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Fixing Indiaâ??s Last-Mile Temperature Control Gap: A Logistics Blueprint for Pharma Safety and Speed

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Fixing Indiaâ??s last-mile temperature control gap is not just a logistics upgrade, it is a strategic imperative for the pharmaceutical ecosystem



India today stands among the world's largest pharmaceutical producers, supplying affordable medicines, vaccines and increasingly complex therapies to both domestic and global markets. Yet, despite strong manufacturing capabilities and improving plant-level compliance, one critical vulnerability continues to undermine this progress, the last mile of temperature-controlled logistics.

The cold-chain logistics sector in India has expanded alongside the pharmaceutical industry, driven by rising demand for temperature-sensitive medicines and India's role as the third-largest pharmaceutical producer globally by volume. However, scale alone does not guarantee safety. As pharmaceutical products move closer to patients, temperature control becomes more fragile, fragmented, and difficult to govern. Pharmaceutical exports stood at $30.47 billion in 2024-25, underlining India's importance in the global medicine supply chain, but also magnifying the consequences of failure in last-mile handling.

For vaccines, biologics, injectable and specialty therapies, the journey from factory to pharmacy is as critical as the formulation itself. A single temperature excursion can compromise efficacy, shorten shelf life, or render an entire batch unusable, posing risks not just to manufacturers, but to patients and regulators alike. This makes temperature-controlled environments a responsibility shared across the entire supply chain, extending well beyond transportation to include warehousing, in-city distribution and secondary storage points.

The real gap today is not the absence of cold-chain assets, but the uneven quality of infrastructure supporting last-mile delivery. While large manufacturing plants and primary cold stores are increasingly compliant with global norms, weaknesses emerge in multi-tenant warehouses, retrofitted in-city facilities, and decentralised distribution hubs that were never designed for pharmaceutical-grade temperature control. These gaps are particularly visible in Tier II and Tier III markets, where demand for specialty medicines is rising faster than compliant infrastructure.

At the same time, the industry is under pressure to deliver both speed and safety simultaneously. The rapid expansion of the pharmaceutical, foodservice and e-commerce sectors has normalised time-critical delivery expectations. In healthcare, this is further complicated by narrower temperature bands, shorter shelf lives, and heightened regulatory scrutiny from authorities such as the US FDA, EMA, CDSCO and global GDP standards. Safety and speed are no longer trade-offs; they are parallel imperatives.

This is prompting a shift toward integrated, future-ready cold-chain solutions where infrastructure design, operational discipline and technology work in unison. Climate-controlled warehouses with clearly defined temperature zones, validated layouts, robust insulation, redundant power systems and audit-ready environments are becoming essential. Equally important is structural readiness, facilities must be engineered to support automation, material handling systems and continuous monitoring without compromising compliance.

Technology plays a critical enabling role but only when embedded within purpose-built infrastructure. IoT-enabled sensors, real-time temperature monitoring, digital SOPs and electronic audit trails help detect deviations, strengthen traceability and simplify compliance. Smart packaging and route optimisation reduce exposure risks during transit. However, technology

cannot compensate for warehouses that lack structural capability, zoning discipline or validation from day one.

Compliance, therefore, must be designed into daily operations rather than treated as a periodic audit exercise. Leading operators are institutionalising calibrated equipment, trained workforces, regular internal audits and standardised processes to ensure adherence to global regulatory requirements. When compliance becomes operational muscle memory, it improves not just safety, but also speed and reliability.

Location strategy is emerging as another defining factor. In-city, near-manufacturing and near-port temperature-controlled facilities reduce transit time, minimise handling risks and improve export readiness. Designing such infrastructure requires a deep understanding of pharmaceutical workflows and regulatory expectations, not merely access to land or storage space.

The broader payoff of fixing the last-mile temperature control gap is significant. Stronger infrastructure reduces product wastage, protects patient safety and enhances India's credibility as a supplier of high-value, temperature-sensitive therapies. As global supply chains become more vulnerable to geopolitical disruptions, pandemics and climate-related events, resilient, decentralised and compliant logistics networks will increasingly define competitiveness.

Fixing India's last-mile temperature control gap is therefore not just a logistics upgrade, it is a strategic imperative for the pharmaceutical ecosystem. As India moves from being the world's pharmacy by volume to a trusted supplier of high-value, temperature-sensitive therapies, the integrity of the last mile will increasingly define its credibility. Infrastructure that is purpose-built for compliance, speed and resilience will not only protect patient safety, but also determine how confidently Indian pharma can scale, innovate and compete on the global stage.

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