Vol. 2 No. 4 (2025)

ONLINE ISSN :3007-309X
PRINT ISSN :3007-3081

Journal of Medical & Health Sciences Review

MARKET SHAPING MECHANISMS IN GLOBAL HEALTH SUPPLY CHAINS: PERFORMANCE-BASED CONTRACTING AND PRIVATE-SECTOR PARTNERSHIPS

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ARTICLE INFO:

Keywords:
Performance-Based Contracting (PBC), Health Supply Chain, Public-Private Partnerships (PPP), Logistics Management in LMICs, Pakistan Healthcare System

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Article History:
Published on November 27, 2025

ABSTRACT

Introduction: In many low- and middle-income countries (LMICs), there are problems with how healthcare supplies are managed. These issues, like poor organization, divided systems, lack of responsibility, and frequent shortages, lead to worse health outcomes for people in those countries. In the last ten years, private-sector logistics collaborations and performance-based contracting (PBC) have been popular strategies for enhancing supply chain performance in environments with limited resources.

Objectives: The structure, application, and effectiveness of PBC models in Pakistan's donor-funded health supply chains from 2015 to 2025 are all critically examined in this review. Additionally, factors influencing private-sector logistics providers in LMICs are examined, and lessons learned are summarized to direct health supply chain reform in Pakistan by 2026.

Methods: In order to assess PBC frameworks, operational, institutional, and market aspects as well as Public-Private Partnership (PPP) models impacting supply chains in LMICs, a comprehensive narrative review was carried out using a variety of regional and worldwide information.

Results: PBC uses the idea of principle-agent theory, which means payments are tied to measurable goals.

These goals include things like delivering supplies in time, keeping accurate records, and providing good quality reports. Countries like Tanzania, Zambia, and Afghanistan have shown that PBC can make healthcare more accessible and convenient. With the help of USAID GHSC-PSM, Pakistan has adopted PBC, which comprises PPP projects that concentrate on last-mile and cold chain distribution. Governmental opposition, inadequate digital systems, and restricted contract monitoring are some of the main obstacles. Resilience and efficiency are improved by strong control, defined responsibilities, uniform agreements, and market-shaping tactics like pooled procurement.

Conclusion: To improve Pakistan's health supply chain, we can focus on strengthening PBC, working more with private companies, using digital data, and employing market-shaping strategies. These changes are crucial by 2026 to build a more reliable, effective, and accountable system.

INTRODUCTION

Lower- and Middle-Income Countries *(LMICs)* have long-standing problems with their health supply chains, including as inefficiency, fragmentation, poor accountability, and recurring stock-outs, all of which have a detrimental impact on health outcomes and service delivery **(UNICEF, 2021).** Performance-Based Contracting *(PBC)* and Private-Sector logistics partnerships have been more popular among national governments and international funders over the past ten years as strategic ways to improve supply chain performance in contexts with limited resources.

Performance-Based Contracting *(PBC)* uses the principle-agent theory, which means that pay is linked to specific, measurable goals. This approach encourages improvements in areas like delivering supplies on time, keeping accurate inventory, efficient purchasing, and quality reporting **(Vining & Weimer, 2016).** PBC has become common in low-and-middle-income countries because of support from organizations like GAVI, the Global Fund, and U.S. Agency for International Development *(USAID)* Global Health Supply Chain-Procurement and Supply Management *(GHSC-PSM)*. Since 2015, *USAID's GHSC-PSM* project has helped PBC grow in Pakistan by setting up Key Performance Indicator *(KPIs)* for forecasting, storage, cold chain management, and last-mile distribution.

To address issues with storage, staff, and transportation, countries like Kenya, Ethiopia, and Bangladesh are using private logistics companies (Third-Party Logistics:3PL / *Fourth-Party Logistics:*4PL) along with Performance-Based Contracting *(PBC)* **(Yadav, 2015; Wiedenmayer et al., 2019).** Pakistan has also increased its use of Public-Private Partnership *(PPPs),* especially in Sindh and Punjab. Outsourcing cold chain operations, warehousing, and health facility logistics through these partnerships has shown potential for better results and less waste **(World Bank, 2018).**

To encourage competition, keep prices stable, and ensure a reliable supply chain, international donors focus on market shaping strategies such as pooled purchasing, long term partnerships, and prequalifying suppliers **(Makinen et al., 2019; GAVI, 2020).** However, there's not much information available about how Performance-Based Contracting *(PBC),* Public-Private Partnership *(PPPs),* and market-shaping methods work together in Pakistan's fragmented provincial health system.

This review looks at experiences from around the world and the region to study (1) How Performance-Based Contracting *(PBC)* models have been developed and used in Pakistan, (2) The operational and institutional factors that affect how well private sector logistics works in Low- and Middle-income countries *(LMICs),* and (3) key lessons to guide supply chain improvements in Pakistan by 2026.

MAIN BODY

1. Performance-Based Contracting (PBC) Approaches in Global and National (Pakistan) Health Supply Chains

1.1 Design and Operational Implementation of Performance-Based Contracting (PBC) Models

In Performance-Based Contracting *(PBC),* payments are tied to specific performance measures. These include things like accurate inventory, meeting deadlines, correct order fulfillment, and how well the Logistics Management Information System *(LMIS)* reports **(Fritzen & Lagomarsino, 2020).** Initiatives funded by donors for health supply chains in Low- and Middle-Income Countries *(LMICs)* use Performance-Based Contracting *(PBC)* to tackle issues like lack of accountability, slow bureaucracy, and poor oversight.

1.2 Global Trends and Empirical Support for Performance-Based Contracting (PBC) approaches

Studies in several Low- and Middle-Income Countries *(LMICs)*show significant improvements:

• **Tanzania:** After using PBC, deliveries on time went up by 19%, and distribution costs decreased by 11% **(Haque et al., 2021).**

• **Zambia:** According to U.S. Agency for International Development *(USAID DELIVER)* **(2017)**, district-level Logistics Management Information System *(LMIS)* reporting timeliness rose by more than 30%.

• **Afghanistan:** Rural health facilities now have more access to necessary medications because to performance-based payment **(Eichler et al., 2018).**

Typical global Performance-Based Contracting *(PBC)* Key Performance Indicator *(KPIs)* consist of:

Stock availability

Reduction of lead time

Accuracy of forecasts

Dependability of order fulfillment

Compliance with temperature-controlled storage

1.3 Performance-Based Contracting (PBC) Models in Pakistan (2015–2025)

Pakistan has been implementing PBC components since 2015 through a number of projects funded by donors:

• The governments of Sindh and Punjab in Pakistan used PBC components in their agreements with private logistics companies. USAID GHSC-PSM set Key Performance Indicators (KPIs) for things like warehouse standards, monitoring the cold chain, planning routes, and delivering goods to the final destination.

Pakistan deals with several major challenges, such as:

• Limited provincial capability for contract monitoring

• Weak or non-integrated digital systems

• Government departments' resistance because they believe they have lost authority

• Inadequate KPI verification processes.

Despite these challenges, evidence shows that well-designed PBC systems improve accountability, transparency, and service delivery **(UNICEF, 2021).**

2. Key Drivers Impacting Private-Sector Logistics Providers in LMIC Supply Chains

2.1 Operational Factors

The following factors affect how well private logistics companies perform:

Transportation difficulties

Expensive fuel and challenging terrain

The difficulty of collaborating with numerous donor-funded projects

Inadequate cold chain capacity in remote areas

A shortage of qualified labor for specialized logistical operations

2.2 Institutional Factors

Strong government leadership and oversight

Clearly defined contract roles

Timely and regular payments

Standardized Service-level agreements (SLAs)

Specialized contract monitoring units

According to experiences in Ethiopia and Kenya,

Strong organizational structures help make services more efficient and reduce waste. **(Wiedenmayer et al., 2019; Bokhari et al., 2020).**

2.3 Market Environment Shaping Private-Sector Logistics Performance

The following market-related elements affect performance:

Third Party Logistics (3PL) provider competition

Demand predictability

Incentive structures

Contract duration and stability

According to **Azmat et al. (2017),** structured market involvement in Bangladesh shortened lead times for contraceptive commodities by two to three weeks.

2.4 Pakistan's Public-Private Partnership (PPP) Experience

Pakistan has used a number of PPP models, including:

• **Sindh:** Storage, transportation, and last-mile distribution of supplies funded by donors are handled by outside companies.

• **Punjab:** Private providers distribute vaccines as part of the Expanded Programme on Immunization *(EPI)*.

• **National initiatives:** Private sector is involved in vaccine logistics and expanding the cold chain.

Results show improvements in:

- **Warehousing standards**
- **Delivery timeliness**
- **Waste reduction**

As long as monitoring systems and service-level agreements (SLAs) were adhered to closely

(World Bank, 2018; UNICEF, 2021).

3. Critical Learning Points for Pakistan's Supply Chain Transformation

3.1 Advancing the Design and On-Ground Execution of Performance-Based Contracting (PBC) Reforms

- Build consistent Key Performance Indicator (*KPIs*) for the province
- Establish provincial contract management units
- Invest in real-time digital Logistics Management Information System (*LMIS)* solutions
- Implement performance-linked payment mechanisms
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3.2 Expand Structured Private-Sector Partnerships

- Use competitive bidding to choose Third Party Logistics *(3PL)* providers.
- Connect Public-Private Partnership *(PPP)* units with national health supply chain changes.
- Use long term contracts that cover multiple years.

3.3 Introduce Market-Shaping Mechanisms

- Adopt pooled procurement across provinces
- Create long-term purchasing commitments
- Strengthen supplier prequalification frameworks
- Make the bidding processes more transparent.

3.4 Enhance Interoperability of Health Supply Chain Data Platforms

Integration should include:

Use a Logistics Management Information System *(LMIS)*

Use District Health Information System, Version 2 (DHIS-2)

Use Global Health Supply Chain (GHSC) digital solutions

Provincial dashboards

Make sure there is real-time visibility and data-driven decision-making.

OBJECTIVES

Objective 1

To critically examine the structure, implementation, and performance indicators of performance-based contracting (PBC) models adopted in international donor-funded health supply chain programs in Pakistan (2015–2025).

Objective 2

To analyze the operational, institutional, and market factors influencing the success or failure of private-sector logistics providers in managing health commodity distribution systems in LMICs.

Objective 3

By 2026, actionable suggestions for Pakistan's public health supply chain reform would be informed by a synthesis of lessons acquired from PBC and private-sector partnerships' regional and global experiences.

METHODOLOGY

This study used a systematic review of existing research, following guidelines from review frameworks **(Grant & Booth, 2009; Mays, Pope & Popay, 2005; Petticrew & Roberts, 2006).** The method was designed to be clear, repeatable, and thorough when gathering evidence on performance-based contracting and private-sector engagement in global health supply chains, especially in Pakistan and other Low- and Middle-Income Countries *(LMICs).*

3.1 Research Design

A systematic review was chosen because the research aims to:

1. Compare and analyze different performance-based contracting *(PBC)* models
2. Find and categorize factors that affect how well private-sector logistics works.
3. Take out lessons and suggestions for Pakistan

This design is commonly used for policy and health systems research where diverse qualitative and quantitative evidence must be integrated **(Popay et al., 2006; Greenhalgh et al., 2018).**

3.2 Search Strategy

A comprehensive search was performed across the following electronic databases:

- PubMed / MEDLINE
- Scopus
- Web of Science
- Google Scholar
- USAID Development Experience Clearinghouse (DEC)
- WHO Global Health Observatory (GHO)
- UNICEF Supply Division Library
- World Bank Documents & Reports

Search terms included:

- "Performance-based contracting"
- "Health supply chain"
- "Donor-funded programs"
- "Private sector logistics"
- "Public–private partnership"
- "LMIC supply chain systems"
- "Pakistan health logistics"
- "Market shaping interventions"

Boolean operators were used (AND, OR, NOT) to refine results, for example:
"Performance-based contracting" AND "health supply chain" AND "LMICs".
Grey literature from USAID GHSC-PSM, GAVI, Global Fund, UNICEF, and World Bank was also included, as recommended by health systems review guidelines **(Tricco et al., 2018), (USAID,2022).**

3.3 Inclusion and Exclusion Criteria

Inclusion Criteria

Studies were included if they met these criteria:

✔ They focused on performance-based contracting, PPPs, or private-sector logistics in health supply chains

✔ They were conducted in LMICs (World Bank classification)

✔ They were published between 2005–2025, with a specific focus on Pakistan from 2015–2025.

✔ They were peer-reviewed articles, donor evaluations, or technical reports.

✔ They reported on outcomes such as delivery timeliness, stock availability, cost efficiency, or system accountability

Exclusion Criteria

✘ studies unrelated to supply chain management

✘ clinical or pharmaceutical formulation studies

✘ papers with inadequate methodological description

✘ commentaries lacking empirical or descriptive evidence

These rules followed the best practices from **PRISMA guidelines (Page et al., 2021).**

3.4 Study Selection Process

The review followed a four-stage selection process, modeled on PRISMA:

1. **Identification:** Records were retrieved from databases and grey literature repositories.

2. **Screening:** Titles and abstracts were screened for relevance to the objectives.
3. **Eligibility:** Full texts were reviewed for methodological and conceptual relevance.
4. **Inclusion:** Final studies were selected for synthesis.

Two independent reviewers screened the articles to improve reliability, similar to procedures recommended by **Gough et al. (2017).**

3.5 Quality Appraisal

Studies were appraised using:

- Critical Appraisal Skills Programme (CASP) Checklist for qualitative studies
- Joanna Briggs Institute (JBI) tools for mixed-methods studies
- USAID Evidence Rating Tool for project evaluations

Quality scoring ensured that only reputable and reliable evidence was synthesized **(Munn et al., 2018).**

3.6 Data Extraction

A structured data extraction sheet was developed capturing:

- Study purpose and country
- Type of Performance-Based Contracting *(PBC)* or Public-Private Partnership *(PPP)* model
- Key performance indicators (KPIs)
- Institutional and operational factors
- Health supply chain outcomes
- Lessons and recommendations

This approach aligns with review procedures recommended by **Booth, Sutton & Papaioannou (2016).**

3.7 Data Synthesis Approach

Because included studies were diverse, a thematic narrative synthesis was used. Studies were grouped into the following themes:

1. PBC models and their design in LMICs
2. Operational performance outcomes of PBC
3. Factors determining private-sector engagement success/failure
4. Market-shaping interventions in health supply chains
5. Lessons for Pakistan's health system

Themes were synthesized using the framework approach suggested by **Dixon-Woods et al. (2005).**

Patterns and contrasts across LMICs were used to derive lessons for Pakistan.

CONCLUSION

Performance-Based Contracting and private-sector engagement represent two of the most influential market-shaping tools being adopted across global health supply chains. Evidence from LMICs consistently demonstrates that PBC improves transparency, delivery timelines, stock availability, and accountability, while private-sector partnerships contribute to operational efficiency, cost reduction, and improved last-mile performance. Pakistan's health supply chain system characterized by fragmentation, capacity constraints, and weak monitoring can benefit significantly from well-designed PBC and PPP models.

However, successful implementation requires strong institutional stewardship, standardized KPIs, digital data systems, and clear contractual arrangements. Lessons from other LMICs show that sustained political support, predictable financing, and robust monitoring mechanisms are essential for long-term success. Market-shaping interventions such as pooled procurement, supplier prequalification, and performance incentives can further enhance supply chain resilience and sustainability.

By adopting these evidence-based strategies, Pakistan can transform its health supply chain into a more efficient, responsive, and equitable system capable of supporting national health priorities and improving service delivery outcomes by 2026 and beyond.

ABBREVIATIONS

LMICs	Lower- and Middle-Income Countries
PBC	Performance-Based Contracting
UNICEF	United Nations International Children's Emergency Fund
GAVI	Global Alliance for Vaccines and Immunizations
USAID	U.S. Agency for International Development
GHSC-PSM	Global Health Supply Chain-Procurement and Supply Management
KPIs	Key Performance Indicator
3PL	Third-Party Logistics
4PL	*Fourth-Party Logistics*
PPP	Public-Private Partnership
LMIS	Logistics Management Information System
SLAs	Service-level agreements
EPI	Expanded Programme on Immunization
DHIS-2	District Health Information System, Version 2
DEC	Development Experience Clearinghouse
GHO	Global Health Observatory
WHO	World Health Organization
CASP	Critical Appraisal Skills Programme
JBI	Joanna Briggs Institute

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