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REVIEW

Brazil–China relations in health: historical context, industrial challenges, and future opportunities

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ABSTRACT

This article analyzes the evolving health cooperation between Brazil and China as a strategic frontier in South-South collaboration. At a time of global health insecurity and technological inequality, the partnership between these two continental powers offers a transformative alternative to traditional donor-recipient models. The analysis traces a shift from commodity-based trade to a potential alliance in co-innovation, encompassing vaccines, artificial intelligence, biotechnology, and digital health. Brazil's deep dependency on imported medical inputs and its fragmented industrial base stand in contrast to China's state-led model of technological scaling and global health outreach. Yet, this asymmetry also reveals opportunities: Brazil's universal health system, research institutions, and regional leadership can be aligned with China's production capacity, digital infrastructure, and development finance to build shared technological sovereignty. The paper examines how Brazil's renewed industrial policy under Lula's administration opens new pathways

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for joint research and development, regional pharmaceutical production, and equitable technology transfer. It also confronts persistent challenges–technological imbalances, intellectual property constraints, institutional volatility, and geopolitical pressures aimed at curtailing South-South alignment. A successful partnership, the article argues, must be grounded in transparent governance, mutual benefit, and a commitment to health as a public good. It concludes with a proposal for a decentralized health innovation ecosystem in Brazil, inspired by China's special economic zones, to overcome the historical concentration of technological power and promote equitable development across the North, Northeast, and Center-West. In doing so, the Brazil–China relationship can become a model for a more just, resilient, and multipolar global health order.

Key Words: Brazil–China relations; global health diplomacy; health industrial policy; South-South cooperation; technological sovereignty; geopolitical economy of health

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Introduction

In an era of converging global crises–from pandemics to climate change–the architecture of global health remains deeply unequal. Technological power is concentrated in a handful of nations, while the Global South often remains dependent on external supply, aid, and conditional partnerships. Within this fragmented landscape, the relationship between Brazil and China emerges as a strategic possibility: not merely a bilateral exchange of goods, but a potential catalyst for a new paradigm of South-South co-innovation.

This paper examines the evolving health cooperation between two continental powers, tracing its historical development, diagnosing its structural challenges, and charting a path toward shared technological sovereignty. Brazil, home to the world's largest public health system, the Unified Health System (In Portuguese: Sistema Único de Saúde, SUS) [1–5], possesses the institutional reach and public mandate to anchor a national health innovation ecosystem. Yet, decades of deindustrialization have left it critically dependent on imported medical technologies and active pharmaceutical ingredients (APIs) – a vulnerability exposed during the COVID-19 pandemic [6, 7].

China, in contrast, has become a global leader in biomanufacturing, digital health, and state-led technological development. Its Belt and Road Initiative and Health Silk Road are not only infrastructure projects but instruments of health diplomacy and industrial outreach. The convergence of Brazil's developmental ambitions under Lula's neoindustrialization agenda and China's global expansion offers a rare opportunity to move beyond commodity-based trade toward joint research and development (R&D), co-production, and equitable knowledge transfer[1].

This article argues that Brazil–China health cooperation must be reimagined not as a transaction, but as a strategic alliance for health sovereignty–one that strengthens SUS, decentralizes innovation across

[1] Ministério da Saúde. Plano Estratégico do Ministério da Saúde 2023–2026 [Ministry of Health. Strategic Plan of the Ministry of Health 2023–2026]. 2023. (In Portuguese). Accessed 30.09.2025. https://www.gov.br/saude/pt-br/acesso-a-informacao/governanca/planejamento-estrategico

Brazil's regions, and contributes to a more just global health order. The path forward is fraught with asymmetries, geopolitical pressures, and institutional fragility. But if grounded in transparency, reciprocity, and long-term vision, this partnership can become a transformative force for equity, resilience, and solidarity in the 21st century.

Historical background of Brazil–China relations

The diplomatic relationship between Brazil and China, formally established on August 15, 1974, emerged during a period of strategic recalibration for both nations. Brazil, under a military government, sought to diversify its foreign policy beyond traditional Western alliances, while China, following its 1971 admission to the United Nations, was gradually reengaging with the international system. Brazil's recognition of the People's Republic of China made it the first South American country to do so, breaking with the regional alignment toward Taiwan and signaling an early openness to a long-term partnership [1, 8]. However, for nearly two decades, this diplomatic opening did not translate into substantive cooperation. Economic exchanges remained minimal, high-level visits were infrequent, and neither country prioritized the other in its foreign policy calculus.

A decisive shift occurred in the 1990s, as both nations embraced outward-oriented development strategies. The 1993 visit of Chinese Premier Li Peng to Brazil marked the first high-level exchange since the establishment of diplomatic relations and led to the creation of the China–Brazil High-Level Commission on Economic, Trade, Scientific, and Technological Cooperation (Cosban) [8, 9]. This institutional mechanism became the cornerstone of bilateral coordination, enabling sustained dialogue across sectors [1]. The same year, the two countries elevated their relationship to a strategic partnership, one of China's first such designations with a developing country. This recognition reflected a growing convergence of geopolitical interests and laid the foundation for deeper engagement.

The partnership was further strengthened in 2012, when Brazil and China upgraded their ties to a Comprehensive Strategic Partnership, integrating cooperation in space technology, energy, agriculture, and health. This evolution coincided with a dramatic expansion in trade, driven by China's industrialization and its growing demand for raw materials. Brazil, rich in natural resources, became a key supplier of soy, iron ore, and crude oil, anchoring a trade relationship that would make China Brazil's largest trading partner by the 2010s [2]. Yet, as authors observe, this economic interdependence has not been matched by a commensurate development of technological or industrial symmetry [2, 9]. Brazil's role has largely remained that of a commodity exporter, while China has consolidated its position as a global leader in manufacturing, innovation, and infrastructure investment.

Cultural and institutional perceptions have further shaped the trajectory of the relationship. Public understanding of China in Brazil remains limited, often confined to its economic presence rather than its broader technological or geopolitical dimensions. In contrast, China's view of Brazil tends to emphasize its natural endowments and agricultural potential, reinforcing a commodity-centric narrative [2]. These asymmetries are mirrored in business practices: Brazilian corporate culture, rooted in low-context communication, values directness and explicitness, while Chinese business environments operate within a high-context framework, where meaning is embedded in hierarchy, context, and indirect expression

[10]. These differences, as noted, can affect negotiation dynamics, trust-building, and the effectiveness of joint ventures, particularly in technology transfer and co-development projects [10, 11].

The roots of China's global engagement, including its outreach to Latin America, can be traced to the economic reforms initiated by Deng Xiaoping in the late 1970s. His policy of "reform and opening-up" reoriented China's development model toward export-led growth, foreign investment, and technological modernization. This shift not only transformed China's domestic economy but also redefined its foreign policy, prioritizing economic cooperation over ideological confrontation. The strategy of "hiding capabilities and biding time" (In Chinese: taoguang yanghui) allowed China to build influence through trade, investment, and infrastructure, rather than through military or ideological competition[2] [8]. Over time, this approach laid the groundwork for initiatives such as the Belt and Road Initiative, which extended China's connectivity agenda beyond Asia into Africa, the Middle East, and Latin America.

For Brazil, the implications of this strategic evolution are profound. The growing interdependence with China is no longer confined to trade but extends to critical domains such as health, digital infrastructure, and biotechnology. The pandemic-era collaboration between the Butantan Institute and Sinovac demonstrated the potential for joint vaccine production, yet also revealed the limits of current cooperation, particularly in intellectual property and local technological absorption[3]. As both countries navigate a complex geopolitical landscape–marked by U.S. pressure to decouple from Chinese technology and growing competition for influence in Latin America–the need for a mature, balanced, and forward-looking bilateral relationship has never been greater.

The historical trajectory of Brazil–China relations thus reflects a transition from diplomatic recognition to economic interdependence, and now to the possibility of strategic co-development. While structural asymmetries and cultural differences persist, they do not preclude a deeper, more equitable partnership. On the contrary, they underscore the importance of building institutional mechanisms, mutual understanding, and shared technological goals that can transform a relationship of convenience into one of lasting strategic value.

Industrial policy and technological development in the Brazilian health sector

Brazil's health sector remains structurally dependent on imported technologies and pharmaceuticals, a condition that undermines its public health resilience and technological sovereignty. According to the Brazilian Health Regulatory Agency (In Portuguese: Agência Nacional de Vigilância Sanitária, ANVISA), over 70% of APIs used in domestically manufactured drugs are imported, primarily from China and India[4]. Similarly, more than 60% of high-value medical devices used in public hospitals are sourced from abroad, including magnetic resonance imaging machines, ventilators, and surgical robotics. This dependency exposes the SUS to global supply chain disruptions, price volatility, and geopolitical risks – issues starkly revealed during the COVID-19 pandemic.

[2] Ministry of Foreign Affairs People's Republic of China Global Development Initiative – Building on 2030 SDGs for Stronger, Greener and Healthier Global Development (Concept Paper). Accessed 30.09.2025. https://www.mfa.gov.cn/eng./zy/jj/GDI_140002/wj/202406/P020240606606193448267.pdf

[3] Fundação Oswaldo Cruz (Fiocruz). Relatório de Atividades 2022: Inovação e Produção para a Saúde Pública [2022 Activity Report: Innovation and Production for Public Health]. 2022. (In Portuguese). https://fiocruz.br/relatorios-anuais?utm

[4] Secretaria de Comércio Exterior (SECEX), Ministério da Economia, Brazil. Estatísticas de Comércio Exterior de Produtos Farmacêuticos [Secretariat of Foreign Trade (SECEX), Ministry of Economy, Brazil. Foreign Trade Statistics of Pharmaceutical Products]. 2023. (In Portuguese). Accessed 30.09.2025. https://www.gov.br/mdic/pt-br/assuntos/comercio-exterior/estatisticas

The pandemic exposed the fragility of Brazil's health industrial base. Shortages of ventilators, personal protective equipment, and diagnostic reagents forced the government into emergency diplomacy to secure supplies. As one analysis noted, "the lack of domestic production capacity led to delays in testing, treatment, and containment, undermining the effectiveness of the national response" [12, 13]. Despite the efforts of institutions like Fiocruz and the Butantan Institute to produce vaccines locally, the country remained reliant on foreign suppliers for critical inputs, including viral seeds, bioreactors, and reagents.

This dependency is not merely a technical failure, but the result of decades of deindustrialization and underinvestment in science and technology. Since the 1990s, Brazil has pursued a liberal economic model that prioritized trade openness over strategic industrial development. However, unlike China, which liberalized its economy while preserving strong state direction, Brazil dismantled key institutions and reduced public investment in innovation. As Isabella M. Weber observes in How China Escaped Shock Therapy, "China adopted liberalizing measures, but not at the expense of undermining the capacity of the socialist state". In contrast, Brazil's state capacity in health technology production has been systematically eroded [6, 7].

The consequences are evident in the fragmented and underdeveloped domestic supply chain. While Brazil has strong research institutions, the transition from innovation to industrial scale remains weak. There is a notable absence of a cohesive innovation ecosystem linking academia, startups, and industry. Venture capital in health technology is limited, and regulatory processes at ANVISA, though rigorous, are often slow and bureaucratic, creating bottlenecks for new products.

Moreover, the integration between public research institutions and the private sector is limited. Fiocruz and Butantan have demonstrated world-class capabilities in vaccine development, yet their production is often confined to fill-and-finish operations under foreign licensing agreements. As one expert noted, "Brazil produces the vaccine, but does not own the technology". This lack of technological autonomy restricts the country's ability to adapt formulations, scale production independently, or respond swiftly to emerging health threats[5,6].

The situation is further compounded by geographic concentration of technological capacity. The health economic-industrial complex remains heavily centralized in the Southeast and South, particularly in São Paulo and Rio de Janeiro. This concentration reinforces regional inequalities and limits the potential for a more inclusive, decentralized innovation model. In contrast, China's development strategy has emphasized regional redistribution of industrial capacity through Special Economic Zones, a model that Brazil could adapt to promote technological development in the North, Northeast, and Center-West.

To overcome these challenges, Brazil must reassert the role of the state in guiding industrial policy. The return of President Lula da Silva has brought renewed emphasis on neoindustrialization, with health technology and biomanufacturing identified as strategic sectors. Initiatives such as National Industrialization Plan (In Portuguese: Plano Nacional de Industrialização, PNI) and the Brazil–China Health Technology Fund offer opportunities to rebuild domestic capacity. However, success will depend

[5] Vianna Sobrinho L. Saúde e inteligência artificial: o que podemos aprender com a China [Health and artificial intelligence: what can we learn from China.]. São Paulo: Hucitec Publishing; 2024. (In Portuguese). Accessed 30.09.2025. https://outraspalavras.net/tecnologiaemdisputa/saude-e-ia-o-que-podemos-aprender-com-a-china/

[6] Banco Nacional de Desenvolvimento Econômico e Social (BNDES). BNDES and CEXIM sign agreement to strengthen co-investments and cooperation between Brazil and China Rio de Janeiro; Feb 19, 2025 Accessed 30.09.2025. https://www.bndes.gov.br/SiteBNDES/bndes/bndes_en/conteudos/noticia/BNDES-and-CEXIM-sign-agreement-to-strengthen-co-investments-and-cooperation-between-Brazil-and-China/

on coherent policy implementation, long-term financing, and equitable technology transfer agreements.

Brazil's industrial challenges in health reflect a historical trajectory of policy choices–one that prioritized short-term efficiency over long-term sovereignty. By learning from models of state-led development, particularly in countries like China, and by leveraging its public health infrastructure and research capacity, Brazil can transform its health sector from a site of dependency into a catalyst for national development and technological equity.

Lula's neoindustrialization agenda and its implications for health

The return of Luiz Inácio Lula da Silva to the presidency in 2023 marked a decisive shift in Brazil's economic and technological trajectory. After years of austerity, deindustrialization, and underinvestment in science and innovation under the previous administration, Lula's government has launched an ambitious neoindustrialization agenda aimed at revitalizing domestic production, reducing foreign dependency, and reasserting the state's role in guiding strategic development. At the heart of this agenda lies a renewed recognition of health as a strategic sector – not only for public well-being but as a driver of technological sovereignty, job creation, and inclusive growth[7].

This shift is formalized in key policy documents such as the PNI and the Action Plan for Sustainable Development (In Portuguese: Plano de Ação para o Desenvolvimento Sustentável, PDES), both relaunched in 2023 by the Ministry of Development, Industry, Commerce, and Services (In Portuguese: Ministério do Desenvolvimento, Indústria, Comércio e Serviços, MDIC). As stated in the PNI, "The reindustrialization of Brazil must be based on innovation, sustainability, and social inclusion, with strategic sectors such as health, energy, and digital technologies at the forefront"[8]. This marks a departure from the liberal economic model of the 1990s and early 2000s, which prioritized trade openness at the expense of productive capacity. The macroeconomic results of that era were severe: a drop in gross domestic product growth, rising unemployment–particularly in industry–and a surge in external debt, as noted by Nilson Araújo de Souza, who observed that industrial employment fell by 42% during the Fernando Henrique Cardoso administration[9] [14].

In contrast, Lula's current agenda seeks to reverse decades of deindustrialization by identifying health technologies and biotechnology as central pillars of national development. The Ministry of Health's Plano Estratégico 2023–2026 explicitly prioritizes "strengthening national productive capacity in health inputs" and reducing dependency on imported APIs and medical equipment[10]. This is not merely a health policy objective but a national security imperative, as underscored in the 2023 update of the National Security Strategy (In Portuguese: Estratégia Nacional de Segurança, ENS), which identifies health sovereignty as a strategic asset[11].

[7] Brazil launches new industrial policy with development goals and measures up to 2033. Accessed 30.09.2025. https://www.gov.br/planalto/en/latest-news/2024/01/brazil-launches-new-industrial-policy-with-development-goals-and-measures-up-to-2033?utm

[8] Ministério do Desenvolvimento, Indústria, Comércio e Serviços (MDIC). Plano Nacional de Industrialização (PNI) [Ministry of Development, Industry, Commerce and Services (MDIC). National Industrialization Plan (PNI)]. 2023a. (In Portuguese). Accessed 30.09.2025. https://www.gov.br/mdic/pt-br

[9] Vieira FS, Benevides RPS. Os impactos do novo regime fiscal para o financiamento do Sistema Único de Saúde e para a efetivação do direito à saúde no Brasil. [The impacts of the new tax regime on the financing of the Unified Health System and the realization of the right to health in Brazil.] Nota Técnica 28. Brasília: IPEA; 2016. (In Portuguese). Accessed 30.09.2025. http://repositorio.ipea.gov.br/handle/11058/7270

[10] Ministério da Saúde. Plano Estratégico do Ministério da Saúde 2023–2026 [Ministry of Health. Strategic Plan of the Ministry of Health 2023–2026]. 2023. (In Portuguese). Accessed 30.09.2025. https://www.gov.br/saude/pt-br/acesso-a-informacao/governanca/planejamento-estrategico

[11] Ministério do Meio Ambiente. Relatório Anual do Fundo Amazônia 2023 [Ministry of the Environment. Annual Report of the Amazon Fund 2023]. 2023. (In Portuguese). Accessed 30.09.2025. https://www.fundoamazonia.gov.br/export/sites/default/pt/.galleries/documentos/rafa/RAFA_2023_port.pdf

The government has taken concrete steps to operationalize this vision. The Ministry of Science, Technology, and Innovation (In Portuguese: Ministério da Ciência, Tecnologia e Inovação, MCTI) has relaunched its Plano Estratégico 2023–2026, allocating increased funding to priority areas such as vaccine development, AI in health, and sustainable pharmaceuticals[12]. The National Bank for Economic and Social Development (In Portuguese: Banco Nacional de Desenvolvimento Econômico e Social, BNDES) has also been repositioned as a key instrument of industrial policy, launching the Innovation and Reindustrialization Support Program (In Portuguese: Programa de Apoio à Inovação e Reindustrialização, ProInova), which has mobilized 50 billion Brazilian reals (approximately 10 billion United States dollars) to finance projects in strategic sectors, including health technology and biomanufacturing[13].

These financial instruments are complemented by regulatory and fiscal incentives. The Lei do Bem (Law No. 11,196/2005)[14], which provides tax credits for innovation, has been expanded to include digital health, telemedicine, and biotech startups. Additionally, the Ministry of Health has strengthened local content requirements in public procurement: as of 2024, 30% of all medical device purchases by SUS must include a minimum level of national production, with incentives for higher integration[15].

To foster innovation, the government has announced the creation of the Brazilian Biotechnology and Health Innovation Network (Rede Biotec Brasil), a cross-institutional initiative linking Fiocruz, Butantan, Vital Brazil, and other public research centers with universities and private firms[16,17]. This network aims to accelerate technology transfer and scale-up in areas such as mRNA vaccines, monoclonal antibodies, and AI-driven diagnostics. The model draws inspiration from China's Shanghai Zhangjiang Biotech Park and India's Hyderabad Genome Valley, where concentrated investment in infrastructure, talent, and regulation has created innovation hubs of global significance.

Moreover, the agenda recognizes the need to regionalize industrial development. Rather than allowing technological capacity to remain concentrated in the Southeast and South, the government is exploring the establishment of specialized industrial zones in the North, Northeast, and Center-West. These zones would leverage regional comparative advantages – such as biodiversity in the Amazon or solar energy in the Northeast – to develop context-specific health technologies. As one policy analyst noted, "The future of Brazilian health innovation cannot be confined to São Paulo and Rio. It must be territorial, just as it must be technological".

This strategic reorientation is also reflected in Brazil's foreign policy. The 2023 Joint Statement on the Strategic Partnership between Brazil and China explicitly recognizes health as a priority area, stating that

[12] Ministério da Ciência, Tecnologia e Inovação (MCTI). Plano Estratégico do Ministério da Ciência, Tecnologia e Inovação 2023–2026 [Ministry of Science, Technology and Innovation. Strategic Plan of the Ministry of Science, Technology and Innovation 2023–2026]. 2023. (In Portuguese). Accessed 30.09.2025. https://antigo.mctic.gov.br/mctic/opencms/ciencia/SEPED/Publicacoes/ENCTI/PlanosDeAcao.html

[13] Banco Nacional de Desenvolvimento Econômico e Social (BNDES). Programa de Apoio à Inovação e Reindustrialização (ProInova) [National Bank for Economic and Social Development (BNDES). Innovation and Reindustrialization Support Program (ProInova)]. 2023. (In Portuguese). Accessed 30.09.2025. https://www.bndes.gov.br

[14] Secretaria da Receita Federal. Instrução Normativa RFB No. 2156/2023 – Atualização da Lei do Bem [Federal Revenue Service. Normative Instruction RFB No. 2156/2023 – Update of the "Lei do Bem" (Innovation Incentives Law)]. 2023. (In Portuguese). Accessed 30.09.2025. https://www.legisweb.com.br/legislacao/?id=448550

[15] Ministério da Saúde. Governo Federal prioriza indústria nacional em compra de equipamentos para o SUS. [Ministry of Health. Federal Government prioritizes domestic industry in purchasing equipment for the SUS.] 2025. (In Portuguese). Accessed 30.09.2025. https://www.gov.br/saude/pt-br/assuntos/noticias/2025/agosto/governo-federal-prioriza-industria-nacional-em-compra-de-equipamentos-para-o-sus?utm

[16] Vianna Sobrinho L. Saúde e inteligência artificial: o que podemos aprender com a China [Health and artificial intelligence: what can we learn from China.]. São Paulo: Hucitec Publishing; 2024. (In Portuguese). Accessed 30.09.2025. https://outraspalavras.net/tecnologiaemdisputa/saude-e-ia-o-que-podemos-aprender-com-a-china/

[17] Banco Nacional de Desenvolvimento Econômico e Social (BNDES). BNDES and CEXIM sign agreement to strengthen co-investments and cooperation between Brazil and China Rio de Janeiro; Feb 19, 2025 Accessed 30.09.2025. https://www.bndes.gov.br/SiteBNDES/bndes/bndes_en/conteudos/noticia/BNDES-and-CEXIM-sign-agreement-to-strengthen-co-investments-and-cooperation-between-Brazil-and-China/

both countries "commit to enhancing cooperation in public health, biotechnology, traditional medicine, and digital health"[18,19] [15]. This high-level endorsement opens the door for deeper collaboration in co-development, co-manufacturing, and joint research–provided that such partnerships are structured to ensure equitable knowledge transfer and shared ownership.

The neoindustrialization agenda, therefore, represents more than a return to state-led development; it is an effort to build a resilient, sovereign, and equitable health ecosystem. It acknowledges that health is not a cost, but an investment–one that can drive industrial transformation, reduce regional inequalities, and strengthen Brazil's position in the global order. As Lula himself has stated, "Development without inclusion is not development". In the health sector, this principle must be operationalized through policies that not only produce medicines and devices but also produce justice, equity, and autonomy.

Opportunities for Brazil–China collaboration in health

The strategic partnership between Brazil and China in the health sector presents a transformative opportunity to redefine the contours of South-South cooperation. This relationship, historically anchored in trade and emergency procurement, is now poised to evolve into a model of co-innovation, shared industrial development, and technological sovereignty. At the heart of this potential lies a convergence of interests: Brazil's need to strengthen its domestic health production and reduce dependency on imported technologies, and China's ambition to expand its global health diplomacy through the Belt and Road Initiative and the Health Silk Road. When structured with transparency, equity, and long-term vision, this collaboration can serve not only national interests but also contribute to a more just and resilient global health order.

A central pillar of this partnership is the role of the SUS as more than a provider of universal care – it is a strategic demand-pull mechanism capable of shaping industrial policy and driving innovation[20] [2, 4, 5, 10, 14]. With an annual procurement budget exceeding 200 billion Brazilian reals, SUS represents one of the largest public health markets in the world. If leveraged strategically, this purchasing power can be used to incentivize local assembly, technology transfer, and co-development of medical technologies tailored to tropical and resource-constrained environments. As one policy analyst noted, "The state is not just a regulator or funder; it is a market architect". By conditioning public procurement on local content and knowledge sharing, Brazil can transform its dependency into a platform for industrial upgrading [14, 16].

This potential was demonstrated during the COVID-19 pandemic, when the Butantan Institute partnered with Sinovac to produce over 200 million doses of the CoronaVac vaccine[21]. While the agreement was limited to fill-and-finish operations and did not include full intellectual property transfer, it proved that public institutions can rapidly scale up production when supported by international collaboration. Building on this experience,

[18] Itamaraty, Ministry of Foreign Affairs of China. Joint Statement on the Strategic Partnership between Brazil and China. Brasília/Beijing; 2023. Accessed 30.09.2025. https://www.fmprc.gov.cn/eng/zy/wjls/3604_665547/202405/t20240531_11367559.html?utm

[19] Ministry of Foreign Affairs People's Republic of China Global Development Initiative – Building on 2030 SDGs for Stronger, Greener and Healthier Global Development (Concept Paper). Accessed 30.09.2025. https://www.mfa.gov.cn/eng./zy/jj/GDI_140002/wj/202406/P020240606606193448267.pdf

[20] Vieira FS, Benevides RPS. Os impactos do novo regime fiscal para o financiamento do Sistema Único de Saúde e para a efetivação do direito à saúde no Brasil. [The impacts of the new tax regime on the financing of the Unified Health System and the realization of the right to health in Brazil.] Nota Técnica 28. Brasília: IPEA; 2016. (In Portuguese). Accessed 30.09.2025. http://repositorio.ipea.gov.br/handle/11058/7270

[21] Fundação Oswaldo Cruz (Fiocruz). Relatório de Atividades 2022: Inovação e Produção para a Saúde Pública [2022 Activity Report: Innovation and Production for Public Health]. 2022. (In Portuguese). https://fiocruz.br/relatorios-anuais?utm

future cooperation should aim for deeper integration – moving beyond technology access to co-ownership of production platforms. Joint ventures in mRNA vaccines, viral vector technologies, and biosimilars could enable Brazil and China to jointly develop vaccines for dengue, Zika, and leishmaniasis–diseases that disproportionately affect populations across Latin America, Africa, and Asia.

To achieve this, both countries must invest in binational research and manufacturing hubs. A proposed Brazil–China Health Technology Fund, co-financed by BNDES and Chinese development agencies such as the Silk Road Fund or the China International Development Cooperation Agency, could support such initiatives. These hubs would not only enhance regional preparedness but also serve as training grounds for a new generation of scientists and engineers. As Massuda et al. warned in The Lancet, political shifts and fiscal austerity pose significant threats to the continuity of SUS, underscoring the need for long-term, cross-administration commitments to health innovation [12].

Beyond vaccines, cooperation can extend to digital health and artificial intelligence. China leads in artificial intelligence-driven diagnostics, telemedicine platforms, and smart hospital systems, while Brazil has developed a robust primary care network through the Estratégia Saúde da Família.

By integrating Chinese technological infrastructure with Brazilian clinical data and regulatory expertise, the two countries can co-develop artificial intelligence models for disease prediction, chronic disease management, and early outbreak detection. Federated learning frameworks – where AI is trained across hospitals without sharing raw patient data–could ensure privacy compliance while enabling large-scale model development. Moreover, China's experience with Special Economic Zones offers a valuable model for regional industrial development. Just as Shenzhen and Shanghai became centers of technological innovation through state-led investment and policy incentives, Brazil could establish Special Health Innovation Zones in the North, Northeast, and Center-West[22,23].

These zones would combine public research institutions, private firms, and digital infrastructure to produce context-specific solutions–such as low-cost diagnostic devices for rural clinics or solar-powered telehealth units for remote Amazonian communities. In this way, health innovation becomes a tool for territorial equity, breaking the historical concentration of technological capacity in the Southeast and South.

Capacity building and cultural diplomacy are equally essential. Brazil and China should launch joint fellowship programs for engineers, regulators, and data scientists, fostering long-term epistemic communities. As Daniel Veras (2023) observes, "Brazilian corporate culture values direct communication, while Chinese business environments rely on implicit cues and hierarchical deference" [10, 17]. Recognizing these differences is not a barrier but a prerequisite for effective collaboration. Training programs that address language, negotiation styles, and institutional norms can reduce friction and enhance trust.

At the multilateral level, Brazil and China can strengthen their leadership within BRICS and the Forum on China–The Community of Latin American and Caribbean States Cooperation. The BRICS Vaccine R&D Center, for instance, could be expanded to include a Latin American node

[22] Vianna Sobrinho L. Saúde e inteligência artificial: o que podemos aprender com a China [Health and artificial intelligence: what can we learn from China.]. São Paulo: Hucitec Publishing; 2024. (In Portuguese). Accessed 30.09.2025. https://outraspalavras.net/tecnologiaemdisputa/saude-e-ia-o-que-podemos-aprender-com-a-china/

[23] Banco Nacional de Desenvolvimento Econômico e Social (BNDES). BNDES and CEXIM sign agreement to strengthen co-investments and cooperation between Brazil and China Rio de Janeiro; Feb 19, 2025 Accessed 30.09.2025. https://www.bndes.gov.br/SiteBNDES/bndes/bndes_en/conteudos/noticia/BNDES-and-CEXIM-sign-agreement-to-strengthen-co-investments-and-cooperation-between-Brazil-and-China/

hosted by Fiocruz or Butantan, with China providing technical support[24]. Both nations should also advocate for a BRICS Health Technology Pool, where patents, data, and manufacturing know-how are shared among member states to ensure equitable access during health emergencies. Such initiatives would reinforce the principle that health innovation should serve humanity, not just markets.

Ultimately, the success of Brazil–China health cooperation will depend on the quality of its governance. Agreements must be transparent, with clear provisions for IP sharing, local patent filings, and compulsory licensing rights under ANVISA oversight. Joint steering committees, composed of representatives from health ministries, regulatory agencies, and research institutions, should monitor progress and ensure accountability. Without such mechanisms, the risk remains that Brazil will remain a site of final assembly, while China retains control over high-value components and design.

This partnership, therefore, is not merely about trade or technology transfer. It is about reimagining the role of the Global South in global health governance–moving from passive recipients to active co-architects of innovation. By aligning their development agendas, investing in shared infrastructure, and prioritizing equity over extraction, Brazil and China can build a health cooperation model that is not only strategic but also morally transformative.

Challenges and risks in Brazil–China health cooperation

The strategic potential of Brazil–China health cooperation is counterbalanced by a complex matrix of structural, institutional, and geopolitical challenges. While the partnership offers a pathway to technological sovereignty and industrial upgrading, its success depends on the ability of both nations to navigate profound asymmetries, ensure equitable knowledge transfer, and resist external pressures that threaten the autonomy of their collaboration[25,26]. These challenges are not isolated but interconnected, forming an integrative matrix of biotechnological industrial constraints that must be addressed through coordinated policy, transparent governance, and long-term strategic planning.

At the core of this matrix is the asymmetry in technological capabilities. China has emerged as a global leader in biomanufacturing, artificial intelligence, and medical device innovation, supported by decades of state-led investment and integrated supply chains. In contrast, Brazil, despite its strong public research institutions such as Fiocruz and Butantan, faces structural limitations in scaling innovation into industrial production. Its health technology sector remains fragmented, undercapitalized, and heavily dependent on imported inputs. This imbalance risks reproducing a core-periphery dynamic, where Brazil functions primarily as a market for Chinese technologies or a site for final assembly, while China retains control over high-value components such as software algorithms, bioprocess design, and intellectual property[27]. Without deliberate policy interventions to build absorptive capacity and co-ownership models, collaboration may deepen dependency rather than foster sovereignty.

[24] BRICS nations launch vaccine R&D center. Accessed 30.09.2025. https://english.news.cn/20220323/39c4aab5da0b4f30ad28ad738d838162/c.html?utm

[25] Secretaria de Comércio Exterior (SECEX), Ministério da Economia, Brazil. Estatísticas de Comércio Exterior de Produtos Farmacêuticos [Secretariat of Foreign Trade (SECEX), Ministry of Economy, Brazil. Foreign Trade Statistics of Pharmaceutical Products]. 2023. (In Portuguese). Accessed 30.09.2025. https://www.gov.br/mdic/pt-br/assuntos/comercio-exterior/estatisticas

[26] Fundação Oswaldo Cruz (Fiocruz). Relatório de Atividades 2022: Inovação e Produção para a Saúde Pública [2022 Activity Report: Innovation and Production for Public Health]. 2022. (In Portuguese). https://fiocruz.br/relatorios-anuais?utm

[27] World Health Organization. mRNA Technology Transfer (mRNA TT) Programme. Accessed 30.09.2025. https://www.who.int/initiatives/mrna-technology-transfer-(mrna-tt)-programme

This concern is compounded by intellectual property governance. Chinese firms and research institutions often operate under proprietary models that prioritize commercial advantage and strategic interests, which can limit transparency and restrict access to source code, biological materials, or process know-how. Brazil, as a country committed to public health and open science, must navigate this landscape carefully. Overly restrictive IP agreements could undermine the very goals of equity and accessibility that underpin the SUS. There is a risk that co-developed technologies–financed in part by public funds–could become locked behind patents controlled by foreign entities, limiting local adaptation, repair, or generic production. To prevent this, bilateral agreements should incorporate equitable intellectual property clauses, such as royalty-free licensing for public health use, open-access provisions for non-commercial research, and mandatory local patent filings that allow for compulsory licensing under ANVISA oversight.

Another critical challenge lies in the political and economic volatility of both countries. In Brazil, shifts in federal administration have historically led to abrupt changes in science, technology, and industrial policy[28] [12, 13]. The reestablishment of institutions like the MCTI and BNDES under President Lula's government marks a positive reversal after years of underfunding, but the fragility of such gains remains a concern. Budget volatility, bureaucratic inertia, and weak interministerial coordination can delay or derail joint initiatives, particularly those requiring sustained investment over multiple electoral cycles. China, while more institutionally stable, operates under a centralized governance model whose foreign engagements are often aligned with broader geopolitical objectives. This raises questions about the consistency and long-term commitment of Chinese partners in projects that may not yield immediate diplomatic or economic returns.

To overcome these obstacles, cooperation must be grounded in transparent, legally robust, and mutually beneficial agreements. Past collaborations, such as the Butantan-Sinovac arrangement, were conducted under emergency conditions with limited public disclosure, raising concerns about accountability, pricing, and technology access. Future partnerships must be governed by clear contracts that define ownership, data rights, production quotas, and pathways for local capacity building. Such agreements should be subject to parliamentary oversight, civil society engagement, and independent evaluation. Mechanisms for joint monitoring–such as binational steering committees with representation from scientific, regulatory, and public health bodies–can help ensure that projects remain aligned with national development goals.

Beyond bilateral dynamics, the partnership operates within a broader geopolitical contest for influence in Latin America, where the United States of America (USA) continues to exert significant diplomatic and economic pressure. The USA government has long viewed deepening ties between Latin American nations and China as a strategic challenge to its regional dominance [8, 9, 18]. This has manifested in efforts to dissuade countries from engaging with Chinese technology providers – particularly in sensitive sectors such as telecommunications, infrastructure, and health. Brazil, as a relatively large but economically vulnerable middle power, is particularly susceptible to such pressures. USA diplomacy may seek to portray China as an unreliable or opaque partner, framing cooperation as a threat to data security, regulatory integrity, or democratic values.

This geopolitical dimension cannot be ignored. It represents not merely a policy difference, but a structural effort to maintain technological

[28] Vieira FS, Benevides RPS. Os impactos do novo regime fiscal para o financiamento do Sistema Único de Saúde e para a efetivação do direito à saúde no Brasil. [The impacts of the new tax regime on the financing of the Unified Health System and the realization of the right to health in Brazil.] Nota Técnica 28. Brasília: IPEA; 2016. (In Portuguese). Accessed 30.09.2025. http://repositorio.ipea.gov.br/handle/11058/7270

and economic hegemony by limiting the autonomy of Global South nations. By discouraging South-South alliances, the USA aims to preserve a global order in which innovation, production, and standards are predominantly shaped in the Global North. For Brazil, resisting this pressure requires a firm commitment to strategic sovereignty – the ability to choose partners based on national interest, not external coercion.

However, this does not necessitate confrontation. Brazil can pursue a multi-aligned foreign policy, maintaining constructive relations with multiple powers while asserting its right to collaborate with any nation that respects its developmental priorities. In health, this means engaging with China on terms that prioritize transparency, reciprocity, and public benefit – without falling into dependency or inviting destabilizing backlash[29].

The challenges facing Brazil–China health cooperation are substantial, but not insurmountable. They demand not retreat, but foresight: careful design of partnerships, strong institutional safeguards, and a clear-eyed understanding of the global power dynamics at play. By acknowledging asymmetries, protecting public interests, and resisting external coercion, Brazil can engage with China in a way that strengthens its own sovereignty, advances scientific progress, and contributes to a more equitable global health order.

Conclusion and recommendations

The health cooperation between Brazil and China stands at a strategic inflection point. What began as a transactional relationship – anchored in trade and emergency procurement – is now poised to evolve into a model of South-South co-innovation, where shared challenges give rise to shared solutions. The pandemic revealed both the fragility of Brazil's technological dependency and the potential of its public health institutions, from Fiocruz to Butantan, to scale production under international partnership. Yet, as the Butantan-Sinovac experience demonstrated, technology access is not technological sovereignty. Without mechanisms for equitable knowledge transfer, local ownership, and industrial integration, collaboration risks reinforcing asymmetries rather than overcoming them.

Brazil's return to a developmental state under Lula's neoindustrialization agenda creates a historic opportunity to reposition health as a core axis of national strategy–not merely a social right, but a driver of technological upgrading, regional equity, and global influence. The SUS, with its universal reach and institutional depth, can serve as the anchor for a new innovation ecosystem, one that links research, production, and care in a cohesive national project. To realize this vision, Brazil must move beyond reactive policymaking and fragmented initiatives toward a long-term, cross-sectoral strategy that integrates health with industrial, scientific, and foreign policy.

China, for its part, offers not only a market or a supplier, but a strategic partner in technological diffusion. Its experience with Special Economic Zones, state-led scaling of biomanufacturing, and digital health integration provides valuable lessons for Brazil's own efforts to decentralize innovation and overcome the concentration of capacity in the Southeast. A Brazil–China Health Technology Fund, joint research centers, and regional production hubs – particularly in the North, Northeast, and Center-West–could transform health cooperation into a vehicle for territorial development and inclusion.

Yet, this partnership does not unfold in a neutral world. Geopolitical pressures, particularly from the United States, seek to constrain Brazil's autonomy and limit its engagement with China. In this context, the choice is not between alignment and isolation, but between dependency

[29] Fundação Oswaldo Cruz (Fiocruz). Relatório de Atividades 2022: Inovação e Produção para a Saúde Pública [2022 Activity Report: Innovation and Production for Public Health]. 2022. (In Portuguese). https://fiocruz.br/relatorios-anuais?utm

and sovereignty. Brazil's path forward lies in a multi-aligned, assertive foreign policy – one that leverages its strategic position to secure equitable agreements, protect public interests, and contribute to a more just global health order.

The material conditions for such a transformation are already emerging: in the revival of MCTI and BNDES, in the growing recognition of health as a security imperative, and in the proven capacity of Brazilian institutions to innovate under pressure[30–32]. As Marx observed, humanity only raises the problems it can solve, and the problem of health sovereignty arises precisely when the conditions for its solution begin to appear. The challenge now is not to imagine a new future, but to act decisively within the present–to build, together, a health cooperation that is not only strategic, but fair.

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