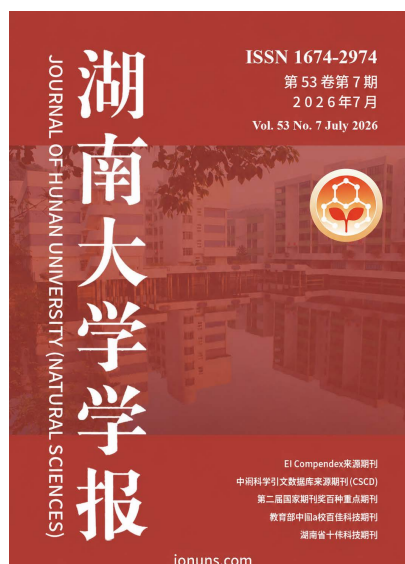




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Geopolitical Conflicts as Emerging Determinants of Access to Medicines in Low- and Middle-Income Countries

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Abstract: Geopolitical conflicts, including armed conflict, economic sanctions, trade restrictions, and financial disruptions, increasingly shape access to medicines in low- and middle-income countries (LMICs). This conceptual policy commentary examines the pathways through which geopolitical pressures affect pharmaceutical systems and argues that they should be recognized as structural determinants of medicine access. Existing evidence indicates that disruptions to global pharmaceutical supply chains, banking and payment channels, logistics networks, and procurement systems can increase costs, delay deliveries, and intensify medicine shortages. These effects are particularly severe in import-dependent LMICs with limited domestic manufacturing capacity and may compromise continuity of care and widen existing health inequities. Strengthening pharmaceutical-system resilience requires the integration of geopolitical risk assessment into pharmaceutical policy, diversification of suppliers and procurement routes, development of strategic stockpiles, expansion of regional pooled procurement, and support for local production of active pharmaceutical ingredients and generic medicines. Stronger global and regional governance mechanisms are also needed to safeguard humanitarian exemptions and promote equitable access during crises. Integrating geopolitical analysis into pharmaceutical policy and health-systems research can support more anticipatory, resilient, and equitable responses in LMICs.



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Keywords: geopolitical conflict; access to medicines; pharmaceutical supply chains; economic sanctions; health-system resilience; low- and middle-income countries.

地缘政治冲突：中低收入国家药品可及性的新兴决定因素

摘要：

地缘政治冲突，包括武装冲突、经济制裁、贸易限制和金融中断，正在日益深刻地影响中低收入国家（LMICs）的药品可及性。本文是一篇概念性政策评论，旨在分析地缘政治压力影响药品供应体系的主要路径，并主张将其视为药品可及性的结构性决定因素。现有证据表明，全球药品供应链、银行与支付渠道、物流网络以及采购体系受到干扰后，可能导致采购成本上升、交付延迟和药品短缺加剧。对于国内药品生产能力有限且高度依赖进口的中低收入国家而言，这些影响尤为严重，并可能损害治疗连续性，进一步扩大既有的健康不平等。提高药品供应体系韧性，需要将地缘政治风险评估纳入药品政策，推动供应商和采购渠道多元化，建立战略性药品储备，扩大区域联合采购，并支持原料药和仿制药的本地生产。同时，还应加强全球和区域治理机制，以保障人道主义豁免条款的有效实施，并促进危机期间药品的公平获取。将地缘政治分析系统地纳入药品政策和卫生系统研究，有助于中低收入国家制定更具前瞻性、韧性和公平性的政策应对措施。

关键词： 地缘政治冲突；药品可及性；药品供应链；经济制裁；卫生系统韧性；中低收入国家。

1. Introduction

Access to essential medicines is a cornerstone of effective health systems and a fundamental component of universal health coverage. Yet, despite sustained global efforts, significant gaps persist—particularly in low- and middle-income countries (LMICs), where many populations continue to lack reliable access to essential treatments. Access to medicines is inherently multidimensional, encompassing availability, affordability, and appropriate use, all of which are shaped by complex interactions across health systems and global markets [1, 2].

In recent years, geopolitical conflicts—including armed conflicts, economic sanctions, and trade disruptions—have emerged as powerful but under-recognized determinants of health. These forces are reshaping global health systems and increasingly influencing the accessibility of medicines. However, their effects are often examined in isolation, with limited integration into broader pharmaceutical policy and health systems discourse [3, 4]. This conceptual policy commentary aims to position geopolitical conflicts as critical yet under-recognized determinants of access to medicines in low- and middle-income countries and to advocate for their systematic integration into pharmaceutical policy and health systems research. The paper integrates geopolitical risk into existing pharmaceutical policy and health-system resilience frameworks for LMICs. The author explains

how geopolitical factors act as "emerging determinants" that extend beyond traditional access models focused solely on health-system financing and governance.

2. Geopolitical Forces and Pharmaceutical Systems

Modern pharmaceutical systems operate within highly globalized supply chains involving multiple countries, actors, and regulatory environments. While this interconnectedness has improved efficiency, it has also introduced systemic vulnerabilities. Dependence on a limited number of manufacturing hubs, combined with complex distribution networks, makes the medicine supply highly sensitive to external shocks [5].

Geopolitical conflicts can disrupt these systems through several mechanisms. Trade restrictions and sanctions may limit access to raw materials and finished pharmaceutical products, while armed conflicts can damage infrastructure and disrupt logistics networks. Financial instability, including currency fluctuations and restricted banking systems, can increase procurement costs, thereby reducing affordability for both health systems and patients [6, 7].

The COVID-19 pandemic further illustrated how geopolitical dynamics can undermine global solidarity. The emergence of vaccine nationalism and fragmented international cooperation exposed the fragility of existing governance systems and raised concerns about

the equitable distribution of essential medical products [8].

Figure 1 illustrates the specific pathways through which geopolitical conflicts affect medicine access.

This includes the sequence from conflict/sanctions to trade restrictions, supply disruptions, increased procurement costs, and ultimately, adverse clinical and equity consequences.

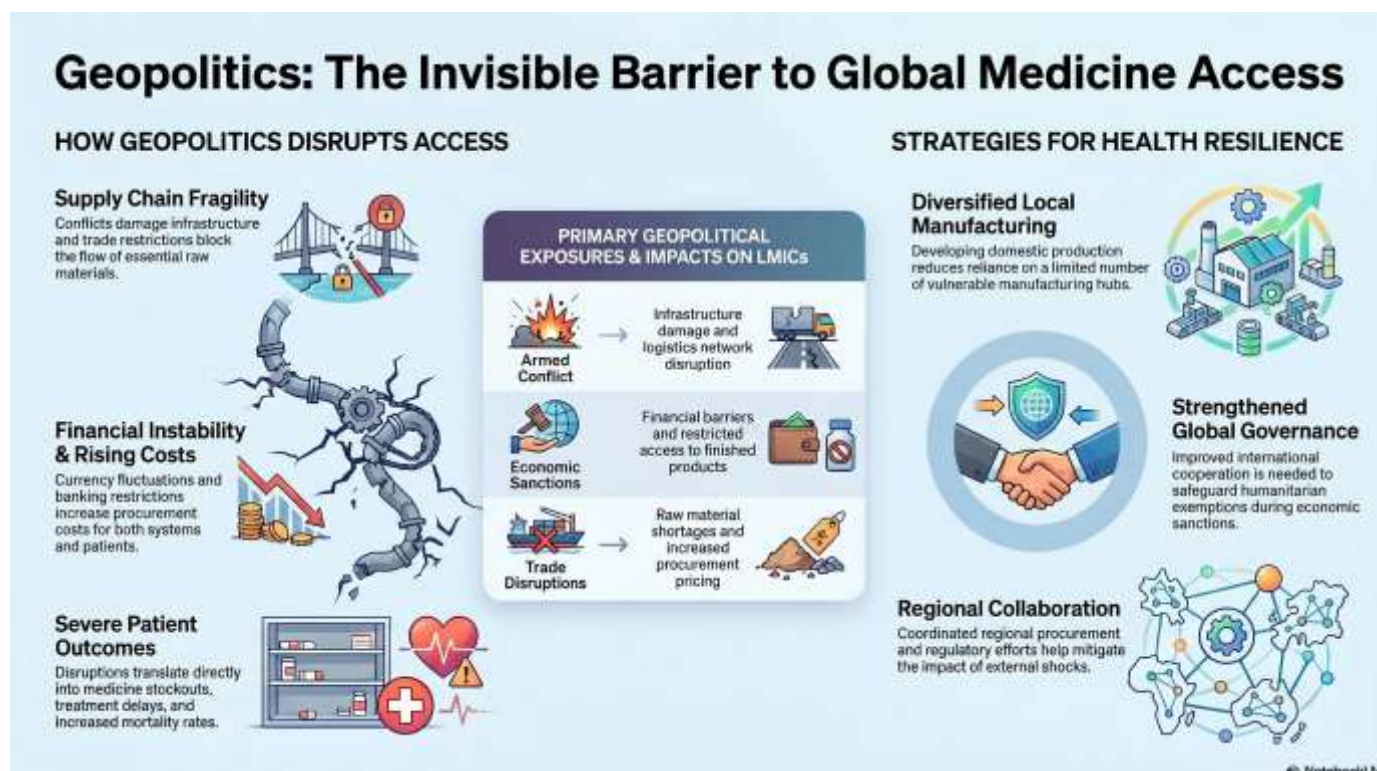


Figure 1. Pathways through which geopolitical conflicts affect access to medicines and strategies for strengthening pharmaceutical-system resilience.

3. Implications for LMICs

The impact of geopolitical disruptions is disproportionately borne by LMICs. These settings often face structural constraints, including limited domestic manufacturing capacity, weak procurement systems, and heavy reliance on imports. As a result, disruptions in global supply chains can quickly translate into medicine shortages, treatment delays, and higher prices [1, 5].

Evidence indicates that such disruptions are associated with adverse clinical and economic outcomes, including increased mortality, higher out-of-pocket expenditures, and reduced treatment adherence [9]. These challenges exacerbate existing health inequities and undermine progress toward universal health coverage.

Furthermore, geopolitical instability can weaken national health systems more broadly by diverting resources away from healthcare, displacing healthcare workers, and reducing international aid flows. These cascading effects reinforce the need to view access to medicines as embedded within broader political and economic contexts [3].

Geopolitical disruptions affect access to medicines not only through formal policy restrictions but also via practical financial and logistical barriers that persist despite humanitarian exemptions. For example, in countries under economic sanctions such as Iran and Syria, studies have documented that although medicines are technically exempt, international banking restrictions and “over-compliance” by global financial institutions limit the ability of importers to process payments, resulting in delayed procurement and reduced availability of essential medicines [6, 7]. These financial constraints are further compounded by currency instability and limited access to foreign exchange, increasing the cost of medicines and disrupting supply continuity.

Similarly, sanctions-related logistics constraints—such as restricted shipping routes, insurance limitations, and reluctance of multinational suppliers to engage with sanctioned markets—create additional bottlenecks. In practice, these factors can lead to prolonged stockouts of critical therapies (e.g., oncology drugs or insulin), even when no formal trade ban exists. This illustrates how the operationalization of sanctions regimes, rather than their legal design alone, determines real-world access to medicines.

Armed conflicts provide further evidence of how infrastructure and logistics disruptions directly affect pharmaceutical systems. In Yemen and Ukraine, conflict-related damage to transport networks, healthcare facilities, and storage infrastructure has significantly curtailed the distribution of medicines, particularly temperature-sensitive products such as vaccines and biologics [10-15]. Supply chain fragmentation in these settings has resulted in interruptions to chronic disease management and emergency care, underscoring the fragility of centralized and import-dependent systems.

The COVID-19 pandemic offers a complementary example through vaccine nationalism, where high-income countries secured large advance purchase agreements, limiting early access for LMICs [16]. Mechanisms such as export restrictions and preferential allocation reduced the availability of vaccines through multilateral initiatives like COVAX, highlighting how geopolitical priorities can override global equity commitments [17]. This resulted in delayed immunization rollouts in many LMICs, prolonging the public health and economic impacts of the pandemic [18, 19].

Collectively, these examples demonstrate that banking restrictions, supply chain fragmentation, and geopolitical prioritization act as *de facto* barriers to access to medicine, even in the presence of formal safeguards such as humanitarian exemptions. Integrating these operational realities into pharmaceutical policy analysis is essential for developing more resilient and equitable access frameworks.

4. Conceptual Gap: Geopolitics as a Determinant of Access

Despite growing recognition of these issues, geopolitical factors remain insufficiently integrated into existing frameworks for access to medicines. Traditional models emphasize health system components—such as financing, governance, and service delivery—but often overlook external macro-level determinants [1].

Emerging literature suggests that geopolitical dynamics should be considered part of the broader “geopolitical determinants of health,” reflecting how global power structures, economic policies, and international relations influence health outcomes [3, 4]. However, current evidence remains fragmented, dispersed across disciplines, and largely focused on specific events or regions rather than providing a comprehensive understanding of the issue.

This fragmentation limits policymakers' and researchers' ability to identify consistent pathways and develop coordinated responses to mitigate the impact of geopolitical disruptions on access to medicine.

5. Towards a Systems-Oriented Response

Addressing the effects of geopolitical conflicts on access to medicines requires the development of more resilient and diversified pharmaceutical systems. Key strategies include strengthening local manufacturing capacity, diversifying suppliers and procurement routes, and enhancing regional cooperation to reduce dependence on a limited number of production centres and supply channels [5].

Global governance mechanisms should also be strengthened to promote equitable access to essential medicines during crises. This requires greater transparency across pharmaceutical supply chains, effective implementation of humanitarian exemptions under sanctions regimes, and stronger international cooperation in pharmaceutical regulation, procurement, financing, and distribution [7,8].

Geopolitical risk assessment should be systematically integrated into pharmaceutical policy and health-systems research. A more comprehensive understanding of how armed conflicts, sanctions, financial restrictions, and logistical disruptions affect access to medicines can support the development of proactive, adaptive, and context-specific policy responses.

Specific measures should include the establishment of strategic medicine stockpiles, regional pooled procurement mechanisms, and stronger local production of active pharmaceutical ingredients (APIs) and generic medicines. Strategic stockpiling can help maintain access to essential medicines and mitigate supply disruptions during emergencies [20–22]. Regional pooled procurement may strengthen bargaining power, reduce costs, and improve supply stability, particularly in smaller or resource-constrained health systems [23,24]. Expanding local pharmaceutical production can also reduce dependence on external suppliers and strengthen health-system resilience in LMICs [25,26].

6. Conclusion

Geopolitical conflicts are emerging as critical yet underappreciated determinants of access to medicines in LMICs. By disrupting pharmaceutical supply chains, increasing costs, and weakening health systems, these forces pose significant threats to global health equity.

Recognizing geopolitics as a central factor in access to medicine is essential for advancing research, informing policy, and strengthening health system resilience. There is an urgent need for interdisciplinary approaches that integrate global health, political economy, and pharmaceutical policy to address these complex challenges.

Future research, such as comprehensive evidence syntheses, will play a key role in mapping the pathways through which geopolitical conflicts affect medicine

access and identifying strategies to mitigate their impact in vulnerable settings.

Declarations

Author Contributions

- Conceptualization, resources, writing—original draft preparation, writing—review and editing are solely contribution of the author. The author has read and agreed to the published version of the manuscript.

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- Data sharing not applicable: No new data were created or analyzed in this study. Data sharing is not applicable to this article.

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The study and ideas did not involve humans.

Conflicts of Interest

The author declares that there is no conflict of interests regarding the publication of this manuscript. In addition, the ethical issues, including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, and redundancies have been completely observed by the authors.

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