Integration of smallholders into formal supply chains** via cooperatives and digital platforms.
3. **Investment in local micro-cold hubs and processing units** to reduce geographic loss impacts.
4. **Policy reforms targeting storage quality standards and incentives** for private investment.

Conclusion

Post-harvest losses in India represent a multifaceted challenge affecting food security,

farmer welfare, and economic efficiency. While structural and infrastructural constraints persist, integrated approaches — combining technology, policy reform, and stakeholder training — can significantly reduce PHLs. Aligning national policies with international reduction goals and extending adaptive technologies (e.g., cold chains, smart storage) will be crucial for sustainable agricultural growth.

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