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Exploring the State of Pharmaceutical Access in China

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Executive Summary

Access to drugs is crucial for achieving Sustainable Development Goal 3 of the United Nations, which aims to promote good health and well-being for all. Improving access to drugs requires addressing availability, affordability, and adoption. Availability refers to the physical presence of medicines in healthcare facilities or in the market, which is influenced by production capacity, quality control, regulatory approval processes, procurement and tendering processes. Affordability, on the other hand, refers to the ability of individuals and health systems to acquire and pay for drugs. High drug prices, intellectual property protection, market competition, government policies, and drug development expenses can create significant barriers to affordability. Finally, adoption is the utilization of drugs by healthcare providers and patients, which is influenced by clinical decision-making, prescribing practices, and patient preferences. Even if drugs are available and affordable, they may not be adopted if healthcare providers and patients do not perceive them as safe and effective.

While addressing all three elements is important for improving access to drugs, it can be challenging and may require trade-offs between different interests, especially when resources and budgets are limited. For example, reducing drug prices to enhance affordability may lead to lower revenues for drug manufacturers, which could deter them from investing in research and development. This, in turn, could affect the availability of innovative medicines in the long run, particularly for neglected diseases or conditions that disproportionately affect marginalized populations.

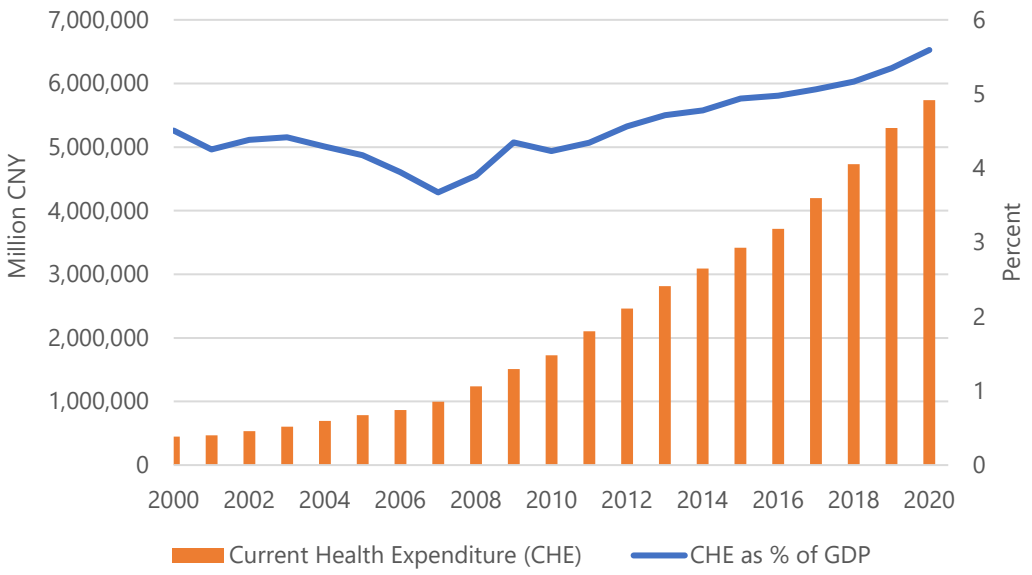
To help policymakers anticipate the long-term implications of drug pricing and availability, rigorous economic evaluation of existing policies is crucial. However, the lack of data remains a significant obstacle to this evaluation, highlighting the need for further research in this area. This report provides a historical overview of the Chinese pharmaceutical market and the evolution of drug policies that have affected accessibility. It also provides a summary of recent initiatives to improve drug availability and their results based on existing evidence. The overview and additional preliminary descriptive analyses are part of the overall drug access research program, and they are expected to provide the basis for a quantitative evaluation of policy effects in future studies.

List of Abbreviations

CFDA	China Food and Drug Administration
CHE	Current Health Expenditure
CAGR	Compound Annual Growth Rate
HTA	Health Technology Assessment
R&D	Research and Development
NMPA	National Medical Products Administration
NRDL	National Reimbursement Drug List
PRDL	Provincial Reimbursement Drug List
WHO	World Health Organization

1. Introduction

Over the past two decades, healthcare spending in China has experienced significant growth, increasing from 450 billion CNY in 2000 to 5,937 billion CNY in 2020, and now accounting for 5.6 percent of GDP, up from 4.5 percent in 2000 (Figure 1). As the population continues to age and the burden of disease shifts to chronic and non-communicable conditions such as diabetes, heart disease, and cancer (World Bank, 2011), the demand for healthcare is expected to continue to rise in the coming years. This increased demand is reflected in drug expenditure, which is the largest contributor to healthcare spending. Notably, the soaring cost of drugs mostly drives up drug expenditures, and this poses a particular challenge for patients with chronic or long-term conditions. In addition to the direct costs of treatment, these patients incur indirect costs such as lost productivity and potential job loss due to their illness. They may be dissuaded from seeking treatment due to high drug costs, resulting in deteriorated health outcomes, lost wages, and diminished earning potential (Zhao et. al, 2013). These factors can also have a broader effect on the economy, potentially impeding economic growth if a large number of people are unable to work due to illness or lack of access to affordable healthcare.

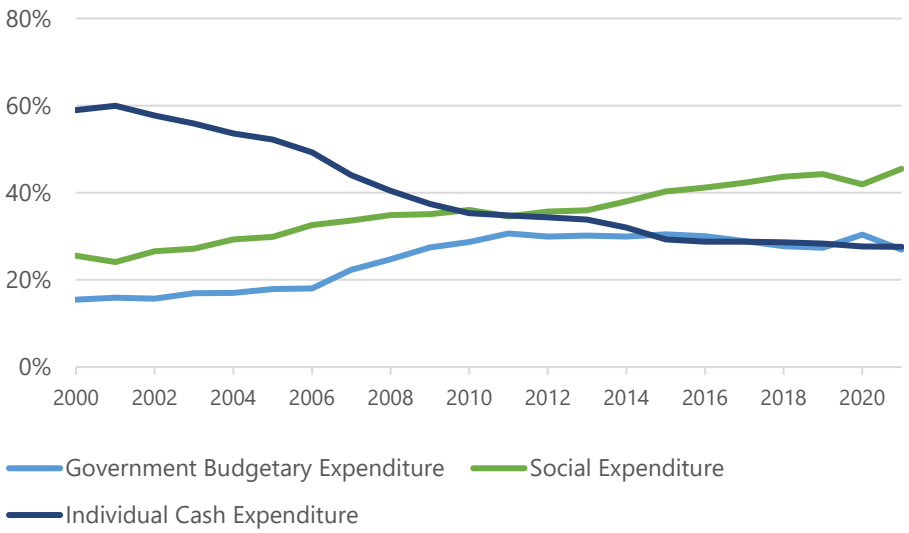


Data Source: WHO Global Health Observatory. https://www.who.int/data/gho

Figure 1. Trends in the Health Expenditure in China

To ensure accessible and affordable healthcare, the Chinese government has implemented a range of policies. These include setting maximum retail prices for essential drugs, regularly updating the reimbursement drug list to reflect the latest medical research and clinical practices, and conducting procurement and negotiation with pharmaceutical manufacturers to promote competition and maintain lower drug prices. Despite efforts to improve access to medicines, significant challenges remain to be addressed.

One of the key challenges is the affordability of medicines, which refers to the ability of both individuals and health systems to purchase and pay for necessary medications. National health insurance system helps to make drugs more affordable, with patients typically paying a portion of the cost of drugs. Although the level of reimbursement varies depending on the drug and the patient's insurance coverage, expensive and innovative treatments typically receive higher levels of reimbursement. Out-of-pocket health expenditure has been declining from 63.2 percent of total health expenditure in 2000 to 28.6 percent in 2018[1], indicating increased individual affordability for drugs. However, this has raised concerns about the sustainability of the current healthcare financing system, which is primarily financed by public funds. Government budgetary spending on health is on an upward trend, accounting for 31 percent of total health spending in 2011 and remaining stable since then. Social spending on health accounted for about 30 percent until 2011, but the gap with government budgetary spending has gradually widened since then, reaching 45 percent of total health spending in 2021 (see Figure 2).



Data Source: CEIC.

Figure 2. Total Expenditure on Public Health

The growing burden of chronic diseases further puts pressure on the sustainability of health financing. This often involves trade-offs and choices on the allocation of healthcare resources within health sectors, such as deciding which drugs to include in the reimbursement list and negotiating with drug manufacturers to obtain lower prices, as well as resource allocation between health and other sectors such as infrastructure and education.

Ensuring drug affordability can also pose challenges to drug availability, particularly in markets where generic drugs are dominant, such as China's pharmaceutical market. Only a limited number of companies are capable of investing in research and development. However, the recent expansion of the reimbursement list to include a couple of new patented pharmaceuticals, coupled with price negotiations with drug companies, has created obstacles

[1] See WHO Global Health Observatory. https://www.who.int/data/gho. (Access Feb 26, 2023)

for companies to recover their research costs. For example, the most recent price negotiation in January of this year resulted in the addition of 111 new drugs to the reimbursement list at an average price reduction of 60 percent.[2] Continued price negotiation and price cuts may discourage investment in research and development, and ultimately limit the availability of innovative medicines, especially for neglected diseases or conditions that disproportionately affect marginalized populations. Essential drugs, on the other hand, may also experience challenges with availability. Coupled with their lower prices, government regulations, such as price reductions and intense price competition through procurement auctions, may compromise the quality of drugs produced or force manufacturers to exit the market (Yuan et. al, 2021; Mao et.al, 2022). This can result in shortages of important medicines and limit patients' access to essential treatments.

Addressing the trade-off between affordability and availability in the pharmaceutical market requires a comprehensive approach that considers the interests of patients and healthcare providers, and the pharmaceutical industry. To assist policymakers in anticipating the long-term implications of drug pricing and availability, a rigorous economic evaluation of existing policies is essential. However, the lack of data remains a significant obstacle to this evaluation, underscoring the need for further research in this area. This report provides a historical account of the Chinese pharmaceutical market and the evolution of drug policies that have affected accessibility. It also summarizes recent initiatives to improve drug availability and their outcomes through existing evidence. We also conduct preliminary descriptive analysis to lay the groundwork for a quantitative assessment of policy effects in future research. The implications drawn from the further analysis are expected to address a balance between affordability and accessibility in the pharmaceutical market.

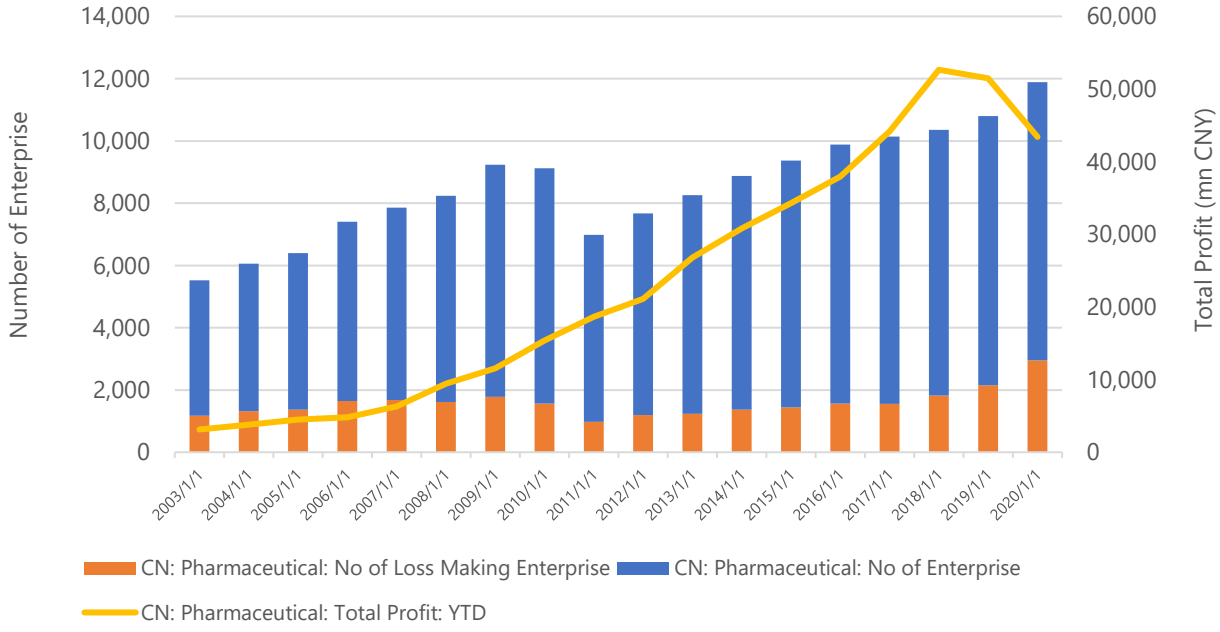
2. Pharmaceutical Market in China

The demand for healthcare services in China has driven rapid growth in the pharmaceutical market, with total sales revenue surpassing 90 billion USD in 2020 (IQVIA, 2021). The Chinese pharmaceutical sector has been attracting international investment, and the ongoing COVID-19 crisis has further fueled its growth. Currently, China is the second-largest pharmaceutical market in the world, representing 40 percent of the global pharmaceutical market[3]. The fastest-growing segment within the pharmaceutical industry is projected to be oncology drugs, with a compound annual growth rate (CAGR) of 13–16 percent forecasted through 2027(IQVIA, 2023). Additionally, medical spending is forecasted to expand at a CAGR of 3.8 percent and reach 197 billion USD by 2026.

The Chinese pharmaceutical market has a large number of firms, with over 8,000 pharmaceutical manufacturers currently operating in the country (See Figure 2). These companies have generated a total profit that has grown at an annual rate of 20 percent, culminating in 52,650 million CNY in 2018. The market is mainly dominated by domestic companies, with the top ten pharmaceutical companies in China being competitive in the world

[2] See Financial Times. https://www.ft.com/content/be0c2ec4-f0c3-411c-81d0-86d20058722c
[3] Daxue Consulting. https://daxueconsulting.com/pharmaceutical-industry-china/

market. However, foreign companies such as Pfizer and Novartis also play a significant role in the market, often through joint ventures with local companies.

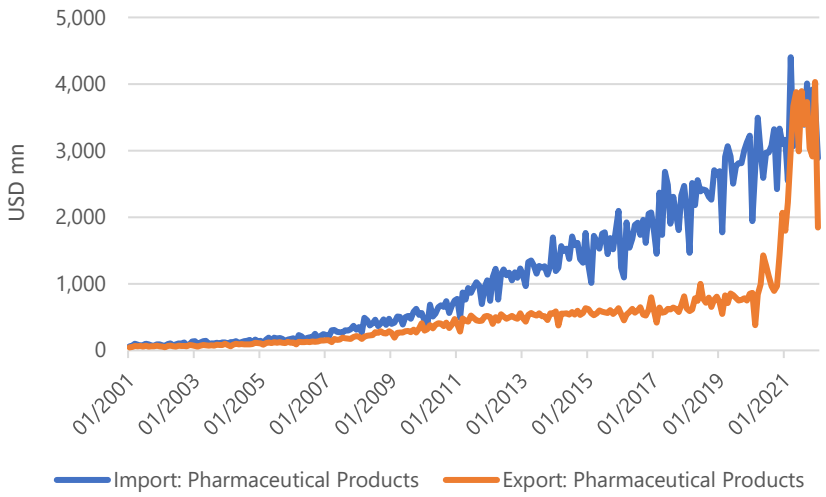


Data Source: CEIC.

Note: The left y-axis represents the number of pharmaceutical companies in China, while the right y-axis represents the year-to-date (YTD) total profits of the pharmaceutical industry.

Figure 2. Size of Chinese Pharmaceutical Market

Despite a large number of pharmaceutical manufacturers in China, most of them focus on producing generic drugs and are in the early stages of innovative drug research and development (R&D). This is reflected in the fact that generic drugs make up over 90 percent of prescriptions in the country (Mills et. al, 2019). Since 2011, the number of generic drug applications for market entry has been steadily increasing, with more than 2,000 applications per year (China Food and Drug Administration, 2016). As most applications for generic drug market entry are for the same gradients, competition has intensified, resulting in low profit margins (about 7–8 percent) for pharmaceutical companies. As a result, the Chinese market is heavily dependent on imported innovative drugs, with the value of imports being approximately twice the value of exports. The import/export gap gradually increases after 2011, with an import value of 3,713 million USD as of December 2021 (Figure 3).



Data Source: CEIC.

Figure 3. Foreign Trade of Pharmaceutical Product

To gain a clear picture of China's place in the global pharmaceutical industry in terms of innovative R&D, we present a statistic comparison of the R&D investment in publicly listed companies between China and major pharmaceutical market such as US and Japan. Table 1 provides an overview of the financial performance of these firms in all three countries.

Firm size. Three indicators, including total assets, operating revenue, and the number of employees, are used to measure firm size. Over the last decade, China's listed pharmaceutical companies have demonstrated consistent growth, with average total asset of 915 million USD in 2020, nearly doubling from 316 million USD in 2010. In addition, these companies' operating revenue doubled, from 212 million USD in 2010 to 461 million USD in 2020. As the size of these businesses grew, the number of employees increased by 30 percent. As a result, the gap between Chinese pharmaceutical companies and their American and Japanese counterparts has also been closing. In 2010, the total assets of Japanese pharmaceutical companies were 12 times greater than those of their Chinese counterparts; by 2020, this disparity had shrunk to five times.

Profitability. Over the past decade, publicly listed pharmaceutical companies from the US, Japan, and China have demonstrated notable differences in profitability. While the gross profit margin (i.e., gross profit as a percentage of net sales) of typical US pharmaceutical companies has remained stable, the net profit margin (i.e., net income as a percentage of net sales) has slightly decreased. Similarly, Japanese companies have witnessed an increase in gross profit margins by five percent from 2010 (69 percent) but have experienced a slight decline in net profit margin from 6.3 percent to 4.7 percent. In contrast, Chinese pharmaceutical companies have shown significant growth in gross profit margins, increasing by 12 percent, from 51 percent in 2010 to 64 percent in 2020. This expansion can be attributed to the rising demand for healthcare products and services in China.

R&D expenditure. R&D investment shows varied patterns in the three countries. Over the past decade, typical (median) US pharmaceutical companies have seen their R&D spending tripled, while their Japanese competitors have shown an opposite trend. Similar to the US, Chinese publicly listed pharmaceutical companies has surged, from 0.15 million USD in 2010 to 11 million USD in 2020. The R&D intensity (i.e., R&D expenditure as a percentage of sales) has also increased from 0.25 to 4.73 percent over the past decade in China. Despite the rapid growth, Chinese companies still lag behind their multinational competitors. In 2020, Chinese companies invested approximately 50 percent less in R&D than their American and Japanese counterparts, which is only around two percent of their counterpart in 2010. Regarding the intensity, Japanese pharmaceutical companies' R&D spending was 17 percent of sales in 2020, while that of the US was 185.94 percent. This comparison highlights the growing competition between Chinese companies and their multinational peers in the global pharmaceutical market.

Table 1. Summary of statistics of the pharmaceutical companies: By country

	China		Japan		The United States	
	2020	2010	2020	2010	2020	2010
Total Assets (thousand USD)						
Mean	914,766	316,199	4,378,218	4,020,676	1,602,683	1,876,373
Median	518,661	188,924	397,901	954,313	78,375	8,342
SD	1,307,381	367,384	15,200,000	7,100,081	12,400,000	14,400,000
Min.	6,379	16,688	9,635	11,809	0	0
Max.	12,800,000	2,541,588	117,000,000	33,500,000	175,000,000	195,000,000
Observations	261	155	64	38	719	307
Operating Revenue/Turnover (thousand USD)						
Mean	461,616	212,247	1,744,183	2,507,620	578,056	867,441
Median	207,159	94,629	146,852	681,624	235	266
SD	717,811	299,373	4,486,907	4,263,826	4,752,358	6,046,017
Min.	233	7,930	23	822	0	0
Max.	5,012,578	1,881,527	29,600,000	17,100,000	82,600,000	65,200,000
Observations	261	155	63	38	720	313
Number of Employees (persons)						
Mean	2,842	2,199	3,233	4,155	971	1,921
Median	1,538	1,094	568	1,371	54	30
SD	3,638	2,891	7,662	7,146	7,542	12,668
Min.	51	13	7	20	1	1
Max.	28,903	16,293	47,099	30,488	134,500	114,000
Observations	254	143	63	38	618	224
Gross Profit Margin (%)						
Mean	54	54	115	66	172	32
Median	64	52	74	69	100	100
SD	200	23	349	17	1,044	2,600
Min.	-3,100	5	17	17	-3,962	-29,819
Max.	472	158	2,717	95	19,829	18,728

Observations	258	155	58	36	402	190
Net Profit Margin (%)						
Mean	167	15	-1,708	-88	-8,008	-6,195
Median	10	13	5	6	-286	-120
SD	3,829	21	9,040	288	45,402	27,214
Min.	-15,172	-109	-68,675	-1,508	-816,121	-273,680
Max.	59,494	113	38	36	8,628	9,750
Observations	258	155	63	38	411	190
R&D expenditure (thousand USD)						
Mean	26,145	2,661	271,571	442,145	171,764	180,200
Median	10,967	153	18,327	67,817	20,949	6,025
SD	63,129	5,369	695,863	840,325	993,786	987,867
Min.	0	0	0	673	0	0
Max.	763,433	35,186	4,117,733	3,474,967	12,200,000	9,449,000
Observations	261	155	64	38	670	256
R&D Intensity (R&D as % sales)						
Mean	-104	2	1,311	72	3,874	2,651
Median	5	0	18	15	186	128
SD	2,911	3	7,263	172	24,179	12,712
Min.	-44,574	0	0	1	0	0
Max.	13,727	26	56,248	909	429,913	120,730
Observations	258	155	63	38	380	173

Note: The statistics presented are derived from the original data provided by the ORSIS database, which collects information on publicly listed companies worldwide. It should be noted that these statistics may be subject to change if additional data cleaning methods, such as imputation and handling missing values, are applied.

3. Policy Interventions to Improve Drug Access

The Chinese government has been engaged in ongoing efforts to enhance access to medicines and manage costs. These include the implementation of price controls, the promotion of generic drugs, the update of the drug reimbursement list, and the adoption of drug procurement and centralized price negotiation.

Price control. Imposing caps on retail prices is a common government practice. China has set price caps based on drug production costs for many years, but their effect on reducing drug prices has been limited. On the one hand, the policy only applies to a selected number of essential drugs, which represent a portion of the overall drug market. On the other hand, the absence of enforcement and monitoring mechanisms has led many drug manufacturers and distributors to find ways to circumvent the price cap by, for example, increasing the prices of other products or reducing the availability of drugs. In an effort to reduce government intervention in drug pricing and adopt a market-based pricing system, price caps for the majority of drugs have been removed as of 2015. This has been replaced by pricing strategies

that allow drug prices to be determined by the market and interact more efficiently with procurement and insurance policies.

Generic drugs. Promoting the use of generics drugs involves the participation of manufacturers and healthcare providers. The National Medical Products Administration (NMPA, the former China Food and Drug Administration) has reduced market entry barriers in recent years by expediting the review and approval process for generic drugs. In 2018, the NMPA committed to prioritizing the review and approval of specific generic drugs in an effort to reduce approval times from an average of 4–5 years to just 8 months. By the end of 2019, the NMPA had approved 43 generic drugs through this fast-track process, and the number of generic drug approval applications submitted by manufacturers increased by 50 percent compared to the previous year (NMPA, 2020). In addition to a fast-track approval process, the NMPA has emphasized the need for generic drugs to adhere to stringent quality control measures. In 2018, the agency implemented new regulations mandating bioequivalence testing for all generic drugs prior to approval. This ensures that generic drugs are as safe and effective as their brand-name counterparts.

The government has also provided incentive for the generic substitution in hospitals. In collaborative practices, pharmacists can advise physicians on generic drug selection, dosage, interactions, and side effects, and provide patient education and counseling on generic drugs when filling medical prescriptions (Qu et.al, 2021).

Reimbursement list. The social health insurance system in China provides coverage for drugs that are included in the reimbursement list, either fully or partially. The National Reimbursement Drug List (NRDL) was first introduced by the central government in 2000 and is regularly updated to ensure it meets the healthcare needs of the population. The NRDL consists of two categories: Class A drugs are fully reimbursed and include essential and first-line medications, while Class B drugs are partially reimbursed and include expensive second-line drugs that require co-payments and restricted formulary authorizations. Essential drugs typically treat common diseases and health conditions (Guan et.al, 2011; Gordon Liu et. al, 2022).

The NRDL is periodically updated to reflect changes in healthcare needs and medical advancements. The second version of NRDL in 2004 expanded the list to 1,850 drugs, while the third version in 2009 added 277 more drugs and included newer drugs and more specific dosage forms. The fourth version in 2017 included 2,535 drugs, with a focus on high-cost oncology drugs and drugs for rare diseases (see Figure 4). A recent update in 2019 has included 2,643 drugs.

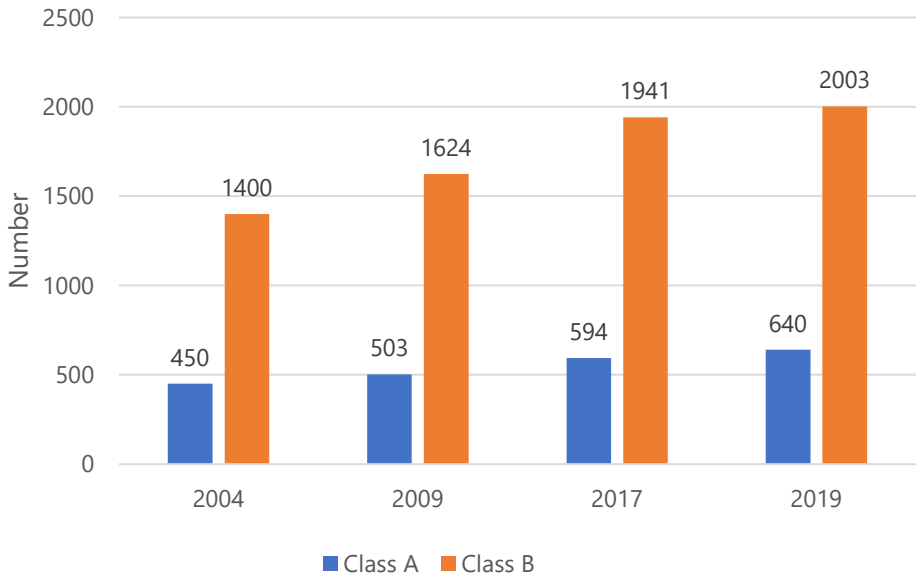


Figure 4. Number of Drugs in the NRDL: by Year

The NRDL sets the national standard for essential drug coverage, while local authorities can customize their own provincial reimbursed drug lists (PRDL) by up to 15 percent. Reimbursement rates for drugs on the NRDL are standardized throughout the country, while reimbursement rates for drugs on provincial PRDLs may vary depending on local health insurance policies and resources. The national and provincial lists work together to ensure access to essential drugs for the whole population.

Drug procurement and negotiation. Drug procurement aims to streamline the hierarchically structured distribution system and reduce drug prices. Public hospitals are able to purchase essential drugs directly from pharmaceutical manufacturers, obviating the need for intermediaries. The pilot drug tendering program was first launched in provinces such as Sichuan and Guangdong in 2006 and was later expanded to the entire country in 2009. Local authorities conducted procurement in accordance with the needs of all their public hospitals. Typically, first-price auctions were adopted, with the lowest-priced manufacturer prevailing. The quantities, however, were not binding, as winning bids and purchases are separate. Hospitals can decide whether to purchase the product and the quantity to be purchased (Liu et.al, 2022).

In 2018, the government implemented a centralized drug procurement program that involved direct price negotiations with pharmaceutical companies. This program, known as the "4+7" procurement reform, was piloted in four municipalities (Beijing, Shanghai, Tianjin, and Chongqing) and seven cities (Guangzhou, Shenzhen, Xi'an, Dalian, Chengdu, Xiamen). The program differed from previous provincial and municipal procurement practices, as participating cities collaborated to negotiate with drug manufacturers for greater bargaining power and lower prices. The program placed a strong emphasis on product quality and quantity. High-quality drugs were prioritized in the procurement process, and prices were negotiated in consideration of quantity and long-term contracts with manufacturers. These measures incentivized manufacturers to offer lower prices while ensuring a long-term stable drug supply.

4. Policy Effects on Pharmaceutical Access

To identify relevant published research articles and reviews, we used PubMed, a free search engine that provides references and abstracts primarily in English related to life sciences and biomedical research. Its main database, MEDLINE, is maintained by the United States National Library of Medicine at the National Institutes of Health. We conducted a search using the following terms "China," "drug policy," "availability," "affordability," and "healthcare reform," which identified eight relevant studies with linked data covering the period from 2013 to 2018. Table 2 summarizes the main findings of the identified English papers.

Table 2. Summary of Research Findings

Authors	Journal	Data	Main Findings
Fang et. al (2013)	The Lancet Global Health	Two cross-sectional surveys about medicine availability and prices in Shaanxi Province between 2010 and 2012	- The National Essential Medicine Policy (NEMP) implementation during the early years led to a decrease in medicine prices, particularly in primary hospitals. - The reduction in prices was more significant for originator brands) compared to LPGs (low-priced generics), despite the fact that the NEMP policy mainly targets generic drugs. - Both procurement prices and prices charged to patients decreased more substantially for OBs than for LPGs.
Jiang et. al (2013)	PLoS One	Cross-sectional survey conducted in 2010 from 50 public and 36 private sector medicine outlets in six regions of Shaanxi Province	- The government procurement agency is purchasing originator brands efficiently, but at very high prices. - Both the public and private sectors have a lower availability of OBs than generic alternatives, which can be attributed to their substantially higher prices. - Availability of medicines listed on the National Essential Medicines List was worse compared to other medicines, especially in the public sector.
Li et. al (2013)	Bulletin of the World Health Organization	Cross-sectional survey in three provinces/municipalities (Ningxia, Chongqing, and Tianjin)	- The introduction of NEMP resulted in decreased drug costs, leading to reduced costs of outpatient and inpatient care. - Improved prescribing under NEMP led to increased uptake of health services. - However, some drugs experienced price increases, which led to reduced availability of other drugs.

			- Health facilities became more reliant on public financing following the implementation of NEMP.
Zhang et. al (2014)	BMJ Open	Financial statements and local statistical of 296 township health centers in Chongqing, Henan and Jiangsu provinces	- The implementation of NEMP resulted in reduced inpatient and outpatient drug expenditures. - The adoption of NEMP did not result in a change in physician care.
Sun et. al (2016)	Journal of Medical Economics	Proprietary datasets from IMS China Hospitals Audit system (2012–2014) that covered all hospitals with 100 beds and above	Switching from brand originator medications to generic equivalents for anti-hypertensives and anti-diabetics is estimated to result in cost savings of 44 percent and 87 percent of the total costs, respectively.
Su et. al (2017)	Lancet	A nationwide cross-sectional survey conducted between 2016 and 20017(China Patient-Centered Evaluative Assessment of Cardiac Events Million Persons Project primary health care survey)	- Deficiencies in availability, cost, and prescription of antihypertensive medications are detected. - Despite the availability of low-cost antihypertensive medications, higher-cost medications were more often prescribed, - The reality of care delivery in the clinics is not consistent with the health needs of the nation.
Huang et. al (2018)	BMC Health Service Research	A five-year longitudinal household survey conducted in a high-income city in the east, Hangzhou, and a lower-income city in the west, Baoji	- The Healthcare Reform in 2009 and the subsequent achievement of universal health coverage have led to improved drug access in urban areas. - Despite this improvement, the affordability of medicines remains a concern. Medical expenditure grows faster than non-food consumption expenditure.
Tang et. al (2018)	PharmacoEconomics	Procurement records of antibiotics from the Hubei Medical Procurement Administrative Procurement System from 2014 to 2016	- The hospital reforms in China, which included zero-markup policies and increased consultation and service fees, had unintended consequences. - Specifically, county public hospitals procured more antibiotics to offset the loss of income from the sale of medicines. This led to an increased total cost of antibiotics.

These studies have examined the effects of introducing essential drug policies and procurement at the regional or national level. The findings suggest that drug policies, particularly those aimed at promoting price competition for essential drugs, have been successful in reducing the cost of medicines paid by patients, thereby increasing their access to medicines. Despite the positive effects of these policies, there are still obstacles and constraints that need to be addressed to ensure equitable access to essential medicines for all. For example, chronic diseases such as diabetes, hypertension, and cancer continue to

have high drug prices. And the unequal health insurance coverage between rural and urban areas can exacerbate their accessibility.

Moreover, these policies have resulted in unintended consequences. The push for market competition and lower prices has led manufacturers to cut costs, resulting in a decline in the quality of drugs. As drug procurement and adoption remain independent processes, lower acquisition costs do not necessarily result in generic substitution. Physicians continue to prefer higher-priced drugs (Zhang et al., 2014; Tang et al., 2018). Overall, to improve access to drugs nationwide, policymakers need to explore alternative mechanisms to balance the interests of manufacturers responsible for drug supply, patients' ability to pay, and health care providers to facilitate greater access to essential drugs nationwide.

5. Discussion

Access to drugs in China is a complex issue that involves a combination of drug regulatory and reimbursement policies. Through policies aimed at price control, as well as promoting price competition through procurement and negotiation, drug costs have been substantially reduced over time. In addition, the health insurance system and periodically updated reimbursement drug lists have further helped to lower the out-of-pocket payment for drugs. Despite the achievements, challenges remain.

The first challenge is to strike a balance between drug innovation and market competition. On the one hand, national negotiation processes have increased access to innovative drugs, such as new anti-cancer and orphan drugs. However, the substantial reduction in the price of these originator drugs may discourage manufacturers from investing in further drug innovation. Although these innovative drugs are included in the NRDL and receive partial coverage of their development costs by public social insurance, it remains unclear whether these measures fully support companies in recouping research and development costs or incentivizing new drug development.

On the other hand, competition in the pharmaceutical market, particularly with generic drugs, has lowered drug prices, reducing the financial burden on patients and the healthcare system. However, intense competition can drive some companies out of the market, negatively impacting the availability of low-cost drugs. Additionally, price negotiations may favor larger companies due to their production capacity and economies of scale, potentially driving smaller companies out of the market and creating oligopolies that impede long-term price competition.

The second challenge concerns the efficient allocation of resources. Currently, NRDL updates are based on pharmacoeconomic evaluations by expert panels. Health technology assessment (HTA) has been recently introduced to evaluate the cost-effectiveness of new drugs. Internationally, HTA is widely used to systematically evaluate the cost-effectiveness of including new drugs to coverage or replacing old ones. However, the addition of a new drug may come at the expense of losing the health benefits derived from another drug. Moreover, prioritizing healthcare development within budgetary constraints will inevitably require

allocating resources away from other sectors. However, the lack of data collection and systematic analysis has limited the availability of evidence on the extent of resource allocation.

The third one relates to drug adoption, as winning a procurement contract does not guarantee drug adoption by hospitals. This may be due to separate processes for procurement and drug adoption, as well as concerns about the quality and efficacy of both generic and innovative drugs. While the NMPA requires generic drugs to be equivalent to originator drugs, some physicians still lack confidence in their safety and effectiveness (He et al., 2022). Hospitals may also prioritize cost-saving measures over the adoption of new drugs due to a national policy of rating hospitals based on the proportion of drug expenditures in total hospital costs. Patient reimbursement caps in some provinces has further impeded the use of innovative drugs (Liu et al., 2022). These barriers exist at both the hospital and patient levels, making it challenging to ensure that drugs are adopted and used by those who need them.

Overall, balancing access, affordability, and adoption of medicines requires a nuanced approach. However, due to a scarcity of data, existing studies have primarily focused on systematic reviews, with limited evaluations of drug policies that address all three elements. In our upcoming research project, we plan to collect data at the manufacturer, hospital, and provincial city levels to quantitatively assess trade-offs and accumulate evidence that can inform policy decisions.

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