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South-South Ideas

How to Harness China-Africa Cooperation in Post-COVID-19 recovery for the Development of Africa's Pharmaceutical Industry

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South-South Ideas

How to Harness China-Africa Cooperation in Post-COVID-19
Recovery for the Development of Africa's Pharmaceutical Industry

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Abbreviations and Acronyms

AfCFTA	African Continental Free Trade Agreement
API	Active Pharmaceutical Ingredient
BRI	Belt and Road Initiative
CAD Fund	China-Africa Development Fund
CAGR	Compound Annual Growth Rate
DFI	Development Financing Institution
FDI	Foreign Direct Investment
FOCAC	Forum on China-Africa Cooperation
GDP	Gross Domestic Product
GTP	Growth and Transformation Plan
KPIP	Kilinto Pharmaceutical Industrial Park
LDC	Least-Developed Country
LPP	Local Pharmaceutical Production
MPP	Medicinal and Pharmaceutical Products
MVA	Manufacturing Value-Added
PHP	Pharmaceuticals and Health Products
PMPA	Pharmaceutical Manufacturing Plan for Africa
PPE	Personal Protective Equipment
R&D	Research and Development
SPH	Shanghai Pharmaceuticals
SSA	Sub-Saharan Africa
SSPC	Shanghai-Sudan Pharmaceutical Co. Ltd.
WHO	World Health Organization

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Executive summary

It has long been the aim and ambition of African countries to become self-sufficient in meeting the continent's pharmaceutical needs. Prompted by the outbreak of the COVID-19 pandemic in early 2020 and the continued repercussions, the need to accomplish this mission has been brought to light and has become more important than ever. Given China's increasing engagement in Africa and the highly complementary economic structures of the two regions, China could potentially play a significant role in helping Africa to build its resilience against health emergencies and meet its own medical demands through the development of local pharmaceutical production. This potential is further magnified by the momentum of growing Chinese business investments in Africa and the deepening of the Belt and Road Initiative (BRI) launched in 2013. As of December 2021, 50 countries (out of 144) in Africa had signed BRI cooperation documents with China, the largest number of countries from any continent in the world.

Based on a mix of quantitative and qualitative analyses that involved both primary and secondary data gathered through public sources and field research, this paper: 1) maps out the landscape of pharmaceutical manufacturing in both China and Africa; 2) identifies constraints and challenges faced by Chinese pharmaceutical investors in Africa; and most importantly of all, 3) provides targeted policy recommendations to key stakeholders to unleash the enormous potential of Africa's nascent pharmaceutical manufacturing industry, promote China-Africa health cooperation and build a role model for broader South-South cooperation.

While the list of recommendations proposed in this study may not be exhaustive, it is aimed at addressing the most pressing challenges and facilitating China-Africa health cooperation in the post-COVID-19 era for the development of Africa's local pharmaceutical production. Firstly, as a key bottleneck to development of the pharmaceutical industry in Africa is the dire shortage of qualified labour, it is highly recommended to institutionalize training programmes in the sector, with support from both African and Chinese governments. This would not only make the training more cost-effective, but it could assure a steady flow of qualified African workers entering the pharmaceutical labour market. Second, stringent foreign exchange controls are observed in many African countries, and it is strongly recommended to ease these controls and give foreign pharmaceutical manufacturers preferential access to foreign exchange. Third, as the central pillar in advancing China-Africa relations and in upholding South-South cooperation, the Forum on China-Africa Cooperation (FOCAC) offers a great venue to continually deepen health cooperation through increased investment in pharmaceuticals in the post-COVID-19 era. It is highly recommended to dedicate a sub-forum on the theme of health in advance of the FOCAC Summit, which is held triennially, focusing specifically on the role of China's investment in strengthening local pharmaceutical production in Africa and the fight against public health crises. Fourth, African governments should strategically take a pharmaceutical-centric approach in developing industrial parks and special economic zones. Lastly, as financing is always a critical issue for investment, and considering the urgency of accelerating Africa's recovery from the COVID-19 pandemic and the importance of developing pharmaceutical production on the continent, it is strongly advised that the China-Africa Development Fund (CAD Fund) prioritizes pharmaceutical manufacturing investments for Africa.

While the pharmaceutical industry in Africa has the potential for a bright future, the journey to establishing a sustainable local supply of affordable and high-quality essential medicines seems long and will require concerted efforts. Nonetheless, as the Chinese proverb goes "a journey of a thousand miles begins with a single purposeful step." The creation of a single African market under the African Continental Free Trade Agreement (AfCTFA), rigorous efforts in establishing the African Medicines Agency and strong political commitments that have placed a high priority on health cooperation in the post-COVID-19 era from both China and Africa suggest that local pharmaceutical production in Africa is an idea whose time may have finally come.

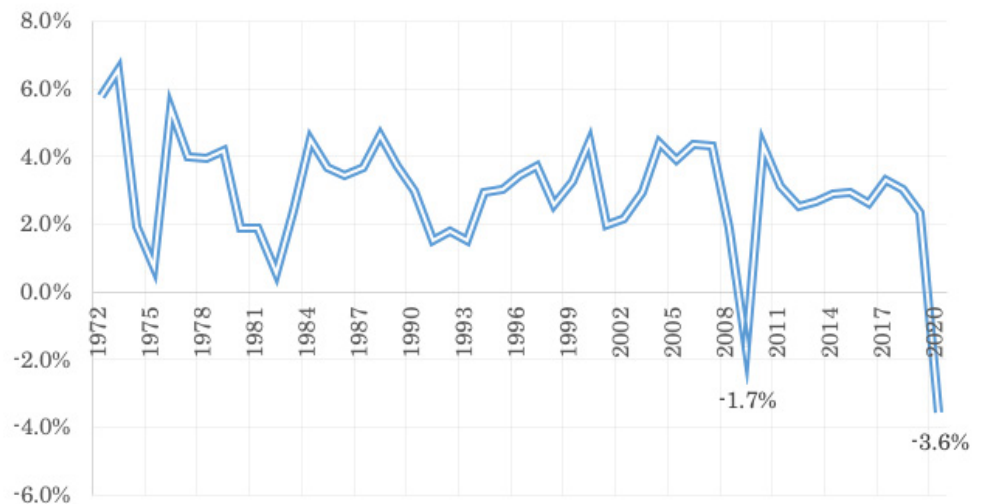
CHAPTER 1. INTRODUCTION



Most countries took stringent containment measures and enforced physical restrictions, which led to a large-scale suspension of economic activities.

The sudden outbreak of the COVID-19 pandemic has taken a devastating humanitarian and economic toll on the world. According to the latest estimates of the World Health Organization (WHO), as of December 2021, there were over 260 million confirmed cases of COVID-19, including a startling number of over 5.2 million deaths. To contain the spread of the virus, most countries took stringent containment measures and enforced physical restrictions (lockdowns and shutdowns) during the early stage of the outbreak, which inevitably led to a large-scale suspension of economic activities. As a result, a public health crisis quickly turned into a global economic crisis. Based on data compiled by the World Bank, the global gross domestic product (GDP) contracted by 3.6 percent in 2020, which is the largest contraction documented over the past fifty years and the loss of GDP is over twice as much as was caused by the 2008 global financial crisis (see Figure 1).

Figure 1: Year-on-year growth of global Gross Domestic Product



Note: Growth rates are calculated based on 2010 constant prices.

Data source: World Development Indicators, 2021.



Given the current trends in incidence and a global shortage of COVID-19 vaccines, Africa is still the most vulnerable region in the world.

With weak health systems and, in most cases, underdeveloped economies, African countries seemed to be particularly vulnerable to the pandemic. Experts and scholars have warned that given the current trends in incidence and a global shortage of COVID-19 vaccines, Africa is still the most vulnerable region in the world and the resulting socioeconomic cost may go beyond calculation (Loembé et al., 2020). Africa's vulnerability is exacerbated by the fact that the continent is already fighting against other deadly diseases (e.g., HIV and malaria). The COVID-19 pandemic exposed the region's inadequate capabilities and capacity to manufacture and supply essential drugs and personal protective equipment (PPE) for a crisis, let alone meet the region's fast-growing healthcare demands. If Africa's deficiency and insufficiency in pharmaceutical and health

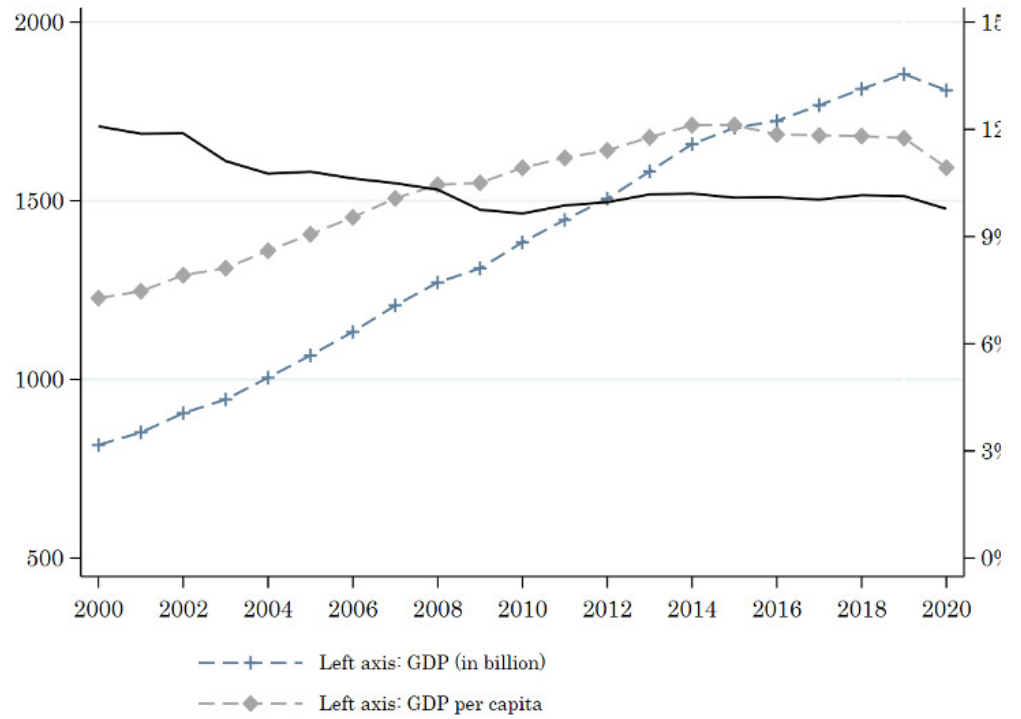


product (PHP) provision is not addressed properly and in a timely manner, the current crisis may reverse hard-fought gains in development and Africa's growth prospects for years to come. To ensure a sustainable future for Africa, especially for those countries that are most vulnerable (sub-Saharan Africa), the urgency and importance for developing local pharma production capacity cannot be overstated.

It is worth noting that before the outbreak of the coronavirus in early 2020, the overall economic development in sub-Saharan Africa has been laudable. As shown in Figure 2, GDP in the region grew steadily between 2000 and 2019. The compound annual growth rate (CAGR) of GDP reached 4.4 percent during this period, making it one of the world's fastest growing regions. Nonetheless, strong economic growth in sub-Saharan Africa is not driven by successful industrialization and has not translated into the same level of improvement in living standards. The black solid line depicted in Figure 2 shows the share of manufacturing value-added (MVA) in GDP in the region, which declined from 12.1 percent in 2000 to 10 percent in 2019, indicating a trend of de-industrialization in the region. As a widely used proxy measure for living standards, the gray dashed line in Figure 2 captures the region's GDP per capita. As shown in the figure, the CAGR of GDP per capita is only 1.6 percent over the same period of observation and the level, measured in 2010 constant US dollars (\$), had already reached its peak in 2015, which is well ahead of the outbreak of the COVID-19 pandemic. This suggests that living standards in the region have stagnated since 2015 and the outbreak of the COVID-19 pandemic only made it worse.

If one looks specifically into the health sector, Africa's performance is also lagging behind. Table 1 compares health expenditures per capita in sub-Saharan Africa with that of the world, North America and East Asia and the Pacific (excluding high-income economies). Given its lower level of economic development, it shall not come as a surprise that health expenditures are much lower in sub-Saharan Africa than the other three comparators (e.g., less than

Figure 2: GDP and GDP per capita of sub-Saharan Africa (in 2010 constant \$)



Data source: World Development Indicators, 2021



Population health is a significant contributor to economic growth and social development.

10 percent of the world average and less than 1 percent of that of North America). What is staggering to note is that a downward trend seems to have emerged over the last decade. To be precise, health expenditures per capita in sub-Saharan Africa declined from \$110 in 2010 to \$80 in 2019, representing a decline of over 27 percent. By contrast, health expenditures per capita for the world and North America remained roughly stable during this period. For East Asia and the Pacific (excluding high-income economies), health expenditures per capita increased dramatically over time, rising from \$197 in 2010 to \$415 in 2019. In addition, health expenditures per capita as a share of GDP per capita are significantly lower in sub-Saharan Africa, with about one-half of the share of the world average and less than a third of the share of North America. Note, while this share is also significantly lower in East Asia and the Pacific (excluding high-income economies), the implication is quite different, as the latter region experienced a significant increase in the value of health expenditures per capita. Thus, even in the absence of the outbreak of the COVID-19 pandemic, the development of the health sector in Africa warrants greater attention and urgent action. A robust and self-sustaining health sector that could meet Africa's own pharmaceutical needs would not only protect lives and build resilience against epidemics and pandemics, but it could also contribute to economic growth and sustainable social development. A large body of literature in economics has already suggested that population health is a significant contributor to economic growth and social development, especially with regard to achieving high-quality growth and sustaining growth over the long run (Bloom, et al., 2004; Sharma, 2018; Weil, 2007).



Table 1: Comparison of health expenditures per capita (in 2015 constant \$)

Year	Health expenditure per capita				Health exp. as% GDP per capita			
	World	N. America	East Asia and the Pacific (excl. high income)	sub-Saharan Africa	World	N. America	East Asia and the Pacific (excl. high income)	sub-Saharan Africa
2000	1095	9821	87	78	8.7%	12.2%	4.0%	5.4%
2001	1102	10343	87	70	9.1%	12.9%	3.9%	5.3%
2002	1164	11162	97	67	9.4%	13.7%	3.9%	4.8%
2003	1274	11766	108	96	9.5%	14.1%	4.0%	5.7%
2004	1312	11741	113	108	9.4%	14.2%	3.9%	5.7%
2005	1326	11881	124	115	9.3%	14.2%	3.9%	5.5%
2006	1318	11822	134	120	9.3%	14.3%	3.8%	5.3%
2007	1279	11046	142	118	9.1%	14.5%	3.6%	5.2%
2008	1174	9663	157	106	9.1%	14.7%	3.7%	5.1%
2009	1170	9814	184	105	9.8%	15.8%	4.1%	5.4%
2010	1132	9442	197	110	9.5%	15.7%	4.0%	5.3%
2011	1081	8563	218	107	9.4%	15.6%	4.1%	5.4%
2012	1042	8432	243	100	9.4%	15.6%	4.3%	5.2%
2013	1017	8432	265	98	9.4%	15.5%	4.5%	5.2%
2014	1021	8257	283	94	9.4%	15.7%	4.6%	5.0%
2015	994	8448	306	88	9.7%	16.1%	4.7%	5.2%
2016	1069	8916	327	86	9.9%	16.4%	4.7%	5.4%
2017	1085	9741	351	88	9.8%	16.3%	4.8%	5.4%
2018	1071	9830	377	79	9.7%	16.2%	4.9%	5.0%
2019	1123	10329	415	80	9.8%	16.3%	5.1%	4.9%

Data source: World Development Indicators, 2021.

As the largest trading partner and equity investor, measured by the inflow of foreign direct investment (FDI),¹ China has played an essential role in Africa’s economic development in the last twenty years. In a series of studies carried out by China-Africa Research Initiative researchers, it was found that Chinese investment in the manufacturing and agriculture industries in Africa has contributed to its growth through job creation, technology spillovers and linkages to local suppliers, buyers, subcontractors and entrepreneurial activities.² With a total of 50 African countries having signed the cooperation

1 According to data compiled by the China-Africa Research Initiative at John Hopkins University, China overtook the United States of America in 2013 as Africa’s largest equity investor, measured by FDI.

2 For more information, refer to www.sais-cari.org/research-chinese-FDI-and-structural-transformation-in-africa.

documents for the Belt and Road Initiative (BRI),³ China will remain critically important for Africa in the post-COVID-19 era, especially in helping the region build industrial capacity and pharmaceutical manufacturing capacity. Aided by an effective pandemic control strategy, China was the only major economy in the world to achieve positive economic growth in 2020. While not all the containment measures and policy responses can be replicated by other countries, much can be learned, and China is open to share its experiences and lessons. Declarations of support have already been made at the multilateral level, in particular with the organization of an Extraordinary China-Africa Summit on Solidarity Against COVID-19 chaired by Chinese President Xi Jinping in June 2020. President Xi re-affirmed China's support for the United Nations-led multilateral system and WHO and pledged to remain committed to fighting COVID-19 together while further advancing China-Africa comprehensive strategic and cooperative partnership through the BRI and the Forum on China-Africa Cooperation (FOCAC) framework. To this end, this report will focus on the role of China in helping Africa develop local pharmaceutical production (LPP) capacity in the post-COVID-19 era. In particular, by drawing on a mix of quantitative and qualitative analyses that involve both primary and secondary data gathered through public sources (e.g., World Bank, United Nations Conference on Trade and Development, National Bureau of Statistics of China) and field research (i.e., onsite interviews with representatives of Chinese pharmaceutical companies and a chamber of commerce), this paper aims to: 1) map out the landscape of pharmaceutical manufacturing in both China and Africa; 2) identify the constraints and challenges confronted by Chinese pharmaceutical investors in Africa; and 3) provide targeted policy recommendations to all relevant stakeholders to unleash the enormous potential of Africa's nascent pharmaceutical manufacturing industry.

Note, while the central theme of this paper is bilateral China-Africa cooperation in pharmaceuticals, the narratives can be fit into the broader context of South-South cooperation (SSC) and triangular cooperation. In fact, cooperation between China (the largest developing country in the world) and Africa (the continent with the largest number of developing countries) is, by nature, a typical example of SSC, which goes beyond and complements traditional North-South cooperation. With humanitarian and financial aid as the central pillar, North-South cooperation often imposes conditionalities on aid-reipient countries. By contrast, SSC is rooted in Southern solidarity, horizontal exchange and mutual economic gains with little or no conditionalities.⁴

3 The Belt and Road Initiative (BRI) is an ambitious development strategy launched by China in 2013, which seeks to connect Asia with Africa and Europe via land and maritime networks and aims to improve regional integration, strengthen trade ties and stimulate economic growth.

4 Note, despite the difference, North-South and South-South cooperation share more commonalities than distinctions in essence. Neither side is superior to the other across all countries and circumstances. A thorough review of the differences and similarities between these two types of cooperation is beyond the scope of this research. Readers who are interested in this issue can refer to Amanor and Chichava (2016) and Abdenur and Da Fonseca (2013) for more detailed discussions.



The rest of the report is organized as follows. Chapter 2 provides an overarching view of the development of Africa's pharmaceutical industry. In particular, special attention is given to mapping out the existing pharmaceutical manufacturing capacity across the continent and new opportunities brought about by the recent launch of the African Continental Free Trade Agreement (AfCFTA). Chapter 3 focuses on the development of China's pharmaceutical industry, including the current health cooperation with Africa in terms of trade and investment in pharmaceuticals and health products as well as the potential for relocating certain segments of pharma production to Africa. To gain further insights and a more granular understanding, this chapter also delves deeper into the issue through onsite interviews with Chinese companies that have invested and are currently operating on the ground in Africa and with industry experts from the China Chamber of Commerce for Import and Export of Medicines and Health Products (CCCMHPIE). Chapter 4 draws on two country cases studies, namely Ethiopia and South Africa. The former has experienced fast economic growth in the past two decades and is now aiming to become the future pharmaceutical manufacturing hub of Africa. The latter is a regional leader in pharmaceutical manufacturing. Chapter 5 offers concluding remarks and outlines a list of policy recommendations. Albeit this list may not be exhaustive, it is targeted at addressing the most pressing challenges and facilitating China-Africa health cooperation in the post-COVID-19 recovery for the development of Africa's local pharmaceutical production.

CHAPTER 2. OVERVIEW OF AFRICA'S PHARMACEUTICAL INDUSTRY



Pharmaceutical manufacturing capacities vary significantly across the African continent.

Comprised of 54 countries with highly heterogeneous levels of economic development, the capacity of pharmaceutical manufacturing varies significantly across the African continent. A few countries are capable of producing pharmaceuticals and health products to meet domestic demand, and sometimes even export to other (neighbouring) countries, while in many countries, the capacity of pharmaceutical manufacturing is virtually non-existent. This chapter will provide an overview of the African pharmaceutical industry in terms of its development history, existing production capacity and current trade relations in pharmaceuticals and health products (PHP) with the rest of the world. In addition, by eliminating both tariff and non-tariff barriers, the recent launch of AfCFTA is expected to boost intra-regional trade of pharmaceuticals and PPE, which offers a unique window of opportunity for Africa to accelerate progress in ramping up production capacity of pharmaceutical manufacturing. This is also the vision of the Pharmaceutical Manufacturing Plan for Africa (PMPA) endorsed by the African Heads of State and Government at a summit in Accra, Ghana, in May 2007.

2.1. The existing pharmaceutical manufacturing capacity in Africa

The origin of Africa's pharmaceutical manufacturing can be traced back to colonial times. According to Banda et al. (2016), giant pharmaceutical companies from Europe and the United States began setting up subsidiaries in Africa back in the 1930s. More specifically, GlaxoSmithKline established a subsidiary in Kenya in 1930, Abbot set up in South Africa in 1935, and May & Baker was established in Nigeria in 1944. In general, the entire period from 1930 to 1960 witnessed a slow take-off of pharmaceutical manufacturing in Africa, which was mainly driven by investments from western multinational companies. Decades after gaining independence from the colonial powers, local investors in pharmaceuticals started to emerge in the mid-1990s—many of whom were local entrepreneurs with experience gained working in those multinational companies. According to a study conducted between 2007 and 2009, 37 African countries⁵ were identified to possess some pharmaceutical manufacturing capability and South Africa was the only country with limited production of active pharmaceutical ingredients (APIs) and intermediates⁶ (Berger et al., 2010). This suggests that almost all the manufacturing capacity of pharmaceuticals in Africa are focused on producing generic medicines, which are copies of originator or innovator

5 Of the 37 African countries with some pharmaceutical production, 34 have the capacity for formulation and 25 are only capable of performing simple tasks, such as packaging and labeling.

6 APIs refer to the drug substance itself. Intermediates refer to materials produced during steps of the processing of an API that must undergo further molecular change or purification before becoming an API.



branded medicines. Thus, the vast majority of APIs and excipients are imported from abroad, mainly from China and India (Banda et al., 2016).

In the pursuit of establishing a sustainable supply of affordable and high-quality essential medicines to improve public health and promote industrial and economic development on the continent, the PMPA was duly developed and endorsed by the Heads of State and Government in Accra, Ghana, in 2007. To accelerate implementation of PMPA and achieve those intended outcomes, a business plan was formulated in 2012 by a partnership of the African Union Commission and the United Nations Industrial Development Organization.⁷ The proposed business plan identified a list of obstacles to developing the pharmaceutical industry in Africa, including a lack of human and financial capital, weak national and regional pharmaceutical regulations, over-dependence on imports of APIs from abroad, poor implementation of good manufacturing practices and underdeveloped supporting industries.

As these limiting factors are still in place a decade later, it can be proposed that China has a significant role to play in helping Africa develop local pharma production. First, China has become the largest bilateral lender for public sector loans across the African continent since 2012, with lending directly mostly toward infrastructure sectors (e.g., roads, energy and water supplies), which help the continent mitigate the lack of access to finance and tackle the issue of underdeveloped supporting industries. Second, albeit it may take a long time to build up the manufacturing capacity of APIs in Africa, attracting Chinese pharma manufacturers is arguably the most effective way to reduce Africa's over-reliance on API imports, as China is the world's largest producer of APIs (Jia, 2007). The PMPA business plan also seems to support the concept of China-Africa pharmaceutical cooperation.

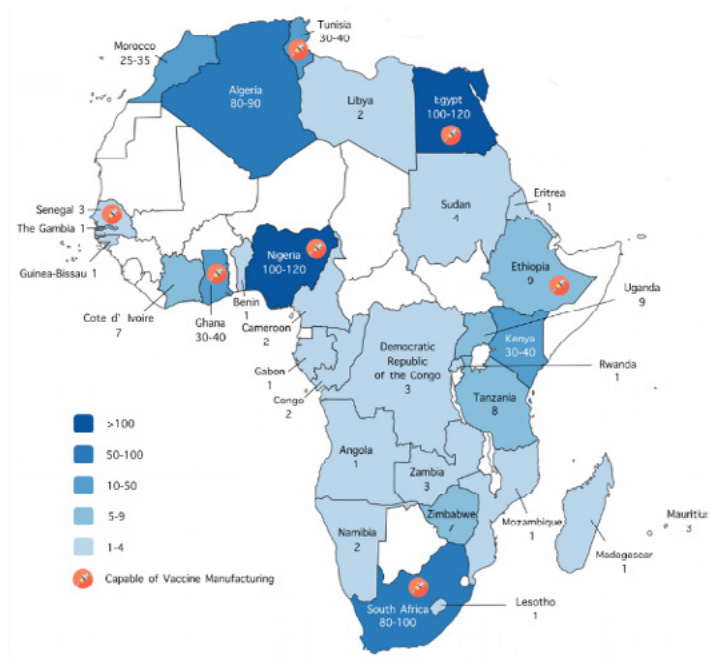
According to a newly released study by Kaufman et al. (2021), Africa currently has approximately 600 pharmaceutical manufacturers operating on the ground, and they are highly concentrated in just four countries—Algeria, Egypt, Nigeria and South Africa (see Figure 3). Taken together, these four countries account for two-thirds of all pharmaceutical manufacturers in Africa. To put it into perspective, with similar population sizes, China and India have as many as 5,000 and 10,500 pharmaceutical manufacturers, respectively (Conway et al., 2019). Moreover, as found by Buckholtz (2021), due to a lack of available investment to scale up operations, modernize equipment and resolve deficiency in local infrastructure, pharmaceutical manufacturing production in Nigeria is only at around 40 percent of its actual installed capacity. Thus, besides having a significantly smaller amount of manufacturing firms, production capacity is also much lower in Africa, leaving Africa's manufacturing capacity further behind vis-à-vis China and India. This also points to the fact that the ramp-up of Africa's pharmaceutical manufacturing capacity requires sustained and coordinated efforts of many different economic sectors.



The ramp-up of Africa's pharmaceutical manufacturing capacity requires sustained and coordinated efforts of many different economic sectors.

⁷ For more information, see https://au.int/sites/default/files/pages/32895-file-pmpa_business_plan.pdf.

Figure 3: Distribution of pharmaceutical manufacturers in Africa

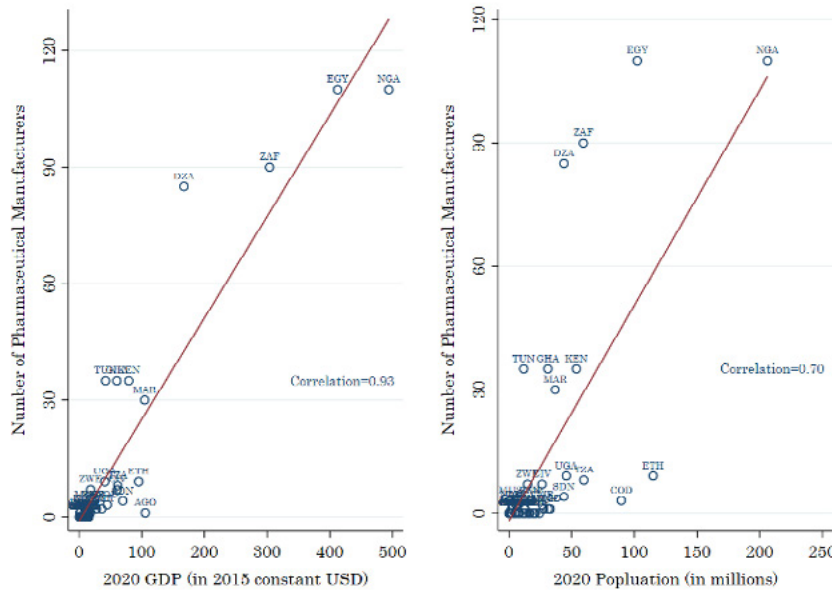


Source: Adapted from Kaufman et al. (2021) and complemented with information gathered through interviews with industrial experts.

A closer look at the concentration of pharmaceutical manufacturers in those four African countries seems to reveal that pharmaceutical manufacturing capacity is highly correlated with a country's level of economic development. As shown in the left panel of Figure 4, the correlation coefficient between the number of pharmaceutical manufacturers and GDP is over 0.93 and it is statistically significant at less than the 1 percent level. This finding conforms to the perception that the pharmaceutical industry is relatively advanced and requires a large amount of capital investment. To a lesser extent, pharmaceutical manufacturing is also associated with the size of a country's population. As shown in the right panel of Figure 4, the correlation coefficient is about 0.7 and it is also statistically significant at the 1 percent level. Although not shown in the paper, pharmaceutical manufacturing capacity is also correlated with various other indicators, such as HIV incidence and death rates caused by communicable and non-communicable diseases. However, the correlation coefficients are quite small (i.e., all below 0.4), suggesting a much weaker association than country size measured by GDP and population.



Figure 4: Correlation between pharma manufacturing capacity and country size



Data sources: Kaufman, et al. (2021); information gathered through field research; World Development Indicators, 2021.

As a constituent of the pharmaceutical industry and prompted by the outbreak of the COVID-19 pandemic, African countries are also paying greater attention to ramping up capacity in vaccine manufacturing. At a virtual summit on Expanding Africa’s Vaccine Manufacturing for Health Security organized by the African Union, Africa’s Heads of State pledged to increase the share of vaccines manufactured in Africa from 1 percent to 60 percent by 2040. This includes building production plants and bolstering the region’s capacity in research and development (R&D), which is severely lacking on the continent. According to estimates, Africa produces less than 1 percent of the vaccines it administers, while the remaining 99 percent are imported from abroad (Irwin, 2021).⁸ As Africa is projected to account for the majority of global population growth over the next few decades, this imbalance in supply and demand is likely to exacerbate if it is not addressed in a timely manner. As noted in Figure 3, there are currently only about ten (both established and planned) vaccine manufacturers in Africa (Irwin, 2021). In addition, capabilities across these existing vaccine manufacturers vary substantially. With the exception

⁸ In the context of the COVID-19 pandemic, a huge immunization gap emerged in Africa as its overall vaccination rate was lower than one-fifth of the global average. According to China’s Foreign Minister, Wang Yi, about 180 million doses of vaccines were provided to Africa, covering almost all African countries. At the Eighth Ministerial Conference of the Forum on China-Africa Cooperation in Dakar, the Chinese president pledged to provide one billion doses of COVID-19 vaccines to Africa, of which 600 million doses will be provided in the form of donation and the remaining 400 million will be provided through local production by Chinese companies in Africa.

of one vaccine manufacturer possessing some R&D capabilities, the rest are primarily engaged in simple “fill and finish” and “pack and label” activities. Thus, daunting challenges lie ahead in developing vaccine-manufacturing capacity in Africa, which would require a substantial investment of time and money as well as collaboration of national authorities across the region to coordinate regulation and quality control of the medicines (Abiodun, et al., 2021).

2.2. The African market potential and need for pharmaceutical and health products



The pharmaceutical market in Africa is enormous and will keep on expanding over time.

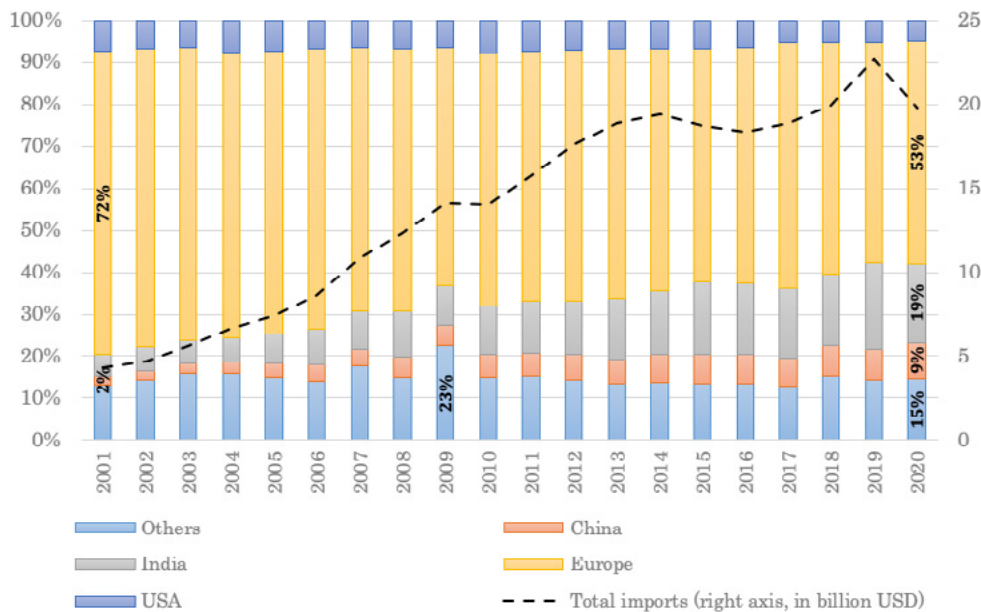
With a total population of over 1.3 billion people and a projected rapid population growth, the pharmaceutical market in Africa is enormous and will keep on expanding over time. As discussed in the previous section, however, there is little domestic supply of pharmaceuticals and health products. According to various studies (e.g., Coutinet and Abecassis, 2018; Pheage, 2017; Tanani, 2021), Africa only accounts for 2-3 percent of global medicine production, and over 95 percent of the required medicine needs are met through foreign imports.⁹ Figure 5 documents the evolution of Africa’s imports of PHP from 2001 to 2020.¹⁰ As shown, Africa’s imports of PHP increased steadily from \$4.3 billion in 2001 to \$22.7 billion in 2019, amounting to a CAGR of over 9 percent, which is over twice as fast as the region’s growth in GDP. If imports in PHP are further split by country of origin, it is interesting to note that while Europe remains the biggest source of imports for Africa, its share has been declining throughout the entire period of observation, down from 72 percent in 2000 to 53 percent in 2020, a decrease of nearly 20 percentage points. On the contrary, China and India are becoming increasingly important for Africa. As shown in Figure 5, the importing share of PHP from China was only a little over 2 percent in 2001; this share quadrupled to nearly 9 percent in 2020. A similar surge in the share of Africa’s imports of PHP is observed for India, which increased from 5 percent in 2001 to 19 percent in 2020. As a global leader in the pharmaceutical industry, the role of the United States in Africa’s imports of PHP has always remained small, accounting for a mere 5 percent in 2020.

⁹ In a more recent study carried out by researchers at McKinsey, the authors also found that imports comprise as much as 70%-90% of drugs consumed in most countries in SSA (Conway, et al., 2019).

¹⁰ Health products shown in Figure 5 are comprised of three categories according to SITC Revision 3: Medicinal and pharmaceutical products (54), Electro-diagnostic apparatus for medical sciences (774), and Instruments & appliances for medical use (872).



Figure 5: The evolution of Africa's imports of PHP, by country origin



Data source: UNCTAD, 2021.

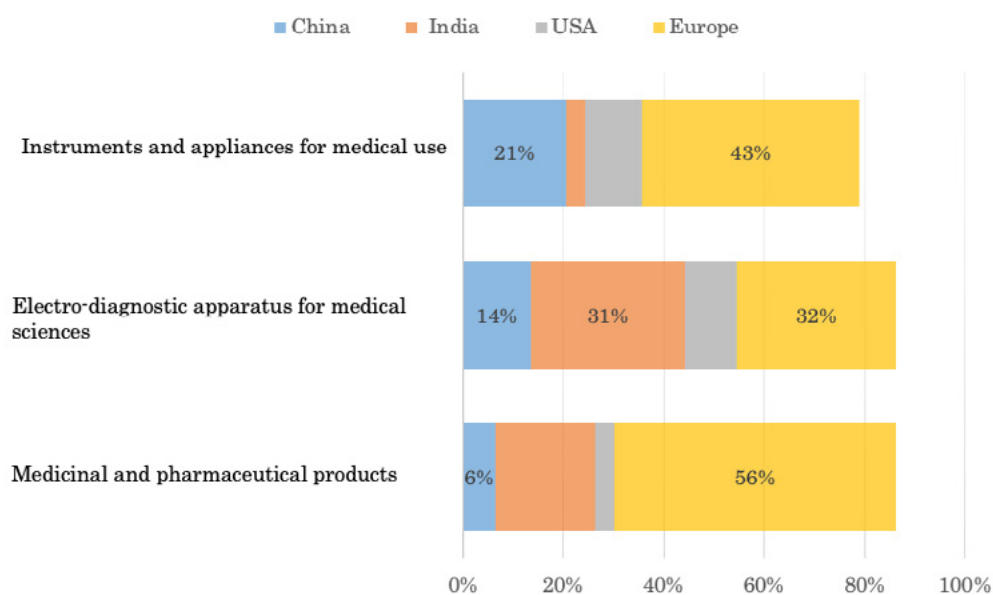
Note, the increasing importance of China and India as countries of origin for Africa's imports is not unique to PHP. In fact, Africa's imports of all products have been gravitating towards the global South. According to trade data compiled by the United Nations Conference on Trade and Development (UNCTAD), Africa's imports from China as a share of its total imports from the world surged from less than 4 percent in 2001 to 18.6 percent in 2020. By contrast, the share of imports accounted for by Europe decreased from 46 percent in 2001 to 32 percent in 2020. The timing of this shift in trade coincides with the launch of FOCAC in 2000, which takes the promotion of China-Africa trade as a key objective. The other reason why China has become an important pharmaceutical trade partner for Africa is related to China's rise as the world's largest producer of APIs (Jia, 2007). As mentioned before, the vast majority of Africa's APIs are imported (ca. 95%)¹¹ and mostly from China. As for India, its importance as a source of Africa's pharmaceutical imports has even exceeded that of China (i.e., accounting for 19 percent versus China's 9 percent in 2020). A key reason for this is associated with India's historical role in supporting Africa to deal with their HIV, tuberculosis and malaria disease burden through low-cost, generic medicines. Besides, pharmaceuticals are a major component of India's trade expansion strategy, especially in exporting into African markets (Kurian and Kapu, 2020).

Figure 6 maps out three major types of PHP imported by Africa by country of origin. As shown in the lower panel of Figure 6, China plays a relatively minor role in sourcing

11 For more information, see <https://europa.eu/capacity4dev/articles/local-production-generic-medicines-africa>.

medicinal and pharmaceutical products, accounting for merely 6 percent. Europe, on the other hand, plays a dominant role in sourcing medicinal and pharmaceutical products for Africa. As for electro-diagnostic apparatus, the importance of India is on par with Europe, each contributing over 30 percent to Africa's imports. With respect to medical instruments and appliances, China surfaced as an important trading partner for Africa, accounting for 21 percent of its imports. India, on the other hand, plays an insignificant role in supplying medical instruments and appliances. While it is not shown in Figure 6, it is of interest to note that among those three product types identified in our analysis, medicinal and pharmaceutical products account for over 80 percent of Africa's imports, confirming Africa's over-reliance on imports for medicines.

Figure 6: Imports of PHP in 2020, by different product types

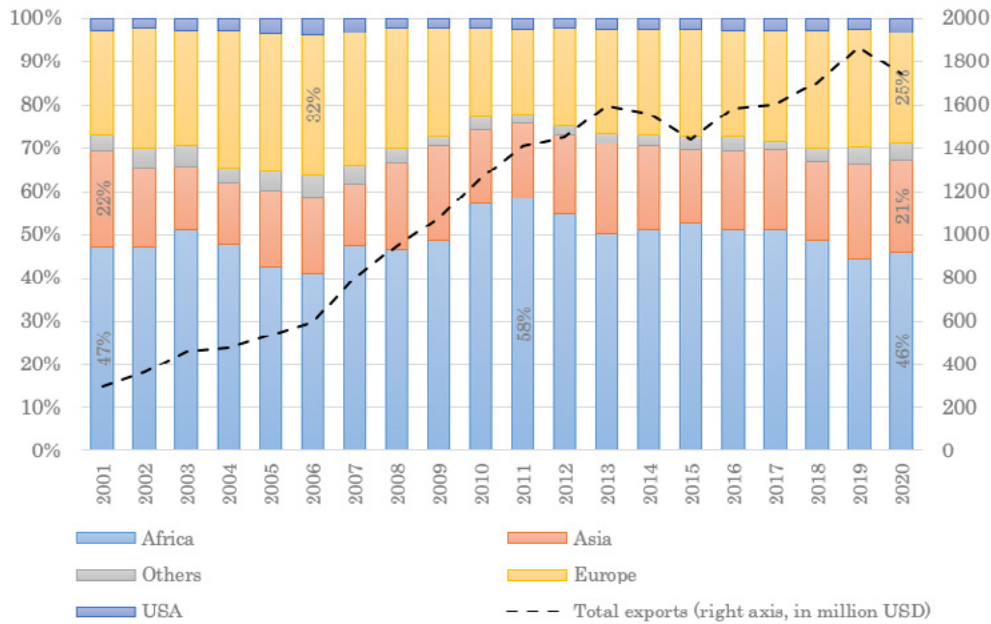


Data source: UNCTAD, 2021.

Turning to exports of PHP, it is no surprise that the export value is much lower than the value of Africa's imports. As shown in Figure 7, while the same increasing trend is observed, the export value is less than one-tenth of the value of imports. In 2019, Africa exported a total value of \$1.8 billion of PHP. In stark contrast to the import structure in which China, Europe and India play a significant role, the export structure shows that the dominant player is Africa itself. That is, the majority of Africa's exports in pharmaceuticals and health products takes place within the region. As shown in Figure 7, the average share of intra-regional exports of PHP accounts for approximately 50 percent of Africa's total exports from 2001 to 2020. While still important, Europe and Asia only account for 25 percent and 21 percent, respectively.



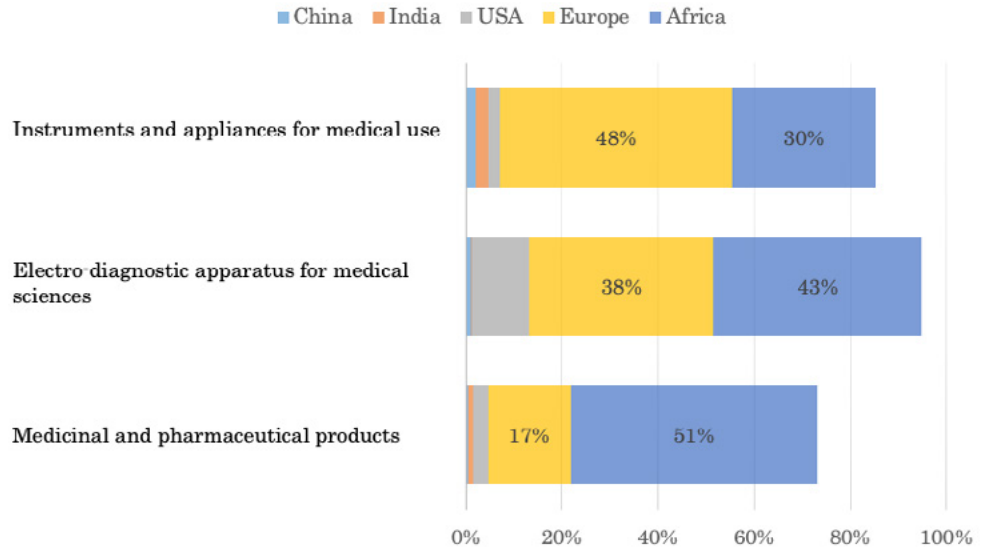
Figure 7: The evolution of Africa's exports of PHP, by country of origin



Data source: UNCTAD, 2021.

In a similar vein, Figure 8 maps out three major product types exported by Africa by destination. As shown, Africa barely exports anything to China and India across all those three product types. A major recipient of Africa's exports of PHP is Europe, especially medical instruments and appliances. As shown in the upper panel of Figure 8, close to 50 percent of Africa's exports in medical instruments and appliances (SITC Rev.3 code 872) ended up in Europe. As said, a significant share of Africa's exports takes place within the region, this is especially true for medicinal and pharmaceutical goods. The lower panel of Figure 8 shows that over 50 percent of exports of medicinal and pharmaceutical goods take place within the African continent in 2020. Akin to the share of imports by product types, medicinal and pharmaceutical products also play a dominant role, accounting for over 83 percent of Africa's exports of PHP in 2020.

Figure 8: Exports of PHP in 2020, by different types



Data source: UNCTAD, 2021.

2.3. New opportunities under the African Continental Free Trade Area



AfCFTA will allow African pharmaceutical manufacturers to enjoy significant economies of scale, increasing Africa's competitiveness in pharmaceutical manufacturing.

Signed by 54 of the 55 African Union member states, the African Continental Free Trade Area (AfCFTA) became effective on 1 January 2021. This is the world's largest free trade area measured by the number of participating countries. The trade agreement will create a single continental market for goods and services, covering 1.3 billion people and a combined GDP of \$2.5 trillion. Thus, the AfCFTA addresses a major challenge of small fragmented markets that have long been a bottleneck constraining the development of Africa's pharmaceutical manufacturing (as with all manufacturing). The creation of a single market under AfCFTA will allow (African) pharmaceutical manufacturers to enjoy significant economies of scale, thereby increasing Africa's competitiveness in pharmaceutical manufacturing. In addition, it has been agreed under AfCFTA that more than 90 percent of intra-African customs tariffs will be eliminated progressively.¹² This, according to estimates by the United Nations Economic Commission for Africa (UNECA), will boost intra-African trade by 52.3 percent by 2022. Part of the boost will come from intra-regional trade in pharmaceuticals and other intermediates, which will be highly conducive to establishing regional pharmaceutical and medical value chains. Moreover, AfCFTA will also dismantle a host of other non-tariff barriers, which will have helpful impacts on the free movement of people and workers. Labour mobility is widely acknowledged as an important contributor to economic growth (e.g., Tipayalai, 2020; Alongso-Carrera and Raurich, 2018).

¹² A distinction is drawn between the least developed countries (LDCs) and non-LDCs for the tariff reductions. LDCs are given 10 years to achieve 90 percent trade liberalization, while non-LDCs need to complete this goal within five years.



Improved harmonization and continental access brought about by AfCFTA have opened up new avenues for developing unified regulatory standards for the pharmaceutical industry. This will facilitate pooled procurement of medicines and pharmaceutical products, which is critical to guaranteeing the protection of an integrated African market from substandard and counterfeit drugs. According to WHO, 42 percent of all fake medicines reported to them in the period from 2013 to 2017 were linked to the African continent. In all likelihood, this number falls short, and the reality may be far worse than reported.¹³ Although a thorough analysis on the causes of the supply of substandard and counterfeit medicines in Africa is beyond the scope of this research, two key causes are highlighted here, as the implementation of AfCFTA might be helpful in fighting against it. First and perhaps the most important cause is Africa's inconsistent legal frameworks and lack of regulations.¹⁴ Most African governments are unable to effectively track and shut down unlicensed drug vendors who sell fake medicines on the streets, kiosks and open-market vendors. This problem is exacerbated by corruption, as illicit vendors may simply bribe government agency workers in exchange for allowing fake drugs to be sold in the local market and/or pass borders illegally. Second, due to taxes, mark-ups and distribution costs, licensed drugs may cost even more in Africa than in other parts of the world,¹⁵ forcing people to resort to substandard and counterfeit medicines that cost only a fraction of the licensed drugs. A unified market created under AfCFTA may help standardize regulations across countries and make licensed medicines more affordable through higher incomes.

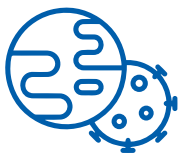
Lastly, African countries could leverage AfCFTA through collective bargaining with foreign pharmaceutical manufacturers. A single market of 1.3 billion people could render Africa the upper hand in negotiations with foreign investors. Similarly, this trade agreement should strengthen Africa's ability to ensure Trade-Related Aspects of Intellectual Property Rights (TRIPS) flexibilities are fully utilized in efforts to enable local production and access to essential medicines. In brief, the launch of AfCFTA offers a unique window of opportunity for Africa to develop pharmaceutical manufacturing and ramp up local production capacity.

13 For more information, refer to <https://inventa.com/en/news/article/545/counterfeiting-of-drugs-in-africa-current-situation-causes-and-countermeasures>.

14 For more information, refer to www.unodc.org/unodc/en/frontpage/2019/May/unodc-launches-a-guide-to-combat-falsified-medical-product-related-crime.html?ref=fs1.

15 According to a news report by BBC, low-income African countries pay 30 times more for drugs (www.bbc.com/news/world-africa-48674909).

CHAPTER 3. OVERVIEW OF CHINA'S PHARMACEUTICAL INDUSTRY AND CHINA-AFRICA TRADE AND INVESTMENT IN PHARMACEUTICALS



Health has remained a key area of cooperation between China and Africa, and the outbreak of the COVID-19 pandemic made it all the more important.

China-Africa cooperation in the health sector has long historical roots. It can be dated back to the 1960s when the first Chinese medical teams arrived in Algeria to provide direct health care to populations, train local healthcare personnel and construct hospitals (Li, 2011). Since then, health has remained a key area of cooperation between China and Africa, and the outbreak of the COVID-19 pandemic made it all the more important. In particular, as the largest trading partner of Africa, China is playing and could potentially play an even greater role in Africa's fight against COVID-19 as well as in building up its resilience against health emergencies through the development of local pharmaceutical manufacturing. This chapter begins with a review of China's own pharmaceutical industry development and its current position in the global market. To evaluate the potential for relocating pharmaceutical production, this chapter examines China-Africa trade in PHP as well as Chinese investments in the African pharmaceutical sector.

3.1. China's pharmaceutical industry

Akin to the development of the Chinese economy, the pharmaceutical industry in China has made rapid progress and notable achievements since the reform and opening-up policy implemented in the late 1970s. Today, China's pharmaceutical industry is in the midst of transformation, aiming to upgrade from the world's leading supplier of APIs and generic medicines to a leading manufacturer of brand-name medicines. To gain a more complete picture, this section will discuss the development history of China's pharmaceutical industry and its current status, followed by placing China's position in a global context.

3.1.1 Historical development

Broadly speaking, China's pharmaceutical industry can be split into four phases: inception (1949-1977); expansion (1978-1991); internationalization (1992-2006); and transition (from 2007 onwards). Table 2 summarizes key properties of pharmaceutical sector development in China over these four phases.



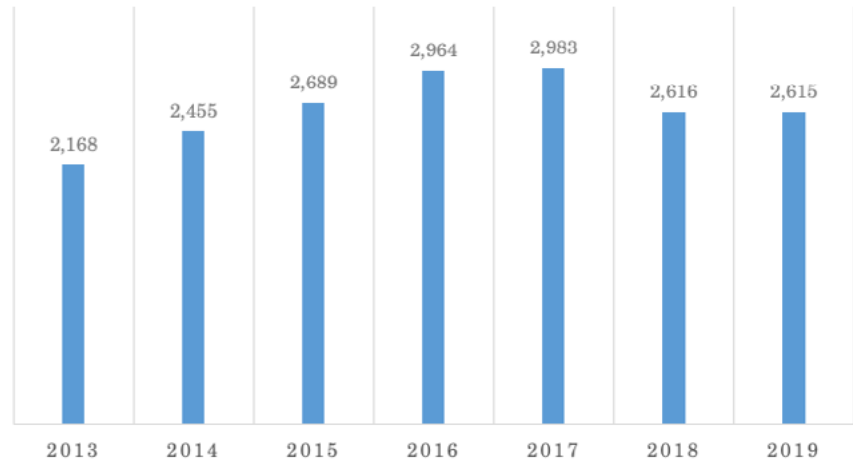
Table 2: Overview of the development of China’s pharmaceutical industry

Phases	Properties
Inception (1949-1977)	Due to the lack of industrial capacity, China was highly dependent on imported medicines. Under these circumstance, the First Five-Year Plan (i.e., social-economic development initiatives issued by the governing body of China) emphasized local production of APIs and essential drugs, such as antibiotics and sulfonamides. Despite a tumultuous period shadowed by “Leftism,” in this phase the pharmaceutical sector in China made laudable progress in manufacturing oral contraceptive pills, cardiovascular drugs, chronic bronchial treatment and anti-tumor drugs (Chen, et al., 2019).
Expansion (1978-1991)	China’s pharmaceutical industry developed rapidly following the reform and opening-up policy. During this period, many joint venture pharma factories were built by foreign investors, which brought in advanced techniques and management practices. Also, the establishment of the State Pharmaceutical Administration and National Medical Products Administration signaled legal regulation of medicine production in China. During this period, China’s pharma sector featured high volume production of essential medicines and exported raw mvaterials of medicines (Xiao, 2015).
Internationaliza- tion (1992-2006)	The period following Deng Xiaoping’s trip to southern China in 1992 marked an important milestone for the Chinese economy. During this period, the Chinese pharma enterprises underwent ownership reforms and private pharma firms began to emerge. At this stage, Chinese pharma firms took advantage of the relatively lax patent regulations to develop generic drug manufacturing, which gradually broadened the domestic market share (Xiao, 2015). Prompted by China’s accession to the World Trade Organization in 2001 and the announcement of a ‘Going Out’ strategy at the turn of the century, major Chinese pharmaceutical companies started to establish subsidiaries and distribution networks abroad and played an active role in health development assistance.
Transition (since 2007)	Since 2007, China has been rolling out various measures to reform its healthcare system, aiming to provide universal healthcare, strengthen industry supervision and encourage investments in industrial R&D. The most representative reforms include the Generic Consistency Evaluation (GCE), the “two invoices system,” and centralized drug procurement. These reforms could improve Chinese medical products in terms of safety and efficacy as well as incentivize companies to invest more in brand-name drugs instead of generics in the long run. In terms of market position, China overtook Japan to become the world’s second-largest pharmaceutical market in 2015 and has emerged as the leading supplier of APIs by volume to the global market.

3.1.2 Current status

In 2019, China is estimated to have over 5,000 pharmaceutical manufacturers with a total revenue of RMB 2.6 trillion (about \$377 billion, see Figure 9). Most of these firms are small and medium-sized, leaving the Chinese pharmaceutical market rather fragmented. As a consequence, it directly constrains the country’s overall R&D investment in new drug discovery and development. According to the list of top 50 global pharmaceutical companies in 2019, the highest ratio of R&D spending to prescription sales was 8 percent for Chinese pharma giants, while this number was over 20 percent for top pharma companies from the developed countries.

Figure 9: Operating revenue of China's pharmaceutical industry (in billion RMB)



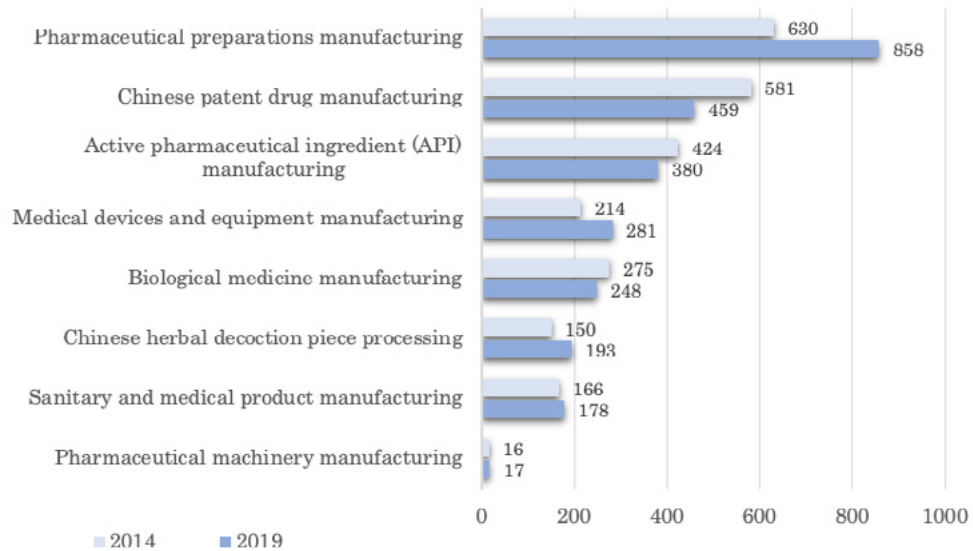
Source: National Bureau of Statistics, China Pharmaceutical Enterprises Association.

Figure 10 shows the breakdown of operating revenues of China's pharmaceutical industry in 2014 and 2019 by segments. As shown, Chinese pharmaceutical manufacturers are primarily engaged in the manufacture of pharmaceutical preparations, Chinese patent medicines and APIs. In 2019, these three segments generated a combined revenue of 1.7 trillion RMB, accounting for 65 percent of the total industry revenue. In addition, China is currently the world's largest producer and exporter of APIs, accounting for 20 percent of total global output of APIs (WHO, 2017). There are two key reasons behind China's dominance in the production of APIs. First and foremost, due to lower costs in electricity, water, logistics, productivity-adjusted labor and unparalleled manufacturing capacities, China is simply more cost-competitive in producing APIs. Second, as noted in a 2019 report released by the United States Food and Drug Administration, less stringent environmental regulations in China have helped the country become the world's leading producer of APIs.¹⁶

¹⁶ For more information, see www.fda.gov/news-events/congressional-testimony/safeguarding-pharmaceutical-supply-chains-global-economy-10302019.



Figure 10: Breakdown of China's pharmaceutical industry (in billion RMB)



Source: National Bureau of Statistics, China Pharmaceutical Enterprises Association.

3.1.3 China's drug regulatory system

As mentioned in Table 2, the domestic pharma sector in China is currently under transition, highlighting a paradigm shift from high-speed growth to high quality growth. To this end, the National Medical Products Administration of China has established a regulatory system to accelerate innovation in pharmaceuticals. Among those regulatory reforms, key milestones are summarized in Table 3. Notably, to simulate pharmaceutical innovation, China created a priority review and approval path to speed up time to market for innovative medicines. Also, eligible Marketing Authorization Holders are permitted to commercialize new drugs without becoming drug manufacturers themselves, which has significantly reduced costs and shortened lead times. On the other hand, more stringent regulations for generics (for example, the launch of Generic Consistency Evaluation in 2012) and dwindling profit margins induced by centralized drug procurement at the national level will serve as an incentive for Chinese pharma companies to focus more on innovation in the future.

Table 3: Summary of China’s pharmaceutical regulation policies

Year	Policy	Content
2009	Priority review and approval system	Under this policy, the “green channel” in the drug review and approval processes was built for innovative drugs.
2012	Generic Consistency Evaluation (GCE)	The core of the GCE is to review the quality and efficacy of generic drugs in comparison with the corresponding brand-name drugs.
2016	The “Two Invoices System”	This is a mechanism in which only up to two invoices are issued along the chain of pharmaceutical product procurement, with one issued by the pharmaceutical manufacturer and the other issued by the distributor to the medical service providers.
2016	Pilot plan for the Marketing Authorization Holder (MAH) system	Domestic drug R&D institutions and individuals are eligible to apply for and hold drug product licenses. Eligible MAHs can commercialize their drug assets without having to become drug manufacturers themselves.
2019	National Centralized Drug Procurement	To be listed for procurement, all generic drugs are required to pass the GCE.

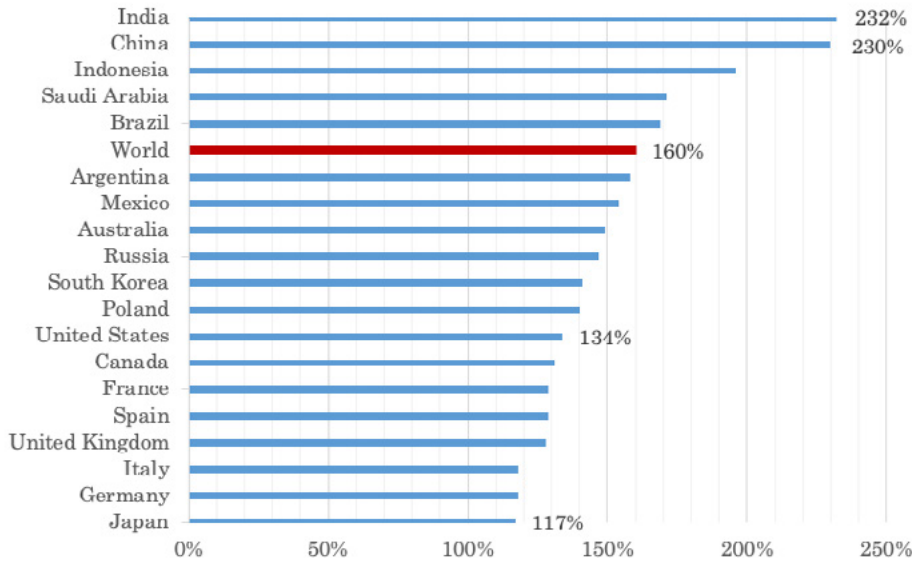
Source: Authors’ own compilation.

3.1.4 China’s position in a global context

A recent report released by a business consulting firm Frost and Sullivan shows that pharmaceutical revenues worldwide totaled \$1.25 trillion in 2019 and are expected to reach \$1.64 trillion by 2024. With a share of nearly 50 percent of the global revenues, the United States is a dominant player in the global pharmaceutical market. China ranks in second place and its share is around one-fifth of that of the United States. However, many forecasts expect to see strong growth from China. Figure 11 lays out the growth projections for each country’s pharmaceutical industry between 2017 and 2030. As shown, the global pharmaceutical industry as a whole is expected to grow by 160 percent, while the fastest growth is projected for China and India, growing by 230 percent and 232 percent, respectively.



Figure 11: Pharmaceutical sector growth worldwide 2017-2030, by country



Source: Torrey Partners, OECD.

Regarding the value chain of the pharmaceutical industry, the United States and European countries play a dominant role in new drug discovery and development, which is also the most profitable and risky segment of the value chain. By far, Chinese pharmaceutical enterprises are lagging behind those pharmaceutical giants from the west. Table 4 shows the Fortune 500 pharma companies in 2020. Among the thirteen companies listed, most of them come from the United States and Europe. Compared to their counterparts, Chinese firms have relatively higher sales but much lower profit margins. Among developing countries, China and India are leading players, as both countries can provide quality products at affordable prices. Thus, it is of interest to compare the development of pharmaceutical industries of these two countries. From 1972 to 2005, the absence of product patents in pharmaceuticals made it legal for Indian firms to imitate foreign branded drugs. Therefore, the Indian pharma industry has become known as the 'pharmacy of the world' due to its vital role in delivering cost-effective and high-quality generic drugs globally. By contrast, China's patent law conformed to international standards in 1992 by granting patents for medical products. Since then, China has been a strong advocate of patent protection of pharmaceutical inventions.



The United States and European countries play a dominant role in new drug discovery and development, which is also the most profitable and risky segment of the value chain.

Table 4: Fortune Global 500 pharmaceutical companies

Ranking	Company	Revenue(\$m)	Profit (%)	Country
79	China Resources	94757.8	3.8	China
104	Johnson & Johnson	82059.0	18.4	U.S.
145	SinoPharm	70689.5	1.3	China
171	Roche Group	63433.5	21.2	Switzerland
214	Bayer	51807.1	8.8	Germany
215	Pfizer	51750.0	31.4	U.S.
225	Novartis	50486.0	23.2	Switzerland
256	Merck	46840.0	21.0	U.S.
282	Glaxosmithkline	43072.5	13.8	Britain
289	Sanofi	42118.8	7.5	France
378	Abbvie	33266.0	23.7	U.S.
414	Takeda Pharmaceutical	30271.5	1.3	Japan
487	Bristol-Myers Squibb	26145.0	13.2	U.S.

Source: Fortune 500 of companies, 2020.

Moreover, as the world's second-largest English-speaking country,¹⁷ India is in a more advantageous position than China in catering to international customers and international pharma standards (Xiao, 2015). Partly due to this, India has the largest number of FDA approved medicine manufacturing plants outside the United States.

3.2. China-Africa trade in pharmaceuticals and health products



Bilateral trade between China and Africa has been steadily increasing for the past twenty years, and the same holds true for trade in pharmaceuticals and health products.

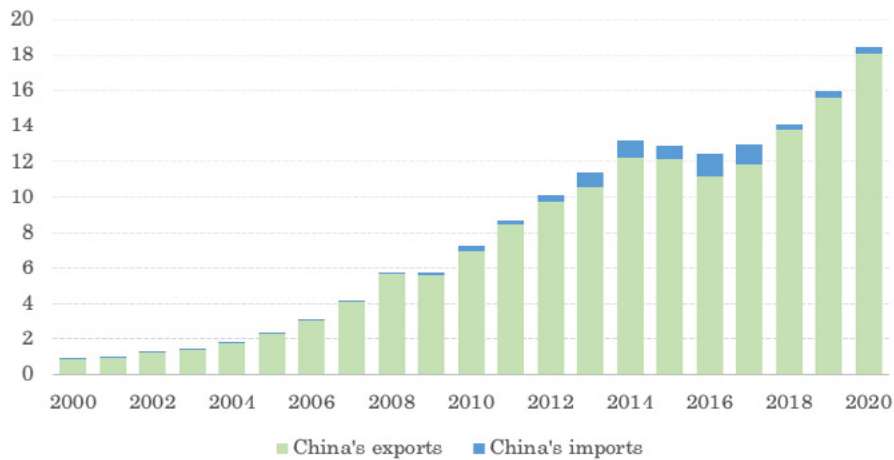
Bilateral trade between China and Africa has been steadily increasing for the past twenty years, and the same holds true for trade in pharmaceuticals and health products (PHP). As shown in Figure 12, China-Africa trade in PHP increased from less than \$100 million to over \$1.8 billion in 2020, amounting to a CAGR of 16.7 percent per annum. A salient feature to note from Figure 12 is that bilateral trade between China and Africa in PHP is mostly driven by China's exports to Africa, rather than China importing from Africa. According to data compiled by China Customs, nearly 98 percent of trade is accounted for by China's exports to Africa, while only 2.2 percent of total trade in PHP is accounted for by China's imports from Africa. To put it into perspective, China's overall imports from Africa account for nearly 40 percent of total China-Africa trade. Thus, such an acute imbalance is not observed at the aggregate level but is unique to trade in PHP. This is in line with the notion that Africa relies heavily on imports to meet their pharmaceutical needs.¹⁸

17 Note, while English is one of the two official languages of India, only around 12 percent of the population is English literate (Karusala, et al., 2018); however India is still the world's second-largest English-speaking country after the United States.

18 Note, for better data availability, China-Africa trade in PHP covers a wider array of products than those



Figure 12: China-Africa trade in PHP (in \$100 million)

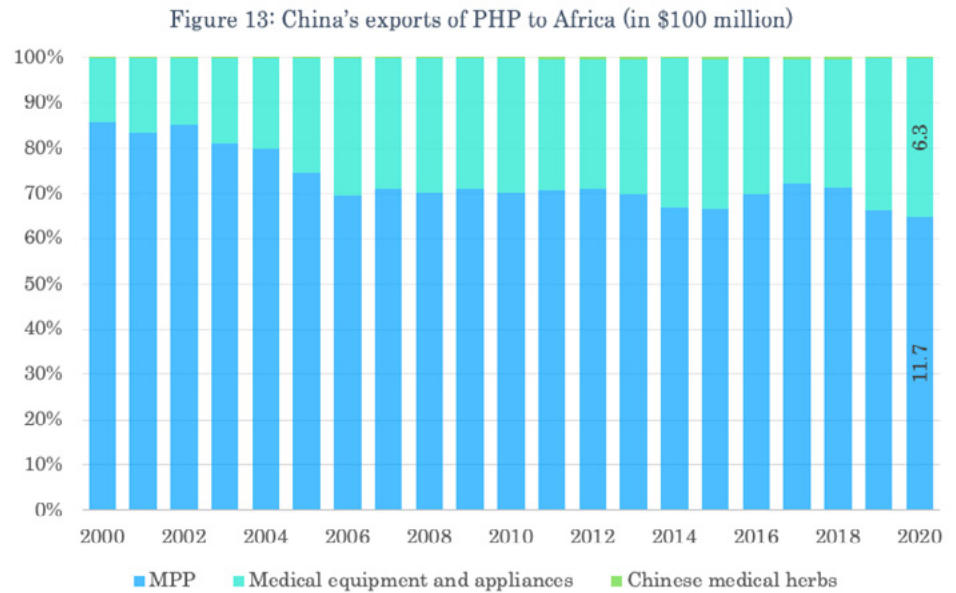


Data source: China Customs, 2021.

Figures 13 and Figure 14 provide a closer look at the composition of trade by three major product types. As shown in Figure 13, while a declining trend has emerged in recent years, medicinal and pharmaceutical products (MPP) have always and still account for the lion's share of China's exports of PHP to Africa (around two-thirds of China's exports of PHP to Africa). In contrast to a declining share, China's exports of medical equipment and appliances gained increasing importance in this period. In 2000, medical equipment and appliances accounted for less than 15 percent of China's exports of PHP to Africa. By 2020, this share has increased to 35 percent, which is a surge of 20 percentage points. As for exports of Chinese medical herbs, its share is almost negligible, which has never exceeded 0.5 percent in the past 20 years. In light of the patterns shown in Figure 12 and Figure 13, it is clear that China-Africa trade in PHP is dominated by China's exports of MPP and medical equipment and appliances, and the latter has gained increasing importance over time.

PHP covered in Chapter 2. For a detailed breakdown of PHP, see Table A1 in the Appendix.

Figure 13: China's exports of PHP to Africa (in \$100 million)

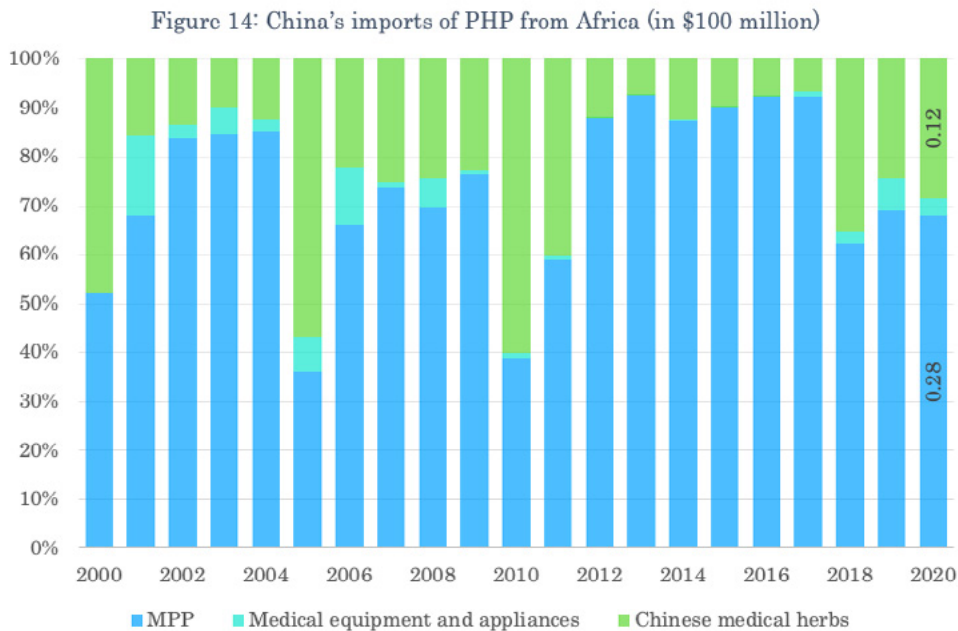


Note: The numbers shown in the far-right column refer to the value of exports of each specific product type. For instance, China exported \$1.17 billion of MPP and \$630 million of medical equipment and appliances to Africa in 2020. Data source: China's Customs, 2021.

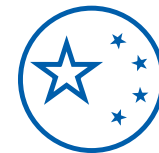
Turning to the composition of China's imports of PHP from Africa, a stark contrast is that Chinese medical herbs now play a much more important role, accounting for over 28 percent of China's total imports of PHP in 2020. Medical equipment and appliances, on the other hand, play a relatively minor role. It is also noteworthy from Figure 14 that the composition of shares was highly volatile during the period of observation. For example, the share of Chinese medical herbs in 2010 was nearly 60 percent but plummeted to just 6.6 percent in 2017. Similar volatility emerged for China's imports of MPP, which accounted for 36 percent in 2005 and then skyrocketed to 92 percent in 2013. This high volatility is presumably driven by the overall low value of China's imports of PHP from Africa, which makes the calculation of shares highly sensitive to changes in the value of imports.



Figure 14: China’s imports of PHP from Africa (in \$100 million)



Note: The numbers shown in the far-right column refer to the value of imports of each specific product type. For instance, China imported \$28 million of MPP from Africa in 2020. Data source: China’s Customs, 2021.



The importance of China as a source of imports for Africa’s medical needs has increased significantly over time.

These trade patterns suggest that the importance of China as a source of imports for Africa’s medical needs has increased significantly over time. On the flip side, this increasing importance also reveals great potential for Chinese pharma companies to invest in local pharmaceutical production in Africa. When manufacturing is localized, Chinese manufacturers would be much closer to an integrated market of 1.3 billion people and produce supplies that are most suited to local market needs.

3.3. Chinese investment in Africa’s pharmaceutical industry

Compared to Europe, the United States and India, China is a latecomer when it comes to investment in Africa’s pharmaceutical industry.¹⁹ According to the records, the first Chinese investment emerged on the continent in the mid-late 1990s when Shanghai-Sudan Pharmaceutical Co., Ltd., (henceforth SSPC) was established in Khartoum, the capital of Sudan. Nonetheless, while China may have a late start, Chinese pharmaceutical investment in Africa has increased significantly in the last 15 to 20 years and is gaining increasing attention among Chinese investors and policymakers alike. For instance, the 2018 FOCAC Beijing Action Plan (2019-2021) devoted specific attention to China-Africa health cooperation. In particular, article 4.2.4. states that China encourages Chinese



Chinese pharmaceutical investment in Africa has increased significantly in the last 15 to 20 years and is gaining increasing attention among Chinese investors and policymakers.

¹⁹ Note, while China-Africa cooperation in the health sector has long historical roots, as mentioned earlier, investment, in particular private sector investment, in pharmaceuticals is relatively new.

medical institutions and companies to partner with African entities in hospital operation, pharmaceutical production and the improvement of information systems in Africa. To defeat the COVID-19 pandemic through greater solidarity and cooperation, and to highlight a stronger China-Africa community with a shared future, it is included in the Joint Statement of the Extraordinary China-Africa Summit on Solidarity Against COVID-19 that preferential policies and resources will be tilted towards China-Africa health cooperation, of which investment in Africa's pharmaceutical industry is a key focal point. Thus, given strong political commitments, there will be renewed efforts from the Chinese side to encourage local manufacturing of pharmaceutical and medical products in Africa.

To see where China stands in terms of investment in Africa's manufacturing industry, Table 5 summarizes, if not all, the key investors that are currently operating on the ground in Africa. As can be seen, some are greenfield investments, with subsidiaries fully owned and operated by Chinese investors. But joint ventures with local partners are more commonly observed. This may point to the fact that mainland Chinese companies are, by and large, relatively new to internationalization and partner with local firms help to diversify investment risks.

Table 5: An overview of Chinese pharmaceutical investment in Africa

Company	Invested in	Key information
China Associate Pharmaceutical Co.	Ethiopia	Jointly established Sino-Ethiopia Associates (Africa) PLC with a local partner in 2011. Main products include medicinal capsules, which are produced to serve both domestic and foreign markets.
China Overseas Engineering Group	Côte d'Ivoire, Madagascar	Kezhong Pharmaceutical company was established in Côte d'Ivoire in the mid-late 1990s and is fully owned by a Chinese company. This company is mainly engaged in producing medical tablets. Madagascar Pharmaceutical Co. Ltd. was established jointly with local partners, and it is primarily engaged in the production of drugs and veterinary drugs.
Humanwell	Mali, Ethiopia	Partnered with China-Africa Development Fund and with a total investment of 271 million RMB, Humanwell set up a subsidiary in Mali in 2013 and is mainly engaged in producing large-volume injections, syrups and tablets. To expand the African market, Humanwell invested in Ethiopia in December 2017.
Sanbao	Ghana	Sanbao set up a subsidiary in 1999 in Ghana, which was bought by the Sinoron Group in 2009 and production commenced in 2013. This company is mainly engaged in producing large-volume injections.
Sansheng Holdings Group	Ethiopia	With a total investment of \$85 million, Sansheng established a Sansheng Pharmaceutical PLC in the Eastern Industrial Park in Ethiopia. This company is mainly focused on producing drugs, including capsules and injections.
Shanghai Pharma	Sudan, Ethiopia	Established SSPC in the mid-late 1990s in Sudan. SSPC is widely seen as the first Chinese pharmaceutical investment on the African continent. Main products produced by SSPC include artemisinin, penicillin and cephalosporins.



Wepon	South Africa	Invested in a local pharmaceutical company through acquisition, which is specialized in producing medical equipment and appliances.
Youcare Pharma Group	Nigeria	With a total investment of \$50 million, Youcare set up a factory in Lagos, Nigeria, through a three-party cooperation with FIDSON and Kedi Healthcare (Hong Kong). Main products include proprietary Chinese medicines and powder injections.

Source: CCCMHPIE.

An interesting feature to note in Table 5 is that besides investments by large-sized Chinese pharma companies, such as Shanghai Pharmaceuticals, Humanwell Healthcare Group and Youcare Pharmaceutical Group, engineering companies also surfaced as an important investment entity. To be precise, China Overseas Engineering Group Co. Ltd. (COVEC) built up two pharmaceutical manufacturing plants in Africa, one in Côte d'Ivoire and the other in Madagascar. This is quite unusual, as the company does not have any professional knowledge in pharmaceuticals, neither in manufacturing drugs nor in selling drugs.²⁰ According to Chi (2017), the key motivation behind COVEC's investment in pharmaceuticals in Africa is two-fold. First, COVEC has accumulated a wealth of land and social resources through infrastructure projects, which greatly facilitated its efforts in constructing pharmaceutical production plants and establishing distribution channels. Second, and arguably the more important motivation, was the discovery of the significant shortage in domestic medical supplies, which represented enormous business potential. It should be noted that due to its lack of industrial knowledge, both pharmaceutical factories are categorized as small- to medium-sized enterprises, specialized in producing basic medicines for local consumption.

Another important feature to note from Table 5 is that Ethiopia has emerged as a popular destination for Chinese pharmaceutical investors. Of the eight investors, four invested in Ethiopia. This may have to do with the launch of the second Growth and Transformation Plan issued by the Ethiopian government, which sets out a clear and ambitious goal of improving local pharmaceutical manufacturing capacity and increasing access to locally manufactured, quality-assured medicines. As Chapter 4 draws on country case studies and provides more detailed analysis on Ethiopia and the development of its pharmaceutical industry. The last point of interest to note is that, except for Wepon, which is the only company specializing in the production of medical equipment and appliances, all the others are primarily engaged in the production of essential medicines.

20 Note, this seems to be a rather common approach of many Chinese overseas investment projects. State-owned enterprises, such as COVEC, are experienced investors in the region. Given well-established government ties, funding capacities and knowledge of the region, these companies naturally become the most competitive candidates for many local projects. While COVEC appears to be the project owner, it may well be the case that de facto management of their pharmaceutical plants is subcontracted to other Chinese or local pharmaceutical companies.

3.4. Field studies

To gain a more granular understanding of Chinese pharmaceutical investment in Africa and the potential for industrial relocation of pharmaceutical manufacturing, this section turns to examine Chinese investors' experience through case studies. The research team went on field trips and held onsite interviews with three of those eight Chinese pharma companies that are currently operating on the ground in Africa as well as with China's largest business association in the pharmaceutical sector, the China Chamber of Commerce for Import and Export of Medicines and Health Products (CCCMHPIE). These companies were chosen for interviews based on their relevance to the topic, representativeness of the industry and the fact all of them are planning to scale up their investment in Africa in the near future. As for CCCMHPIE, one of the key aims of the association is to promote China-Africa cooperation in pharmaceutical trade and investment. The association is in close contact with key pharmaceutical players in Africa, both at the governmental and business level. Thus, interviews with experts from CCCMHPIE help (indirectly) reveal African perspectives on China-Africa pharmaceutical cooperation.

3.4.1 Shanghai Pharmaceuticals (Ethiopia and Sudan)

As one of the largest pharmaceutical companies in China, Shanghai Pharmaceuticals (SPH) is a state-owned enterprise founded in 1994. It is publicly listed by the Shanghai and Hong Kong stock exchanges. In 2020, SPH appeared on the Global Fortune 500 list and the list of Top 50 Global Pharma Companies. SPH is actively engaged in research, manufacturing and distribution of pharmaceutical and healthcare products. To strengthen its foothold in the global pharmaceutical market in the future, research and development of new drugs is taking up an increasingly important role at the company.

Prompted by a foreign aid project assigned by the Chinese Ministry of Commerce, SPH set its foot in Sudan in 1998 and became the first Chinese pharmaceutical company producing on the African continent. The Shanghai-Sudan Pharmaceutical Co., Ltd. (SSPC) was established as a joint venture between SPH and Sudan's Central Medical Supplies Co., Ltd. A key product manufactured by SSPC is an artemisinin-based malaria medicine, which has been sold having a higher quality and at a lower price in Sudan for more than 20 years. To raise Sudan's pharmaceutical capacity and cultivate pharmaceutical personnel for the country, SPH sent over 20 professionals (both technicians and managers) from China to work side-by-side with Sudanese workers to scale up production capacity and develop new drugs for domestic consumption. At the moment, SSPC employs over 200 workers, of which only eight are Chinese professionals and the rest are local employees. SSPC is in the mature phase with a near-fully localized personnel and a stable production volume.

To expand its presence in Africa, SPH also entered the Ethiopian market and pledged to invest \$30 million in the Kilinto Industrial Park, which is a newly constructed area dedicated to attracting foreign pharmaceutical companies into Ethiopia. As shared by the representatives of SPH during the interview, the size of the factory is about 28,466 m² and is scheduled to be finished by the end of 2021. SPH plans to specialize in producing



antibiotics, serving both the domestic Ethiopian market and its neighbouring countries. Due to the lack of local supply of APIs and excipients, these will be imported from China and local workers will mainly focus on the manufacture of the finished dosage form. While Ethiopia has some industrial capacity and nine local pharmaceutical companies, SPH does not expect to see quick returns from its investment in Ethiopia. Instead, SPH regards this investment as a starting point of its long-term development strategy in Africa. The primary goal is to bring high-quality medicines at affordable prices to people in Ethiopia and neighbouring countries as well as strengthen its foothold in Africa, while profitability is of secondary importance at this stage.

3.4.2 Humanwell Healthcare Group (Ethiopia and Mali)

Humanwell Healthcare Group (henceforth Humanwell) is a private Chinese pharmaceutical company founded in 1993 and is specialized in the manufacture of anesthetics, women's health medicines, fertility drugs and traditional Uyghur medicines based on herbs. Humanwell is a fast-growing company with a CAGR of operating revenues reaching 23.64 percent between 2011 and 2017, which is over twice as fast as the average growth of the Chinese pharmaceutical industry. At present, Humanwell has consolidated its global presence in over 50 countries and regions, among which Africa is of strategic importance for the development of the company and its internationalization.

As shared by company representatives during the interview, Humanwell's early connection with Africa was built through sales agencies, which mainly imported drugs from China and then sold to local customers. Experiences gained through sales agencies have led the management team of Humanwell to realize the enormous business opportunities in localizing pharmaceutical production. To seize the opportunity, and as an important component of the company's internationalization strategy, Humanwell invested \$50 million in Bamako, Mali, and founded the country's first modern pharmaceutical manufacturing facility in 2009. Upon the commencement of production in 2015, the President of Mali extended his congratulations to the company and noted that "Humanwell put an end to the history that Mali couldn't produce medicine." The factory in Mali is specialized in producing medicinal syrups, suspensions and large volume injections, which are basic drugs with low profit margins and high sensitivity to transportation costs. Back-of-the-envelope calculations suggest that localized production of these medicines has brought down the prices of syrups and large volume injections by 30 percent in Mali. In addition, the Malian factory does not only manufacture drugs locally but also actively promotes a localized supply chain by locally sourcing packaging materials, including cartons, labels and syrup bottles. Currently, the factory employs over 230 Malian workers plus another 20 Chinese professionals holding functional and technical positions.

Given its great success in Mali, Humanwell has stepped up its internationalization effort by expanding its presence and influence in Africa. Given a population of over 100 million people and a sound industrial capacity, Humanwell set foot in Ethiopia in 2015. In contrast to the successful investment in Mali, however, the Ethiopian subsidiary has not achieved its full production capacity yet. This is partly due to the stringent control of foreign exchange imposed by the Ethiopian government, which inhibited the company

from sourcing APIs and excipients from other countries (e.g., China and India) and the outbreak of the pandemic made normal operation of the factory all the more difficult.

3.4.3 Wepon Pharmaceutical Group (South Africa)

Started in 1970, Wepon Pharmaceutical Group is a private firm located in the southeast coast of China and specializes in research and manufacture of modern Chinese medicines and APIs. Prompted by the Belt and Road Initiative (BRI) and as a strategy of structural transformation, Wepon expanded its business into medical apparatus and entered the African market in January 2016 through the acquisition of two medical device manufacturers in South Africa, Tecmed Africa and Elite Surgical. The key reason behind this strategic move is that Wepon aspires to combine China's superior capabilities in manufacturing with South Africa's superior technological capabilities in medical devices such that synergies can be created and Wepon's overall competitiveness can be improved in the world market.

As shared by company representatives during the interview, Wepon plans to build three production lines in the post-COVID-19 era in South Africa, producing surgical masks, vacuum pressure syringes and test kits. In addition, to further expand its presence in Africa, Wepon plans to build a smart town/special economic zone (SEZ) in South Africa. This is aimed at cultivating local industrial clusters through FDI, covering, inter alia, pharmaceutical and labour-intensive manufacturing industries.

3.4.4 China Chamber of Commerce for Import and Export of Medicines and Health Products

Founded in 1989, the China Chamber of Commerce for Import and Export of Medicines and Health Products (CCCMHPIE) is the largest pharmaceutical business association in China. Currently, CCMHPIE has over 2,000 health-related member companies, covering the entire value chain activities, from the production of pharmaceuticals, medical devices and equipment to traditional Chinese medicines and nutraceuticals. The association is devoted to promoting healthcare cooperation between China and the rest of the world, and Africa is an increasingly important partner.

Before the outbreak of the COVID-19 pandemic, CCMHPIE organizes at least 50 international trips per year for Chinese pharmaceutical investors who are interested in investing abroad or establishing trade ties with foreign countries. Since the launch of the BRI in 2013, Africa had become a popular destination among Chinese investors, especially Ethiopia, Kenya, Nigeria and South Africa. One key reason why these countries are of greater interest to Chinese investors is the size of the domestic market as measured by population.

As a facilitator between Chinese pharmaceutical companies and African governments and local enterprises, CCMHPIE is in a unique position to convey the needs and expectations of both sides regarding the investment. As shared by industry experts from CCMHPIE, there are three key challenges hampering Chinese pharmaceutical



investments in Africa. First, policy inconsistency, either caused by changes in political power or weak governance, is widely seen among Chinese pharmaceutical investors as the biggest disincentive to invest in Africa. Second, many countries in Africa experience regular power shortages, which is an issue that is particularly bothersome to pharmaceutical investors. Third, there are significant barriers to entry into Africa's pharmaceutical market. As shared by the interviewees, pharmaceutical product standards set by WHO, the United States, Europe and Japan have been widely recognized by African countries. By contrast, the recognition of Chinese standards is still low or even absent. This constraint has significantly undermined the potential of China-Africa health cooperation. Barriers to entry are also recognized by African countries as significant inhibitors of Chinese pharmaceutical investment. In addition, the interviewees further noted that African governments have repeatedly expressed their desire to attract investments from Chinese API manufacturers, as the continent is overly dependent on API imports from China, the world's largest producer of APIs.

3.5. Challenges and constraints

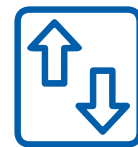
Those onsite interviews provided a perfect opportunity for the research team to gain insights into Chinese investment in Africa's pharmaceutical industry, especially in finding out what are the key challenges and constraints they face in their daily operations in Africa, and in gaining practitioners' views on the potential of relocation of pharmaceutical manufacturing to Africa. Besides the challenges shared by industry experts from CCMHPIE, the following issues are identified as the most pressing challenges faced by Chinese pharma companies operating in Africa.

First, political instability and security is a major issue preventing Chinese pharma companies from investing and/or scaling up their current investments. For instance, the eruption of unrest in South Africa in July 2021 fatally disrupted domestic supply chains and as a result, many foreign firms were forced to shut down their operations. The ongoing internal conflict in Ethiopia is another case in point. Although this is a common risk faced by all industries, the pharmaceutical industry seems particularly sensitive. This is because the establishment of a pharmaceutical factory requires the installment of highly advanced machinery and equipment, which are generally much more expensive than those used for labour-intensive manufacturing. Relatedly, frequent leadership changes in African countries often lead to policy inconsistency (the viewpoint shared by industry experts from CCMHPIE), which significantly depletes investor's appetite and confidence, thereby inhibiting overall industrial development.

Second, stringent foreign exchange controls have significantly impeded Chinese pharma companies from achieving their full production capacities. As stressed by company representatives from SPH and Humanwell, both are under constant pressure of foreign exchange shortages in Ethiopia, as most of their inputs (e.g., APIs and excipients) used for production in African factories are sourced from abroad, such as China and India. The inability to convert locally generated revenues into foreign currencies has markedly stymied firms' production activities and profitability, posing threats to firms' viability in the foreign market. Albeit it is far from enough, companies have resorted to exporting and



Political instability and security is a major issue preventing Chinese pharma companies from investing and/or scaling up their current investments.



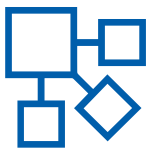
Stringent foreign exchange controls have significantly impeded Chinese pharma companies from achieving their full production capacities.



Lack of human capital is an important factor constraining Africa's pharmaceutical industry.

selling products in neighbouring countries with less stringent foreign exchange controls to alleviate the pressure faced in Ethiopia.

Third, the lack of human capital is another important factor constraining Africa's pharmaceutical industry. Unlike labour-intensive manufacturing activities, such as the manufacture of apparel and footwear, which require little skill but a nimble hand, the manufacture of pharmaceuticals requires the workers to have a certain level of literacy such that they could properly operate the machines and equipment used for producing medicines. It has been repeatedly stressed by company representatives that it is often a challenge to find enough qualified personnel in Africa. Chinese pharma companies need to invest a sizeable amount of money and time to train local workers. According to experience, the training of a regular operation worker would take two years before he/she could operate the machine independently, while the training of a technician or manager could take up to ten years. Another labour-related issue is that the local labour market can be highly rigid in some African countries. As mentioned by company representatives from Wepon, it is extremely cumbersome and costly to lay off workers in South Africa even if his/her performance is far from being satisfactory. According to Valverde, et al. (2000), when a labour market is too rigid, it can compromise a firm's performance and limit the firm's growth.



Inadequate infrastructure is a key barrier to the development and expansion of Africa's pharmaceutical industry.

Last, but not least, inadequate infrastructure is a key barrier to the development and expansion of Africa's pharmaceutical industry, which directly reduces the efficiency in mobilizing production inputs (e.g., APIs and excipients) imported from abroad, thereby increasing the overall costs and the price of medicines produced in Africa. It should be noted, however, this constraint is not unique to the pharmaceutical industry, but common to Africa's industrial development as a whole.

As for the relocation potential of Chinese pharmaceutical manufacturing, all the companies that have been interviewed take a highly positive stance and believe that investment in the African pharmaceutical sector is promising. A common consensus among those practitioners is that an integrated market of over 1.3 billion people with strong growth projected for the coming decades, strong political commitments from both sides and the gigantic gap in local supply and demand of pharmaceuticals provide a golden window of opportunity for Chinese pharma companies to accelerate their internationalization strategy in Africa. Meanwhile, companies are also highly cautious regarding their investments, as the continent has a huge talent gap and shortage in the supply of a skilled workforce. In the foreseeable future, production relocation will be limited to those rather low value-added activities, such as the manufacture of basic pharmaceutical products and pharmaceutical preparations, which are much less knowledge- and capital-intensive than R&D and the manufacture of APIs.



CHAPTER 4. COUNTRY CASE STUDIES

To gain further insights and have a more granular view on Africa's pharmaceutical manufacturing, this section will delve deeper into two African countries as case studies, Ethiopia and South Africa. These two countries are chosen based on their relevance to the topic, their representativeness of the region (e.g., Ethiopia is one of the fastest growing economies in the region, aiming to become Africa's next pharmaceutical manufacturing hub and South Africa is a regional leader in pharmaceutical manufacturing) and the ease with which the research team could collect (first-hand) information on Chinese pharmaceutical companies that have already invested and are operating on the ground.

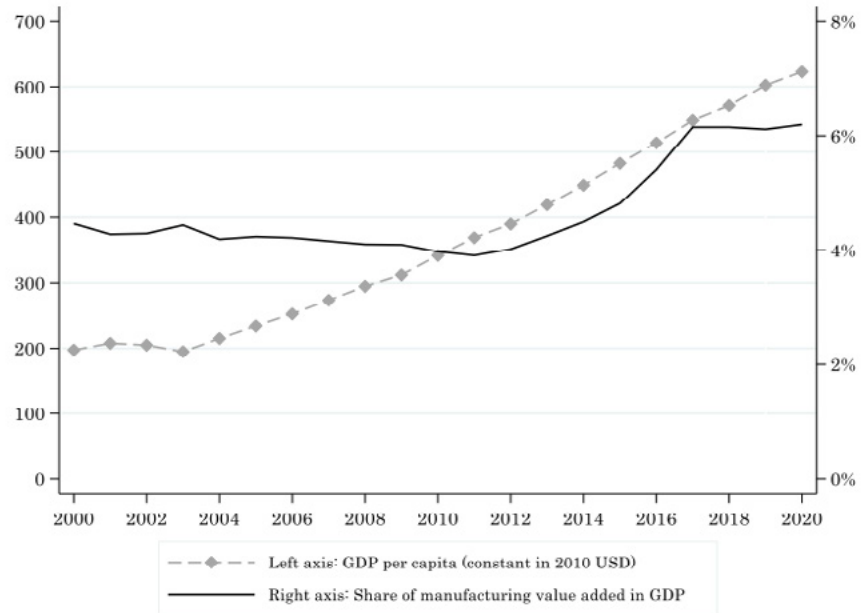
4.1. Ethiopia

4.1.1 A macro-overview

With a population of more than 110 million, Ethiopia is the second most populous country in Africa. In 2011, the government launched its first Growth and Transformation Plan (GTP) to promote industrialization and economic growth. As shown in Figure 15, living standards measured by GDP per capita have been steadily increasing in Ethiopia since 2003, amounting to a CAGR of 7 percent. It is interesting to note that the level of industrialization, measured by the share of manufacturing value added (MVA) in GDP, did not increase until the launch of GTP in 2011. As can be seen, MVA as a share of GDP decreased somewhat between 2000 and 2011, down from 4.4 percent to 3.9 percent. Upon the launch of the first GTP, industrialization processes accelerated and MVA as a share of GDP increased to over 6 percent in 2020. As for the growth of GDP, the CAGR reached 8.9 percent in the period 2000-2020, making Ethiopia one of the fastest-growing economies in the world in the last two decades. To keep the growth momentum, Ethiopia has released the second GTP, which aims to spur economic structural transformation and growth. An important pillar of the second GTP is prioritization of the development of pharmaceuticals, as the country envisions itself to be the African hub for this sector in the future. Despite the ambition and growth potential in pharmaceutical manufacturing, the Ethiopian population still has poor access to sanitation and health services, with 85 percent of pharmaceutical needs met through imports.²¹ In fact, the country faces daunting challenges in communicable diseases, such as AIDS, malaria, diarrhea and respiratory infections.

21 For more information, refer to https://ethiopianembassy.org/wp-content/uploads/2021/02/EIC_Presentation-Pharma-2021.pptx.

Figure 15: Ethiopia's industrialization and economic growth, 2000-2020



Data source: World Development Indicators, 2021.

Table 6: Ethiopia pharmaceutical industry – Fact Sheet (2019)

Population	112.1 million	Pharmaceutical SEZ	Kilinto Industrial Park
Income level	Low income	Labour costs	100-150 \$/month
CAGR of GDP in the last 10 years	9.1%	Major investors	Sansheng Industrial Co. Ltd.; Humanwell Healthcare Group; Cadila Pharmaceuticals
Pharmaceutical imports (2018)	\$690 million	Pharmaceutical exports (2018)	\$0.95 million

Note: Labour costs refer to factory workers only. The value of pharmaceutical imports and exports only include pharmaceutical products as covered by Harmonized System (HS) commodity codes 30.

Data source: World Development Indicators, United Nations Comtrade Database, Ethiopian government websites.

4.1.2 The pharmaceutical sector

The history of the pharmaceutical manufacturing industry in Ethiopia can be dated back to 1964 when the first production plant, the Ethiopian Pharmaceutical Manufacturing Company, was jointly established by the Ethiopian government and the British company Smith & Nephew. It was the only pharmaceutical factory in Ethiopia until 1993



(Gebre-Mariam, et al., 2016). From 1995 to 2004, a temporary boom emerged, and ten more production sides were built, many of which were joint ventures financed through FDIs. According to Gebre-Mariam, et al. (2016), the Ethiopian pharmaceutical market grew at a rate of 20 percent per year from 2007 to 2011. In 2015, the government launched the National Strategy and Plan of Action for Pharmaceutical Manufacturing Development in Ethiopia (2015-2025) which made Ethiopia one of the first African countries adopting pharmaceutical manufacturing as a national strategy. The pharmaceutical manufacturing can be seen as a nascent and burgeoning industry in Ethiopia. The domestic pharmaceutical market was \$400 to \$500 million in 2015 and was projected to grow at an annual rate of 15 percent, reaching \$1 billion by 2020. As shown in a recent report by Addis (2021), the market value had indeed grown to nearly \$1 billion as projected in 2015. As discovered through interviews with SPH and CCCMHPIE, there are currently nine local pharmaceutical manufacturers operating in Ethiopia. Among foreign pharmaceutical investors, China is playing an increasingly significant role. As the world's largest manufacturer of APIs and the second largest pharmaceutical market, China is a strategic partner for Ethiopia's early industrialization. Industrial cooperation between the two countries covers various areas, such as financing, infrastructure construction, labour-intensive manufacturing and pharmaceuticals. As mentioned in Chapter 3, a number of Chinese pharma companies have already invested in Ethiopia, including SPH, Humanwell and Sansheng Industrial Co. Ltd.

Main players

The ownership and origins of FDI in the Ethiopian pharmaceutical sector is diverse, including local entrepreneurs and foreign investors from China, India, Jordan, Saudi Arabia, Sudan, the United Arab Emirates and the United Kingdom. Table 7 offers an overview of the most important pharmaceutical manufacturers in Ethiopia and the key products manufactured in the country.

Table 7: Main pharmaceutical manufacturing enterprises in Ethiopia

United Arab Emirates	Julphar Ethiopia was established in 2013 under a joint venture between Gulf Pharmaceuticals Industries and Med-Tech Plc. Key products manufactured in Ethiopia include tablets, capsules, syrup and suspension and ointment.
U.K. and Sudan	Founded in 1996 by British and Sudanese investors, East African Pharmaceuticals PLC (EFP) is one of the first privately owned joint ventures established in Ethiopia. In March 2012, ownership of the company was transferred to Saudi, Sudanese and Yemeni investors. Currently, EFP is engaged in the production of tablets and capsules and veterinary medicines.

Ethiopia	Established in 1992, the Addis Pharmaceuticals Factory (APF) is the largest pharmaceutical manufacturing plant in Ethiopia. It produces a wide array of pharmaceutical products, including antibiotics, gastrointestinal drugs, central nervous system drugs, cardiovascular drugs, among others.
China	Humanwell Pharmaceutical Ethiopia PLC was established in 2017. It is specialized in manufacturing generic drugs, antibiotics in the forms of tablets and oral medicines. Due to stringent control of foreign exchange and the COVID-19 pandemic, the factory in Ethiopia is not operating at its full capacity.
China	Established in 2016, Sansheng Pharmaceutical PLC is a modern pharmaceutical company located in the Eastern Industrial Zone. The factory is primarily focused on manufacturing antibiotic preparations in the form of tablets and capsules, small volume injections and large volume fluids.
China	Shanghai Pharma, a Chinese state-owned enterprise and one of the biggest pharma companies in China, invested in the Chinese-built Ethiopia's Kilinto Industrial Park, which aspires to attract world-class pharmaceutical companies. The investment project is still on-going, and construction of the factory is expected to finish in 2021.
India	Cadila Pharmaceuticals LTC was built in 2007 in Ethiopia. It mainly manufactures simple (requiring relatively low-skilled workers) tablets, capsules, oral liquids and powders.

Pharmaceuticals regulations

Classified as a least developed country (LDC) by the United Nations, Ethiopia enjoys a multitude of preferential trade policies and a more flexible framework on patent use. The international community is strongly in favour of transferring and diffusing technologies to LDCs. The Ethiopian government has been actively working with international organizations. In August 2003, the World Trade Organization passed a resolution that allows countries with limited income and insufficient production capacity in the pharmaceutical sector to have access to cheaper and safer drugs. Accordingly, Ethiopia joined a "renewed partnership" launched by WHO to lower the prices of and improve the quality of medicines and reduce substandard and counterfeit medicines.

Second, industrial policies are tilted towards the development of local pharmaceutical products. The Ethiopian government imposed import tariffs and other protective measures to support the development of local manufacturers. As found by Ewen, et al., (2017), the Ethiopian government paid a higher price for locally manufactured products than for imports. According to their estimation, among those eight products covered in their analysis, the Ethiopia government spent an extra of \$3.7 million on locally produced medicines. Thus, in addition to having a large domestic market, highly favourable procurement policies serve as a great incentive for foreign manufacturers to produce in Ethiopia.



In addition, highly attractive financing and tax schemes are provided to local pharmaceutical manufacturers. According to the country's investment policy, the Ethiopian government provides tax-free loans to pharmaceutical investors. For example, loans of up to 70 percent can be provided by the government. If investors continue to scale up their investment, up to 60 percent additional tax-free loans can be provided.²² Regarding income tax, pharmaceutical manufacturers located in industrial parks are exempt and the exemption period could last up to 8 to 10 years.²³

Pharmaceutical industrial parks

The Ethiopian government made rigorous efforts in constructing industrial parks, one of which is the pilot Kilinto Pharmaceutical Industrial Park (known as KPIP). Covering an area of over 270 hectares, KPIP is located southeast of Addis Ababa (the capital of Ethiopia), near the airport and the Addis Ababa-Djibouti railway. KPIP offers developed land that includes most of the essential infrastructure, such as a reliable water supply, a sewage disposal system and an electrical substation. A series of incentive schemes will be provided to enterprises that settle in the park, such as exemption from corporate income tax and personal income tax for foreign employees for 5 to 10 years. While not titled a pharmaceutical industrial park, the famous Chinese-built Eastern Industrial Park (EIP) has also attracted pharmaceutical companies. In 2016, Chongqing Sansheng Industrial Co. Ltd. from China became the first pharmaceutical manufacturer operating in the EIP.

4.1.3 Pharmaceutical cooperation between China and Ethiopia

Since the establishment of official diplomatic relations in 1970, China and Ethiopia have been deepening political mutual trust and making fruitful progress in economic cooperation. The first Chinese pharmaceutical investment in Ethiopia can be dated back to 2001. Two Chinese firms, China Associate Group (35 percent) and Dandong Jinwan Group (35 percent), together with an Ethiopian company named Zaf Pharmaceuticals PLC (30 percent), jointly established Sino-Ethiop Associate (Africa) PLC (SEAA) near Addis Ababa. SEAA is specialized in producing empty gelatin capsules, which are sold across Africa and the Middle East. Since then, in particular from 2015 onwards, other Chinese pharmaceutical firms have followed suit. Based on information gathered through onsite interviews with two of those companies that have invested in Ethiopia, the pharmaceutical cooperation between China and Ethiopia have the following two key features. First, both companies that have recently invested in Ethiopia consider their investments as a long-term strategy and the returns on their investment will take no less than 20 years. Thus, the company does not aim for quick wins in Ethiopia. Instead, both companies place a higher priority on the provision of equal and affordable medical services to the local

22 For more information, refer to the National Strategy and Plan of Action for Pharmaceutical Manufacturing Development in Ethiopia (2015–2025).

23 For more information, refer to www.investethiopia.gov.et/index.php/investment-opportunities/strategic-sectors/pharmaceuticals.html.

people and setting foot in the Ethiopian pharmaceutical market. Second, to avoid malicious price competition, Chinese pharmaceutical companies pursue a product differentiation strategy in Ethiopia. More specifically, both Humanwell and SPH plan to produce medicines that are not available or are under supplied in the local market. In addition, products will be customized according to Ethiopia's local conditions and consumers' preferences. In the case of Humanwell, in contrast to the production of large volume infusion and medication in a liquid form (e.g., syrup) in Mali, the company plans to produce vial injections and medication in the form of tablets in Ethiopia. For SPH, company representatives also stated that their investment in Ethiopia will target different medical products than those produced in Sudan to accommodate the needs of the local Ethiopian pharmaceutical market.

Besides laudable progress in the business area, pharmaceutical cooperation between China and Ethiopia has been extended to academic exchanges. As part of the Global Engagement Programme launched by Shanghai Jiao Tong University in 2018, a collaborative research project has been established with Addis Ababa University and the Center for Innovative Drug Development and Therapeutic Trials for Africa.²⁴ This project features mutual exchanges of medical students and researchers between the two universities, and the key aim is to contribute to the development of African pharmacopeia, which systematically documents the sources, ingredients, clinical dosages and side effects of the use of African traditional medicine.

4.2. South Africa

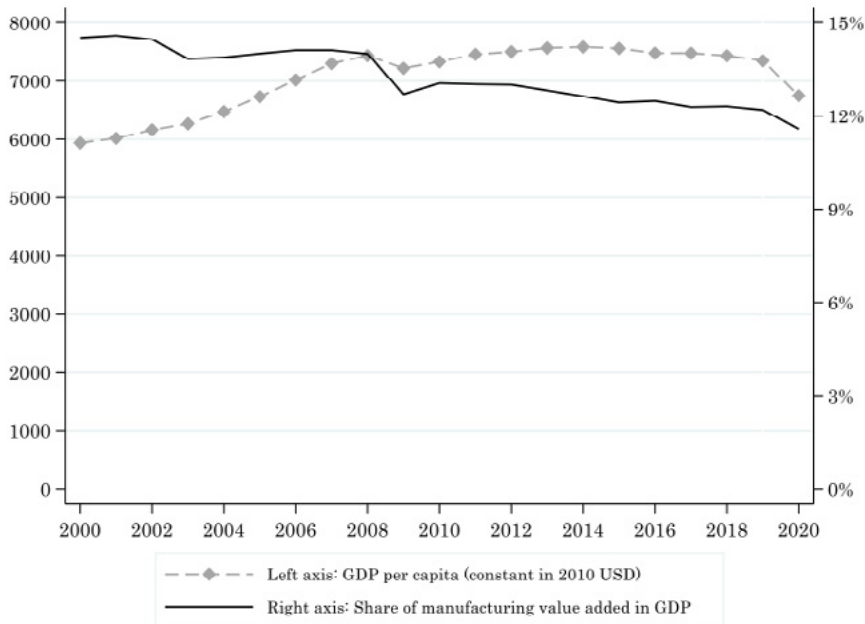
4.2.1 A macro-overview

After Nigeria and Egypt, South Africa is the third-largest economy in Africa. With a per capita gross national income of \$5,410 in 2020 (denoted in current prices), South Africa is classified as an upper-middle-income economy by the World Bank. Unlike Ethiopia's remarkable improvements in living standards, socio-economic development in South Africa has been modest. As shown in Figure 16, the CAGR of per capita GDP is merely 0.6 percent in the last 20 years and the CAGR of GDP is also just a little over 2 percent, which are dwarfed by the glamorous growth performance achieved by Ethiopia. In the meantime, South Africa seems to have experienced a constant de-industrialization as well. According to the measure of MVA as a share of GDP, it has declined from 14.5 percent in 2000 to 11.6 percent in 2020. While the magnitude of the decline may seem small, it seems to have gained momentum. Besides a rather sluggish economic performance, South Africa suffers among the highest levels of inequality in the world as measured by the Gini index, rising from 0.58 in 2000 to 0.63 in 2014. To put it into perspective, the average level for emerging economies and for Nigeria is around 0.4 and 0.35, respectively.

24 For more information, refer to www.cdt-africa.org/index.php/features/news-and-events/all-news/53-aa-u-participated-in-the-4th-investing-in-africa-forum-and-signed-cooperation-agreement-with-leading-chinese-universities.



Figure 16: South Africa's Industrialization and economic growth, 2000-2020



Data source: World Development Indicators, 2021.

4.2.2 The pharmaceutical sector

South Africa has the largest pharmaceutical market in Africa. Recent estimates found total pharmaceutical expenditure was \$4.1 billion in 2019 and \$3.6 billion in 2020.²⁵ The market, mainly supplied through imports, is currently dominated by the prescription of patented and generic drugs, accounting for approximately 90 percent. Similar to other sectors of the economy, the rebooting of the South African sociopolitical system had profound influences on the domestic pharma industry and its actors in many ways.

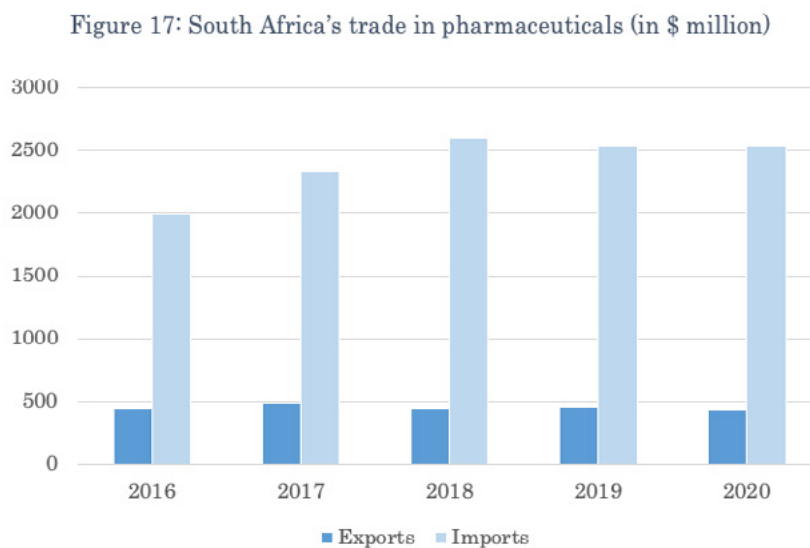
The restructuring of South Africa's pharmaceutical industry began with the 1996 Constitution which declared access to healthcare a basic human right. The South African government carried out a series of reforms to align legislative frameworks with people's needs. More specifically, through the prohibition of price discrimination and increased importation of medicines from abroad, the legislation sought to increase access to safe, affordable and quality medicines for all. As a result, profitability for many local pharma firms were reduced and a sizable number of local pharma manufacturing sites were forced to shut down within a decade. It was reported that at the time South Africa was home to around 45 pharmaceutical manufacturing facilities, but only a handful remain today.²⁶ Akin to other African countries, insufficient local production led South Africa to

²⁵ For more information, refer to www.trade.gov/country-commercial-guides/south-africa-healthcare-medical-devices-and-pharmaceuticals.

²⁶ For more information, refer to <https://pharmaboardroom.com/articles/south-africa-leading-the-pharma-model/>.

run a large and constant pharmaceutical trade deficit, which totaled nearly \$10 billion between 2016 and 2020. As shown in Figure 17, total imports were valued at \$2 billion in 2016 and 2.5 billion in 2020, representing over 85 percent of South Africa's pharmaceutical trade. On the supply side, major overseas medicine exporters include India (24.2 percent), Germany (11.4 percent), France (9.9 percent), the United States (8.6 percent), and Ireland (7.3 percent). Taken together, these countries account for over half of South Africa's total imports by value in 2020. China is not among the top five most important sources of pharmaceutical imports for South Africa; rather China ranked 7th with a share close to 4 percent.

Figure 17: South Africa's trade in pharmaceuticals (in \$ million)



Data source: UNCTAD, 2021.

One of the key factors constraining the development of South Africa's pharmaceutical industry is its highly inefficient drug application procedure. To reduce red tape and reinforce domestic production capacity, the South African government replaced the fifty-year-old Medicines Control Council with the South African Health Product Regulatory Authority (SAHPRA) in 2018. One of the primary goals was to create a more streamlined entity that could tackle the country's enormous backlog of drug applications and speed up the process. To be specific, SAHPRA claimed to reduce the average length of drug applications from 1,422 calendar days to 275 working days.²⁷ While the goal has not yet been reached, SAHPRA is making rigorous progress meeting key milestones on its quest to improve regulatory efficiency.

²⁷ For more information, refer to www.pharmamanufacturing.com/articles/2020/global-dose-focus-on-south-africa/.



Currently, local production of pharmaceuticals in South Africa is mainly focused on generic drugs and key players include both domestic and foreign-owned multinational companies. For instance, Aspen Pharmacare (an indigenous South African-based multinational company) is specialized in the production of generic drugs. In 2020, the net revenue of Aspen reached \$2.66 billion, making it the largest pharmaceutical company in Africa. Aspen is followed by Adcock Ingram, the second largest local pharmaceutical manufacturing firm in South Africa. Adcock Ingram operates on three local manufacturing sites and is producing liquids and tablet/capsule products. Apart from these local firms, the Indian firm Cipla is the third largest pharmaceutical manufacturer in South Africa, occupying around 7 percent of the nation's private market and 6.6 percent of the over-the-counter market. The other firm with a significant manufacturing presence in South Africa is the French pharmaceutical giant, Sanofi. Sanofi is a highly innovative firm with cutting-edge pharmaceutical innovation technologies and runs a diverse product portfolio across 15 key therapeutic areas, including innovative and generic medicines that seek to address the country's healthcare needs in diabetes, mental health and tuberculosis.

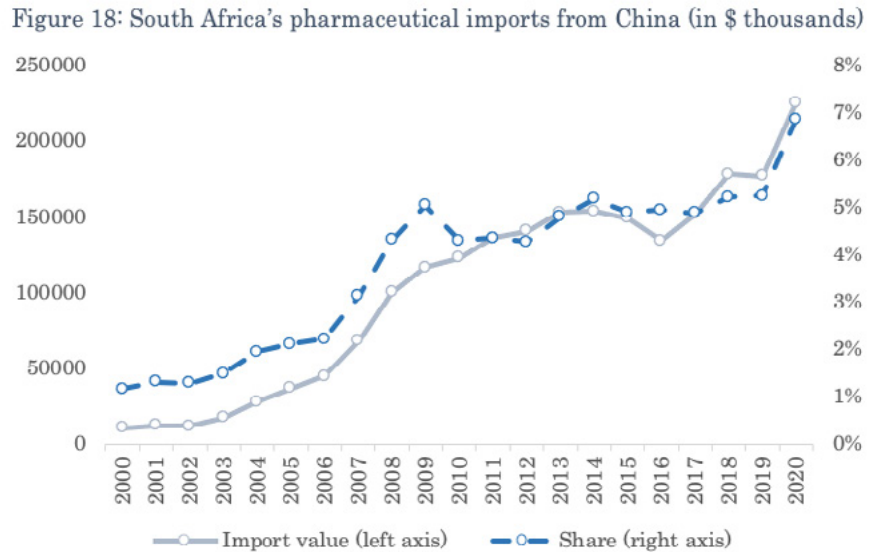
4.2.3 Pharmaceutical cooperation between China and South Africa

China and South Africa established official diplomatic relations in 1998. In 2010, both countries signed an agreement to build a comprehensive strategic partnership and in 2015, South Africa undertook the role of co-chairing FOCAC and held the summit in Johannesburg. China became the largest trading partner for South Africa in 2009 and has held the position since then. South Africa is also the biggest trading partner for China in Africa. In 2019, China accounted for over 10.7 percent of South Africa's total trade. According to China Customs, major exports from China to South Africa in 2020 include electrical machinery and equipment (18.7 percent), nuclear reactors (14.5 percent), furniture (6.5 percent), footwear (4.5 percent), vehicles (4 percent) and apparel (3.9 percent). Taken together, these products account for over half of China's exports to South Africa in 2020. In terms of investment from China, South Africa had a total investment stock valued at \$6.1 billion by 2019, making it the largest recipient of China's FDI in Africa (accounting for 13.8 percent of China's total investment stock in Africa).

Though only accounting for a rather small share of South Africa's total pharmaceutical imports, a clear upward trend has been observed over the past two decades. As shown in Figure 18, China's exports to South Africa have increased in both absolute and relative terms, rising from just 1 percent of South Africa's total imports of pharmaceuticals in 2000 to almost 7 percent in 2020.²⁸ Compared to imports from China, exports of pharmaceuticals from South Africa to China is minute. In 2020, the export value is just a little over \$7 million (vis-à-vis imports valued at \$225 million).

28 Note, pharmaceutical imports comprise medicinal and pharmaceutical products as well as medical equipment.

Figure 18: South Africa's pharmaceutical imports from China (in \$ thousands)



Data source: UNCTAD, 2021.

Relative to other African countries, Chinese pharmaceutical investments in South Africa seems rather distinctive. First, unlike other African countries (e.g., Ethiopia) characterized by weaker and backward pharmaceutical manufacturing, South Africa has pharmaceutical giants that are operating at the global technological frontier, such as Aspen Pharmacare. As mentioned in the preceding chapter, investment by Wepon to acquire Tecmed and Elite Surgical is a good case in point showing that Chinese pharmaceutical investors are interested in acquiring advanced technology and/or production techniques from local South African pharmaceutical companies. Second, the Parliament of South Africa went through the legislative process of recognizing the legality of traditional Chinese medicines, including acupuncture, in October 2000, making South Africa the first country in Africa to legally recognize traditional Chinese medicines. Either being considered a complimentary treatment or a primary one, traditional Chinese medicine is on the rise in South Africa, with products are becoming increasingly available and accessible over the counter nationwide. A key milestone to note in this process is the entry of a leading traditional Chinese medicine company, (Beijing Tong Ren Tang Chinese Medicine Company Limited, into the South African market in 2016. To gain insights into traditional Chinese medicines in South Africa and whether or how these medicines could play a role in helping the development of African traditional medicine, the research team also held an interview with a company representative from Beijing Tong Ren Tang. Found in 1669, Tong Ren Tang is one of the largest and best known traditional Chinese medicine producers in China. The company set foot in Africa in 2016 by opening five retail stores in Durban, Johannesburg and Pretoria. Tong Ren Tong also established a traditional Chinese medicine acupuncture centre and a traditional Chinese medicine



museum in Johannesburg in April 2017.²⁹ As shared by the company representative, at the moment all traditional Chinese medicine products are imported from China and the company envisions setting up local manufacturing facilities to produce traditional Chinese medicine products in the future. The strategic move to open retail stores and a museum first is to get people acquainted with the products and build a client base. At present, its clients have exceeded well over 10,000 people, ranging from ordinary citizens to dignitaries and celebrities. Besides selling traditional Chinese medicine products and the vision to localize production, Beijing Tong Ren Tang is making efforts to advance Africa traditional herbal medicine. First, herbal medicines constitute the key component of both Chinese and African traditional medicine, which have been used for thousands of years. One way that the company is contributing to the development of African traditional medicine is to help local traditional medicine practitioners to discover and/or realize the medical value of herbs and plants (e.g., *Calamus draco* [Willd], aka “dragon’s blood”) that are widely present in Africa. Second, Beijing Tong Ren Tang is engaged in promoting products of African traditional medicine in the Chinese market. An iconic example is Rooibos, an herbal tea made from the leaves of the *Aspalathus Linearis* shrub grown in the Cederberg mountains of South Africa. Given the enormous size of the Chinese marketplace, the promotion of African traditional medicine products in China can function as a financial pillar supporting the development of African traditional medicine. Third, Beijing Tong Ren Tang is planning to establish (both online and offline) platforms to facilitate communication and cooperation among traditional medicine practitioners in China and Africa. As shared by the company representative, relative to the Chinese pharmacopeia, African pharmacopeia is still in its early phase of development. The establishment of such a platform may help traditional medicine practitioners from both sides to further advance the development of African Herbal Pharmacopoeia.

In addition to initiatives taken by private enterprises, cooperation in traditional medicine between China and South Africa is also taking place at the governmental level. In October 2021, the Chinese Embassy in South Africa, the National Administration of Traditional Chinese Medicine and the University of the Western Cape jointly organized a four-day workshop on traditional medicine in Cape Town. The workshop is aimed at strengthening communications and fostering cooperation between African and Chinese traditional medicine practitioners. Thus, it is clear that both the private and public sectors are making rigorous efforts to strengthen China-Africa cooperation in traditional medicine, and a key constituent is discovering the medical value of African medical herbs and introducing it into Chinese market.

29 For more information, refer to www.china.org.cn/arts/2017-09/21/content_41626038.htm.

CHAPTER 5. CONCLUSIONS AND POLICY RECOMMENDATIONS



The development of local pharmaceutical production (LPP) is of critical importance for Africa.

Dating back to the endorsement of the Pharmaceutical Manufacturing Plan for Africa (PMPA) in 2007, it has long been recognized by African Heads of State and Government that the development of local pharmaceutical production (LPP) is of critical importance for the continent, which bears a disproportionate burden of deadly diseases and is overly dependent on pharmaceutical imports. The sudden outbreak of the COVID-19 pandemic in early 2020 made the development of LPP all the more important and urgent for Africa. Besides the urgency, recent developments seem to suggest that LPP in Africa is an idea whose time has finally come. First, China is the largest trading partner and equity investor in Africa. Combined with strong political commitments as manifested in the Joint Statement of the China-Africa Summit on Solidarity Against COVID-19, China could play a major role in Africa's fight against COVID-19 as well as in helping the continent build up its resilience against health emergencies through increased pharmaceutical investments. Second, considering the creation of a single market under AfCFTA covering more than 1.3 billion people and with strong population growth projected for the coming decades, it is in the interest of Chinese pharma companies to expand their presence in Africa and accelerate their internationalization strategy into Africa.

There is little doubt that the pharmaceutical industry in Africa has a bright future ahead of it, but the journey to establish a sustainable local supply of affordable and high-quality essential medicines seems long, arduous and risky. However, as the Chinese proverb goes, "a journey of a thousand miles begins with a single purposeful step." The timing for the development of local pharmaceutical production in Africa has never been better and the need has never been stronger. Based on the analyses on China-Africa trade and investment in pharmaceuticals and the onsite interviews with companies that are operating on the ground in Africa, the following suggestions and policy recommendations are listed for policymakers on both sides. While this list may not be exhaustive, it is targeted at addressing the most pressing challenges and facilitating China-Africa health cooperation in the post-COVID-19 recovery for the development of Africa's local pharmaceutical production.

First, a key bottleneck that has long constrained the development of LPP in Africa is the dire shortage of qualified labour, coupled with substantial training costs borne by pharmaceutical manufacturers. It is highly recommended to institutionalize labour training programmes with support from both the African and Chinese governments. This would not only make training more cost-effective, but it could assure a steady flow of qualified African workers entering the pharmaceutical market. To do this, it is important to realize that communication with (Chinese) pharmaceutical companies is essential, as companies know best the skills that they need. There is room for international organizations, such as WHO, to play a role in supporting health workforce training programmes using triangular cooperation methods.



Second, the Chinese government and international organizations provide sizable amounts of free medicines to Africa every year to bridge the gap in access to medicines. Rather than buying medicines from pharmaceutical manufacturers outside Africa, it is strongly advised to switch procurement to local manufacturers in Africa. Procurement from local suppliers would not only be more efficient in terms of time, logistics and cost, but it would directly support Africa's LPP and attract foreign pharmaceutical manufacturers to invest in Africa.

Third, financing is always a central issue in a firm's investment decisions. In two out of the three companies interviewed, they have received financing from the China-Africa Development Fund (CAD Fund), but only to a very limited extent. Given the urgency to accelerate the continent's recovery from the COVID-19 pandemic and the importance of developing local pharmaceutical production in Africa, it is strongly advised for the CAD Fund to prioritize investments related to Africa's pharmaceutical manufacturing. Relatedly, it is highly important to involve development financing institutions in foreign investment (e.g., the World Bank, national development banks). As opposed to deposit-taking and short-term profit-maximizing commercial banks, DFIs often rely on sovereign creditworthiness to issue long-term bonds in capital markets, which can help them to be better positioned to provide long-term industrial finance. The fact that returns on pharmaceutical investments generally take a long time aligns more closely with the financing goals of DFIs than commercial banks.

Fourth, it is recommended to ease the stringent foreign exchange controls observed in some African countries and give foreign pharmaceutical manufacturers preferential access to foreign exchange. As repeatedly stressed by company representatives during the interview, business operations in Africa have been severely constrained by the lack of access to foreign exchange and factories are producing far below installed production capacities. The need for foreign exchange arises from the fact that the vast majority of APIs and excipients used for production need to be imported from abroad, mainly China and India. It is simply unsustainable for foreign investors to keep importing intermediates without being able to make use of revenues generated locally. Even in the presence of foreign exchange shortages, preferential access should be given to pharmaceutical manufacturers such that production can be brought up to its installed capacity.

Fifth, as the central pillar in advancing China-Africa relations and in upholding South-South cooperation, the Forum on China-Africa Cooperation (FOCAC) offers a great venue to continually deepen health cooperation through increased investment in pharmaceuticals in the post-COVID-19 era. It is highly recommended to dedicate a sub-forum on the theme of health in advance of the FOCAC Summit, which is held triennially, focusing specifically on the role of China's investment in strengthening local pharmaceutical production in Africa and the fight against public health crises. This would not only attract attention among Chinese pharma companies and stimulate their investment appetite but may help resolve some of the key challenges confronted by those currently operating on the ground.

Sixth, African governments should take full advantage of existing industrial parks and special economic zones, which are aimed at addressing Africa's infrastructure gap by concentrating resources in a small, designated area such that both hard and soft infrastructure can be provided to cater for the needs of (prospective) manufacturers. To the best of our knowledge, Kilinto Industrial Park in Ethiopia is the only park specialized in pharmaceutical manufacturing in Africa. To accelerate the development of local pharmaceutical production in Africa, more industrial parks and special economic zones are recommended to take a pharmaceutical-centric approach. Nonetheless, it should be noted that given regional heterogeneity in development, not all African countries are best suited to focus on pharmaceutical manufacturing at this stage. Instead, only countries with a certain level of industrial capacity and/or are in the process of industrial upgrading to higher value-added activities (e.g., Ethiopia) should consider transforming their existing industrial parks to be pharmaceutical-centric.

Seventh, for Chinese pharmaceutical manufacturers that are interested in investing or expanding production capacities in Africa, it is of critical importance to put a high priority on branding and the provision of (after sales) services. It is widely acknowledged that Chinese manufacturers are among the world's most cost-competitive ones, but their competitiveness in such aspects as branding, marketing, and (after sales) services seem to lag far behind European, American and Indian counterparts. As Chinese pharmaceutical investments in Africa mostly revolve around the production of basic drugs that do not require much innovation, raising the awareness and popularity of Chinese brands will be key for Chinese pharmaceutical investors to gain sizeable shares in the market and achieve long-term success in Africa. Moreover, pharmaceutical production (e.g., manufacture of APIs) can be pollution intensive, Chinese pharmaceutical investors should carefully weigh the environmental costs and fully comply with local environmental regulations.

Eighth, while African countries may share commonalities in the development of their pharmaceutical industries, development strategies need to be tailored to each country's context. For instance, in the two countries examined in the paper, the top priority for Ethiopia now would be to quickly resolve the ongoing domestic conflict and restore stability and investor confidence. For South Africa, it is recommended to continue and strengthen cooperation in traditional medicines through, for instance, the establishment of joint research labs. Given its relatively developed economy and the recognition of traditional Chinese medicine, South Africa could play a leading role in advancing African traditional medicine and contributing to the development of the Africa Herbal Pharmacopeia.



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Appendix

Table A1: Harmonized System classification of pharmaceuticals and health products

Category	HS codes	Descriptions
Pharmaceutical products	2936	Provitamins, vitamins; natural or reproduced by synthesis
	2937	Hormones, prostaglandins, thromboxane and leukotrienes
	2938	Glycosides, natural or reproduced by synthesis
	2939	Alkaloids, natural or reproduced by synthesis
	2941	Antibiotics
	3001	Glands, organs (extracts, secretions thereof) for organo-therapeutic uses
	3002	Human blood, animal blood for therapeutic, prophylactic or diagnostic uses
	3003	Medicaments of two or more constituents mixed together for therapeutic or prophylactic use
	3004	Medicaments consisting of mixed or unmixed products for therapeutic or prophylactic use
	3005	Wadding, gauze, bandages, impregnated or coated with pharmaceutical substances
	3006	Pharmaceutical goods
Medical equipment	9018	Instruments and appliances used in medical, surgical, dental services
	9019	Mechano-therapy, massage appliances, psychological aptitude testing apparatus
	9020	Breathing appliances and gas masks
	902212	Apparatus based on the use of x-rays, computed tomography apparatus
	902213	Apparatus based on the use of x-rays, for dental uses
	902214	Apparatus based on the use of x-rays, for medical, surgical or veterinary uses
	902221	Apparatus based on the use of alpha, beta or gamma radiations
940290	Furniture for medical, surgical, veterinary use	
Chinese herbal medicine	50790	Animal products, tortoise shell, whalebone and whalebone hair, horns, antlers, hooves, nails and beaks
	0510	Ambergris, castoreum, civet and musk, cantharides, bile
	091020	Spices, saffron
	121120	Ginseng roots
	121150	Ephedra
121190	Plants and parts used primarily in perfumery, pharmacy or for insecticidal, fungicidal purposes	



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