PANEL 5 | SESSION 05

SUPPLY CHAINS THAT SUSTAIN CARE

The Backbone of Reliable and Equitable Delivery

MODERATOR

Soumitro Ghosh — Chief of Party, Abt Global (formerly Abt Associates). 30+ years in global health and development; founding CEO of WISH Foundation India, transforming 1,500+ primary health centres; formerly led USAID private sector health systems strengthening in Afghanistan.

PANELISTS

1. **Sivaram Rajagopalan**: CEO & Principal Consultant, Shiva Consultants LLP, Singapore. 30+ years in medical technology; former Asia-Pacific Business Manager at HP and Philips Medical; Managing Director of Laerdal Medical South Asia; mentor for health-tech startups across India, Asia, and Europe.
2. **Vivek Choudhary**: Assistant Professor, Nanyang Business School, NTU Singapore; Former Consultant, McKinsey & Company. Research at the intersection of behavioural operations and digital health platforms; led data-driven health projects for Singapore and Indian government bodies; PhD from INSEAD.
3. **Dr. Gautam Chakraborty**: Director, Innovative Financing, Impact Scale Ventures; Former Senior Health Finance Specialist, USAID/India. Over 30 years in healthcare financing; led the $300M SAMRIDH blended finance platform and India's first Development Impact Bond (Utkrisht); DBA in Blended Finance; recipient of U.S. Ambassador's Eagle Award 2024.

1 PANEL OVERVIEW

Panel 5 examined the critical role of healthcare supply chains in ensuring reliable service delivery and equitable access to care. A central argument of the session was that supply chains must be understood not as logistics systems, but as integrated components of health system performance — directly shaping patient outcomes, community trust, and service continuity.

The discussion united perspectives from health system implementation, operations management, financing, digital systems, and rural healthcare delivery. Panelists explored how traditional supply chain models — driven by inventory management and budget constraints — must evolve toward demand-responsive, outcome-oriented frameworks.

A recurring theme was the direct link between supply reliability and community confidence. Disruptions do not simply hinder service provision — they erode trust in healthcare institutions, particularly in underserved and remote areas where alternatives are limited. The panel focused on identifying practical strategies to strengthen supply chain resilience, improve forecasting, and align procurement and financing mechanisms with real healthcare needs.

2 CONTEXT AND KEY ISSUES

Healthcare supply chains operate within complex, dynamic environments — shaped by geographic constraints, disease patterns, infrastructure limitations, and financial structures. Historically, planning has been guided by warehouse capacity, cost optimisation, and distribution targets, rather than alignment with health outcomes at the point of care.

This logistics-centric approach creates persistent mismatches between supply availability and actual service needs. Panelists emphasised that supply chains must extend beyond product movement to ensure that commodities are usable, accessible, and capable of delivering intended clinical impact.

Several interconnected issues were identified as central to this challenge:

- Rural and remote delivery gaps: Long distances, poor transport infrastructure, extreme environmental conditions, and fragmented health networks compound stockout risks and delivery failures.
- Informal care pathways: In many rural settings, the first point of contact is an informal or rural medical practitioner. Supply chains must be designed around actual patient pathways — not just formal system structures.
- Regulatory misalignment: Existing frameworks often do not reflect the realities of rural healthcare delivery, where informal providers play a significant role in supplying medicines and basic care.
- Financing ambiguity: A persistent tension exists around who pays for preventive interventions — with responsibility falling ambiguously between public systems, private actors, and individuals.
- Forecasting limitations: Traditional models that rely solely on historical consumption data frequently fail to capture evolving factors such as migration trends, climate variability, and seasonal disease outbreaks.

3 INSIGHTS FROM THE DISCUSSION

Supply Chains as Enablers of Health Outcomes

Panelists stressed that supply chains must be understood as end-to-end systems supporting healthcare impact — not isolated operational functions. This reframing shifts focus toward ensuring that products reach patients in usable condition and within appropriate timelines.

Supply reliability was identified as a decisive determinant of community trust. When patients travel long distances only to encounter stockouts or malfunctioning equipment, confidence in health services declines — and restoring that trust is significantly harder than building it initially.

Operational Realities and Human Variability

Experiences from logistics and warehouse management underscored the importance of designing systems that account for operational bottlenecks and variability in human performance. Supply chain failures frequently occur not from lack of infrastructure investment, but because planning overlooks worker fatigue, transportation constraints, or local environmental risks.

Effective supply chain management therefore requires anticipatory planning and contingency frameworks — including root cause analysis and scenario-based planning. Unlike other industries, healthcare supply disruptions carry immediate and severe consequences for patients, making system robustness non-negotiable. User-centric design, with clear understanding of end-user realities and potential failure points, was identified as foundational to resilience.

Data, Forecasting, and Predictive Analytics

The panel underscored the growing importance of data-driven forecasting and predictive modelling in improving supply chain responsiveness — while cautioning against over-reliance on complex machine learning approaches, particularly in contexts where data quality is inconsistent.

Segmented forecasting approaches — which account for variations in demand patterns across geographic regions, disease profiles, and population groups — were identified as more effective than uniform models. Integrating human expertise with analytical tools can further enhance decision-making under uncertainty.

Panelists also noted that healthcare supply chains often lack consistent demand patterns, making it difficult to apply standardised models across contexts. Overly complex models risk capturing noise rather than signal — and improper use of data, such as incorporating future information into historical models, can introduce data leakage and yield inaccurate predictions.

Financing Mechanisms and Procurement Reform

Financial structures were identified as a critical determinant of supply chain efficiency. Short-term procurement contracts, delayed budget approvals, and fragmented financing streams frequently drive supply interruptions and inefficient resource utilisation.

Innovative financing approaches discussed as practical solutions included multi-year procurement contracts, index-based price revisions, capitation models, and risk-financing mechanisms. Insurance mechanisms to cover losses from expired or damaged inventory were highlighted as underutilised tools capable of protecting public investments. Blended finance was also noted as a cross-cutting enabler of supply chain innovation — spanning infrastructure, technology, and last-mile delivery.

Technology and Last-Mile Delivery Innovations

The panel highlighted emerging opportunities in digital supply chain technologies and innovative logistics solutions. Examples discussed included drone-based transportation for diagnostic samples, automated inventory tracking systems, and last-mile medicine delivery models such as e-pharmacies and dispensing kiosks.

Such innovations can meaningfully reduce transportation delays and improve accessibility for patients with chronic conditions who require consistent medication supply but do not need frequent clinical consultations.

4 CHALLENGES IDENTIFIED

Despite growing recognition of supply chain importance, several persistent structural and operational barriers were identified:

- Service delivery misalignment: Supply chain design remains poorly aligned with real-world care delivery pathways and patient flows.
- Inadequate data infrastructure: Weak data systems limit accurate demand forecasting and ongoing performance monitoring.
- Procurement and funding cycles: Short procurement windows and delayed budget releases disrupt supply continuity and prevent proactive planning.
- Regulatory-reality gaps: Complex regulatory requirements frequently fail to reflect the realities of rural healthcare, where informal providers are integral to delivery.
- Equipment maintenance deficits: Weak servicing infrastructure and limited spare parts availability undermine the long-term functionality of medical equipment.
- Last-mile environmental risks: Geographic isolation, poor transportation networks, and climate-related disruptions threaten delivery reliability in remote settings.
- Informal provider exclusion: Informal care providers remain insufficiently integrated into formal supply chain planning, despite their central role in communities.

These challenges underscore the need for system-wide reforms that integrate operational, financial, and technological perspectives.

5 OPPORTUNITIES AND PROPOSED SOLUTIONS

The panel identified clear pathways to strengthen healthcare supply chains and enhance service reliability. Each represents an actionable area for investment and reform:

Demand-driven supply chain planning: Shift forecasting models to incorporate real-time service data, disease trends, and population dynamics. Investments in digital health information systems can enable continuous monitoring of stock levels and consumption patterns.

Last-mile delivery innovation: Scale innovative logistics approaches — including drone delivery, decentralised distribution models, and technology-enabled dispensing systems — to improve accessibility in remote and underserved regions.

Frontline capacity-building and co-design: Actively involve frontline healthcare workers and operational staff in supply chain design and pilot implementation. Their feedback identifies practical failure points early and improves performance before scale-up.

Financing and procurement reform: Introduce multi-year contracts, flexible funding mechanisms, and risk-sharing arrangements to provide stability and enable proactive management. Explore public-private partnerships and grant-based funding for predictive analytics and system innovation.

Pilot design and feedback loops: Ensure pilot programmes are explicitly designed to identify operational gaps. Continuous feedback from field-level implementation is critical to refining supply chain models and enabling successful scale-up.

Usage-based technology financing: Adopt payment models linked to actual utilisation, encouraging efficient resource allocation and ensuring that technologies are designed with integrated monitoring capabilities from the outset.

6 KEY TAKEAWAYS

- Reliable supply chains are foundational to effective healthcare delivery and the maintenance of community trust — disruptions have consequences that extend well beyond logistics.
- Supply chain systems must evolve from logistics-driven models to outcome-oriented, demand-responsive frameworks aligned with real service delivery needs.
- Real-world operational realities — including human variability, environmental risks, and informal care pathways — must be built into system design, not treated as exceptions.
- Data-driven forecasting and digital technologies can significantly enhance supply chain agility, but must be calibrated to local data quality and context.
- Financing and procurement reform — including multi-year contracts and risk-sharing mechanisms — are essential to ensuring continuity and scalability.
- Integrating frontline workers and informal care providers into supply chain planning is critical for designing solutions that perform in the field, not just in design.

7 IMPLICATIONS FOR FUTURE HEALTH SYSTEMS

Panel 5 made clear that supply chain resilience must be treated as a strategic pillar of universal health coverage — not a background operational concern. Future health systems must integrate supply chain planning with service delivery models, financing frameworks, and digital health infrastructure from the outset.

Investments in predictive analytics, innovative logistics technologies, and decentralised distribution networks will be essential to delivering responsive, equitable care. Strengthening governance mechanisms and aligning procurement processes with real-time service needs will be equally critical.

Ultimately, supply chains must be reframed — from invisible logistics infrastructure to active enablers of health outcomes. By adopting integrated, data-driven, and patient-centred approaches, health systems can ensure continuity of care, strengthen community trust, and advance the goal of equitable access for all populations.

> “By elevating supply chains from logistical background systems to strategic health infrastructure, health systems can guarantee the continuity, reliability, and equity that communities depend on.”
>
> **— Panel 5 Closing Statement — Workshop Proceedings**