



Review

The Global South—Economic History and Health Systems Development

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How To Cite: Jakovljevic, M.; Ozaki, A.; Lee, M.; et al. The Global South—Economic History and Health Systems Development. *Global South & Sustainable Development* **2026**, *1*(1), 1.

Received: 20 October 2025

Revised: 12 December 2025

Accepted: 6 January 2026

Published: 12 January 2026

Abstract: The low-and-middle-income-countries (LMICs) of the Global South witness rapid health system development with substantial heterogeneity of affordability of medical care. Financial sustainability challenge is hard to understand without knowledge of economic history. Centuries have witnessed Colonialization, slave trade, world wars, Cold War, Non-Aligned Movement and Colonial Liberation Movements. Painful legacy shaped contemporary economic growth, and ability to invest in healthcare. There is expanding demand for health workforce-to-population ratio and supply of essential pharmaceuticals and medical devices. Despite rapid expansion of the middle class throughout the Global South, out-of-pocket spending remains excessive, while catastrophic healthcare expenditure is widespread. Most of the newly established welfare and abundance of disposable resources for healthcare investment are centered among the BRICS countries (Brazil, Russia, India, China, and South Africa). Despite significant health expenditure growth in PPP terms, LMICs' insufficiently prioritize medicine in budgetary spending. Global South inability to meet ever-rising demand for medical care will remain constrained by wide socioeconomic inequalities and vulnerability of the poor. Sustained economic growth requires strategic interventions that prioritize equitable healthcare access and financial toxicity protection. Without comprehensive reforms that account for historical legacies and resource constraints, the promise of universal health coverage in the Global South will remain elusive.

Keywords: global south; Third World; LMICs; Developing countries; healthcare; sustainability; cost; economics; history; Geopolitics; health financing; BRICS; belt and road; emerging markets; medicine; health economics; health policy

1. Historical Legacy of Colonialism and Slavery in the Global South

The term “Global South” appears to have been first used in 1969 by political activist Carl Oglesby. Writing in the liberal Catholic magazine Commonweal, Oglesby argued that the war in Vietnam was the culmination of a history of northern “dominance over the global south” [1]. Its contemporary constellation consists of the vast number of low-and middle-income countries (LMICs), geo economically belonging to this vast grouping, ranging from Mexico to Argentina in Latin America, from the Arab League nations of Middle East and North Africa (MENA) to Botswana and Zimbabwe in its south, and from Mongolia in Central Asia up to Papua New Guinea in Southeast Asian Oceania. Their joint population size comprises slightly more than 86% of the global population, while their Gross Domestic Product (GDP) counts for approximately 39% of the world’s GDP [2].

There remains an obvious discrepancy in economic development between the wealthy post-industrial Global North and the rather underdeveloped Global South. For a more profound understanding of this invisible world

division, one needs to observe the landscape or recent economic history, primarily over the past five and a half centuries [3]. The Great Naval Discoveries originating from Western and Southern European monarchies of that time surpassed the traditional Silk Road as the main continental trade route connecting Far East Asia with Mediterranean civilizations [4]. The core trigger event for these ambitious explorations of open oceanic naval routes was the historical seizure of Constantinople by the Ottoman Empire in 1453 and consecutively imposed harsh taxes on the import of traditional Oriental goods: Chinese silk and porcelain, Arabic spices, African ivory, rare species of timber and precious metals. This has forced Venetian and Genovese traders to raise prices of commodities in European monarchies of the time. Ultimately, it has led to vast-scale financing of ambitious maritime explorations by the crowns of Spain and Portugal and, to a lesser extent, smaller European powerhouses. Discoveries of Vasco da Gama, Ferdinand Magellan, Amerigo Vespucci, Christopher Columbus, James Cook and many others changed the knowledge and capabilities of “The Old World of Antiquity” forever [5]. This refers to the historical designation for Asia, Africa and Europe centered around Jerusalem and the wider Middle East [6]. These events were followed by several consecutive waves of the Industrial Revolution of coal and steel [7]. The milestone event, James Watt’s improvement of the steam engine patent, has given Imperial England and the Netherlands, as the cradle of the first revolution, a distinctive sharp edge in the competition for resources in newly discovered, faraway overseas territories to be named Colonies [8].

One of the most tragic consequences of the Colonial Era was the famous slave trade route originating mostly in the Gulf of Guinea in Africa, ending up in huge slave markets in Cuba and Jamaica. It has sent an incredible amount of twelve millions of slaves from Africa to both Americas over the course of the XVI–XIX centuries [9]. At the same time, the massive loss of human lives due to difficult transport conditions, poor food, infectious diseases, and trader cruelty was assessed at several dozen million in different sources [10]. To give a wider historical perspective, between 11 and 18 million African slaves were estimated to have crossed the Red Sea, Indian Ocean, and Sahara Desert from 650 to 1900 AD within the traditional Oriental slave trade [11]. These routes of raiding were taking place for more than a millennium before the establishment of the Atlantic slave trade, which began in 1501.

On this backdrop, the paper examines how historical economic factors are associated with current healthcare mechanisms and their outcomes in the global south. In this exercise, the paper focuses on the historical factors including, the origin of Global North-South divide, colonialism, industrial revolution and its effects, demographic transition and global urbanization, and post-colonial geopolitical realignment. Then, the paper qualitatively discusses how those historical economic factors are associated with major healthcare challenges under major themes including, disease-burden, health financing and economic challenges, governance and weak regulations, and demographic pressures and urbanization-related vulnerabilities. Finally, the paper proposes some policy recommendations to improve healthcare mechanisms being operated in LMICs.

2. Economic History of Global North—South Divide

The world economy’s division between the wealthy, industrialised northern hemisphere and the less affluent, developing southern hemisphere can be traced back primarily to the Colonial Era [12]. In earlier periods, such as the Medieval Era or Antiquity, this division did not exist. Historically, the Orient was often considered a hub of wealth, prosperity, and advancement in knowledge and technology. Economic history suggests that if a nation’s wealth were measured by its ability to extract gold, the Empire of Mali, under Mansa Musa’s reign from around 1312 to 1337, might be considered the wealthiest in the recorded history of mankind [13].

Both Western chronicles of Marco Polo, and Imperial Court archives of China suggest that India and China were the economic powerhouses of the Old World for much of the past two millennia, specifically until 19th century [14]. This is supported by data from the Angus Maddison Project, which has attempted to estimate the economic contributions of various states throughout the past 2000 years. These enduring monarchies, which engaged in trade far beyond their borders, highlight key aspects of ancient economic systems [15]. The main indicator of an economic system’s strength was often its capacity to mine and produce precious metals, especially gold. Gold production peaked during the Roman Empire around 1 AD and was much greater than the total production of the Byzantine Empire, Arabic Caliphates, and mediaeval European kingdoms 1000 years later. During antiquity, economies heavily relied on slave labour, while mediaeval feudalism depended more on the work of free peasants [16].

Urban development was notably affected by the rise of early factories through industrial revolutions that began in England in the early 18th century [17]. These economic changes altered agricultural practices and increased-energy consumption. With more efficient food production, historical populations experienced higher fertility and improved early childhood survival rates [18].

Advancements in modern medicine, housing, water and food safety, and wastewater management led to longer life expectancies and extended healthy longevity [19]. These changes caused a rapid demographic boom over the past three centuries. Populations grew faster than the socioeconomic systems, housing, and education systems could adapt [20]. Approximately 300 million people moved from rural areas to cities in Western nations during their industrialization [21]. In order to understand the scale of the world transformation now taking place, it is enough to say that around three billion (3,000,000,000) people are about to migrate from the countryside to the cities in Asia, Africa, and Latin America [22]. Most of this urban migration has occurred since World War II, within just half a century, resulting in a significant demographic pressure. This is evident across the Global South megacities like Guangzhou, Mumbai, Delhi, Shanghai, Beijing, Moscow, Istanbul, Jakarta, Buenos Aires, Mexico City, Rio de Janeiro, Dhaka, Sao Paulo, Kinshasa, Lagos, Manilla, Karachi, Chongqing or Calcutta [23].

Key events in the 19th and 20th centuries shaped modern dynamics across Asia, Africa, and Latin America. As a paradox, despite Colonial Age, India and China still remained the wealthiest nations until the late 18th century [24]. From the early 19th century, colonial exploitation led to a massive transfer of wealth from India, China, and surrounding regions to Western European colonial powers, and eventually to their former colonies in North America and Australia. Economic recovery for the Global South began mostly post-WWII during the Cold War Era [25].

Anti-colonial movements led by figures like Mahatma Gandhi [26], Nelson Mandela [27], Patrice Lumumba [28] and others in the 1960s initiated change. During the Cold War, the USA and the USSR's interests allowed the rise of Non-Aligned Movement [29]. The Western European colonial empires, such as Britain, France, the Netherlands and Belgium, lost most of their colonies, particularly economically valuable ones [30]. The Portuguese and Spanish empires were partial exemptions from this rule, since unlike Africa, the decolonisation of their colonial possessions in Latin America took place since the early 1800s [31].

After the successes of post-WWII liberation movements, their metropolitan European powerhouses continued to exert limited influence through structures like the British Commonwealth and French Pan-African initiatives [32]. In some regions, educational and cultural ties to former imperial powers persisted, like Belgian schools in Congo, Italian school in Eritrea, French influence in Vietnam or British one in Nigeria [33]. However, tensions sometimes remained, such as the reluctance in Korea to engage with Japanese culture [34]. This transition continued during the Cold War, with the USA and USSR filling the power vacuum left by the withdrawing European powers [35].

3. Contemporary Global South Landscape and the Role of UN Multilateral Agencies

The focus and mission within the United Nations (UN) premises is to support the Development of the Global South—the regions that used to be called Third World countries during the Cold War Era—contemporary LMICs. In recent decades, we have witnessed the exceptionally rising influence of this silent world majority in terms of their increasing global market share in the world's agricultural production, industrial manufacturing, South-South trade [36] and healthcare sector investment [37]. The pioneering launch of "Voice of Global South Summit" hosted by India in March 2023 is a prominent example [38]. Diplomatic representation of 125 developing countries' leadership contributed to India's mainstream media broadcasting the event as the largest diplomatic event of this kind ever held [39]. Probably most comparable iconic event of this scale was the establishment of the Non-Aligned Movement back in 1961 at the peak of Cold War era [40].

One of the United Nations Economic and Social Council's special advisory bodies, the Finance Center for South-South Cooperation [41], established in 2014, is held accountable for the famous list of 78 Global South countries, including the Group of 77 plus China. The Group of 77 was founded at the peak of Cold War era in 1964, with a purpose to strengthen unity and cooperation among developing countries in the international economic arena and promoting socio-economic development [42]. While gradually expanding over the course of decades, nowadays, it encircles even 134 member countries and often refers to itself as the Global South.

4. Low- and Middle-Income Countries and Their Healthcare Sectors

4.2. Major Challenges

LMICs of Asia, Africa and Latin America have passed a long way since the establishment of early modern European-style health systems of late XIX and early XX century such as Bismarck [43], Beveridge [44] and Semashko [45,46]. The great diversity of developing world countries refers also to the fact that some of them, like India, mainland China, Russia, Ethiopia, Mali, Zimbabwe, Mexico, Brazil, Turkey, Cambodia, Iraq, Syria, Egypt, Islamic Republic of Iran are actually the descendant cultures of underlying centuries and in some cases millennia old, statehood legacies [47]. This lengthy historical experience in public administration and guidance of

socioeconomic transformations alongside generations, does have impact on modern day functioning of their social structures and risk sharing financial arrangements [48,49]. Economic constraints remain rather typical of most LMICs' economies which are often stagnant, with low Gross National Product (GNP) and challenges competing in the global market dominated by high-income countries [50]. This economic situation limits the resources available for healthcare investment and innovation [51].

The passage of time highlights the multifaceted challenges that LMICs face in achieving Universal Health Coverage (UHC) [52]. These challenges stem from a combination of epidemiological, economic, demographic, and political factors that complicate the delivery of equitable and sustainable healthcare services [53]. LMICs are contending with an array of challenges difficult to cope with. Among major challenges to achieving UHC are frequently recognized inadequate government funding, inequity in provision of medical care services and sustainability concerns [54]. Many LMICs' governments typically face challenges in increasing health budgets sufficiently to improve service quality and expand coverage [53]. Evidence from other countries show the significance of strong regulatory oversight when expanding UHC. Empirical evidence from India reveal that the lack of a comprehensive system approach to healthcare policies, inadequate and inefficient health financing mechanisms, and fragmented service provision by public and private sectors were key barriers to UHC [55]. The evidence further demonstrate that Indian people rely heavily on empaneled-private providers without adequate monitoring mechanisms, and this has led to unnecessary procedures, avoidable hospital admissions, and cost escalation. These challenges underscore the need for robust governance, quality assurance systems, and cost control measures to guarantee that expanded UHC translates into equitable healthcare without being an unintended financial burden for households [56].

Moreover, in metropolitan areas in LMICs, aforesaid challenges are exaggerated for migrant workers and households located in informal settlements including slums and shanties. These groups often face overcrowded and poor housing conditions, restricted-access to healthcare facilities, and higher exposure to environmental hazards like pollution. These structural vulnerabilities intensify their risk of communicable and non-communicable diseases. Recognizing these disadvantageous groups is essential to design an inclusive urban healthcare policy thereby to facilitate the most at-risk sub-populations [57]. Ensuring equitable access to healthcare services remains a significant hurdle due to economic disparities and uneven distribution of healthcare resources. Furthermore, there is a lack of focus on sustainable economic growth strategies that support long-term health system financing and resilience [58].

Another significant obstacle is the “Triple burden” of disease consisting of Communicable Diseases, Non-Communicable Diseases (NCDs) and Injuries & Reproductive Health Issues. With improved-living standards, increased-sedentary lifestyles, and a shift in dietary habits from traditional foods to processed-foods—primarily after the 1950s, and in many low-income nations after the 1980s. Despite efforts to control infectious diseases, many LMICs continue to struggle with outbreaks and the emergence or re-emergence of diseases, as seen in parts of Africa [59]. Although some of them bear substantial risk of mortality or disability, most of bacterial, fungal and protozoal infections still remain within the therapeutic outreach of modern antibiotics, amebicides or fungicides [60]. Furthermore, there is a rising prevalence of NCDs such as diabetes, cancer, obesity, and chronic respiratory conditions. Contributing factors include urbanization, sedentary lifestyles [61], and dietary changes favoring fast and processed foods [62]. Yet such clinical entities are rather chronic in clinical course, mostly incurable and expensive to treat, consuming substantial medical resources sometimes involving intensive care unit admissions [63]. Injuries and Reproductive Health Issues remain at the last share of the spectrum of morbidity landscape. High rates of injuries and persistent reproductive health problems add to the healthcare burden [64].

Demographic shifts which remain as one of another challenges in LMICs typically consist of demographic changes, including high rates of international migration [65], a growing middle-income population, and an increasing share of elderly citizens. Much of an individual's lifetime medical spending occurs in the final year of life. Coupled with long-term care needs, these increases create a pressure on healthcare systems [66].

Political instability is also a rather common feature of many countries across the Global South. Unstable political environments, characterized by shifting alliances, dynastic politics, internal armed-conflict and insufficient democratic practices, hinder consistent and effective health policy implementation [67]. Political uncertainty often leads to fluctuating priorities and inadequate long-term planning in the health sector [68].

Financial barriers to healthcare within developing nations' health systems typically consist of high out-of-pocket expenditures, weak health insurance coverage and variability in healthcare expenditures [69]. In LMICs, a major proportion of population pay for healthcare services directly, leading to increased-risk of catastrophic health expenditures that can push households into poverty [70]. Poor enrolment rates and high dropout levels in health insurance schemes reduce risk pooling and limit financial protection for the most vulnerable populations.

Significant differences in the cost and quality of healthcare services across facilities, particularly between wealthy metropolitan and poor rural areas, make it difficult for individuals to access affordable and reliable care [71].

Consumers' financial barriers are further complicated by drug shortages, long and convoluted supply chain mechanisms, and internet pharmacy practices [72], which enforce [73] and unintentionally choice [74] for adverse consumption of counterfeit and substandard medicines, in order to save money as a coping behavior to avoid catastrophe. These medicines, mainly including antibiotics [75] and antiparasitic, which crudely make 10 percent [76] of the global drug market and 30 [76] to 50 [73] percent in developing countries and ever growing. In Asia and Africa, up to 60% of anti-infective drugs are out of pharmacopeial limits [73]. Since the nexus of counterfeit medicines follows a complex global supply chain [77], anti-falsifying strategies, including pharmacovigilance, equipping, training, and stewardship with multiple stakeholders such as healthcare, pharmaceuticals, and law enforcement [78] at national and international levels, are needed [79].

Another observable characteristic in the healthcare systems in LMICs is that their early investments are primarily directed toward controlling infectious diseases and expanding reproductive and child health (RCH) services. In contrast, studies uncover that in LMICs, private sector is the dominant provider of outpatient care for women and children and a significant provider of reproductive and maternal health services including for inpatient care [80]. This trend in LMICs has vital implications on health financing as such private providers consume a larger share of the health insurance programs provided by the government. Thus, in those countries, any expansion of health insurance without comprehensive mechanisms for primary and preventive healthcare services creates little benefits to patients while being profitable for private healthcare providers [81]. Accordingly, it is timely important in LMICs that they need to equally strengthen both public and private sectors in an effort of achieving UHC.

4.2. Policy Recommendation

Some of the major recommendations to address these challenges include strengthening health financing, expanding prepaid health insurance, increasing government health expenditures, and providing international support and collaboration [82].

Many consecutive governments continue efforts to develop and promote health insurance schemes that are accessible and affordable to increase enrollment and reduce out-of-pocket expenses. BRICS' emerging markets are leading examples among other nations which managed to allocate a higher percentage of the national budget to health (in their GDP share terms), prioritizing primary healthcare and preventive healthcare services [83]. Many rapidly developing nations in Latin America, sub-Saharan Africa, and South Asia continue to seek partnerships with leading international forums for technical and financial assistance [84]. Next to Western-led financial institutions such as the World Bank and International Monetary Fund, many LMICs increasingly seek alignment with non-Western actors such as the Belt and Road Initiative [85], BRICS Development Bank [86], Shanghai Cooperation Organization, Eurasian Union, ASEAN, Arab League, Pan-African and Latin American forums and other regional associations of nations [87].

Promotion of different health equity strategies are being deployed, including implementation of progressive health policies, introduction of subsidies for essential medical services and pharmaceuticals [88]. Policies are being designed to specifically target underserved and vulnerable populations in order to reduce health disparities [89]. These policies provide subsidies for essential health services to low-income groups, improving access and utilization. Such measures typically enhance the affordability of these goods and services for ordinary citizens [90].

Enhancement of health system efficiency and investment in health infrastructure are also done in a variety of ways. Standardization of healthcare costs regulates healthcare pricing to minimize cost variability and prevent exploitation [91]. Efforts to improve and expand network of healthcare facilities, particularly in rural and underserved-areas, to enhance service delivery have also proven as worthy investment [92].

Attempts to address social determinants of health usually consist of promotion of healthy lifestyles and implementation of public health campaigns to encourage physical activity and healthy eating habits, aiming to reduce the burden of NCDs [93]. Important tool in order to achieve such agenda remains improvement of education and awareness [94] coupled with increased public awareness about health insurance benefits and preventive health measures [95].

Strengthening government and political stability played a pivotal role throughout the promotion of transparent and inclusive governance [96]. Encouragement of public debate and participation in health policy development has led to a reduction of corruption through the implementation of strict anti-corruption measures [97] to ensure that health funds are used appropriately [98].

Last but not least, among the Global South's LMICs, there are ongoing efforts to leverage technology and innovation and increase the applicability of research findings and big data utilization [99]. Digital health solutions

typically utilize mobile health technologies to expand reach and improve health information systems [100]. At the same time, telemedicine services made possible the implementation of telehealth services to provide care in remote areas and reduce the burden on physical facilities [101]. Conducted local research efforts lead to investment in research to understand local health challenges better and develop context-specific solutions. Evidence-based decision-making has spread only gradually outside wealthy Organization for Economic Co-operation and Development (OECD) economies of the global North [102]. This process most frequently took place throughout the Health Technology Assessment network and systematic reviews and meta-analysis reports [103]. Such use of epidemiological and social data for decision-making has led to the strengthening of health information systems and their ability to inform policy and track progress toward UHC goals [104].

Achieving UHC in LMICs requires a comprehensive and holistic approach that addresses the economic, political, and social challenges outlined. By focusing on sustainable healthcare financing, promoting equity, enhancing system efficiency, and fostering political stability, LMICs can make significant strides toward providing accessible and quality healthcare for all [105]. Collaboration between governments, international agencies, and local communities is essential to develop and implement strategies that are both effective and sustainable.

5. Bridging Gaps in Access to High-Price Pharmaceuticals in the Global South

Cutting-edge pharmaceuticals are indispensable in modern medicine; however, their exorbitant costs significantly limit access, particularly in the Global South [71]. The prices of recently developed cancer therapies, gene therapies, and biopharmaceuticals frequently exceed \$100,000 to \$1,000,000, posing a substantial financial burden for individuals as well as health care system in HICs [106]. In LMICs, these costs present an even greater barrier, exacerbating health disparities and further restricting equitable access to essential treatments [107,108].

The primary driver of this disparity in access is the pricing strategies employed by global pharmaceutical companies [109]. Operating within a capitalist market framework, these corporations prioritize profitability over equitable access to medicines, setting prices with the primary goal of maximizing revenue [110]. Value-based pricing, a common justification for the high costs of innovative drugs, incorporates not only manufacturing expenses but also opaque research and development costs, often resulting in unjustifiably inflated prices [111]. In markets such as the US, Western Europe and Japan, where high prices are more readily accepted, new drugs are typically developed, approved, and commercialized first, while their distribution in the Global South is often deprioritized [112]. The COVID-19 pandemic starkly illustrated the consequences of this strategy, as HICs secured excessive vaccine supplies while LMICs faced delays and inadequate vaccination coverage [113]. This structural inequity in global pharmaceutical distribution underscores how the profit-driven rationale of global pharmaceutical companies frequently takes precedence over pressing public health needs [114].

Furthermore, the protection of intellectual property rights remains a critical factor that further complicates access to medicines in the Global South. While patents incentivize pharmaceutical innovation, they also extend monopolistic control over essential medicines, delaying the production of generics and biosimilars in LMICs. The Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS), enacted by the World Trade Organization (WTO) in 1995, mandates strict patent protection in LMICs, effectively restricting access to affordable medications [115]. Although the 2001 Doha Declaration allowed for greater flexibility in patent enforcement during public health emergencies, its implementation has been largely inadequate. This was exemplified during the COVID-19 pandemic when negotiations over a comprehensive TRIPS waiver—proposed by India and South Africa—faced prolonged resistance, ultimately resulting in a limited agreement in 2022 that waived patents only for vaccines. Therapeutics and diagnostic tools were excluded from the waiver, leaving significant barriers to comprehensive healthcare access in LMICs [116].

The WHO has sought to improve access to medicines through initiatives such as the development of the Essential Medicines List, the utilization of patent pools, and the promotion of fair pricing. However, structural barriers—including intellectual property monopolies, international trade regulations, and the pharmaceutical industry's influence—continue to constrain the effectiveness of these efforts [117]. According to data from the WHO's *Global Health Observatory* (2010–2019), the proportion of healthcare facilities in LMICs that consistently provide essential medicines at affordable prices ranges from only 8% to 41%. In these regions, pharmaceuticals account for 20% to 60% of total healthcare expenditures, with up to 90% of the population relying on out-of-pocket payments for medicines. As a result, pharmaceuticals represent the second-largest household expense after food, rendering essential treatments financially inaccessible for a significant portion of the population [118].

Addressing disparities in medicine accessibility in the Global South requires decisive policy interventions capable of counterbalancing the profit-driven structure of the pharmaceutical industry [119]. Specifically, expanding the application of compulsory licensing for essential medicines and strengthening patent waiver

mechanisms are necessary steps to facilitate the rapid market entry of generic medicines and biosimilars. Additionally, increasing public funding for pharmaceutical research and development (R&D) can reduce dependency on for-profit enterprises and ensure greater transparency in drug pricing through the disclosure of cost structures. To curb the opacity of pharmaceutical pricing, international organizations such as the WHO and WTO must strengthen their regulatory authority, establish equitable pricing models tailored to national economic conditions, and enforce the effectiveness of tiered pricing mechanisms.

Furthermore, ensuring access to high-cost medicines requires reforms in clinical trial and drug approval processes to eliminate unnecessary barriers. Establishing international funding mechanisms, enhancing technology transfer and regional production capabilities, and promoting collaborative procurement frameworks and competitive market conditions are also essential to dismantling monopolistic control over pharmaceutical markets. These measures, in turn, will improve the global medicine supply chain and logistics infrastructure in LMICs, ensuring a stable and equitable distribution of essential medicines [120]. Without advancing these reforms—alongside the promotion of UHC, the education of local health workers, and the implementation of appropriate medicine use policies—inequalities in healthcare access will continue to widen, leading to the preventable loss of lives [121]. A truly global public health perspective is urgently needed, one that prioritizes equitable medicine distribution over economic imperatives, thereby establishing a sustainable and just pharmaceutical supply system [122].

Further, LMICs are gradually shifting towards generic medicines from branded medicines due to physical and financial reasons. Medicines account for relatively larger portion of total out-of-pocket healthcare expenditure of the households in those countries, and for example, this portion is approximately 69% in India. Some studies reveal that unbranded generic medicines offer greater opportunities to save cost of households substantially. However, policies are proposed to review LMICs' medicine procurement and distribution policies and thereby to address availability and supply chain issues [123]. However, the concerns have been raised by both medical practitioners and patients regarding the perceived-quality and therapeutic efficacy of certain generic medicines. These concerns are reasonable as the quality, safety, and efficacy of medicines directly affect the patients' lives. To this end, some studies reveal that some anti-cancer unbranded drugs lead to greater incidence of toxicities among cancer patients [124]. Moreover, studies demonstrate that 90% of generic anti-cancer drugs contain insufficient active drug components and an excessive portion of impurities. These have implications on practitioners' prescribing behaviour, patients' adherence, and drug utilization patterns. Thus, there is a need to review the pharmaceutical challenges associated with different medicines in terms of their content, safety, and efficacy, and this may guide pharmaceutical policies particularly in LMICs to effectively interact with public expectations and provider incentives within their healthcare systems.

6. Challenges for Global Health at the Rapidly Evolving World Stage

A historical era of early accelerated demographic growth occurred with a moderate intensity in Western Europe and North America, following the spread of industrial revolutions of coal and steel and advanced agriculture. It took place mostly between the 1750s and 1950s [125]. Yet after WWII, following the Colonial Liberation Movement, a much more substantial and intensive population explosion started to take place in Asia, Latin America, and Africa. From 1804 until 2025, the global living human population has increased from 1 billion to 8.2 billion due to medical advancements and improved- agricultural productivity. Annual world population growth peaked at 2.1% in 1968 and has since dropped to 1.1% [126].

These underlying patterns in human fertility, early childhood survival, and life expectancy were also largely influenced by the sexual revolution [127]. Education of women and their consecutive absorption into the labor markets worldwide has essentially created a financial incentive for them to give less birth, which remains a prevailing consensus in mainstream economic theory [128]. As a consequence, the global landscape since the last world war became characterized by several core landmarks, such as accelerated population ageing, the end of the colonial era, almost half a century of Cold War rivalry [129], the rise of the Non-Aligned Movement, industrial revolutions spreading from developed towards the Global South developing nations, huge-scale rural-urban migrations and mega-scale environmental pollution [130].

These major developments accelerated the hierarchical establishment and spread of large national health systems across the world. After WWII, the bulk of medical innovation moved from Europe to the U.S. [131]. Peculiarly, the first nation to effectively deliver universal health coverage for almost the entire population, including the poor, back in the 1930s was the USSR via its renowned Semashko system [132]. Other countries adopted different strategies to provide universal health coverage—ranging from systems based on the state budget, through public insurance systems, to more market-oriented solutions, with Bismarckian, Beveridge, and the US systems being the most prominent examples.

Great attainments in living standards, education, medical care, and public health policy led to bold advances in population health indicators. These were most visible in the U.S., Western European nations, and Japan at the time [133]. They consisted of extended longevity, falling fertility rates, decreasing morbidity from infectious diseases, improved maternal health, and improved early childhood survival [134]. Low-income nations in the Southern Hemisphere—across Africa, Latin America, and Asia—remained significantly below these thresholds and required decades to catch up with the industrialized economies of the Global North [135].

Since the end of the Cold War era, observing the time horizon 1989–2025, the world has become a much different place. During the 1990s and early 2000s, globalization processes continued to accelerate worldwide [136]. This meant the rise of the newly industrialized or the so-called “emerging” markets such as the BRICS nations [137], heavily dominated by the overachievement of the People’s Republic of China [138]. The so-called transitional health-care reforms tended to move the focus of former socialist health systems from expensive, curative, hospital-based health care towards preventive, cost-saving, outpatient-centered health care [139]. Health financing patterns tended to provide relief to state-owned health insurance funds toward an ever-larger share of out-of-pocket spending by ordinary citizens [140].

Among substantial underlying contributors to such a healthy economic pattern, are also rising socioeconomic inequalities worldwide, documented with Gini indexes. Unlike in the wealthy post-industrial Global North societies, middle class in the LMICs is rapidly expanding [141]. On top of them lies rather thin but super rich millionaire class citizens whose wealth sometimes substantially exceed that of their Northern counterparts, due to the sheer market size and expanding business opportunities in the South [142]. These high-income citizens create an ongoing demand for luxury goods, including spa, advanced-medical care and expensive organ transplantation surgeries [143]. Convenient example witnessing this trend is the fact that Japan and China have been topping the world ranking lists of the luxury goods market for well beyond a decade [144]. Inequalities created this way, are giving impetus to the rising cost of market prices of certain expensive medical services in high demand [145]. Such an asymmetry in return affects the affordability of those medical goods and services for the ordinary citizens given the poor insurance coverage in most developing countries [146]. Inability of many of these societies to deliver social justice in equality and accessibility of medical care for all, creates lengthy waiting lists for expensive surgery, invasive radiology or high-end innovative pharmaceuticals [147].

Population aging as a global phenomenon became evident over the past three decades, with Japan in the lead among the large countries [148]. As of 1 October 2023, Japan’s aging rate (the proportion of the population aged 65 and over) was 29.1%. Current UN forecasts indicate that China will be the fastest-aging large nation deep into the twenty-first century [149]. Surprisingly, aging has ultimately reached some of the traditionally young nations such as the Arab countries of the MENA region and Turkey [150]. Soon, it became obvious that this population change would be coupled with an explosive increase in incidence and prevalence of non-communicable “prosperity diseases” (NCDs). A remarkable feature of core NCDs is their chronic clinical course characterized by growth in medical services demand, long-lasting disability, work absenteeism, and premature mortality [151].

The third major contributor to the skyrocketing costs of medical care provision was technological innovation in medicine [152]. Diagnostic frontiers and therapeutic opportunities extended tremendously. Availability of cutting-edge technologies, joined with improved affordability of ordinary “golden-standard” services, leads to increased citizen demand, further threatening the financial sustainability of contemporary systems [153]. Cost containment efforts and policies soon became top priorities not only in wealthy Western and Asian countries but worldwide.

Governments and multilateral institutions across the Global South countries continue to struggle with the challenge to deliver universal health coverage to their transforming societies [154]. These challenges are likely to intensify as political shifts in key countries reshape the global health landscape, with the U.S. as a prominent example. Withdrawing from the WHO in early 2025 disrupted international health governance and cut nearly 18% of the organization’s budget. A broad suspension of U.S. foreign aid, including programs for HIV/AIDS, malaria, and maternal health, severely disrupted services in many low- and middle-income countries. The halt in The U.S. President’s Emergency Plan for AIDS Relief (PEPFAR) funding led to HIV clinic closures and treatment interruptions for hundreds of thousands of patients, particularly in sub-Saharan Africa. Additionally, slashing billions in aid threatens multilateral health efforts, risking setbacks in disease control worldwide. However there are promising signs of recovery of WHO funding which has managed to secure additional revenue streams from private donors and multilateral agencies. In addition, negotiations to raise annual national membership fees to WHO up to 20% for 2026–2030 period is currently underway.

The expanding South-South trade and collaboration may, to some extent, provide relief from this challenging task [155]. Convenient examples are insufficient domestic pharmaceutical and medical device manufacturing capacities and unmet demand by the ASEAN nations, complemented by the large industrial base and supply capacities of India and China to the ASEAN [156]. In Sub-Saharan Africa, underdevelopment of the rural network

of healthcare facilities and hospitals is largely substituted with stronger telemedicine capabilities, including travelling units providing on-site medical testing for infectious diseases, which partially cover unmet needs of the countryside and village populations [157]. The same is applicable for isolated indigenous communities of the rainforests of Amazonia and the Andes [158]. A lot of hope is being devoted to artificial intelligence (AI)-assisted wearable medical devices. Anticipated advances should allow attending physicians to follow up with their patients suffering from chronic NCDs in real time and adjust therapy decisions without the need for medical examination of patients and travel [159]. This becomes increasingly important in the superaged societies of East Asia, where low fertility rate—reaching a low of 1.1 children per woman over a lifetime—are leading to the extinction of traditional family structures due to the prevalence of single-child families [160]. Millions of elderly citizens, many even suffering from dementia, will heavily rely on these AI-related opportunities for the provision of home-born medical care in regions with scarce density of available nursing staff [161]. Genomic profiling and advent of personalized pharmaceuticals, particularly in the fields of autoimmune diseases and oncology, are further contributing to the bottleneck of financial sustainability of healthcare financing in many of the rapidly developing Global South societies [162]. The last year of life treatments of mostly incurable diseases, although improving patient prognosis of survival and life quality, ultimately consume the entire lifetime cost of medical consumption of individual citizens. Shrinking of the employed taxpayer base, due to demographic transition, takes place in parallel to these changes, mostly triggered by the exhaustion of baby boomer generations, and thus effectively contributes to the insufficient inflow of revenues to the health and social insurance funds [163].

Altogether, this myriad of factors shaping demand and supply of medical services, pharmaceuticals and devices to the nations of the Global South remains dynamic and unpredictable [164]. Additional constraint imposed to rather limited healthcare budgets across these nations, is the issue of bottleneck inefficiencies in terms of their resource allocation priorities. Decision makers' awareness of the cost-effectiveness and health technology assessment principles, is rising gradually [165]. Yet, national capacities build-up in interdisciplinary health sciences commonly lag far beyond their economic development. Most of the LMICs have witnessed bold progress in the overall social development, food security [166] and accessibility of essential medicines, all together leading to a substantial rise in human longevity. For some countries, particularly those at the crossroads of ongoing great power rivalries [167] or owning substantial natural resources without the ability to protect them, are experiencing continuity of painful social reforms and civil unrests [168]. The degree of inequality and lack of affordability of even basic medical care, such as acute surgery or antibiotics, is sometimes strikingly concerning [169]. However, the overall impression of prevailing progress, despite the rocky roads ahead, continues to dominate the landscape all across Latin America, Africa, Asia and Oceania [120]. We firmly believe that not only technological progress in medicine and real economic growth, but also a rise in human consciousness and compassion for the poor and those in need, will secure a better future for generations to come.

Author Contributions

M.J. has created research questions and drafted an early manuscript version. A.O., M.L., T.T., T.C., J.P.T., R.W., A.C., N.K., C.R., M.T., T.M., R.K., R.O., J.P., P.M.S., H.H., M.J.M.T., M.A.-Z., Y.K., J.J.-N., H.J., H.S.R., L.G., E.Y., C.E., A.S.K., E.K., S.S., W.W., C.A., M.K., M.G.T., S.M., T.K.T., S.C.R., O.I.E., T.W., V.K.C. and L.S. have all amended for important intellectual content alongside ICMJE rules. All authors have read and agreed to the published version of the manuscript.

Funding

This research received no external funding.

Conflicts of Interest

The authors declare no conflict of interest. Given the role as Editor-in-Chief, Mihajlo (Michael) Jakovljevic had no involvement in the peer review of this paper and had no access to information regarding its peer-review process. Full responsibility for the editorial process of this paper was delegated to another editor of the journal.

Use of AI and AI-Assisted Technologies

No AI tools were utilized for this paper.

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