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Review and Outlook on the development of the Health Silk Road

Nov 2023

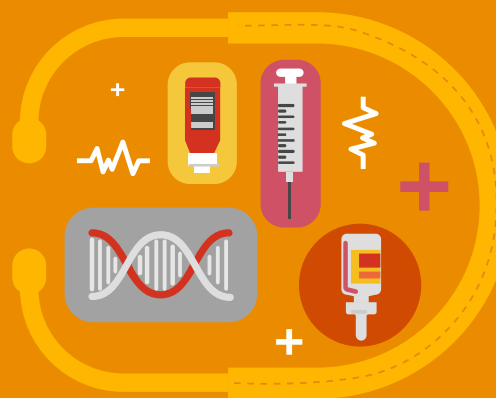


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Preface



In autumn 2013, Chinese President Xi Jinping proposed the Belt and Road Initiative (BRI). With the actualisation of the BRI, not only have new drivers for global economic growth been created, but the scope for strengthening economic and cultural exchanges and co-operation between China and its BRI partner countries has also broadened. Within the BRI, the medical and health industry is an important field with a great potential for international co-operation.

In 2016, Preseident Xi JinpingIn formally proposed to joint contribute Health Silk Road when visited Uzbekistan. 2017, China signed a memorandum with the World Health Organization (WHO) to promote co-operation among BRI partner countries and other key partners to build the Health Silk Road. During the critical period in the global fight against the COVID-19 pandemic in 2020, President Xi Jinping once again stressed the necessity to build the Health Silk Road. The President also proposed the initiative to 'build a global community of health for all', which would play a leading role in strengthening global co-operation against the pandemic. In 2021, The third

symposium on the Belt and Road Initiative (BRI) took joint construction of the Health Silk Road as an important aspect of the future high-quality joint construction.

The COVID-19 pandemic drastically impacted the economy and people's life in many countries. Throughout the COVID-19 outbreak, China performed efficiently and effectively in pandemic prevention and control , and demonstrated its scientific and technological strengths in the research and development (R&D) of COVID-19 vaccines. During the pandemic, China and BRI partner countries co-operated closely in various areas, including material sourcing for pandemic prevention, vaccine R&D and dissemination, dispatch medical experts, and the acceleration of medical and health infrastructure construction. All of these indicated China's assumption of its responsibility as a major world power, and its commitment to building a brighter future for mutual benefit of mankind by co-operating with other countries.



According to The Outline of the 14th Five-Year Plan (2021–2025) for National Economic and Social Development of the People's Republic of China and the Long-Range Objectives Through the Year 2035 ('the 14th Five-Year Plan' or 'the Plan'), China will actively co-operate with BRI partner countries in the medical and health sector as well as infectious disease prevention and control so as to build the Health Silk Road. The Plan also proposes clear steps to develop strategic emerging industries such as biotechnology, new materials and new energy vehicles. It also suggests to dedicate top-of-the-line resources to develop key core technologies related to: emerging infectious diseases; biosafety risk prevention and control; and medicine and medical equipment. With this, the country aims to make its bio-economy bigger and stronger. This will further promote the quality development of the

domestic medical and health industry, lay a foundation for its integration into the domestic and international Dual Circulation pattern and, in turn, bolster the development of the Health Silk Road.

This report, as a part of the PwC Belt and Road report series, focuses on the theme of building the Health Silk Road. The report reviews the co-operation between China and BRI partner countries in the medical and health field, tracks the construction progress of the Health Silk Road, and analyses the relevant opportunities and challenges under the New Normal. This report connects team members from PwC's global Chinese business networks to introduce the local conditions in four countries, offering an international perspective and laying a foundation for potential initiatives to take the whole industry to a new level.



Building the Health Silk Road is an important initiative concerning the future of mankind. PwC looks forward to co-operating with governments and enterprises to actively participate in the construction of the Health Silk Road. We hope to encourage Chinese enterprises to take part in the international division of labour and the industrial chain reconstruction and play an active role in building a global community of health for all. We look forward to further exploring the new opportunities that arise in the New Normal.





01

Co-operation between China and BRI partner countries

1.1 Overview of trade and investment in medical field

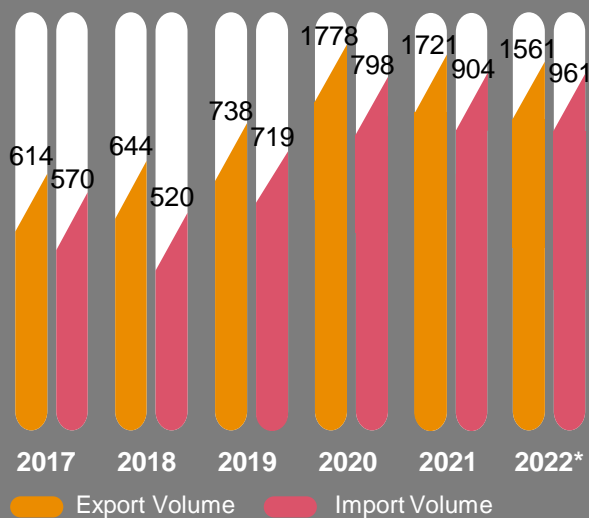


In 2013, President Xi Jinping proposed the idea of collaborating to build the Silk Road Economic Belt and the 21st Century Maritime Silk Road. In 2015, the National Health and Family Planning Commission of the People's Republic of China (NHFPC) issued The Three-Year Implementation Plan for Promoting Health Exchanges and Cooperation along the Belt and Road (2015-2017). Since then, the Health Silk Road, as an important part of the BRI, has established extensive international co-operative relationships. The development classification of the BRI partner countries vary, and mostly fall into the middle-income category with a small to medium population (10-50 million people). Thus, for effective co-operation, it is necessary to understand the pharmaceutical demands and regulatory requirements of each country so as to carry out collaborative and extensive commercial and scientific research with the local government and enterprises.

According to the statistics from China Chamber of Commerce for Import & Export of Medicines & Health Products (CCCMHPIE), the exports of Chinese pharmaceutical products increased from USD52.7bn in 2010 to USD177.8bn in 2020, up 3.4 times in the last decade. During the COVID-19 pandemic in 2021, the export volume slightly decreased to approximately USD 172.1bn. The exports included mainly medicines, Active Pharmaceutical Ingredient (API), medical devices, and diagnostic equipment; to various destinations including the US, the EU, India, Japan and South Korea. During the same period, China's imports of pharmaceutical products increased from approximately USD20bn in 2010 to about USD90.4bn in 2021. Within which BRI partner countries accounted for roughly 33% of the export value and 15% of the import value of pharmaceutical products.

Fig. 1: Import and export volumes of pharmaceutical products in China (2017 to 2021)

Volume (100Million USD)



Data source: CCCMHPIE (Pharmaceutical products including traditional Chinese medicine, medicine and medical devices)

Note: The annual import and export amount for 2022 is estimated based on the data from January to October 2022 and year-on-year changes (exports: -9.29%; imports:+6.62%)

According to the CCCMHPIE, from 2015 to 2021, Chinese pharmaceutical products exported to BRI partner countries and regions indicated an upward trend with a compound annual growth rate of 19.69%. This shows that the BRI partner countries have become important destinations for Chinese pharmaceutical products.

Due to the weak foundation of pharmaceutical industry, the rapid population and medical expenditure growth along with the low self-sufficiency rate of drugs in BRI partner countries, the demand for pharmaceutical products from these countries is growing rapidly. Chinese pharmaceutical enterprises can help improve the maturity level of the local medical and health industry.

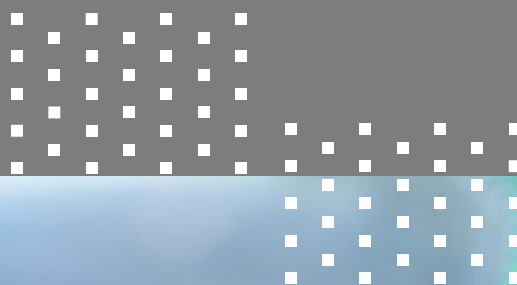


Fig. 2: Pharmaceutical products exported to the BRI partner countries and regions (2015-2022)

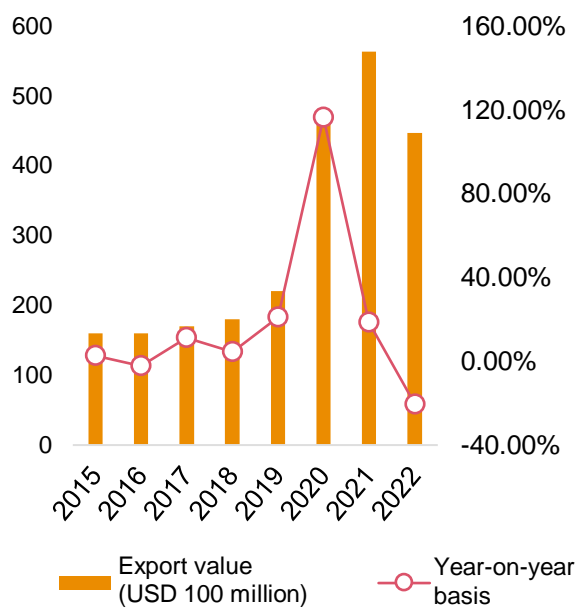
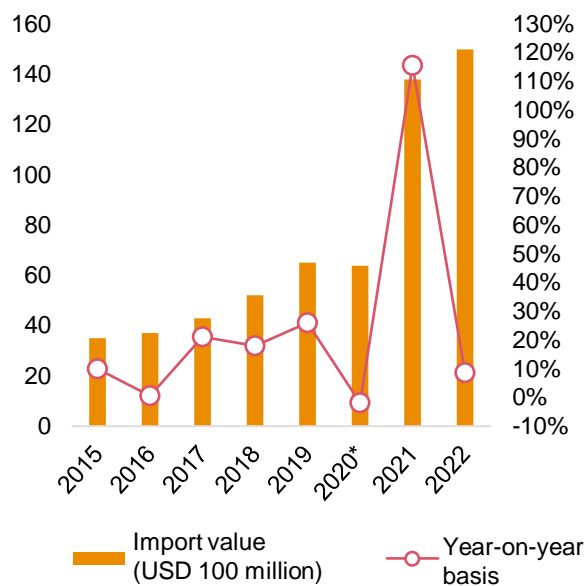


Fig. 3: Pharmaceutical products imported from BRI partner countries and regions (2015-2022)



Data source: Blue Paper of the Internationalisation of Chinese Pharmaceutical Industry in 2020; China Chamber of Commerce of Medicines & Health Products Importers & Exporter

Note: The data of imported pharmaceutical products from BRI partner countries in 2020 is estimated using the change ratio (-1.8%) of China's total imports to BRI partner countries in 2020 compared with 2019

In terms of types of exported goods, considering 2022 as an example, medicine and medical device are the main products, accounting for over 90% of the total

In terms of export markets, Association of Southeast Asian Nations (ASEAN) became China's largest export region for pharmaceutical products. Africa and ASEAN were important export markets for medicine preparations produced in China, while bulk API were mainly exported to Latin America, the Middle East, and Central and Eastern Europe.



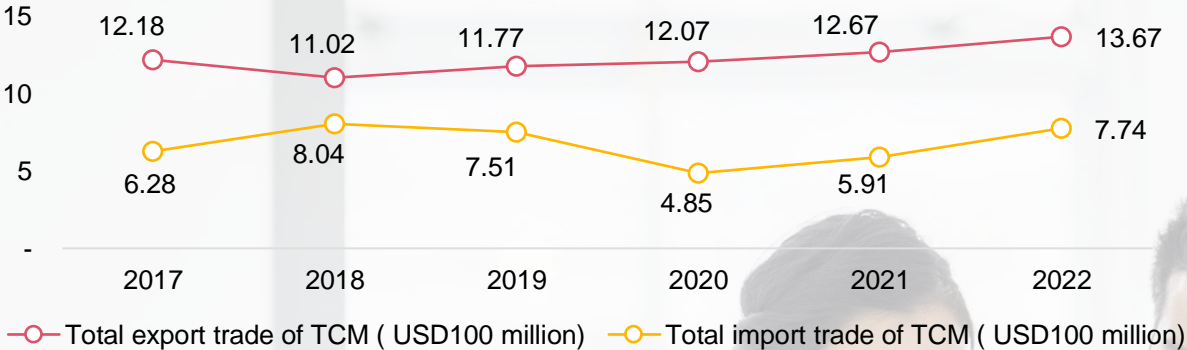
In terms of imports, although the import value of pharmaceutical products from BRI partner countries is relatively small (USD15bn), the overall growth rate is higher than that of exports.

According to data from the General Administration of Customs of the People's Republic of China, the exports and imports of TCM products continued to grow from 2017 to 2022. TCM export products included plant extracts, herbal decoction pieces, Chinese patent medicines and health products. The main export countries were the US, Japan, South Korea, Malaysia and India; Asia continues to be the main market for TCM exports.

in 2021, among the top ten export destinations for TCM products, in addition to TCM products export hotspots - Southeast Asian countries, the United States, Germany, and Australia had also entered the list of China's top ten export destinations for TCM products.

Among the top ten export destinations, the BRI partner countries had outstanding performance, Malaysia, Vietnam and Indonesia had all increased by about 20% year on year. This indicates the great potential for TCM products in Southeast Asian countries.

Fig. 4: Import and export values of TCM commodities (2017-2022)



Data source: General Administration of Customs of the People's Republic of China (TCM commodities include plant extracts, herbal decoction pieces, Chinese patent medicine and health products)

Fig. 5: The top ten fastest growing markets among the top ten export destinations of TCM products in 2021



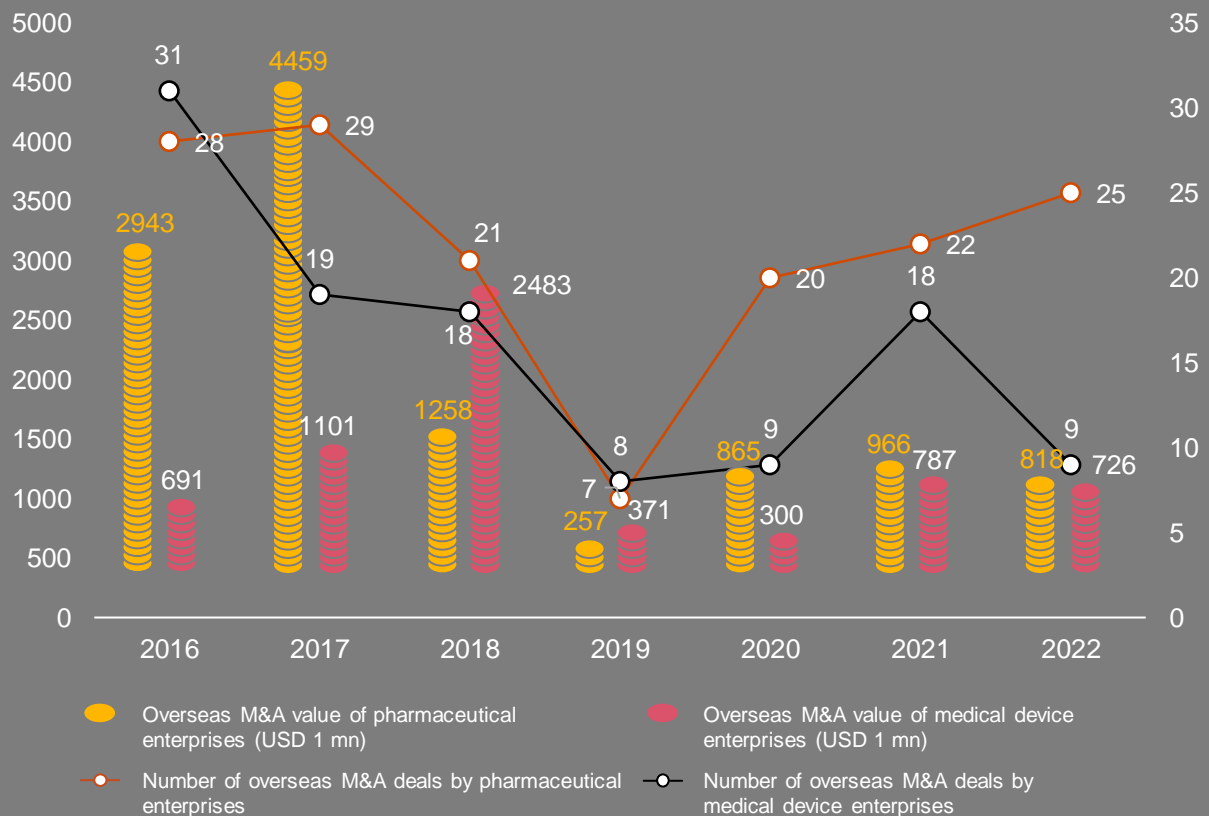
Data source: General Administration of Customs of the People's Republic of China, China Galaxy Research Institute

From 2021 to 2022, the number of overseas investment and mergers and acquisitions (M&A) had rebounded, capitals and large domestic pharmaceutical companies were actively laying out high-quality overseas pipelines and accelerating globalisation layout through investment and M&A.

In 2021, Chinese pharmaceutical enterprises and medical device enterprises had 40 overseas M&A deals with a total value of USD1.8bn. In 2022, there were 34 overseas M&A deals with a total value or USD 1.6bn..

Since the release of the BRI implementation plan, and recently enforced a series of policies promoting the rapid development of the pharmaceutical industry, Chinese enterprises are gradually making headway in the international market and winning market share. Due to the COVID-19 pandemic, Chinese enterprises that specialise in Chinese medicines, devices and vaccine products have taken the opportunity to increase their visibility and influence in the international market.

Fig. 6: The value and number of overseas M&A deals by Chinese enterprises (2016-2022)



Data source: Thomson Reuters, CVSource

Fig. 7: M&A deals with Chinese enterprises in the healthcare industry

Date	Investor	Investee	Industry	Country	Amount (USD)
29/11/2022	Full-Life Technologies	Focus-X Therapeutics	Pharmaceutical R&D	US	245 million
15/11/2022	Decheng Capital	CG Oncology Inc	Pharmaceutical R&D	US	120 million
23/06/2022	China National Biotec Group	F-Star Therapeutics	Pharmaceutical R&D	UK	154 million
29/04/2022	CDH Investments	Tessera Therapeutics	Pharmaceutical R&D	US	300 million
21/01/2022	PAG	NMS集团	Pharmaceutical R&D	Italy	221 million
01/07/2021	Grand Pharmaceutical Group	Grand Phama Sphere Pte	Pharmaceutical R&D	Singapore	150 million
01/03/2021	Pharmaron Inc	Allergan Biologics Limited	Pharmaceutical R&D	UK	120 million
22/03/2021	China National Biotec Group	Soft hale NC	Pharmaceutical R&D	Belgium	110 million
30/03/2020	Ping An Group	SHIONOGI	Pharmaceutical R&D	Japan	312 million
06/11/2020	Pharmaron Inc	Absorption Systems	Pharmaceutical R&D	US	138 million
17/01/2020	WuXi Biologics	A biologics factory of Bayer	Pharmaceutical production	Germany	86 million
31/07/2020	Fuan Pharmaceutical	Red Realty	Pharmaceutical production	US	75 million
22/06/2020	Betta Pharmaceuticals	Agenus	Pharmaceutical R&D	US	35 million
23/12/2019	Aier Eye Hospital	ISEC Healthcare Ltd.	Healthcare Provider	Singapore	49 million
31/10/2019	Yifan Pharmaceutical Co., Ltd.	Bioton S.A.	Pharmaceutical R&D	Singapore	98 million
29/07/2019	Sitobiotech	Laboratorio Italiano Biochimico Farmaceutico Lisapharma S.p.A.	Pharmaceutical distribution	Italy	12 million
16/05/2019	Yifan Pharmaceutical Co., Ltd.	SciGen	Pharmaceutical R&D	Singapore	28 million


Data source: Research by PwC

1.2 Medical and health assistance prevention and treatment of major infectious diseases



After over 20 years of effort, China has signed health co-operation agreements with countries from five continents. Through information sharing, technical training, joint scientific research and medical assistance, China has been actively co-operating with the countries along the Belt and Road in establishing health systems that encompass human resource development, health facility construction, health management, maternal and child health, and health education, among others. The country is

also collaborating with its peers on areas that include disease prevention and control, including infectious diseases control and immune system building, medical technical support and the popularisation of Chinese medicine. The signing of the co-operation agreements not only provides solid policy support for promoting health co-operation along the Belt and Road, but also helps improve the strength, speed and efficiency of international prevention and control of infectious diseases.



As the Chinese economy continues to develop, China has been increasing its medical aid to other countries. The types of organisations involved in providing foreign aid have also diversified. At the early stages, foreign aid was mainly provided by the government, but nowadays, hospitals, nonprofit social organisations and enterprises are all contributing to the cause. An increasing number of leading enterprises in the medical industry will seek to send foreign aid teams to provide a variety of high-quality medical services to the BRI partner countries. In the long run, foreign aid will also diversify in terms of service content and form.

China and the BRI partner countries have achieved remarkable results in the prevention and treatment of major infectious diseases through co-operation. In 2017, by leveraging the advantages of international co-operation and the domestic market's abundant experience in relevant research, the Chinese Academy of Sciences moved their research base for emerging and emergent pathogens from China to other regions where infectious diseases frequently occur. At the end of 2018, the Chinese Center for Disease Control and Prevention (China CDC) at the National Institute for Viral Diseases Control and Prevention initiated the project Research on the Regularity, Early Warning and Response to Important Infectious Diseases Along the Belt and Road. At the end of 2020, after two challenging years disrupted by the COVID-19 pandemic, the research was finalised.

The Chinese pharmaceutical industry is gradually integrating into the international industry ecosystem. It is gradually upgrading its advantages, from traditional international pharmaceutical trade to innovation-driven, high

value-added international development. In BRI partner countries and regions, the implementation of the Health Silk Road blueprint has seen positive progress over the past few years. The Chinese government, industry associations and pharmaceutical enterprises have jointly promoted multi-level win-win measures, especially in terms of dealing with the global pandemic. Organisations have collaborated with many BRI partner countries and regions to fight against the pandemic.

In 2020, the world was hit by an unprecedented pandemic, affecting every region, including the Belt and Road initiative. However, not all construction activities along the Belt and Road were disrupted. Based on the reality of the situation, proactive measures were taken demonstrating the resilience and vitality of the initiative; significant contributions were made to the global fight against the pandemic and economic instability.

At a national level, BRI partner countries have been actively sharing pandemic prevention and treatment plans and providing anti-pandemic assistance to each other. Meanwhile, China has sent teams of medical experts to some partner countries, while some Chinese enterprises have built temporary hospitals and organised the local production of protective materials according to the actual needs of the respective countries.

As the pandemic gradually came under control in China after the initial outbreak, the country started to provide emergency materials to countries with scarce medical resources to help them alleviate the local pressures. At the beginning of the pandemic, China also sent a large number of materials to the countries with relatively advanced medical systems and limited material production capacities.

As the Chinese government leads by example, Chinese enterprises have taken note, and are demonstrating their spirit of internationalism by helping other countries. By June 2020, Chinese enterprises had sent 82.33mn masks overseas to support fight against the pandemic, the 15 countries and regions that benefitted includes the US, Australia, Singapore, Greece and Czech Republic.

China, as the first country to experience the pandemic, has been making continuous efforts in vaccine development. The country co-operated with the BRI partner countries to carry out clinical trials in order to quickly develop safe and effective COVID-19 vaccines. Chinese enterprises co-operated with BRI partner countries, including Egypt, Indonesia, Pakistan and UAE, to carry out Phase III clinical trials, which greatly shortened the 'go-to-market' cycle of Chinese vaccines. As the conditions vary among partner countries, the Chinese government engaged in various forms of collaboration.

In the past two years, TCM also performed well in the fight against the COVID-19 pandemic. According to data from the State Council Information Office of the People's Republic of China, the total effective rate of Chinese medicines for the treatment of COVID-19 in China is over 90%. The excellent results demonstrated made TCM popular worldwide. Lianhua Qingwen has become a popular TCM product around the world; it has already obtained marketing licenses in many countries such as Canada, Brazil, Singapore, and has started the product registration process in more countries.

During China's fight against the pandemic¹, the international community has provided support and assistance to both the Chinese government and its people through various means, including material donation and loan support. China has

also provided support to the international community within its capacity. In particular, the Chinese government offered various forms of foreign aid including material and financial assistance, medical and health personnel support, the promotion of pandemic prevention and control knowledge, and co-operation and sharing scientific research resources. These methods have effectively solved the functional difficulties in recipient countries and regions.

In terms of material assistance, China donated anti-pandemic materials to more than 150 countries, regions and international organisations. From March to May 2020, China exported pandemic prevention materials to 200 countries and regions; the materials included protective materials such as masks, protective clothes, goggles, as well as virus detection materials, such as COVID-19 test kits and infrared thermometers, and therapeutic equipment, such as respirators. In terms of funds, China has provided the WHO with two rounds of cash assistance totalling USD50mn. At the opening ceremony of the World Health Assembly in May 2020, President Xi Jinping announced that China would provide USD2bn in international aid within two years.

In terms of medical and health assistance, China has not only 'offered assistance in kind' but also 'taught skills in mind'. The country sent 29 medical expert groups to 27 countries, offered anti-pandemic assistance to 150 countries and 4 international organisations, guided long-term foreign aid medical teams in 56 countries in pandemic prevention and control, and held more than 400 online and offline trainings. In terms of scientific research resources, China has collaborated with the international community on academic exchanges, resource and achievement-sharing, and pandemic prevention, control and treatment strategies through various means.

¹ White Paper China's Action against COVID-19 by the State Council Information Office of China

1.3 Co-operation in medical and health infrastructure



In terms of policy support, the **Announcement on Adjustment to Inspection, Examination, Release and Control of Foreign aid Material Supplies** issued in 2016 exempted inspections for emergency humanitarian aid materials and construction machines for foreign aid projects, increasing the convenience and speed in which Chinese enterprises can provide foreign aid, and build medical and health infrastructure overseas. With the global spread of COVID-19 in 2020, the Ministry of Commerce of China and China Development Bank jointly issued **Work Notice on Supporting the High-quality and Cooperative Building of “One Belt One Road” by Leveraging the Role of Development Finance in Response to the COVID-19 Outbreak**. The Work Notice provides the projects and constructors affected by the pandemic with various forms of financial support, such as low-cost financing, special foreign exchange working capital loans and reasonable grace periods for repayments.

In terms of institutional reform, in order to better serve overall national diplomacy and build the Belt and Road, the State Council’s institutional reform plan integrated the foreign aid responsibilities of the Ministry of Commerce of China and the foreign aid co-ordination responsibilities of the Ministry of Foreign Affairs

of China in 2018. The China International Development Cooperation Agency was also established directly under the State Council.

The Chinese government’s commitment to providing medical assistance to BRI partner countries and developing countries, together with its initiative to build a transnational public health community, have incentivised Chinese enterprises to provide foreign aid for the construction, investment and building medical infrastructure. In June 2016, President Xi Jinping proposed the Health Silk Road Initiative for the first time in his speech on a state visit to Uzbekistan. On March 21, 2020, in President Xi Jinping’s call with the French President, Emmanuel Macron, is when he first proposed the idea of building ‘a global community of health for all’ to improve global public health governance.

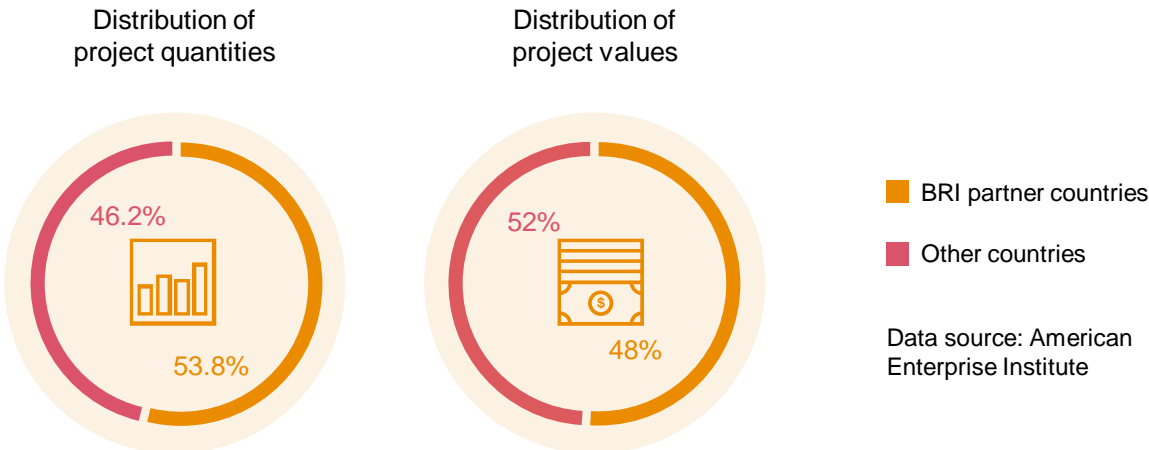


Throughout the construction of the Belt and Road, China has been adhering to its vision of building a global community of health for all. The country has been helping developing countries build medical and health infrastructure to improve their public health systems through construction aid, i.e., contracts to build and invest. By early 2023, China had more than 30,000 medical team members and public health experts working in 76 countries around the world and had built more than 150 landmark facilities such as general hospitals, specialist centres and drug warehouses. After the BRI was proposed, China has been actively providing construction aid for infrastructure concerning people’s livelihood such as hospitals in partner countries. China is helping these countries overcome their shortcomings in infrastructure and basic public services related to medical care and other relevant areas. According to the white paper, China’s International Development Cooperation in the New Era, released by the

State Council Information Office of the People’s Republic of China, there were 423 complete sets of projects² aided by China between 2013 and 2018, including 58 hospital projects.

In addition to construction aid, Chinese enterprises, especially the central enterprises represented by the China Railway Construction Corporation and PowerChina, have built a large number of medical and health infrastructures overseas, most of which are located in BRI partner countries. According to the statistics from the American Enterprise Institute, from 2013 to 2022, Chinese enterprises were contracted to build 14 hospital projects in the BRI partner countries, accounting for 53.8% of the total number of hospital projects undertaken by Chinese enterprises during the same period. The projects were valued at a total of USD2.62bn, accounting for 48% of the total value³.

Fig. 8: Distribution of the quantities and values of the hospital projects undertaken by Chinese enterprises (2013-2023)



² Complete sets of projects refer to the assistance projects where China provides all the equipment and engineering facilities for production, living and public services to the recipient countries by organising or guiding parts of each stage of construction, installation and trial production. China also offers long-term quality assurance and technical support after the projects are complete.

³ The China Global Investment Tracker[Z].The American Enterprise Institute,2023

Before the COVID-19 outbreak, most of the partner countries had insufficient medical and health expenditure, related infrastructure construction lagged, and the number of newly signed projects on medical and health infrastructure was small. According to statistics from the World Bank, the average proportion of medical and health expenditure of the partner countries⁴ in relation to GDP was 6.7% in 2020. This was far lower than the global average of 10.89% and the average level in high-income

countries (14.02%). According to statistics from Fitch Solutions' project database, the number of large-scale national medical and health infrastructure projects that were newly signed or under construction in most of the partner countries was mostly less than three between 2018 and 2020⁵.

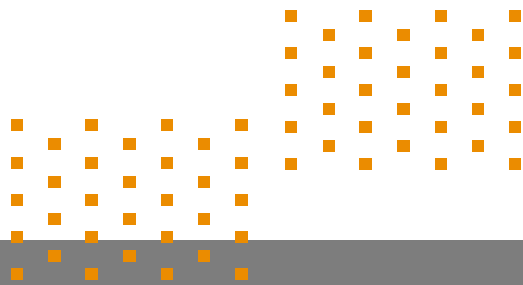
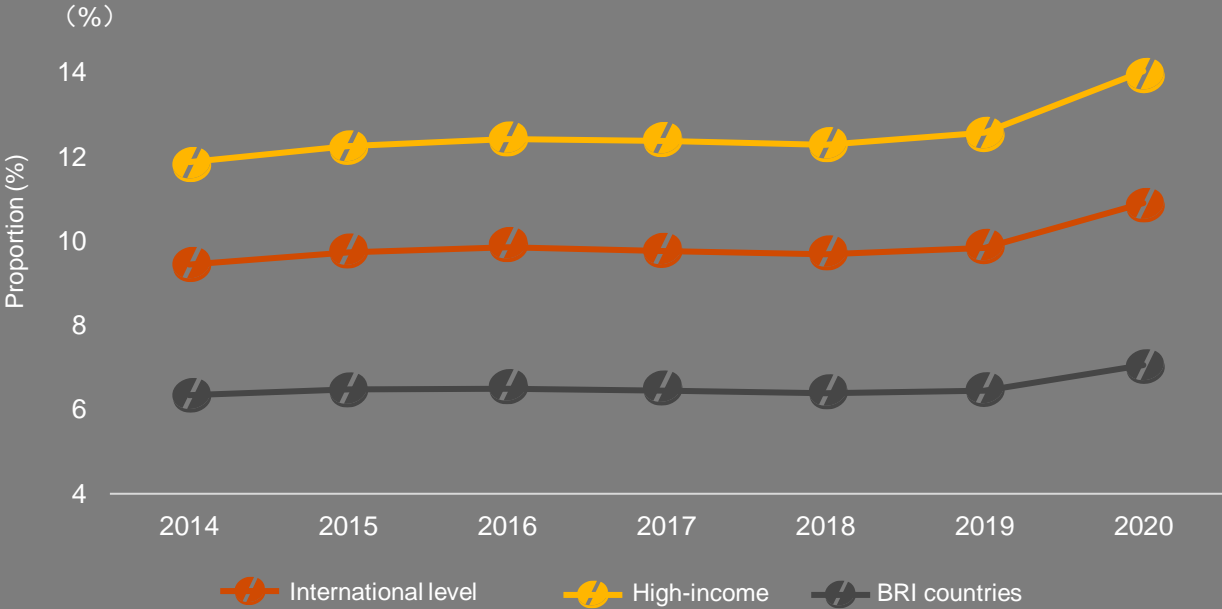


Fig. 9: The proportion of medical and health expenditures in GDP in different countries during 2014-2020



Data source: The World Bank

⁴ List of countries that have signed co-operation agreements with China to build the Belt and Road

⁵ Fitch Solutions, 2021

Before the outbreak of the COVID-19 pandemic, there was limited attention on the medical and health infrastructure around the world. However, the pandemic has brought infrastructure construction in this field to the forefront. The data from Fitch Solutions shows that in 2019, the number of global medical and health infrastructure projects only accounted for about 2.3% of total projects, and the value of these projects was relatively small. After the outbreak, many countries started to pay greater attention to the construction of medical and health infrastructure. Georgia planned to invest GEL60mn to improve its medical facilities. In March 2020, Nepal announced that it would increase its medical and healthcare expenditure in order to import additional medical supplies and establish quarantine centres and temporary hospitals. India also planned to invest INR150bn to develop its health infrastructure.

During the outbreaks, apart from strengthening its own pandemic prevention and control measures, China also provided anti-pandemic support to other countries, especially developing countries. Specific measures included medical material assistance, vaccine assistance, dispatching medical experts, accelerating the construction of medical and health infrastructure, supporting international multilateral platforms and institutions in managing the pandemic and helping countries cope with the debt challenges.

In terms of accelerating the construction of health infrastructure, China has provided anti-pandemic support to the BRI partner countries by helping build infectious disease prevention and control institutions, CDC facilities, and helping existing medical facilities carry out a transformation that focuses on anti-pandemic concerns. The China-aided construction project for the Africa Centers for Disease Control and Prevention (Africa CDC) headquarters started at the end of 2020, with the aim of helping Africa

improve its disease prevention and control capabilities. Other projects such as the specialist outpatient building for infectious diseases at the Grand National Hospital of Mauritania and the Sino-Guinea Friendship Hospital, which received China's support before the pandemic, also played an important role in the local fight against the pandemic.

In July 2020, the China-aided construction of a COVID-19 isolation hospital in Pakistan opened to public. At the beginning of 2021, the Myanmar National Center for Disease Control and Prevention and Medical Care Training Center started to operate after receiving aid from China. During the pandemic, Chinese enterprises also reconstructed and upgraded isolation facilities for COVID-19 in designated hospitals in Ethiopia, Zimbabwe and Senegal.

Chinese enterprises leverage three primary methods to participate in the construction of medical and health infrastructure: construction aid, direct investment, and contracts to build. China's foreign aid through hospital projects is mainly funded by the Chinese government and undertaken by Chinese contractors with state-owned enterprises as the anchor. Mahosot General Hospital in Laos is the biggest Chinese government-aided hospital project with the largest number of beds and the largest investment.





Unlike 'government-funded, central state-owned enterprises-built' model adopted by most of the construction aid projects, Chinese private and state-owned enterprises (SOEs) have a high degree of participation in overseas investment for hospital projects. For example, Addis Ababa Silk Road General Hospital received investment from AFEI Holding Company, a Chinese private capital entity, which then built and operated the facility, making it the first Chinese-funded general hospital in Ethiopia. The hospital consists of 15 departments and holds nearly 100 beds. After the outbreak, it has become a designated hospital for COVID-19 patients in Ethiopia.

In addition, Chinese engineering contractors represented by central SOEs like the China Railway Construction Corporation and PowerChina have undertaken a large number of

medical and health infrastructure projects overseas. For example, Alima General Hospital built by the China Railway Construction Corporation was funded by the government of Trinidad and Tobago. It is the first hospital project in which the China Railway Construction Corporation which encompassed design, construction, equipment procurement and training. It is also one of the largest and most advanced hospitals in the country. At the beginning of 2020, when the hospital was nearly completed and delivered, the COVID-19 pandemic broke out. In June 2020, the whole hospital and the extended anti-pandemic isolation facilities were completed and handed over. This project further cemented the positive reputation of Chinese engineering contractors in overseas markets.

1.4 International medical co-operation centred around Traditional Chinese Medicine



According to the definition by the WHO, traditional medicine refers to such medicine that uses drugs based on plants and minerals as well as psychotherapy and limb therapy to treat, diagnose and prevent diseases or maintain health. Traditional Chinese medicine (TCM) is the general name of ethnomedicine from all ethnic groups in China, including Han (Chinese) medicine, Tibetan medicine, Mongolian medicine and Uygur medicine among others. Most of the BRI partner countries have a history of using TCM or other traditional medicine, which provides a good foundation to promote the culture of TCM. By 2022, China has established 75 TCM international co-operation bases in more than 40 countries along the Belt and Road. Statistics show that every year, more than 13,000 international students come to China to study TCM and about 200,000 overseas patients come to China to receive TCM services.

According to the disclosure by the National Administration of Traditional Chinese Medicine (NATCM), China has signed special TCM co-operation agreements with 43 foreign governments, regions and international organisations by 2021. Since 2015, China has built 59 domestic demonstration bases for the foreign exchange and co-operation of TCM and started construction on 30 overseas TCM centres in the BRI partner countries. According to statistics, as of 2021, China has co-operated with 88 countries and established more than 70

overseas TCM centres in over 40 countries, serving 150,000 foreigners while training 7,100 foreign professionals and more than 10,000 students. In addition, China encouraged the development of legislation for TCM practices in Czech Republic, Hungary and other countries⁶.

Thanks to the joint efforts of international governments, non-governmental organisations and the general public, TCM is gaining popularity all over the world. As Europe already has a history of using acupuncture and herbal medicine over hundreds of years, the locals can easily understand and accept TCM as it is considered more natural and healthier with fewer side effects.

Southeast Asia, which is home to the largest population of overseas Chinese, is rich in Chinese medicinal plants. This makes Singapore, Malaysia, Vietnam, Thailand and other BRI partner countries the main suppliers of the raw materials for Chinese herbal medicine, as well as important consumers of TCM products and services.

Similar to TCM, it is also commonplace for traditional African medicine to adopt the use of herbs. Some countries, including South Africa, have also implemented a relatively relaxed policy on herbs, including Chinese herbal medicines, which provides opportunities for TCM to expand into other markets.

⁶ Xinhua News Agency

In May 2019, the 72nd World Health Assembly, held in Geneva, deliberated and approved the eleventh revision of the International Classification of Diseases, which included traditional medicine originating from TCM for the

first time. According to the information disclosed by the NATCM and the WHO, TCM has been used in 196 countries and regions by September 2022. The popularity of TCM in some countries/regions is summarised as follows:

Fig. 10: Dissemination and recognition of TCM in various countries

Country	Current integration level	Popularity
Singapore	Incorporating TCM into the medical system	<ul style="list-style-type: none"> TCM has become an integral part of Singapore's health culture. Public hospitals in Singapore provide acupuncture treatments for rehabilitation.
Laos	Establishing TCM treatment plan	<ul style="list-style-type: none"> Expert groups in Laos approved and adopted the COVID-19 diagnosis and treatment plan formulated by China, which included Chinese herbal preparations (Jianti Anti-epidemic Mixture and Antipyretic Mixture) and common patent Chinese medicines (Huoxiangzhengqi Soft Capsules and Lianhua Qingwen Capsules) into the treatment plan.
UK	Legislation for TCM	<ul style="list-style-type: none"> UK is the first country in Western Europe to legislate complementary and alternative medicine. In 2004, the Chinese Medical Council was established. Currently, there are more than 3,000 TCM clinics and 10,000 TCM acupuncturists.
Germany	Official recognition of acupuncture	<ul style="list-style-type: none"> There are more than 50,000 therapists qualified to practice acupuncture, and more than 70 Western hospitals have set up specialised clinics to provide TCM services. Acupuncture is officially recognised by the German Medical Association as an auxiliary medical treatment. Acupuncture treatment expenses can be reimbursed by national/private medical insurance.
Netherlands	Official recognition of acupuncture	<ul style="list-style-type: none"> Currently, there are more than 4,000 TCM personnel and 1,500 TCM clinics. Acupuncture is officially recognised. Acupuncture treatment expenses can be reimbursed by private medical insurance.
France	Official recognition of acupuncture	<ul style="list-style-type: none"> Currently, there are more than 10,000 acupuncturists and 3,000 acupuncture clinics. Acupuncture is recognised by French Healthcare Association as an auxiliary medical treatment. Acupuncture treatment expenses can be reimbursed by national/private medical insurance.
Portugal	Official recognition of acupuncture	<ul style="list-style-type: none"> Currently, there are more than 3,000 acupuncturists. Acupuncture is officially recognised.

Data source: Analysis by PwC according to public information from the World Federation of Acupuncture-Moxibustion Societies, World Federation of Chinese Medicine Societies, Guiding Journal of Traditional Chinese Medicine and Pharmacology, Economic Daily and China's Foreign Trade

Country	Current integration level	Popularity
South Africa	Incorporation of TCM into the medical system	<ul style="list-style-type: none"> The SA Association of Chinese Medicine and Acupuncture was established and started recruiting Chinese scholars in 1996. TCM acupuncture and acupuncturists are made legal and regulated. TCM treatment is officially incorporated into the medical system. University of the Western Cape offers TCM as a specialty.
Hungary	Legislation for TCM	<ul style="list-style-type: none"> In 1989, the Magyar Akupunktúrás Orvosok Társasága (MAOT) was established. In 2013, the legislation on TCM was passed, and 13 TCM practitioners were licensed to practice medicine. In 2015, the detailed regulation on the implementation of TCM legislation was officially promulgated. TCM products are available in Hungarian pharmacies and most DM drugstores. In 2017, 600 Hungarian physicians opened their TCM clinics.
Australia	Legislation for TCM	<ul style="list-style-type: none"> In 2012, the Australian government passed its TCM legislation and incorporated it into the medical system. Australia was the first developed country in the West to legislate TCM. Currently, there are about 5,000 registered TCM practitioners and about 3,000 TCM clinics in Australia. There are more than 3mn outpatient visits every year, 80% are from non-Chinese patients.
Rwanda	Traditional medical exchanges between the two countries	<ul style="list-style-type: none"> James Kimonyo, Rwanda's ambassador to China, recognised the efficacies of TCM and hopes that TCM exchanges between the two countries can be maintained.
New Zealand	TCM Legislation	<ul style="list-style-type: none"> The success of TCM legislation indicated the official integration of TCM services into New Zealand's healthcare system by the government, and the development of TCM in New Zealand will enter into a new stage

In addition to government authorities, non-governmental associations, universities and TCM enterprises are also important agents for the promotion of TCM development overseas. In 2014, Gansu University of Chinese Medicine and Kyrgyzstan collaborated to establish the Qi Huang Traditional Chinese Medicine Institute and the Department of TCM in the country. Gansu Province also established Qi Huang Traditional Chinese Medicine Institute or TCM centres in 16 countries, including Belarus, Hungary and Thailand. In 2016, a platform that promotes TRT International's TCM centre globally was

launched. The platform covers India and Brazil, and provides nearly 300 special TCM products or services.

Since the establishment of the Chinese Medicine Base for Overseas Chinese from Jiangsu in December 2017, Jiangsu Provincial Hospital of Chinese Medicine has been actively carrying out online and offline overseas TCM services, co-operating with 15 international TCM institutions to provide TCM medical and teaching services. It has treated more than 3,000 foreigners and Chinese patients overseas.



1.5 Medical innovation and healthcare services

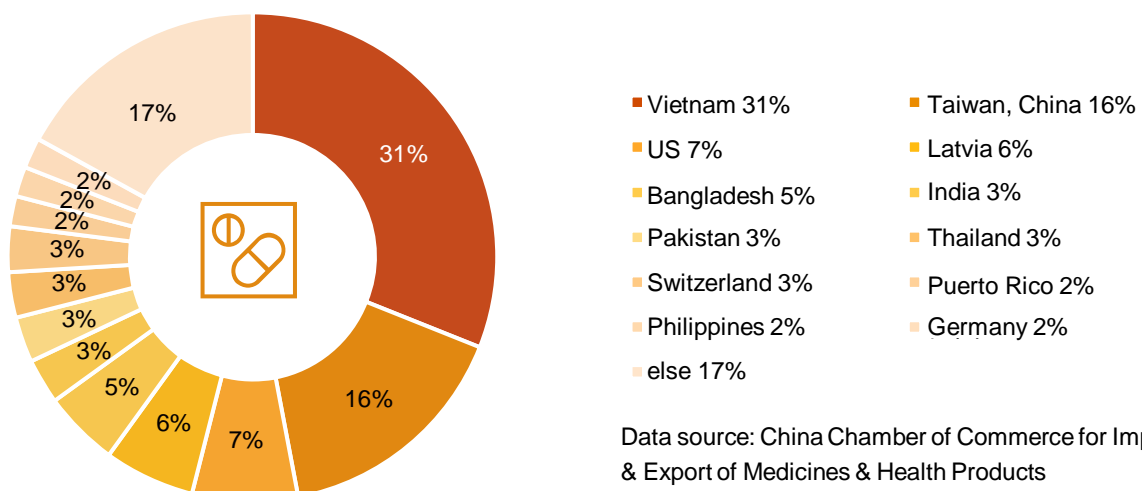
In the past few years, the Chinese government has been leveraging the opportunities provided by the BRI, adhering to international cooperation and multilateralism, and upholding the integrity of the global health governance system centered around United Nations (UN) and WHO. The Chinese Government considers enterprises as its driver by providing high-quality products and services for the Health Silk Road, actively enhancing its influence and promoting the mutual progress of health services in China and other countries along the Belt and Road.

In order to promote the further growth of the Chinese pharmaceutical industry, it is necessary to strengthen its international influence. In terms of medicine, China can improve its innovation ability and export more first-in-class drugs. In terms of medical devices, the country can leverage its strengths in domestic production capacity and experience to help partner countries and regions improve the development

level of their pharmaceutical industry. The increased emphasis of international community on vaccines during the COVID-19 pandemic has stimulated the swift development of China's vaccine R&D and production capacity. As a national health industry with great originality potential and China's completely independent intellectual property rights system, TCM needs to be further endorsed.

According to the statistics from CCCMHPIE, as of December 2019, there were 288 preparations from self-owned brands released overseas by Chinese enterprises, including Zanubrutinib produced by BeiGene. BRI partner countries, including Vietnam, Bangladesh, Pakistan, Latvia, Thailand, and the Philippines, accounted for more than 50% of the overseas market. Chinese API enterprises have shifted production from extensive low-end intermediates to refined high-end products, and their deep processing capacities have gradually improved.

Fig. 11: Chinese preparations of self-owned brands released in overseas markets

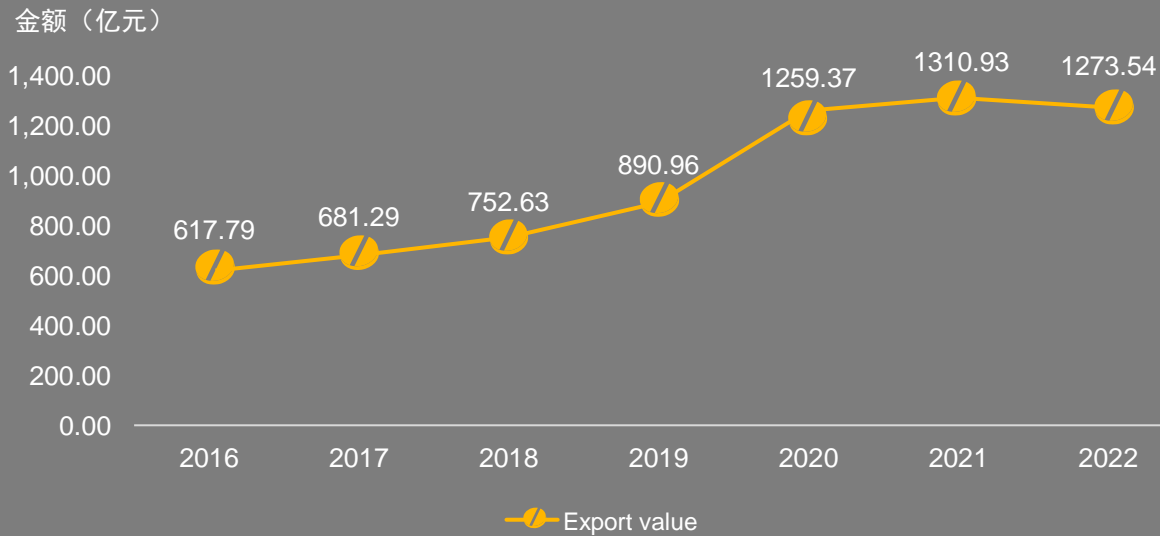


Data source: China Chamber of Commerce for Import & Export of Medicines & Health Products

Domestic pharmaceutical enterprises have enhanced both their influence and sales network by investing in factories and establishing representative offices in order to improve the accessibility of drugs for BRI partner countries. In terms of manufacturing, Chinese enterprises have been actively bringing their advanced production management experience to BRI partner countries under the guiding principle of developing a global community of health for all. As such, they are investing in and establishing factories to leverage the advantageous local labour markets, and strengthening the drug production capacity of the countries along the Belt and Road. In terms of product sales, enterprises have been actively communicating with the BRI partner countries and are exploring an economic development model for drugs that not only conforms to local regulations but also achieves mutually beneficial results.

China’s medical device industry chain is relatively comprehensive, the supply chain tends to be structurally balanced, and the value chain is shifting from the low-and mid--end to the mid-and high-end. Domestic medical device enterprises are expressing an increasingly strong intention to expand to international markets and are accelerating the process. Trade, foreign aid, international co-operation and exhibitions will become important channels through which Chinese medical device enterprises can penetrate international markets. According to the statistics from China Customs, China’s medical device exports exceeded RMB124.4bn in 2022, and the compound annual growth rate from 2016 to 2022 was 12.81%. The growth rate of exports to the BRI partner countries accelerated significantly, and the countries along the Belt and Road have become important markets for Chinese medical devices to ‘go global’.

Fig. 12: Export value of medical instruments and devices (2016-2022)



Data source: General Administration of Customs of the People’s Republic of China

Although the vaccine industry in China was established later than developed countries, due to the COVID-19 pandemic, it has been growing quickly by leveraging the favourable policies of the Health Silk Road as well as its own excellent R&D capabilities. In May 2020, President Xi Jinping announced that China was willing to make its COVID-19 vaccines a global public resource and contribute to the accessibility and affordability of vaccines in developing countries.

In May 2021, the WHO announced that the COVID-19 vaccine developed by Sinopharm was included in its emergency usage list. It was the sixth vaccine to be included on the list, and the only inactivated vaccine so far. In addition, China has carried out vaccine testing in more than 20 developing countries around the world, including BRI partner countries like UAE and Brazil.

As the Chinese population ages, the healthcare industry is increasingly becoming a focal point. According to the strategic objectives proposed in The Outline of Healthy China 2030 Plan issued by the State Council, the scale of the health service industry would exceed RMB8tn in 2020 and reach RMB16tn by 2030. In recent years, the demand arising from the elderly healthcare industry in China increased to more than RMB5tn. By 2030, the demand of the domestic healthcare industry is expected to reach RMB20tn.

In the domestic healthcare market, the enterprises which currently participate in the elderly healthcare industry can be divided into three categories:

- enterprises represented by real estate and medical institutions, which mainly focus on developing residential projects for the elderly by leveraging the close ties between their primary businesses and elderly services;

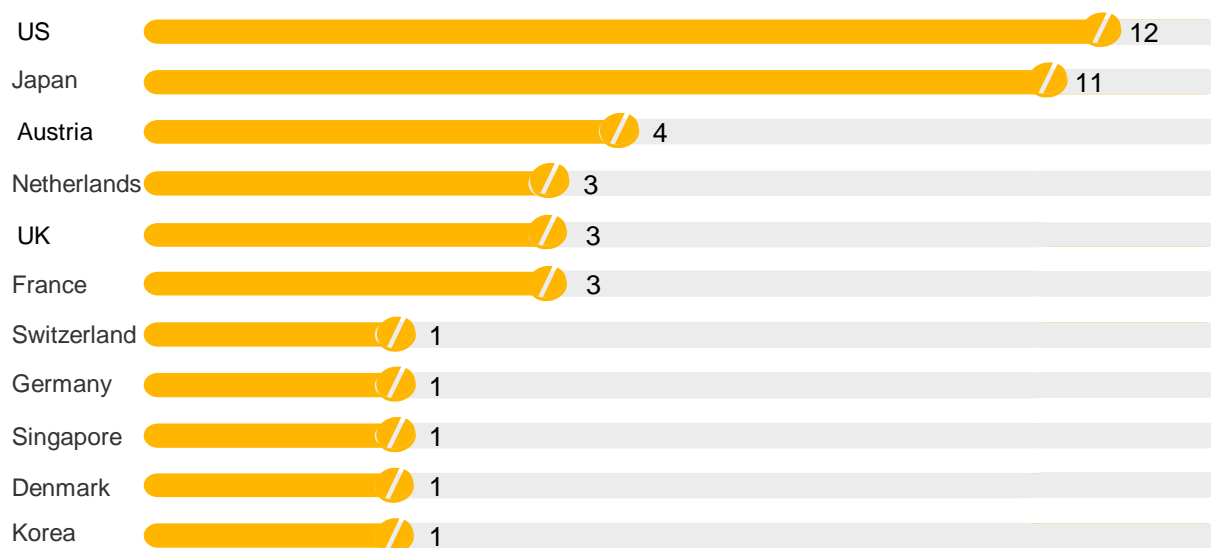
- enterprises composed of insurance and financial institutions, which have inherent advantages in terms of client base and strong investment capabilities, mainly serving high-net-worth customers by building high-end and large-scale retirement communities;
- enterprises represented by state-owned enterprises, which, relying on their strengths in capital and reputation. Have developed the eldercare industry by leveraging an industrial layout for setting up pension funds among other means, but this type of enterprise is still in search of a sustainable and profitable business model⁷.

The overseas healthcare industry was established early and has developed rapidly. Its theoretical research and industrial system have become increasingly mature and have gradually formed several representative development models – namely the large-scale, market-oriented and specialised American model, the community-based, miniaturised and franchise-based Japanese model, and the large-scale, medical and public-funded German model – all of which have become the benchmarks of the international healthcare industry.

According to statistics, there were at least 40 foreign enterprises running eldercare industry in China by 2020, among which enterprises from the US, Japan and Europe accounted for over 80%. With growing demand in China's market and the increasingly close international co-operation, it is possible that more and more foreign enterprises will enter China in the future, and the exchanges between Chinese and foreign healthcare industries will become more frequent. This will further increase the scale and improve service quality of the Chinese healthcare market.

⁷ Cui Yongwei, He Mang, Peng Fei, Du Jie and Shen Shan. Health Care Market Analysis Report in 2019 [N]. 2020

Fig. 13: Statistics on the proportion of foreign enterprises' eldercare business in China in 2020



Data source: AgeClub

The development of the healthcare industry is closely related to national socio-economic development, population structure and national per capita consumption level. Therefore, the development level of the healthcare industry across countries and regions around the world is uneven. BRI partner countries and regions are mainly in the developing stage. Most of them

have a smaller ageing population and poor consumption power. Therefore, the demand and development level of the healthcare industry are relatively low. As the Chinese healthcare market further develops, the country can explore new co-operation opportunities in this space with the BRI partner countries and regions.



1.6 Medical talent training and capacity building



China promotes the training and co-operation of international medical talent on both the government and enterprise-level. Since 2013, China has carried out many talent co-operation and training projects with schools and public hospitals in more than 20 BRI partner countries and regions, covering specialities that include infectious diseases, paediatrics, clinical medicine, public health and ultrasound imaging. Most of the projects are led by national institutions such as the National Health Commission's Bureau of Medical Administration. The sub-units that implement these projects include the Chinese Center for Disease Control and Prevention, universities, public hospitals and enterprises such as Guilin Pharma.

At the government level, supported by the relevant policies of the BRI, medical experts globally have been co-operating in the field of medicine and adhering to the common goal of protecting the health of people around the world. At the enterprise level, strengthening international health exchanges and co-operation has become an important aspect of promoting the construction of the Health Silk Road. In recent years, Chinese health departments have established multi-level, inter-departmental and multi-topic health exchange and co-operation mechanisms with most of the countries along the Health Silk Road as well as international organisations; the co-operation, covers fields such as medical personnel training, medical R&D, global health and safety, health system, and information sharing.

Under the framework of the China-ASEAN Health Cooperation Forum, China and ASEAN countries have vigorously promoted the co-operation and exchange in the fields of infectious disease prevention and control, emergency health response, traditional medicine, talent training and global health governance. In June 2019, member states of the Shanghai Cooperation Organisation (SCO) signed **Basic Action Plan for the Development of cooperation of the SCO Member States in Healthcare (2019-2021)** to co-operate on the prevention and control of infectious and non-infectious diseases, the response to health emergencies, telemedicine, and the exchanges between medical personnel and institutions. In this regard, Xinjiang has actively co-operated with Central Asian countries in the prevention and control of the plague and AIDS, and is committed to establishing the region as an international medical service centre on the Health Silk Road.





Up to now, China has signed bilateral and multilateral health co-operation agreements with more than 100 BRI partner countries or regions. The country has launched or is involved in formulating more than 10 regional and international health co-operation mechanisms and initiated the formation of an all-round, cross-disciplinary strategic layout for health-related co-operation along the Belt and Road. China has actively co-operated with the BRI partner countries, schools and public hospitals to develop a number of cross-border projects on talent training. These initiatives provide opportunities and platforms for international co-operation and exchange of medical talent training. In recent years, international co-operation on talent training projects has entered a growth phase and achieved remarkable initial results. Below, some key co-operation projects and their achievements.

Apart from co-operative projects, China and BRI partner countries have also set up educational alliances. By establishing research centers and special funds, conducting trainings, holding meetings and other events, China has been continuously promoting international co-operation in medical personnel training. This has shifted the occurrence of international exchange and co-operation beyond the base level of periodic projects to the norm, creating a conducive environment for the sustained and high-quality development of talent.

In June 2019, the Belt & Road Health Professional Development Alliance was officially established in Jiujiang City, Jiangxi Province, China. By September 2023, more than 300 institutions around the world joined the alliance.



02

Challenges, opportunities and the prospect of building the Health Silk Road

2.1 Medicine, medical devices, vaccines and scientific research

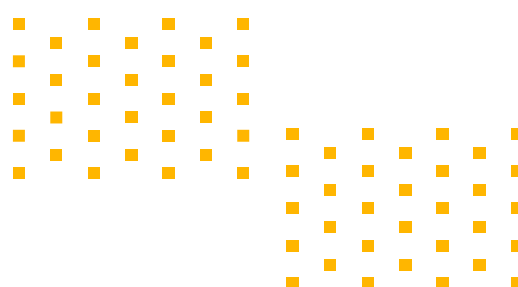


In June 2021, at the Asia and Pacific High-level Conference on Belt and Road Cooperation, 29 participating countries launched the Initiative for Belt and Road Partnership on COVID-19 Vaccines Cooperation and Initiative for Belt and Road Partnership on Green Development. After that, the United Nations Secretariat submitted the above two initiatives as official documents of the 75th UN General Assembly under agenda item 14, 'Integrated and coordinated implementation of and follow-up to the outcomes of the major United Nations conferences and summits in the economic, social and related fields, and agenda item 131, 'Global health and foreign policies', further calling on all parties to strengthen international vaccine co-operation, promote global economic recovery and realise green and sustainable development.

This reflects BRI countries' recognition of and support for the UN's 2030 Agenda for Sustainable Development, the equitable distribution of vaccines globally and a green, resilient and inclusive economic recovery advocated by the UN. It also shows that the BRI has gained the attention and recognition from the international community for its collaborative efforts, its role in promoting the global equitable distribution of vaccines and realising global sustainable development. The BRI will further enhance the international influence of Chinese

medicine, medical devices, vaccines, scientific research and related industries. While China's local enterprises will be able to leverage unprecedented development opportunities, they will also face some functional challenges.

The main challenge of medicine is that in recent years, the import requirements of its products in various countries have become stricter, and the international trade environment has become more complicated and volatile. Therefore, medicine products produced in China are facing more challenges in 'going abroad'. Domestic pharmaceutical enterprises need to further improve their R&D, production and compliance management capabilities and strive to continuously narrow the gap in terms of quality when compared to developed regions such as Europe, the US and Japan. The M&A deals that absorb small and medium-sized pharmaceutical enterprises into large pharmaceutical enterprises enable them to compete with multinational companies and improve the R&D capability of innovative medicine in China. As China's drug regulatory system gradually aligns with the international market, it will be beneficial for Chinese pharmaceutical enterprises to explore international markets.

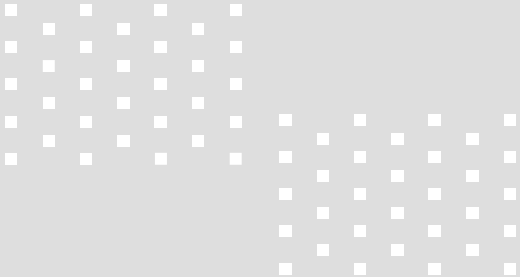


China's medical device industry chain is relatively complete, with its rich production experience and strong production capacity. To become more comprehensive, China should fix the technical problems in the core components of large-scale medical devices for a breakthrough, increase independent R&D investment, and constantly transform from low value-added manufacturing to high value-added scientific and technological innovation. Innovation is a strong driving force and will be the source of the continuous development for the medical device industry.

In recent years, vaccines are a trending topic in the international biomedical field. Although some enterprises in China have entered this field with an advantage over others, there is still a gap between China and developed countries in Europe as well as the US in terms of nurturing of talents and core R&D capabilities. China needs to vigorously nurture local enterprises, expand the coverage of locally-produced products, enhance R&D capability in the field of biomedicine comprehensively while gaining international recognition through approvals from

international co-operation organisations in conjunction with its partner countries.

The transformation and upgrade of the aforementioned industries have been disrupted, but more opportunities are also emerging. With China's proven pharmaceutical capacity for production and product support, the speed of vaccine R&D, vaccine quality, and the production capacity of medical devices and consumables during the pandemic, the influence of the Health Silk Road has rapidly increased, bringing new development opportunities.



2.2 Medical and health assistance and prevention and treatment of major infectious diseases




Due to globalisation and other causes, the spread of infectious diseases has become rather rapid and difficult to rein in, which poses significant challenges to the form, efficiency and closeness of international co-operation in disease prevention and control. Firstly, participants of the current international health co-operation lack diversity. While co-operation between governments is the main driver of China's foreign aids projects, non-state actors⁸ have not been able to fully play their roles at a large scale. The opportunities for leading healthcare enterprises to provide assistance and participate in co-operation are emerging. Secondly, global health co-operation is still dominated by 'emergency supply mode', so a long-term co-operation mechanism that is more conducive to the sustainable development of international health co-operation should be established. In terms of international certification, some Chinese pharmaceutical products have not passed the prequalification process of the WHO, making it difficult to enter the overseas mainstream market, further hindering the drug supply support that could aid the countries in need. The development of vaccines, anti-virus and virus prevention drugs for the people in countries/regions along the Belt and Road still require long-term R&D investment and support.

Apart from the deteriorating health conditions in the areas receiving assistance, the lack of awareness in infectious disease prevention and control among locals and the lack of institutional health management experience are also some of the challenges. To facilitate global support and co-operation, it is necessary to make concerted efforts in raising people's awareness in infectious disease prevention and control; improving the management of infectious disease prevention and control; and strengthening the development of the pharmaceutical industry.

The COVID-19 pandemic further highlights the aforementioned challenges which are reflected in the following areas: joint prevention and control measures are insufficient, and the co-ordination among international organisations and institutions is difficult; the logistics supply chain is not smooth; international standards for medical materials/facilities are not consistent; difficulty in improving public health knowledge among residents in the short term.

⁸ The entities other than countries which can independently participate in international affairs.



Joint prevention and control of infectious diseases is an important opportunity to promote globalisation and emulate the roles of international organisations. The COVID-19 pandemic also brings opportunities for the high-quality development of the Belt and Road. The pandemic provides an opportunity to promote the building of the Health Silk Road. Countries across the globe are facing the same challenges in the field of public health security. In the future, we can focus on international co-operation in this field, so that China can co-operate more closely with BRI partner countries and further promote the implementation of the Health Silk Road. Moreover, the pandemic also provides an opportunity to promote a more comprehensive 'Healthy and Innovative Silk Road'. During the pandemic, new technologies such as online medical technology, artificial intelligence, 5G and big data have been implemented rapidly in China with the support of relevant policies. This will create new opportunities for BRI partner countries to utilise these new technologies.

In the future, health co-operation will be more diversified in form, involving participants from more ranks and expanding to a broader scope. It will promote the shifts from bilateral assistance to multilateral co-operation; clinical diagnosis and treatment services to a comprehensive public health system and facilities; single government assistance to assistance driven by a variety of institutions such as enterprises and non-profit organisations. This shift will help deliver medicines, equipment, consumables and medical services to the BRI partner countries. Following the emergence of the COVID-19 pandemic, Chinese experts in the field of infectious diseases will have greater discourse

power and influence in the world; international co-operation on infectious diseases will be closer, the hard and soft power of materials and equipment will be further enhanced, and the co-operation between medical education and 'Internet + medical services' will be further deepened.

With this, more and more enterprises will have the opportunities to go abroad. They will bear the mission of building a global community of health for all and undertake broad social responsibilities. They will continue to add to the international co-operation in public health and bring positive and far-reaching impacts in ways that include but are not limited to:

- 1) Sending permanent medical and health assistance teams, providing basic medical materials to the BRI partner countries, and providing peer-to-peer specialist and general medical services on a regular basis.
- 2) Improving informatisation level, medical service capacity, and the diagnosis and treatment within BRI partner countries through technical co-operation and talent exchange projects.
- 3) Co-operating with international organisations, local governments and other institutions to promote exchanges in the field of TCM, continuously promoting the building of overseas TCM centres, and providing TCM drugs, diagnosis and treatment services for people in BRI partner countries.

2.3 Medical and health infrastructure co-operation



The current challenges in the construction of medical and health infrastructure mainly come from slow economic recovery after the pandemic and access policies. The global economic recovery is full of uncertainty. Problems such as financial strain and currency depreciation caused by the pandemic in some countries cannot be resolved in a short period of time, increasing the risks of sovereign debt and default on project payment, further incurring high capital costs and operational pressure for engineering contractors. In addition, the loose monetary and fiscal policies adopted by various countries during the pandemic brought about a rise in inflation expectations, making it more difficult for the existing infrastructure construction projects to proceed as planned. In addition to the pandemic, some countries have a tendency to implement policies that restrict cross-border investments in medical and health infrastructure in recent years, further increasing the difficulty in engaging in the construction of such projects.

The COVID-19 pandemic also brought attention to the insufficient medical and health infrastructure in BRI partner countries, and heightened demand for strengthening the existing public health system extensively. In the long run, there is a huge potential to develop the medical and health infrastructure in BRI partner

countries. The reconstruction of public medical facilities, the informatisation of medical services, and the construction of smart hospitals, biological laboratories, pharmaceutical and medical device factories will become the potential growth points for medical and health infrastructure development in BRI partner countries⁹.

Building the Health Silk Road is a long-term commitment for China. The 2021 government white paper, entitled China's International Development Cooperation in the New Era, proposed that China will continue to help build a global community of health for all and assist developing countries in improving their public health systems. Specific measures include co-operating with the WHO, establishing 30 co-operation mechanisms between local and counterpart hospitals in Africa, and accelerating the construction of Africa CDC headquarters. China will help developing countries, especially African countries, build a public health defense line, improve the emergency response speed, and strengthen the ability of disease prevention and control in relation to public health emergencies¹⁰.

⁹ China International Contractors Association, China Export & Credit Insurance Corporation

¹⁰ State Council Information Office of the People's Republic of China, 2021

Building the Health Silk Road requires the joint effort of governments, enterprises, financial institutions and other parties. The governments of various countries need to strengthen their co-operation in many aspects, including: fighting the pandemic; creating a conducive environment for the contracting and investing in medical and health infrastructure; and provide policy support in access control, fiscal and tax and mutual recognition of medical qualifications. Enterprises should strengthen their risk assessment and carefully adjust their overseas business layouts to cope with volatile international affairs as the pandemic persists. Different types of financial

institutions, such as policy banks, commercial banks and international development institutions, should strengthen co-operation with one another. Based on their respective functions, they should explore BRI partner countries, which have different financing conditions, to improve the levels of risk management and control, and actively participate in the construction of medical and health infrastructure in the local market.



2.4 Medicine and traditional medical services

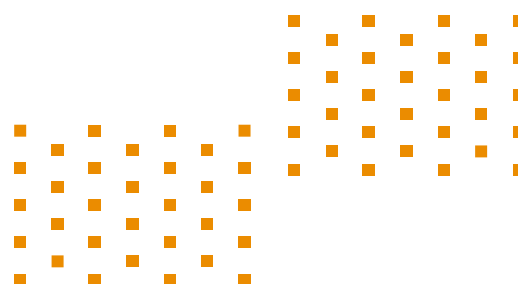


In the past few years, there have been gratifying achievements with the internationalisation of TCM. Due to the influence of the COVID-19 pandemic, there is a rare window of opportunity for TCM to 'go global'. However, we should also be alert to the many challenges TCM faces in the international markets, and that promotion overseas will be subject to many restrictions. For example, there is no unified and comprehensive set of international standards, nor are there any management norms in TCM. The awareness around TCM intellectual property protection is lacking both at home and abroad. High-quality, international talent for TCM is urgently needed.

Currently, the challenges faced by TCM are far from being solved overnight, nor can any enterprise achieve breakthroughs on its own. However, the industry should start with the overall layout for the long-term and then gradually overcome various difficulties. The BRI has brought new development opportunities to the internationalisation of TCM. It incorporated TCM as an important component in building a shared future for human beings and international co-operation along the Belt and Road. Signing bilateral and multilateral agreements with countries along the Belt and Road provides opportunities and channels for TCM to enter the partner countries. Through continuous recognition of TCM's healing effects from a global audience, its international

influence can be heightened. With this, China's authority on TCM can be recognised.

The inspection and testing systems of both traditional Chinese and Western medicine products are aligned with international standards. The quality and safety certification process is internationalised as well. In 2015, the State Council issued *The Plan of Developing Healthcare Service of Traditional Chinese Medicine (2015-2020)*, which clearly stated that the country 'should vigorously develop third-party services: carry out third-party quality and safety inspection, testing, certification and evaluation services; cultivate and develop third-party medical service certification, medical management service certification and other service evaluation modes; and establish and improve the inspection and testing system of TCM'. The development plan also specified the quantitative indicators of 'focusing on supporting the construction of 20 third-party inspection and testing institutions'.



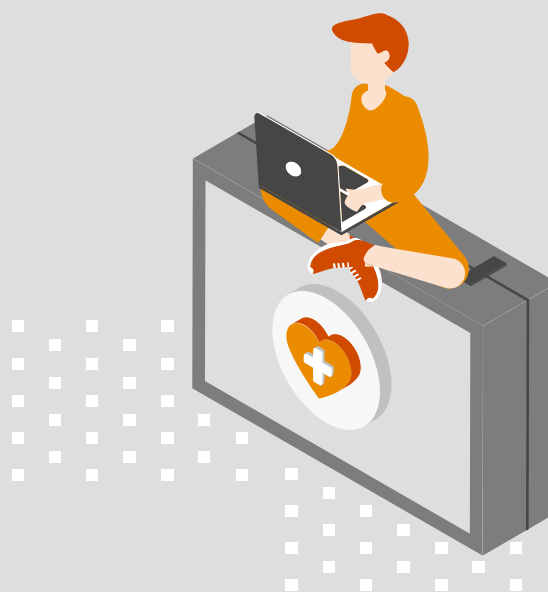
Since the outbreak of the COVID-19 pandemic in China in early 2020, China has given full play to the unique advantages of TCM. It promoted TCM's deep involvement in the whole medical process, especially the vital function of preventative prescriptions of Chinese patent medicines. TCM played an important role in anti-pandemic strategies. China also took the initiative to share relevant TCM knowledge in pandemic prevention and control with the international community in a timely manner. In particular, anti-pandemic TCM products such as Lianhua Qingwen Capsules and Jinhua Qinggan Granules among other Chinese patent medicines and herbal decoction pieces were praised worldwide, accelerating the market demand for Chinese patent medicines.

In terms of cultivating leading talent, *TCM Inheritance and Innovation "Hundred-Thousand-Ten Thousand" Talents Project (Qihuang Scholar)* issued by NATCM in 2017 clearly stated that 'about 10 "chief scientists of TCM" with international visions, world academic influences and outstanding contributions will be selected'. Regarding the training of successors, China has set up third-party testing laboratories for TCM. As of now, the Chinese-foreign TCM laboratories include the China-ASEAN Joint Laboratory for International Cooperation in Traditional Medicine Research and Joint Sino-Italian Laboratory on Traditional Chinese Medicine, etc..

Chinese enterprises need to follow the current direction set by the Chinese government, adjust their operation mindset, reorganise product R&D departments and increase capital investment. This will enable them to follow up on R&D achievements of national laboratories and

actively explore opportunities for future market development. In the future, by leveraging the BRI, enterprises, governments and non-profit organisations will join hands to fully co-ordinate domestic and international resources, utilising culture as the medium, medicine as the substance, and digitalisation and trade as the paths to continuously promote the internationalisation of the culture, products and services of TCM and highlight its unique advantages. They will also co-operate with the BRI partner countries to build a global community of health for all.

Relevant parties should treat culture as a medium to accelerate the exchange and dissemination of TCM. They should interpret and spread the theory of TCM by using the accepted scientific and technological terms of modern medicine. By organising educational activities and public welfare lectures, and setting up talent exchange and co-operation projects in the BRI partner countries, medical professionals can experience TCM culture and gain TCM knowledge in China. Through these platforms, China can increase the popularity of TCM culture.



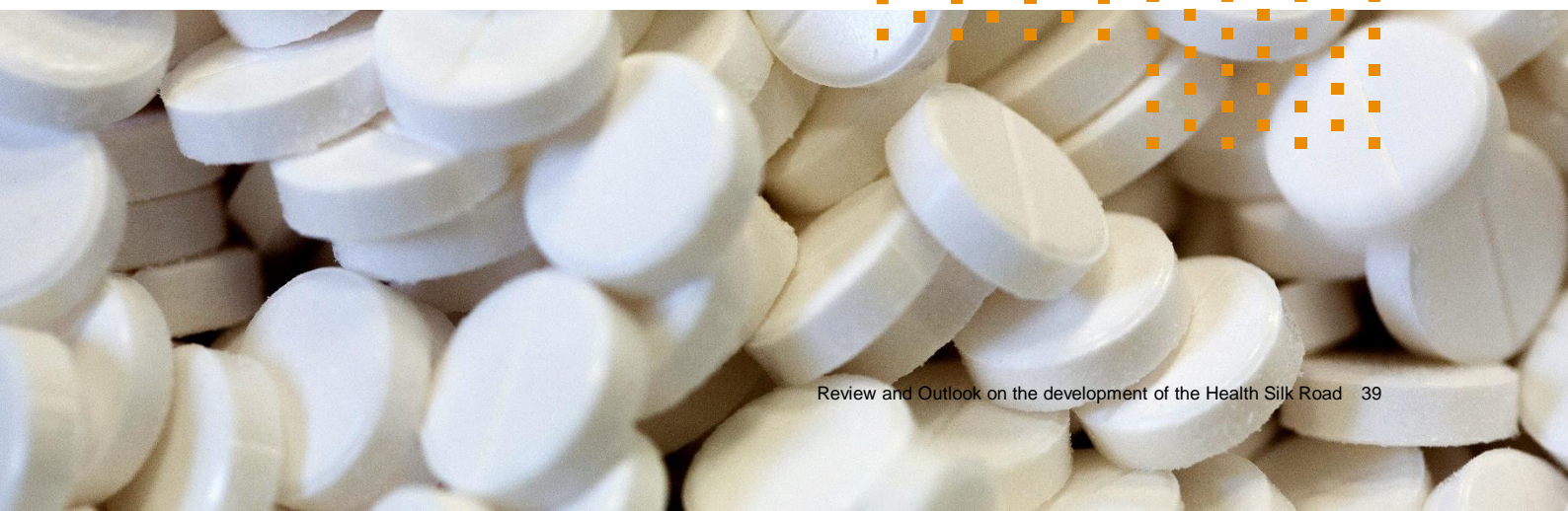
Innovation will empower the modernised development of TCM with a focus on medicine. Based on the existing clinical curative effects and the secondary development of TCM, the drug production quality control system will be further standardised, and its technology will be continuously optimised and upgraded. This will make the administration of TCM more convenient and facilitate the overseas promotion and use of TCM drugs. Driven by scientific and technological innovation, China will combine TCM diagnosis and treatment methods with modern science and technology to constantly promote the scientific and technological co-operation and application of TCM in the BRI partner countries.

China will leverage TCM services to promote and popularise TCM as a whole. In recent years, TCM, especially acupuncture, has been proven its definitive healing effects for some chronic diseases, cervical spondylosis and other problems that medicine cannot completely cure. There is an abiding interest in acupuncture across the world because of its practical curative effect and word of mouth. The difficulty in scientising TCM drugs along with the lack of traditional use of herbs in many regions has resulted in the subdued popularity of TCM drugs when compared to TCM services such as acupuncture and massage. Acupuncture should be considered a breakthrough for TCM as a whole. By expanding the overseas market for

acupuncture, the acceptance of TCM drugs can gradually be improved.

Through digital channels and trade, we will be able to constantly promote new forms of engagement with TCM, for example, 'Internet + TCM'. At the 2021 China International Fair for Trade in Services, the theme around the TCM industry was 'TCM helps build a global community of health for all'. The theme this year combined tradition with digitalisation, which not only highlighted the uniqueness of TCM, but also presented a new form to digitally explore TCM through scientific and technological innovation.

With the gradual formation of an industry chain that facilitates TCM through the Internet and the continual popularisation of remote diagnosis and treatment, it will become more common for TCM practitioners to conduct remote video consultation for overseas cases. Once more TCM products are approved in BRI partner countries, the distribution and circulation of the TCM products will become more convenient. The support of new formats such as online diagnosis and treatment, and digital logistics and distribution will inject a new vitality into the development of TCM.



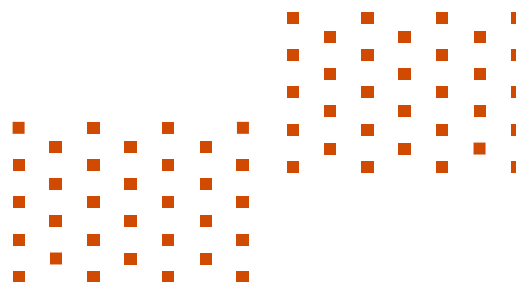
2.5 Healthcare industry



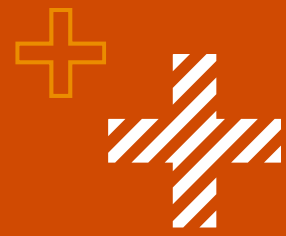
Due to its late development and an ageing population, China's healthcare industry still faces many challenges. First, China's ageing population is growing, which will continue to cause tension between supply and demand in the healthcare market in the short-term. It is estimated that by 2050, the proportion of the elderly people aged 65 and above in China will reach 26%, and the number of elderly people aged 65 and above living alone will reach 46mn¹¹. Secondly, the current structure of China's healthcare industry is not sound. Institutions and community support alone cannot meet the increasingly particular demand of the elderly care market. Thirdly, the infrastructure and talent supply are lacking.

The booming demand have brought unprecedented development opportunities for the healthcare industry. While relevant top-level policy designs will continue to bring benefits, Beijing has proposed to develop itself into a model for Healthy China before 2030. In the past seven years, there were more than 100 special incentive plans involving preferential subsidies and land policies among others. The policy of vigorously building a 'beautiful countryside' will also bring great opportunities for rural healthcare. According to Research on Data Development of Rural Health Care Industry in China 2020, the rural healthcare market growth rate remained above 10% in the recent

decade. On November 15, 2020, China signed the Regional Comprehensive Economic Partnership, ushering in new opportunities for international co-operation in the healthcare industry. As a leading pilot zone, Boao in Hainan province strives to seize the opportunities for international co-operation by actively introducing advanced foreign technologies and talent and trying to build a medical tourism island with global influence. The State Council issued a guideline to promote the development of national undertakings for the aged and improve the elderly care service system during the 14th Five-Year Plan period (2021-2025) in 2022. By 2025, the compliance rate of supporting elderly care service facilities in newly built urban areas and residential areas will reach 100%, among other major indicators, to overcome the difficulties in the development of elderly care and the construction of elderly care service systems.



¹¹ Yang Zhengwei & Huang Kailun, 2020



With the increasing aging of the population and the global COVID-19 pandemic, triggered public attention to health. The healthcare industry will usher in a blowout development. Therefore, we think that the future development of the healthcare industry is mainly reflected in the following aspects:

- The central government will maximise its policy support. The pandemic has pushed national health and relevant services to the forefront. In turn health-oriented tourism will also see strong government support.
- A cross-industry healthcare market featuring a combination of industry capital and financial capital will be formed in the future. Technology enterprises, financial companies, real estate developers and other industries will be increasingly involved in cross-industry 'big health'. By integrating healthcare service resources and building a health service network platform, Taikang Life Insurance organically integrates traditional insurances, medical entities and modern health management with service philosophies to provide customers with one-stop health management solutions.
- In the future, a comprehensive home-community-institution-medical treatment solution will be formed. An elderly care

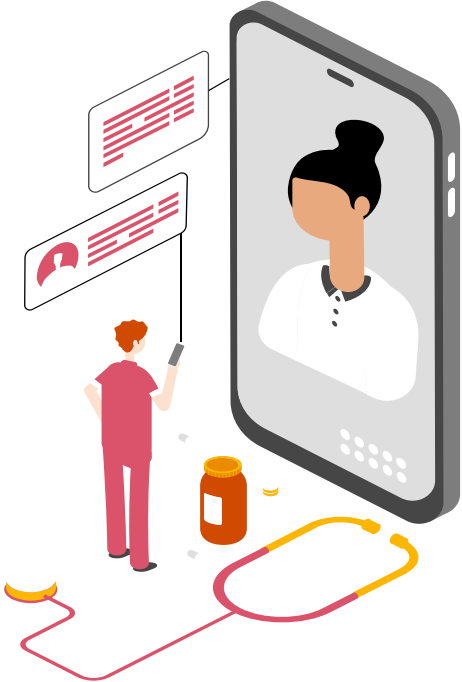
service system that is based at home, supported by the community, supplemented by institutions and focused on medical care will be built. The combination of medical treatment and healthcare has been carried out in 90 pilot cities successively. Medical treatment is the decisive factor within this combination. Therefore, enhancing medical services for the majority of the population will be the core element of this model.





Developing the healthcare industry is imperative to implementing the national strategy, promoting the development of China's industrial economy, and an inevitable way to deal with the ageing population. As for the government, they would need to increase support, further improve the industrial policy system, study and issue special policies and service standards and drive the implementation of the policies. It is also suggested to establish a diversified investment system and actively promote the building of an investment and financing system for the healthcare industry according to 'government guidance, public participation and market investment' model, and raise funds for the development of healthcare projects through various channels. As for talent training, it is suggested that the local governments should set up training bases for elderly care services, set up vocational colleges dedicated to healthcare,

adopt diversified vocational training modes, and support the building of a training system for practitioners in the healthcare industry.



2.6 Medical personnel training and capacity building



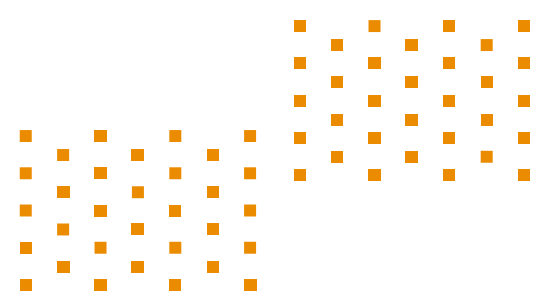
The dissonance between medical systems, unbalanced development levels and varying languages among countries have brought great challenges to the training and communication of medical talent across the world. The global distribution of medical resources is uneven. The

following table compares and analyses China and the three BRI partner countries, namely Indonesia and Israel, on four aspects: government policies, cultivation mechanism, scientific and academic research abilities, and talent training and reserve.

Fig. 14: Comparison of talent training in the BRI countries

	Government policies	Cultivation mechanism	Scientific and academic research abilities	Talent training and reserve	Situation assessment and prospect
China					<ul style="list-style-type: none"> The country has attached great importance to the training of medical talent, the development of disciplines and the introduction of talent in its policies; China has its own advantages in training, but it still has shortcomings in areas such as infectious diseases and general practice; It has a strong scientific research ability in clinical medicine, basic medicine, etc., but lacks world-class talent; It lacks versatile and top-class talent, and needs to optimise the education system, and strengthen international exchanges and co-operation.
Indonesia					<ul style="list-style-type: none"> It has launched the 'BPJS-Kesehatan' national health insurance system, one of the largest public medical insurance plans in the world; The level of scientific and academic research and talent training are still at the development stage, and the medical facilities are relatively weak; Indonesia attracts limited talent due to the lack of economic strength and academic ability; China and Indonesia can strengthen academic and economic exchanges, and China can provide basic medical equipment assistance and learning opportunities through exchanges.
Israel					<ul style="list-style-type: none"> As a globally recognised leader in life sciences, it has high-level medical system, and large-scale and high-quality resource-based infrastructure; It has many of the top medical schools in the world, and the proportion of medical doctors in the population is currently at 3.5 doctors per 1,000 people; The government encourages and supports technological innovation while providing stable capital flows; China and Israel can strengthen exchanges and co-operation in medical training, and China can learn from Israel's advanced technologies and experience.

Data source: Research by PwC



Taking the comparative analysis between China and the three BRI partner countries as an example, we can identify various opportunities. For one, China can learn from Israel and Indonesia terms of medical talent training and academic capacity building. China can do so by improving the quality of medical talent and attracting top talent to join local teams of physicians by collaborating to build a medical talent training base, short-term talent exchange, among other projects. China should also help BRI partner countries with insufficient resources such as a low number of TCM physicians and weak training ability of medical talents. For example, the publication of Science Citation Index (SCI) papers and the Essential Science Indicators (ESI) ranking of clinical medicine specialties¹² shows that China has a relatively high academic level in clinical medicine. The country can leverage this to help partner countries with weak academic capabilities through training and talent transfer.

In addition, China should further deepen talent exchange and co-operation with partner countries. While there will be more such opportunities under the BRI, China should seize this moment to set up a discipline-based education alliance with the BRI partner countries and establish a joint training mechanism. Through talent transfer and department construction, it can train top international talent with 'multi-specialities and multi-abilities' to cope with difficult situations.

China should establish a diversified interdisciplinary system and cultivate high-performing talent. The country can learn from the medical training systems of the developed countries by analyse pain points exposed during the COVID-19 pandemic and the current

situation of talent training in China. Once China understands its areas of improvement, the country should establish a comprehensive talent training system, which can include: joint training of clinical medicine and public health; cross-training of practical disciplines such as basic medical research and clinical medicine or surgery; and innovative talent training using the 'medicine + X' model based on the latest scientific and technological innovation. China should align its training system with international standards, enhance the level and competitiveness of China's medical talent while attracting more international talent for exchange and collaboration. This will promote mutual progress in both China and its partner countries.

China should use online platforms to explore new forms of international communication. With the Internet's continuous development, remote online training and learning have become increasingly convenient, breaking the traditional restrictions of time and geography between teachers and students. This enables high-quality training with wider audiences. Therefore, the country should make full use of online platforms to: carry out lifelong education for medical talent in China; strengthen foreign language abilities and international literacy on medical specialties; promote the training of 'foreign languages + X'; accelerate the assembly of an international team of talent; and enable smoother academic exchanges with BRI partner countries. In addition, online platforms also provide new ideas and create new forms of international talent exchange and collaborative training. When compared to old ways to transfer knowledge, online platforms can maximise global talent's access to the top academic knowledge.

¹² In 2019, the clinical medicine specialties of 78 Chinese universities ranked the world's top 1% of ESI May 2019.



03

Country studies

3.1 Brazil



China and Brazil closely co-operate in the field of healthcare. In November 2019, President Xi Jinping visited Brazil during the 11th BRICS Summit, and the two countries signed co-operation agreements and memorandums of understanding for various fields, including traditional medicine, complementary medicine, and the integration of Chinese and Western medicines. This aimed to further enhance co-operation between Brazilian and Chinese healthcare institutions and promote the related fields.

In June 2020, the COVID-19 pandemic spread wildly in Brazil, infecting a large number of people. It was reported that China donated medical materials worth about BRL60mn (USD10.6mn) to Brazil which were mainly used to purchase about 1,200 tons of materials and equipment for local people¹³. China was the first country to partner with Brazil on vaccine R&D and production.

In addition, Butantan Institute, a leading immunobiologics manufacturer in Brazil under the Ministry of Health of São Paulo, Brazil signed a momentous technical co-operation agreement with Sinovac Biotech Ltd., a biopharmaceutical company in China, to jointly research, develop and test the CoronaVac COVID-19 vaccine. As of August 30, 2021, Butantan produced and supplied 92mn doses of the vaccine for the National Immunisation

Program (PNI). With the completion of the new factory, the Institute will achieve an annual output of 100mn doses of the CoronaVac vaccine. The co-operation has played a decisive role in Brazil's fight against the pandemic, and the support from China's leading pharmaceutical enterprises has been particularly prominent in this fight.

“Sinovac chose to collaborate with Butantan because of the institute's expertise in vaccine production and the fact that Brazil has an internationally recognized regulatory agency, which is important for endorsing the data obtained in the studies.”, indicated by Tiago Rocca, Manager of Strategic Partnerships and New Business at Instituto Butantan

Brazil's public health system faces many challenges, including insufficient funds and expensive private programs. Its two-tier health system includes a publicly-funded health system and health insurance plans provided by the private sector. When compared to countries with universal health protection, only 41.7% of Brazil's total health expenditure comes from public expenditure as the public health system has long been underfunded. As such, more and more Brazilians are turning to private health insurances to access more treatment options, but most people still rely entirely on the public health system because of the high cost of private health insurance plans.

¹³ Folha de S. Paulo, Desde o início, China fomenta parceria com Brasil no enfrentamento da pandemia, 28/05/2021



Brazil's pharmaceutical industry is currently facing two challenges: dependence on API and slow innovation. Out of which, investment innovation is a common challenge faced by all industries in Brazil. In the Global Innovation Index 2020¹⁴, Brazil ranked 62nd among 131 countries. Although Brazil has issued a series of measures to support pharmaceutical innovation, it is still unable to meet its national needs and drive sufficient returns to improve its development level and competitiveness. The current severe financial crisis has led to scarce public incentive measures for R&D and innovation in the country.

The profitability of Brazil's pharmaceutical industry is low. The global supply chain disruption and the devaluation of the Brazilian real against the US dollar have pushed up the pharmaceutical production cost. In addition, the excessive tax burden and centralised drug price formation mechanism greatly reduced the profitability of the industry. As the Brazilian government's policy has always favored local drug manufacturers, and the government itself is also the main producer and consumer of the drugs and vaccines, there is a conflict of interest. In addition, Brazil's punitive tax system for pharmaceutical products will continue to be a burden on the investments of multinational pharmaceutical enterprises. The combined total of the national and state taxes is as high as 38%. Brazil's increasing prominence health technology assessment also limits the availability of innovative drugs.

However, Brazil's reputation as an attractive market for pharmaceutical manufacturers remains intact. Supporting factors include the increasing prevalence of chronic diseases, the rising middle-class population, the expansion of medical coverage and the rise of Brazil, which will create opportunities for investors. Biotechnology also facilitates the development of important business opportunities between Brazil and China, especially in the medical and healthcare field. The two countries will jointly develop many areas by co-operating in R&D.

In addition, the internationalisation of Brazil's pharmaceutical industry will continue as local companies are encouraged to expand their foreign businesses through organic growth and acquisitions in order to increase their scale and efficiency as well as innovation ability. For China, Brazil is the hub of South America, and it is also one of the countries on the continent that pays more attention to TCM and co-operates with China in this area. In the future, Chinese enterprises will be able to leverage Brazil as the gateway to the South American market.

¹⁴ Cornell University, INSEAD and WIPO. The Global Innovation Index 2020: Who Will Finance Innovation?

In terms of medical devices, China is a major importer. According to data from the Brazilian Alliance of Innovation and Health Industry (ABIIS), due to the COVID-19 pandemic, the total revenue of the medical devices market in Brazil reached USD11.9bn in 2021, a growth of 6.9% from the previous year. Moreover, the data from ABIIS showed that the total import value of medical devices in Brazil was USD6.3bn in 2022, down 5% year-on-year. The export value was USD800mn, up 5.1% year-on-year. Brazil's medical equipments were primarily imported from the US. In 2022, the value of Brazil's imports from the US was USD1.2bn, accounting for 19.2% of total imports, followed by the China (14%) and Germany (12%).

“China could bring its factories to Brazil, which would become an API hub for Latin America and the United States. The production in China would serve Asia and Europe, and our production here would go to Africa and the Americas. I do not doubt that this would be extremely profitable for the Chinese.”, indicated by Nelson Mussolini, Executive President of Sindusfarma



¹⁴ Cornell University, INSEAD and WIPO. The Global Innovation Index 2020: Who Will Finance Innovation?

3.2 Singapore



In recent years, the Chinese government and local enterprises have co-operated with Singapore in the areas of medical treatment, medical equipment, vaccines, scientific research and public health. The establishment of the Shanghai-Singapore Comprehensive Cooperation Council (SSCCC) in 2019 further deepened the partnership between Singapore and Shanghai. The Council's areas of co-operation include TCM, infectious and non-infectious diseases, pandemic prevention and control, and maternal and child healthcare. At the enterprise level, Ping An Capital Co., Ltd., an investment platform of Ping An Insurance (Group) Company of China, Ltd., invested USD121mn in the Singaporean enterprise Fullerton Health.

During the pandemic, the Ministry of Defense of Singapore (MINDEF) delivered 2,000 kilograms of medical supplies to Chinese military hospitals while China donated 500,000 surgical masks and 100,000 KN95 masks to Singapore. The Singaporean company, Tetsuyu Healthcare, collaborated with Shanghai Carelinker Medical Technology Co., Ltd., a Chinese digital medical

company, to develop AI treatments for foot ailments of diabetic patients. The Chinese government provided Sinovac COVID-19 vaccines to Singapore, and the Health Sciences Authority (HSA) of Singapore approved the dispersal of Sinopharm Group's COVID-19 vaccine through special channels.

In the field of scientific research, the China-Singapore International Joint Research Institute (CSIJRI), will invite advanced technologies and top talent from South China University of Technology (SCUT) and Nanyang Technological University (NTU) among other well-known universities and research institutions. In December 2020, the Ministry of Health of Singapore signed a memorandum of understanding with the National Health Commission of China to strengthen co-operation in areas pertaining to the prevention and control of infectious and non-infectious diseases, health promotion and primary healthcare.

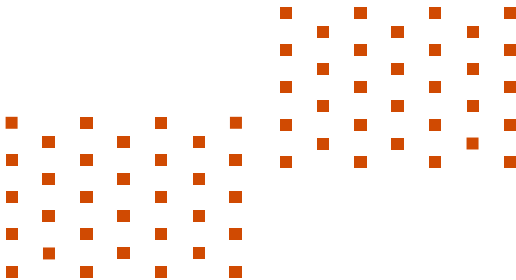
The healthcare field in Singapore is stable. By 2029, the medical market of Singapore is expected to reach USD49.4bn. A Fitch Solutions report showed that by 2029, the Government's medical expenditure and private medical expenditure are expected to reach USD36bn and USD13.5bn respectively. Currently, Singapore provides its citizens with multi-level comprehensive medical care services. Among ASEAN countries, Singapore spends the most on healthcare per capita every year. Its healthcare industry is supported by more than 100,000 workers from both the public and private sectors.

The health and medical trends in Singapore and Southeast Asia have stimulated the demand for TCM, a common practice in the region and regarded as a supplement to medicine. The Ministry of Health of Singapore has signed its fifth co-operation plan with NATCM regarding TCM, which will focus on research co-operation. The growing ageing population will further drive the demand for TCM as an alternate form of medical assistance.

Singapore and China signed a memorandum of understanding during the Joint Council for Bilateral Co-operation (JCBC), which covered areas pertaining to public health, including R&D, production and sale of vaccines, diagnosis and treatment of viruses. Both countries will deepen their co-operation in these segments. In addition, Singapore's capital contribution to the WHO increased from USD4.227mn (2018-2019) to USD4.641mn (2020-2021). Its voluntary donation increased from USD548,000 in 2014 to USD1.125mn in 2020, which was used to

support the WHO's emergency health plans and help strengthen the organisation's capacity in Southeast Asia.

In light of the different quality standards and language barriers in the drug regulation of different countries, it is necessary to further enhance the co-operation among the governments of the BRI partner countries. As far as Chinese medicine is concerned, TCM practitioners in Singapore must register with the Traditional Chinese Medicine Practitioners Board (TCMPB) before being allowed to practice. Like medicine, TCM is also highly supervised. All Chinese patent medicines, i.e. finished preparations that include tablets, capsules and liquids, fall under the supervision of the HSA and need to meet local safety and quality standards before they can be sold in Singapore.





Although Singapore provides mRNA vaccines for free, there remains demand for COVID-19 vaccines made in China. The reasons include allergy to mRNA vaccines and preference for traditional inactivated vaccines. The acceptance of China's COVID 19 vaccines, e.g. Sinovac, by the Singapore government may garner public attention for other 'Made in China' vaccines, such as the influenza vaccine, and thus help strengthen the perception of its effectiveness.

Singapore's unique strategic position in Southeast Asia may attract Chinese vaccine manufacturers to set up vaccine factories in Singapore. This may increase China's vaccine distribution capabilities in both Southeast Asia and the rest of the continent while expanding its market share in the industry. The TCM Research Center set up by the Ministry of Health of Singapore and the TCM Research Funding Scheme will encourage collaborative research between Singapore and China for TCM, promote the transformation of knowledge, and strengthen the promotion and application of TCM in Singapore.

There are some opportunities for the development of medical systems in Singapore. with the ageing population, increasing burden of chronic diseases, technological progress and quick information dissemination, the demand and expenditure of medical care will increase correspondingly. The gradual shift from hospital-centered care to out-of-hospital care will create opportunities for telecare programs, which will be strategically significant to pharmaceutical

enterprises. Medical professionals will be able to better monitor patients' compliance with treatment, especially as an increasing number of patients are affected by various chronic diseases that require multi-drug treatments.

A quarter of adults in Singapore suffer from at least one chronic disease. Chinese enterprises have the opportunity to set up digital health projects that focus on telemedicine and remote health monitoring, especially for chronic diseases such as diabetes and high blood pressure.

Singapore is a member of ASEAN; ASEAN has been developing a unified system for the registration and evaluation of medical devices in its ten member states. ASEAN economies have begun to adopt the ASEAN Medical Device Directive (AMDD), which requests member nations to adopt a unified classification standard for medical devices. It is a good sign for medical device manufacturers, because they will be able to easily enter the general medical device market with a size of over 600mn people. ASEAN is likely to fully comply with the basic principles of AMDD in the next few years. Therefore, settling in the Singapore market may enable health technology companies to penetrate other ASEAN markets and improve scalability.

Through the Health Silk Road co-operation, the high-tech and service industries of Singapore may become more prominent. This will be beneficial in two ways; not only will Chinese healthcare companies invest in Singapore but Singaporean healthcare companies will also invest in China and introduce the city state's excellent management expertise to serve the high-end consumers in need of healthcare services in China. Co-operation between Singaporean and Chinese research institutions on new medical breakthroughs, such as biomedicine and medical and health technology, will continue to meet the needs of joint research in areas of Chinese medicine, remote health diagnosis and 'Made In China vaccines. Meanwhile, the expertise of the two countries will help further promote medical breakthroughs.

Looking ahead, with the co-operation between Singapore and China through the JCBC, as well as the Ministry of Health of Singapore and the National Health Commission of China, the two countries will continue to deepen their co-operation in the field of public health. Their co-operation may include R&D of COVID-19 vaccines, treatment and diagnosis, prevention and control of infectious and non-infectious diseases, health promotion and healthcare.



3.3 Malaysia



China and Malaysia have co-operated frequently in the medical and healthcare fields in recent years. In December 2017, Universiti Tunku Abdul Rahman in Malaysia collaborated with Guangxi University of Chinese Medicine to establish the China-Malaysia Centre for Traditional Chinese Medicine in the Sungai Long Campus of the university. In April 2020, Titijaya Land Berhad signed a five-year agreement with Sinopharm Group to jointly develop the transaction and distribution businesses related to medical and hospital equipment, real estate and the medical industry.

On January 12, 2021, the Malaysian company, Pharmaniaga, signed a COVID-19 vaccine purchase agreement with Sinovac Biotech Ltd. to buy 14mn doses of the CoronaVac vaccine. On January 15, the Clinical Trial Institute of the Ministry of Health of Malaysia announced that it would start recruiting healthy volunteers over 18 to participate in the third phase clinical trial of the COVID-19 vaccine developed by the Institute of Medical Biology at the Chinese Academy of Medical Sciences in Malaysia. The clinical trial involved nine government hospitals and 3,000 volunteers in Malaysia and lasted for 13 months.

The medical and health sector of Malaysia, especially the medical devices industry, is developing rapidly. It is composed of more than 200 manufacturers, out of which 30 are multinational companies based in Malaysia, and includes many well-known brands. Therefore, it has become the ASEAN medical device manufacturing centre and the outsourcing

destination of many multinational companies. The market size of medical devices in Malaysia exceeded USD3bn in 2022 with more than 90% exported. From the perspective of market share of product imports, the US accounted for 21% of the Malaysian medical device import market share, followed by Singapore (17.9%), Germany (12.5%), Japan (11.3%), China (7.1%), and South Korea (3.1%). In addition, 60% of medical gloves and 80% of catheters in the world were supplied by Malaysia.

In 2022, pharmaceutical industry in Malaysia was worth more than USD3bn. It was composed of more than 100 companies, consisting of generic drug manufacturers, research-based pharmaceutical enterprises and over-the-counter (OTC) drug manufacturers. In addition, Malaysia is striving to become a pioneer in the manufacturing, certification and distribution of halal drugs. By 2025, the global market value of halal drugs will reach USD174bn.

TCM is well accepted in Malaysia and is supported by the Malaysian government. About 11% of Malaysia's drug wholesale licenses are attributed to TCM. The government has not only set up the Traditional and Complementary Medicine Division within the Ministry of Health, but also the corresponding units in major hospitals in various states across the country. TCM is one of the main services provided by the Division. As of August 2022, there were 15 hospitals under the Ministry of Health of Malaysia providing TCM services. More than 7,700 TCM practitioners had been registered with the Malaysian Ministry of Health.

Currently, Malaysia's medical and health field is facing a trio of challenges, namely vaccine shortage, high drug prices and low insurance coverage. The National Immunisation Program (NIP) in Malaysia is quite comprehensive, and all vaccines are provided for free to citizens through public health facilities. However, budget constraints and political factors have prevented new vaccines from joining the NIP, while some vaccines are totally dependent on foreign supplies. Although other Southeast Asian countries such as Thailand, Vietnam and Indonesia have set up local vaccine facilities, Malaysia still relies entirely on the imported vaccines, which is prone to shortage during emergencies and pandemic outbreaks.

The high price of medicines has also long been a problem in Malaysia. The Malaysian government plans to continue to intervene and establish a drug price control system to increase people's access to affordable drugs. In June 2017, the government mandated pharmaceutical companies to register drug prices with the Ministry of Health. In May 2019, the Malaysian government approved the use of an external reference pricing system to develop the drug pricing control system. Reference pricing is usually only applicable to the publicly subsidised drugs, and manufacturers and retailers are free to set the prices for self-financed drugs.

According to the National Health and Morbidity Survey in 2019, only 22% of the Malaysian population bought personal health insurance. Among those who did not buy personal health insurance, 36% of them claimed that it was unnecessary while 43% could not afford them. 45.5% of the Malaysian population did not have any supplementary medical insurance except the government-funded medical insurance. The survey also shows that Malaysians' expenditure on healthcare has been increasing at an annual rate of over 12%, accounting for about 5.1% of the household monthly expenditure.

The Malaysian government hopes to make Malaysia an important player in global clinical research by improving its capacity in drug R&D and medical equipment production and maintaining its position as a favorable region for clinical trials in Southeast Asia. Similar to developed countries, cancer and cardiovascular diseases are the main causes of morbidity and death in Malaysia. The high incidence of the non-infectious diseases provides a large pool of patients for clinical trials in therapeutic fields.



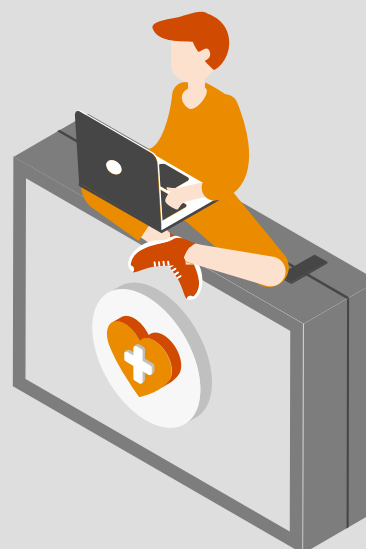
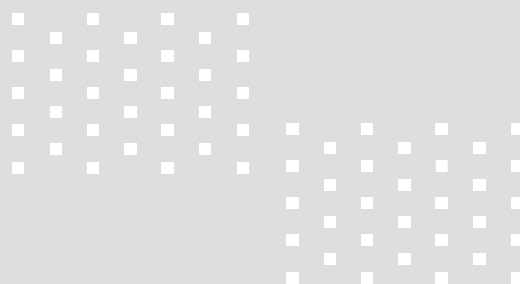
Although the trend of multinational companies exporting their medicines to Malaysia and then selling them through their sales teams or local distributors is prominent, the government has been increasingly supportive of foreign companies setting up their pharmaceutical facilities in Malaysia in recent years. This has led to an increase in the number of foreign companies establishing pharmaceutical factories in Malaysia. The Ministry of Health also encourages foreign investment and provides offtake agreements for new pharmaceutical companies. Currently, relevant policies for foreign investment include:

- Foreign investors can hold 100% equity in all new investment projects and in the expansion or diversification projects of existing companies;
- Enterprises can introduce foreign personnel for 'key positions' or 'fixed positions' in the absence of trained personnel in Malaysia;
- 100% tax exemption for investments;
- Manufacturing enterprises that relocate to Malaysia will enjoy a zero percent tax rate for 10 or 15 years depending on the scale of capital investment.

Looking ahead, Malaysia is seeking to position

itself as a preferred destination for China's foreign direct investments. Malaysia Investment Development Authority (MIDA) and other government investment development agencies such as InvestKL have set up various teams and organised activities that facilitate China's foreign investment. This includes opening a China Special Channel (CSC) to accelerate the approval process of foreign direct investments from China while quickly tracking Chinese enterprises with high value, technology and investment capabilities to encourage settling in the Asia Pacific region via Malaysia.

The CSC will serve as a bridge to simplify the investment process, including the selection of suitable production sites, talent and tax incentives. CSC will attract about USD2.5bn of new investment from China in the next two years. It encourages Chinese enterprises to set up new overseas businesses and regional centres as an opportunity for China's smart manufacturing and high-value services to go global. In addition, Malaysia's investment policy is free and transparent, its infrastructure is developed, labor skills are high, and manufacturing industry chain is complete. All of these are very attractive to foreign investors.



3.4 Serbia



With the advancement of the BRI, the co-operation between China and Serbia in the medical and health field has increasingly strengthened. In early February 2020, during the initial surge of cases in China, Serbia delivered medical and other materials worth about EUR125,000 to China. When some schools in Serbia were affected by the pandemic and faced with a shortage of remote learning equipment, Huawei quickly provided the nation with a batch of tablets. Since the outbreak of the COVID-19 pandemic, 58 airplanes transported medical equipment donated by the Chinese government and local enterprises to Serbia. In addition, three freight trains delivered all the materials Serbia purchased from China during the outbreak.

After summer 2021, Serbia experienced a fourth wave of outbreaks, and the number of cases continued to rise. The effective and timely control measures taken by the Serbian government at the early stage of the pandemic enabled the nation to control the spread more effectively than many of its European counterparts. In addition, a number of agencies, committees and headquarters in Serbia collaborated and took up the responsibility for dealing with different aspects of the COVID-19 pandemic. They legislated and defined the procedures for dealing with the funds, ensuring

regulatory approval for medical device usage, emergency procurement and fast-track imports, among other initiatives. However, due to the lingering pandemic, public holidays, vaccine skepticism and the highly contagious Delta variant, the number of newly infected people in Serbia continued to rise.

Since January 2021, Serbia has purchased 4.2mn doses of the Sinopharm vaccine from China, and the Chinese army has donated an additional 200,000 doses. Among the four vaccines approved in Serbia, the Sinopharm vaccine accounted for 60% of the doses purchased to date, followed by the Pfizer-BioNTech vaccine. Serbia has co-operated with many governments internationally on medical services, medical supplies and vaccination. It successfully obtained vaccines from many sources, enabling one of the highest vaccination rates in Europe. In addition to vaccinating its own citizens, Serbia donated vaccines and provided vaccination services for the citizens and foreign residents of neighboring countries. The countries that benefited the most were Bosnia and Herzegovina, Northern Macedonia and Montenegro.

With the vigorous media publicity around vaccine procurement and immunisation processes in Serbia, people around Western and Central Europe have recently shown great interest in getting vaccinated in Serbia. A large number of citizens, travel agencies and airlines from Europe have consulted on 'the vaccine tours'. The Serbian government is one of the first countries in the world to provide vaccination services for the members of local diplomatic bodies, with all the four vaccines available. The United Nations High Commissioner for Refugees (UNHCR) spoke highly of the Serbian government's initiative to include refugees in the vaccination program. By September 2021, nearly 50% of the Serbian population had been vaccinated to fight against the COVID-19 pandemic.

Limited by its national strength, Serbia faces multiple challenges in the field of healthcare. There are 59 health institutions in Belgrade, including 16 health centres, four clinical hospital centres, three specialised hospitals, five clinics, one clinical centre, 14 regular care institutions, 12 institutions without regular care, three public health institutions and Beograd, a pharmaceutical institution encompassing 100 pharmacies. There are a total of 12,035 standard beds in the permanent health institutions, as well as a large number of private pharmacies, physicians and clinics. The healthcare system in Serbia is managed by the

National Health Insurance Fund (RFZO), which covers all citizens and permanent residents. All employees, individual operators and pensioners must pay for it. The payment is based on a progressive system, where wealthier members in the society pay a higher proportion.

In the past few decades, there have been many changes in Serbia's healthcare system. The reform has been implemented at different levels, including adopting the use of co-payments. While the basic services are not provided to all, they can be supplemented by private insurance. Although the government and non-governmental organisations have launched a large-scale anti-corruption campaign, many physicians are still asking for bribes in exchange for better treatment because of their low wages. Currently, the Serbian government is co-operating with the World Bank to improve the quality and efficiency of its healthcare system.



In addition, widespread corruption, persistent austerity measures and poor healthcare services will severely restrain market opportunities. The low purchasing power of patients continues to hinder the development of the whole market as the public sector does not cover many essential drugs that are expensive. The continuous shortage of public funds leads to the shortage of medicines, which prevents many people from getting proper treatment and care. Counterfeit products from other markets also make it difficult for many companies to profit in the Serbian market. Due to the significant wage disparities globally, Serbia has already lost and is continuing to lose a large number of high-quality medical personnel to the EU and other developed countries.

Serbia's market has significant development potential. In the next few years, the expansionary monetary policy in the country will further promote household demand and enterprise investments, while stronger government investment will help support stable drug sales growth. Underlined by an ageing population and the increasing burden of chronic diseases, the drug consumption in Serbia will continue to increase. The gradual integration with the EU and the prospect of joining the EU will stimulate reform, while the relatively low

development level of domestic industrial technologies, the nation's capability and the simplified application procedures for generic products also provide opportunities for domestic and foreign generic drug manufacturers.

Looking ahead, according to Fitch's forecast, the pharmaceutical market of Serbia will reach USD1.8bn in 2025, a five-year compound growth rate of 5.7%. By 2030, the compound annual growth rate of the pharmaceutical market will increase to about 5.8% and reach USD2.38bn. While the support for the vaccination plan has led to a short-term rise in the market, the annual growth rate will still be lower than the historical level.

In recent years, the quality of medical care in Serbia has significantly improved and the waiting time has greatly reduced, enhancing the accessibility of medical services. Theoretically, this will promote demand and increase expenditure. However, there is still much room for improvement in Serbia's medical system in order to match up to the more developed Balkan countries. In a country with a low average income, the widespread corruption in the medical system and the high dependence on self-payment will hinder growth.



Suggestion

The co-operation between China and BRI partner countries has strengthened significantly in recent years. The information exchange and co-operation in the medical and health field will play an important role in enhancing the relationship between BRI countries and building a brighter future for the mutual benefit of mankind. The large population base and market potential, as well as the continuous upgrade of co-operation mechanisms have laid a foundation for Chinese enterprises to actively contribute to the building of the Health Silk Road.

The report explored the great potential of further strengthening the medical and health co-operation among countries in the post-pandemic era. It focused on analysing the co-operation mechanisms to prevent and control major infectious diseases, such as the COVID-19 pandemic, and outlined the prospect for co-operation in various aspects, including foreign aid, personnel training, infrastructure, TCM and healthcare. While there is a long way to go in promoting the development of the Health Silk Road, we propose the following suggestions that will enable Chinese enterprises to lead the way with this initiative.

1. Strengthen the co-operation in medical and health services by prioritising neighbouring countries

China can give full play to the unique advantages of its inland border regions such as Xinjiang, Guangxi and Yunnan. The country can deepen the integration of these geographic areas into the development of the BRI and strengthen co-operation in medical and health with countries in Central Asia, South Asia and ASEAN. This should promote the co-operation for a broader range of services in varied field at a deeper level, while expediting the development of international medical services, medical tourism, healthcare and related industries.

2. Promote co-operation and innovation in R&D and industrialisation

The country can focus on 'promoting medical science, technology and R&D', 'developing the health industry' and other major areas, and give full play to the leading role of various medical and health institutions and the BRI industrial alliances. This will promote the development of the overall health industry, benefiting the well-being of humankind as a whole by: co-ordinating domestic and foreign resources; stimulating and cultivating innovation and collaboration; strengthening innovation and co-operation in R&D of the health industry; and providing technical and industrial support for developments regarding human well-being, safety, and health.

3. Accelerate the mutual recognition of international drug regulatory systems

Under the framework to jointly build the BRI, the drug regulatory authorities in China and BRI partner countries have been strengthening the exchange of regulatory and certification policies as well as technologies. The countries involved are also gradually strengthening the sharing and mutual recognition of clinical trial data, test standards and results; promoting the construction of a regional co-ordination network for drug regulations; and accelerating the promotion of the listing, recognition and clinical use of medical and health products in BRI partner countries. Pharmaceutical enterprises should further improve product standardisation, actively acquire international quality and safety certifications, and lay a solid foundation for products and services to gain traction in the international market.



4. Develop a strategic plan to expand the international influence of Traditional Chinese Medicine

Traditional medicine has an extensive history in BRI partner countries. It is an important part of the health industry in numerous countries, and plays an active role in maintaining people's health while promoting traditional culture. As China actively promotes TCM in BRI partner countries, it is important to leverage the opportunity to develop a strategic plan – gradually expanding from regions with high acceptance to those with a weaker cultural background in TCM. This should be done in three steps: giving priority to the development in certain areas; promoting development in more key areas; and expanding the influence and stimulating a wider scope of development. With this, China can continuously improve the acceptance and international influence of TCM.

5. Further promote joint R&D and production of vaccines

Infectious diseases pose a major public security risk for all countries. In the global fight against the COVID-19 pandemic, China has established partnerships with numerous countries for vaccine R&D or production. These partnerships can further strengthen the complementary regulatory policies, encourage mutual recognition and promote joint research on vaccines for specific population groups.

6. Actively promote digital medical co-operation

China should actively promote the exchange of digital medical and health data standards with various countries to promote information interconnectivity. China can actively co-operate with international medical equipment suppliers to explore overseas markets by leveraging its

strengths, including: the booming innovative technologies in online diagnosis and treatment; big data and AI-assisted diagnosis; wearable devices; and the advantages of the country's manufacturing industry. In addition, with the ongoing adoption of telemedicine, digital TCM will become more popular.

7. Continue to improve the capabilities of international communication

China can continuously improve international communication capacity through information exchange and co-operation, and by focusing on demonstrating the achievements of its medical and health industry. The country should encourage industry associations and professional organisations to build more communication platforms, further enhance and promote typical project cases, fine tune storytelling in the medical and health field, enhance mutual understanding and trust, as well as improve their international visibility, influence and authority on Chinese medical and health enterprises and products.

Promoting co-operation in the medical and health field in the BRI is not only conducive to improving people's health, but will also lead to positive contributions to economic development. The building of the Health Silk Road has provided a new platform for international co-operation in the medical and health industry and new opportunities for Chinese enterprises to explore overseas markets. As these enterprises expand their products, services and brands to BRI partner countries, they should adhere to the principle of 'wide consultation, joint contribution and shared benefits', and actively adjust their strategies to cater for local markets while reinforcing the benefits of building of the Health Silk Road.

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Tuck Seng Tham	China Business Group Lead Partner Capital Markets Leader PwC Singapore	Lorraine Yeoh	China Business Group Lead Partner PwC Malaysia
Echo Chen	Joint Lead Partner China Business Group PwC Singapore	Yennie Tan	Leader Deals Strategy PwC Malaysia
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Catrina Li	Manager Inbound Outbound Services PwC China	Andrea Han	Senior Associate Healthcare Industry of Deals PwC China
Yawen Hou	Senior Associate Capital Project and Infrastructure PwC China	Shan Liang	Senior Associate Clients & Markets PwC China
Wayne Lu	Senior Associate Capital Project and Infrastructure PwC China	Sage Yan	Senior Associate Capital Project and Infrastructure PwC China

Contacts



Gabriel Wong Inbound Outbound Leader
PwC China
Email: gabriel.wong@cn.pwc.com

Steven Shum Inbound Outbound Associate Director
PwC China
Email: steven.shum@cn.pwc.com



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