6

Challenges for the Future and the Role of Industrial Policy

6.1 Introduction

Along with the massive social and economic transformation that has occurred in the last decades, China has been promoting the establishment of a world-class domestic healthcare system. This has implied not only profound changes in the financing and organization of healthcare services supply, to significantly impact on public health conditions and on the quality of healthcare, but also the promotion of a competitive national industry for healthcare products.

In the previous chapters, we have analysed the improvements made by China, which is gaining a growing role in the global healthcare industry, while trying to catch up with western standards in the production and management of healthcare services and products. Huge reforms of the healthcare system have gone hand in hand with economic progress, and have led to profound changes in the quality of life of people and also the competitiveness of Chinese industries. The life expectancy of China’s population has grown in the last decades of accelerated industrialization.
and development. The immense process of structural change of the Chinese economy and society, as analysed in Chap. 2, have radically modified individual and community demands for goods, services and rights.

Throughout the process of economic growth of China, public policies, and in particular industrial policies, have played a crucial role, as discussed in Chap. 3. Healthcare quality and equal access to healthcare service have become a priority in maintaining harmony and unity in the country. As it is clear observing the evolution of the Five-Year Plans, health-related sectors have become increasingly strategic for the promotion of further adjustment and transition of the Chinese society towards a mature and well-developed country.

As analysed in Chap. 4, Chinese firms are gaining competitive advantages, especially in the pharmaceutical and medical equipment sectors, and seem to be ready to compete more fiercely with the major global players. They are leveraging not only on local resources and government support, but also on foreign knowledge and brands, thanks to mergers and acquisitions with world class firms.

China is also increasing its reputation in the scientific and academic circles, as analysed in Chap. 5. Scientific cooperation and university networks are promoted to boost the quality and visibility of Chinese researchers. This could be considered as a prerequisite to conquer a leading position in the research, development and management of the healthcare sector and is wholly in line with the “new Chinese dream” of becoming the world leader for innovation in few decades.

In this context, it is interesting to consider the key challenges that lie ahead of China as it attempts to enhance its role in the global healthcare context, both at home (with the still incomplete healthcare reform as shown by recent coronavirus epidemic) and abroad (with growing concerns and hostility moved by foreign firms and countries, also witnessed by trade war with the US).
6.2 Challenges for the Future of Chinese Healthcare

At present, China has reached a “wide but shallow distribution of health insurance” (Wharton University 2020). Reforms have brought healthcare to 95% of Chinese people—most of whom have never had insurance before—but this has caused huge strains on the delivery system and massive costs for China. In this context, the government is still struggling to find a good balance between the competing areas of access, cost and quality of healthcare (Wharton University 2020).

There is still a significant gap between the available medical resources and the health needs of the population (Wong 2019). Innovative solutions for the market are promoted and, indeed, the combination of unique factors such as a large middle class, advanced technology capabilities, and constant government support are granting key capacities in the Chinese context (Wong 2019). In general, the most relevant challenges that China still has to address are related to:

(a) uneven accessibility of services, due to regional disparities in economic growth, quality of service as well as social imbalances;
(b) sustainability of growth, considering aspects such as pollution or the protection of individual rights;
(c) the world industry dynamics, including the rush for innovation supremacy and the trade war with the US.

6.2.1 Accessibility of Services

As already mentioned in the previous chapters, in 2009, the Chinese government published “Opinions on Deepening Health System Reform”, setting the goal of implementing “an accessible, equitable, affordable, and efficient health system to cover all people by 2020” (Meng et al. 2019). Indeed, a high level of equity in social welfare has long been a fundamental goal of China’s national policies (Liu et al. 2002), even if in practice this has not yet been achieved.
Based on the available data, in 2003, 45% of the urban population and 79% of the rural population were not covered by social health insurance schemes. The access to public health services was limited. The promotion of a universal health coverage was considered a key part of the reforms implemented by the government. Coherently, the government promoted a variety of measures to improve the quality of life of Chinese people (thus stimulating the demand for care) and, at the same time, to promote the growth of a national, competitive and strong healthcare industry (as analysed in Chaps. 3 and 4).

In a few years, China has made huge progresses in a large number of areas, as underlined by the World Health Organization (WHO 2018, p. 2). Specifically:

- basic health insurance coverage increased from 24% of the population in 2005 to more than 95% at present;
- out-of-pocket payments dropped from nearly 60% in 2001 to less than 30% in 2016;
- infant chronic hepatitis B infections decreased from 9.7% in 1992 to 0.32% in 2014;
- HIV/AIDS mortality rate fell from 69% to 5.6% over the last decade;
- life expectancy at birth increased from 67.0 years to 76.3 years between 1990 and 2015;
- essential vaccine coverage (e.g. polio, measles and hepatitis B) remained above 95% over the last decade;
- the maternal mortality ratio was reduced from 80 deaths per 100 000 live births in 1992 to 23 deaths per 100 000 live births in 2013;
- premature deaths from infectious diseases were reduced from 15% in 1990 to around 45% in 2010;
- under-5 mortality dropped 75% between 1996 and 2014.

Despite these achievements, China still suffers from huge imbalances in the distribution of healthcare services as a result of uneven development across the country (Vedom and Cao 2011a; Zhao 2006; Zhu et al. 2017).

Thanks to the implementation of the opening-up policy, described in Chap. 2, China has benefited from considerable economic growth, but
there has been a growth in geographic (coastal–inland), sectoral (urban–rural), and social (majority–minority) disparities (Vedom and Cao 2011b). While medical resources are available in large and medium-sized cities, rural and remote parts of the country—those where minorities are also settled—are underserved (Jiang and Wang 2018; Li et al. 2017). There is a substantial difference “in health expenditures between the poorest rural areas of the West and developed eastern areas of China. As a result, health risks are significantly higher in vulnerable and disadvantaged populations” (Vendom and Cao 2011b; Fu 2004; Yao and Zhang 2001; Zhao and Tong 2000).

A differentiated access to medical facilities is noted not only among provinces, but also within provinces, as in the case of Guangdong (Li et al., 2017). Differences pertain the healthcare capacity in terms of both human capital and physical facilities. In general, the “level of medical care available in an area almost directly correlates with a province’s level of development” (Shawn 2020). The best hospitals tend to be in the more developed, and richer, eastern coastal cities. The recent case of diffusion of the coronavirus epidemic, which originated in the city of Wuhan, has clearly highlighted these pitfalls.

Moreover, imbalances are likely to be exacerbated within the Chinese society in the future given the increasing proportion of elderly people and of people suffering from chronic disease. China still lacks an adequate number of organized long-term care or home healthcare solutions for the elderly and is also unprepared to cope with growing cases of chronic illnesses (such as hypertension and diabetes) that are associated with the high number of middle-aged workers exposed to smoke, poor nutrition and stress (Wharton University 2020).

Multiple imbalances are a serious issue for at least two reasons. First, given the very nature of health, which entails externalities and public good characteristics (see Chap. 1), a failure to include some segments of the society could jeopardize some of the results achieved. Second, failure to implement healthcare reforms in an extensive and inclusive matter, could put at risk at the same time both the social stability and the legitimacy of the party.

In this sense, disparities and differences within China and within social classes—in terms of access to healthcare—remain one of the “shadows” and serious weaknesses for the future of a prosperous and harmonious China.
6.2.2 Pollution

Another threat to national political stability and unity is pollution, which is still one of the sources of major concern for public health risks. China has been suffering from massive pollution since the beginning of the industrial revolution (Spigarelli et al. 2016). Despite the huge attention of policymakers starting from the 12th Five-year Plan, people’s concerns about health risks from contamination of water, air, soil and food remain very high (Otsuka 2016; Lu et al. 2018).

Outdoor air pollution is a key challenge: the massive level of average concentrations of inhalable particles in the air has led to the proliferation of respiratory diseases, from lung cancer, to acute respiratory infection, and chronic obstructive pulmonary disease (Zhang and Smith 2007; Zhou et al. 2015; Hu et al. 2015, only to cite some), as well as to growing mortality rates for hypertension, cardiovascular diseases and stroke (Guan et al. 2016) and even an increase in premature mortality (Chen et al. 2004). The situation is critical also in the countryside, because of the use of biomass fuels and coal. Water pollution has also reached very dangerous levels (see, among others, Wang and Yang 2016; Han et al. 2016). “Exposure to contaminated drinking water has been associated with increasing rates of digestive cancers and infectious diseases such as hepatitis and cholera” (Kan 2009).

In 2011, the State Environmental Protection Twelfth Five-Year Plan on Environmental and Health Administration was issued (Otsuka 2016, p. 36), in which it was stated that “with the rapid development of China’s industrialization and urbanization, the problem of environmental pollution impacting on public health is getting more and more outstanding, and becomes one of the important factors affecting China’s sustainable development, the construction of well-off society and the harmony of the society”. This plan has marked an important step in the development of specific long-term measures to improve the quality of the environment in order to ensure a better quality of life for the Chinese people. More recently, the revised environmental protection law (in 2014), and “Healthy China 2030” plan have stressed the need for a more effective management of health risks from pollution.
Indeed, it will “require huge economic and social costs to recover polluted water and land and to remedy the illnesses and diseases of people who have been exposed to heavy pollution” (Otsuka 2016, p. 39).

Furthermore, given its nature of negative externality and the impossibility to confine its effects within the national boundaries, the reduction of pollution is not exclusively a “Chinese issue”. *In primis*, it affects neighbouring countries but, given the size of China, pollution is a problem that should raise concerns at the global level (Currell and Han 2016). Indeed, there are some signals that China wants to play an increasing role in the international approach to environmental issues. Its rapid ratification of the Paris Agreement on Climate Change, coupled with the decision of President Trump’s decision to pull the US out of it, is a first signal, along with its commitment towards Agenda 2030 (including participation into Voluntary National Reviews on the progresses towards Sustainable Development Goals). In addition, the efforts in terms of renewable energies—with the country ranking first in terms of global investment in this area (Spigarelli et al. 2016)—and sustainability cannot be overlooked. This said, the task of promoting a healthy environment remains a challenging one: the fast growth rates of Chinese production, coupled with the demand of a globalized market, continue pushing the development of specific industries (including consumer goods) that can be stressful for the environment.

### 6.2.3 Innovation and Industry

The rush for innovation embraced by China, as analysed in Chap. 2, is also having a significant impact on healthcare. China is investing in Artificial Intelligence (AI) and in other domains of technology, such as augmented reality and robotics, that could be used to tackle some of the challenges related to regional disparities, while promoting a more cost-effective healthcare system in China.

As the recent experience of coronavirus has shown, healthcare is one of the most promising sectors for the application of AI, which is a booming industry all around the world (Cogley 2020; Accenture 2017; Stanford Medicine 2018). The most interesting areas of development should be
robotic assisted surgeries, as well as virtual nursing assistance, and administrative work-flow assistance (Accenture 2017; Stanford Medicine 2018). AI can be used in patient care and diagnostic systems; it can help “organize patient routes or treatment plans better” and, in general, it provides healthcare professionals with the information needed to decide about diagnosis and treatments (EffeMarket 2017). Thanks to AI, the typical evidence-based approach to healthcare can be shifted to an approach based on real-time outcome and—in the future—to predictive and preventative care models (EffeMarket 2017).

At the moment, China has gained competitive advantages in the development of information and communication technology to support the delivery of healthcare services and to improve healthcare management (also in public health management of an epidemic like coronavirus). The use of AI is favouring the development of “advanced medical platforms like wearable’s or biosensors, mHealth, big data and health analytics and internet of medical things” (EffeMarket 2017) which can improve the level of services for physicians, patients, and payers.

The spread of the internet among citizens and its massive usage are essential assets supporting the diffusion of AI in China, in various healthcare subsectors. Chinese population is one of the most active in the world for the use of mobile phones and the internet (Li et al. 2014): penetration rate of smartphones is very high (55.3% of total population) and the country is the biggest e-commerce market in the world, with more than 640 million e-shoppers.

It is undoubtedly true that the introduction of digital technology and innovation-based solutions can improve the efficiency, and quality, of healthcare in the country, promoting the reduction of disparities and barriers to access healthcare services (Sun et al. 2016).

For example, AI facilitates efficient and effective online patient management. Technology can be used to increase the quality of the patient experience thanks to the promotion of mobile healthcare apps, online payments, remote patient monitoring systems, etc. Several Chinese tech start-ups are developing solutions to offer citizens smart application to choose medical facilities, to detect and monitor symptoms/vital parameters, etc. The diffusion of mobile healthcare platforms in China is
particularly rapid and may represent a way to improve the healthcare access in remote areas (Lv et al. 2019; Hsu et al. 2016; Li et al. 2014).

A second area of use of AI is related to wearable medical devices to monitor consumer health. This domain is of particular relevance, considering the ageing population issue that China is facing along with the diffusion of chronic disease, which accounts for more than 80% of deaths in the country (Wong 2019). Disease management and monitoring are fundamental: wearable sensors and other medical devices can be of significant help to increase the quality of life of patients, to overcome the shortage of medical doctors and nurses, and also to reduce the misutilization of hospitals (Poon et al. 2011; Majumder et al. 2017).

Third, AI can be used in China to assist doctors in medical diagnosis and help relief the overcrowding situation of urban hospitals in major cities and overburdened healthcare system: based on recent data, China has 1.8 practicing doctors per 1,000 citizens. Top hospitals (i.e. those receiving a top “triple-A” ranking) only represent 7.7% of the country’s medical centres and manage half of the total outpatient visits (Wong 2019). The industry is responding quite actively in this area. The two major Chinese tech companies, Alibaba and Tencent, developed AI software that help the interpretation of “medical scans and make diagnoses in order to speed up the screening of medical images” (Wong 2019). Also, many Chinese start-ups are researching and producing solutions to support medical diagnosis.

Thanks to a comprehensive set of policy measures, industrial application and research efforts, the country aims to become the world leader in AI by 2030. Analysts consider that this is “an ambitious but achievable target” (Craglia et al. 2018, p. 9). While it is sharing the role of dominant players with the US and Europe (Craglia et al. 2018), China is emerging as a leading patenting country (accounting for almost 60% of the world total patents in AI).

Online interfaces are booming in China to solve the needs of both patients (appointment registrations, online information inquiries, payments, test results delivery) and hospitals (for the effective and efficient diagnosis treatment and management of patients). “Fingertip medical treatment” is a new term to describe the new emerging healthcare model based on technology (Wong 2019).
Indeed, a fundamental challenge in the implementation of AI is related to the availability, processing, storage and use of high-quality structured and standardized data coming from different sources such as electronic medical records, physician notes, patients’ habits or health insurance claims. For the best development of AI, data are the key resource and this means that access to information about personal and professional life of people is necessary, posing huge concerns and issues in terms of security and privacy of data. In this sense, the ability of China to balance security problems, with personal freedom and business needs will be fundamental in defining the scope of the success of Chinese firms in the AI industry, both in domestic and international markets.

6.2.4 Health Industry and Trade War

The role of China in the global healthcare market, and the competitiveness of Chinese firms, might be affected by the recent escalation of the trade war with the US. Trade and investment in the healthcare industry are still at the centre of the dispute, despite the fact that the US and China are currently playing different and complementary roles in the healthcare global value chain.

Indeed, the trade war is rooted in the fight for supremacy on innovation, which also includes the medical field. While the US has led global ranking in terms of global research and development spending, China is making huge progress in medical innovation and especially in the biopharmaceutical domain (Radu 2019).

The implications of the trade war are huge for firms all around the world, considering that many companies have “supply chains that cross back and forth between the US and China. These companies move raw materials, components and finished products in and out of the US and China during the manufacturing of medical equipment, creating scope for them to be taxed at multiple points in the supply chain” (GlobalData Healthcare 2019).

In the pharmaceutical sector, while the US imports bulk drugs from China, “China is dependent on the US for the drug formulations import” (Rees 2019). Given that the US have imposed tariffs on crude drugs
coming from China, the countermeasures will make American drugs more expensive. In order to decrease the burden on health expenditure, this will favour the replacement with nationally produced ones, which are, however, not yet equally reliable and effective, with a possible general worsening in health conditions of the Chinese population (Du et al. 2018).

In the medical equipment segment, China exports aluminum and steel, which are widely used as base materials in the production of medical devices (AAMI 2018). The US has been enacting tariffs on many items, including medical devices, MRI scans medical products, defibrillators and orthopedic implants (Hochfelder 2019). Those US tariffs on imaging products and components could “harm the American medical technology sector’s ability to stay competitive and will adversely affect the US economy in ways that could compromise patient access to care” (Taylor 2019).

China is reacting by leveraging on its strategic role of supplier of essential drugs and raw ingredients, including antibiotics, anti-depressants, birth control pills and chemotherapy medications, as well as of producer of medical equipment, diagnostic reagents used in X-ray examinations, surgical gloves and lamps used in medical settings (Taylor 2019).

FDI flows between US and China are also part of the war. The US government committee has started vetoing some Chinese investments, as those in the biotechnology industry, because of national security problems. Conversely, many American producers of medical devices located in China are moving out. However, they do not seem to be willing to come back to their home country. They instead tend to re-locate to other low labour-cost areas such as Vietnam, Mexico or Malaysia (Newmarker 2019).

The US–China trade war is also expanding to the production and diffusion of knowledge. The US Congress is working on the possibility of restricting access to US universities for Chinese students wishing to study biotechnology and advanced medical care (Wu 2019).

The trade tension between the two countries might also have repercussions for their relations with other countries. For example, according to Rees (2019), it could give a push to Indian pharma firms that could take advantage of the situation and strengthen their partnership with both China for drug formulations and US for the bulk drugs category. In this
respect, the search for strategic partnerships becomes the critical issue for China to continue in the direction of becoming a world leader in health-related sectors. Some recent policy measures could help this process: in 2019, subsectors of both the pharmaceutical and healthcare industries were added to the 2019 Foreign Investment National Encouraged Catalogue. Accordingly, foreign investors manufacturing raw materials for the production of vaccines and cell-therapy drugs and those investing in medical institutions services can access preferential treatment, such as tax incentives, streamlined procedures or discounted land prices.

It seems natural to question the role of Europe in this scenario, as a possible strategic partner for China. However, Europe appears to be still lacking a clear strategy in this respect. On the one hand, Europe is becoming one of the preferential targets for M&A in the health industry. In 2018, 2 billion euros were invested in the EU in the health and biotech sector. On the other, the new EU investment screening framework introduced in 2018 also includes health among sectors that might hinder security and public order interests to be protected (Hanemann et al. 2019, p. 5).

These considerations further highlight the centrality of health-related productions in contemporary global manufacturing. They are, on the one hand, carriers of huge innovation potential and a push towards new knowledge creation and production. On the other, they are also related to some fundamental human rights, such as the right to live a healthy life. The combination of these two characteristics make health-related industries a delicate terrain, where a shift of powers within the global economy appears tense and disputed.

### 6.3 Industrial Policy and Healthcare Reforms

Given the huge innovation potential that health-related industries can release, recent industrial policy measures have concentrated on sectors such as pharmaceuticals, medical devices, biological industries and Traditional Chinese Medicine (TCM).

As highlighted in Chap. 3, two main directions emerge from the long-term industrial strategy.
The first one is the commitment to further integration with western medicine. On the one hand, the inclusion of western medicines in the Chinese system of health provision is encouraged. On the other hand, China is committed to becoming a competitive player in the global market. In this respect and with reference in particular to FDI policies, we can expect China to act as it did in the past with other sectors of the economy, as environmental industries or ICT, encouraging FDI to learn and improve its own processes, practices and technologies (Di Tommaso et al. 2013). Additionally, starting off from a situation of extreme fragmentation in some sectors, such as the pharmaceutical one, China has engaged in a process of industrial restructuring that follows some traditional industrial policy routes. Among these is the creation of *national champions*, by means of increased concentration in the sector through M&As. As highlighted in Chap. 3, some results in terms of industry performances have already appeared. The emergence of new, large players in the pharmaceutical sector seems to trigger positive industrial performances. However, there are also challenges that need to be further investigated and monitored. In particular, policies favouring investment in the pharmaceutical sector seem to have also attracted a number of conglomerate M&As that need to be studied further, as they might signal possible rent-seeking behaviours from companies hunting government subsidies. A general trend that, if confirmed, could have negative effects on the performances of the whole industry.

The second long-term direction for industrial policy relates to the promotion of indigenous innovation. Despite the huge efforts made by the Chinese government to promote structural changes in the healthcare system, a new set of measures might be needed in the next future. In particular, “it will be necessary to turn from health-concerned policies to health-centered policies to secure human health and well-being” (Otsuka 2016, p. 39).

In this direction goes, for example, the support of the government towards the use of Traditional Chinese Medicine (TCM). TCM is a field of excellence within the Chinese healthcare system. In fact, the first and only Chinese scientist to win a Nobel Prize, Tu Youyou, received their award in 2015 because of the research she had carried
out in the field of TCM. The role of Traditional Chinese Medicine has always been central within the national healthcare system (Di Tommaso et al. 2017; Zhu 2018; Qi et al. 2011) and it gained a renewed role after the release in 2016 of “Traditional Chinese Medicine in China”, the first white paper on TCM to be published by the Chinese government (Weeks 2017). With 452,000 practitioners and assistants, almost 4,000 TCM hospitals (including 253 hospitals of ethnic minority medicine and 446 hospitals of integrated TCM and western medicine) and almost 270 million patients treated by the end of 2015, along with much lower costs than modern western medicine, Traditional Chinese Medicine can represent a strategic sector for the promotion of sustainable and accessible healthcare, in the respect of the environment and of the human being. One of the main principles guiding TCM is, in fact, “to put people first”, grounding the provision of TCM measures in the ancient tradition that China has developed in this field. However, as stated, the Chinese government is also well aware of the need to integrate TCM with western medicine, given their complementary nature and different potentials, and also to promote continuous innovation in this field (GoC 2016). Finally, yet importantly, TCM also represents a very significant industrial sector, accounting for 29% of total pharmaceutical output, strongly interconnected with the agricultural sector and therefore representing “a key means of adjusting the rural industrial structure, improving the eco-environment, and increasing farmers’ incomes” (GoC 2016).

Of course, TCM also faces some important challenges, especially as production and exports rise. It shares, for instance, together with western medicines, concerns over the damage potentially caused by the over-exploitation of specific kinds of plants or animals. Such exploitation could bring about a loss of biodiversity and eventually cause negative effects on health itself. In this respect, the quest for sustainability must necessarily be placed at the centre of future industrial policies and future developments in the collaboration between western medicine and TCM.
The Chinese healthcare system has been subject to profound changes, beginning from the outbreak and spread of the SARS virus. The new coronavirus (named 2019-nCoV) has been considered by observers to represent a test of whether “the changes really improved China’s ability to contain an outbreak” (Bendix 2020).

The mobilization of the whole of China and the efforts made by the government to organize the emergency plan to cope with the epidemic have been considerable, as was reflected in reports by the World Health Organization (Bendix 2020).

The authorities’ response has highlighted many pitfalls of the Chinese healthcare systems to the world and criticism is mounting over how China has reacted to the virus. The unbalanced distribution of healthcare resources (physical assets and staff) and the lack of properly trained general practitioners delayed the detection of the first cases of the disease and caused congestion in hospitals (Shawn 2020). Moreover, Chinese residents reported long lines at hospitals, shortages of doctors, high costs for pharmaceuticals, as well as a lack of transparency and communication from both central and local government.

At the same time, the coronavirus emergency has given China the chance to show the world its strengths. First of all, China has demonstrated the huge progress it has made in the use of technology. QR codes, for example, have been used to track people entering or exiting buildings, supporting the monitoring of infected citizens even through their WeChat payments (Palmer 2020). Artificial intelligence, machine learning and data analytics have all helped to map and prevent the diffusion of coronavirus, thereby supporting medical and security actions (Yakobovitch 2020).

When educational institutions closed, the country’s telecom infrastructure and videoconference systems have been used to deliver school classes across the country. The maturity and availability of the Chinese technologies allowed for a massive implementation of remote working, helping employers and offices to continue their activities. This has opened
a new era for testing how efficiently (and to what extent in specific jobs) people can work from home (Dans 2020).

Also, in terms of the economic impact of the epidemic, the government has shown its capacity to use economic and industrial policies to react to an emergency situation. It has launched specific policies and measures which include funding and rolling out targeted tax and fee reduction measures to ease strains on firms, discounted loan interest rates for producers of anti-virus materials, support to foreign firms to resume work and global operations. Other initiatives are intended to ensure the orderly resumption of work and production in enterprises, along with a stable job market for college graduates and other job seekers.

In general, the onset of the epidemic and its impact on China’s economy and the Chinese role in the global context, open a reflection on the importance that the health sector in a country that aims to become, by 2049, a “fully developed” economy and a leader of innovation.

Failure to implement health reforms across the vast domestic territory risks undermining the Chinese “new dream”. The disparities examined above are wide and such that the enormous efforts that China has made in the last decades, in financial and organizational terms, are potentially ineffective. Furthermore, the political leadership itself is likely to crack, as many analysts already observe in this specific occasion.

In addition to the urgent need to complete the reforms, it is necessary to underline the importance of implementing specific policies that change, from a cultural point of view, the approach of citizens and businesses: a specific action on the issue of prevention and on the rules of hygiene-sanitary behavior seems urgent.

References

AAMI. 2018. Healthcare Industry Braces for Fallout from China Trade War. AAMI News, August. https://www.aami.org/productspublications/ articledetail.aspx?ItemNumber=6890

Accenture. 2017. Artificial Intelligence: Healthcare’s New Nervous System, available at: https://www.accenture.com/_acnmedia/pdf-49/accenture-health-artificial-intelligence.pdf
Bendix, A. 2020. Mistrust, Low Pay, and a Tradition of Bribery in China’s Healthcare System have Crippled Efforts to Contain the Wuhan Coronavirus. Business Insider, February 7. Accessed February 17, 2020. https://www.businessinsider.com/china-healthcare-system-coronavirus-outbreak-2020-1?IR=T

Chen, Bingheng, Chuanjie Hong, and Hiadong Kan. 2004. Exposures and Health Outcomes from Outdoor Air Pollutants in China. Toxicology 198 (1–3): 291–300.

Cogley, M. 2020. China Unleashes its Surveillance Technology to Fight Coronavirus. The Telegraph, February 11. Accessed February 17, 2020. https://www.telegraph.co.uk/technology/2020/02/11/china-unleashes-surveillance-technology-fight-coronavirus/

Craglia, M., A. Annoni, P. Benczur, P. Bertoldi, P. Delipetrev, G. De Prato, and C. Feijoo, eds. 2018. Artificial Intelligence: A European Perspective, EUR 29425 EN, Publications Office, Luxemburg, ISBN 978-92.79.97219, https://doi.org/10.2760/936974. http://publications.jrc.ec.europa.eu/repository/bitstream/JRC113826/ai-flagship-report-online.pdf

Currell, Matthew, and Dongmei Han. 2016. The Global Drain: Why China’s Water Pollution Problems Should Matter to the Rest of the World. Environment: Science and Policy for Sustainable Development 59 (1): 16–29.

Dans, E. 2020. Why The Coronavirus is a Great Opportunity to Really Put Remote Working to the Test. Forbes, February 2. Accessed February 20, 2020. https://www.forbes.com/sites/enriquedans/2020/02/19/why-the-coronavirus-is-a-great-opportunity-to-really-put-remote-working-to-thetest/#a2768131bcba.

Di Tommaso Marco R., Lauretta Rubini, Elisa Barbieri. 2013. Southern China: Industry, Development and Industrial Policy. London: Routledge.

Di Tommaso, Marco R., Stefano Bonnini, and Qi Yue. 2017. Focusing on the Chinese Health Industry: An Empirical Enquiry on the TCM Listed Firms. Is Large and Private Beautiful? International Journal of Healthcare Technology and Management 16 (1–2): 77.

Du, Jinpeng, Jing Zhang, Yong Fan, and Dageng Huang. 2018. China–USA Trade Dispute Could Affect Health Care. The Lancet 392 (10158): 1622–1623.

EffeMarket. 2017. Global AI in Healthcare Market Report 2027. https://www.effemarket.com/global-ai-in-healthcare-market-report-2017-2027.php

Fu, Xiaolan. 2004. Limited Linkages from Growth Engines and Regional Disparities in China. Journal of Comparative Economics 32 (1): 148–164.
GlobalData Healthcare. 2019. *US–China Trade War Casualties: Biopharma Sees the First Wave of CFIUS Vetoes, But No Tariffs on Chinese Pharma Imports.* https://www.pharmaceutical-technology.com/comment/us-china-pharma-trade-2019/

GoC (Government of China). 2016. Traditional Chinese Medicine in China, The State Council Information Office of the People’s Republic of China, White Paper.

Guan, Wei-Jie, Xue-Yan Zheng, Kian Fan Chung, and Nan-Shan Zhong. 2016. Impact of Air Pollution on the Burden of Chronic Respiratory Diseases in China: Time for Urgent Action. *The Lancet* 388 (10054): 1939–1951.

Han, Dongmei, Matthew J. Currell, and Guoliang Cao. 2016. Deep Challenges for China’s War on Water Pollution. *Environmental Pollution* 218: 1222–1233.

Hanemann T., M. Huotari, and A. Kratz. 2019. Chinese FDI in Europe: 2018 Trends and Impact of New Screening Policies, Report by Rhodium Group and the Mercator Institute for China Studies (MERICS). Accessed February 17, 2020. https://rhg.com/research/chinese-fdi-in-europe-2018-trends-and-impact-of-new-screening-policies/

Hochfelder, B. 2019. In US–China Tariff Poker Game, Health Supply Chains Stand to Lose. https://www.supplychaindive.com/news/us-china-tariff-health-supply-chains/554792/

Hsu, Jeffrey, Di Liu, Ya Min Yu, Hui Tong Zhao, Zhi Rou Chen, Jiao Li, and Wei Chen. 2016. The Top Chinese Mobile Health Apps: A Systematic Investigation. *Journal of Medical Internet Research* 18 (8): e222.

Hu, Guoping, Nanshan Zhong, and Pixian Ran. 2015. Air Pollution and COPD in China. *Journal of Thoracic Disease* 7 (1): 59–66.

Jiang, Jufeng, and Peigang Wang. 2018. Health Status in a Transitional Society: Urban–Rural Disparities from a Dynamic Perspective in China. *Population Health Metrics* 16 (22): 169–185.

Kan, Haidong. 2009. Environment and Health in China: Challenges and Opportunities. *Environmental Health Perspectives* 117(12), A530–A531.

Li, Huijun, Tianhong Zhang, Hongmei Chi, Yingmei Chen, Yue Li, and Jijun Wang. 2014. Mobile Health in China: Current Status and Future Development. *Asian Journal of Psychiatry* 10: 101–104.

Li, Xi & Lu, Jiapeng & Hu, Shuang & Cheng, KK & Maeseneer, Jan & Meng, Qingyue & Mossialos, Elias & Xu, Dong & Yip, Winnie & Zhang, Hongzhao & Krumholz, Harlan & Jiang, Lixin & Hu, Shengshou. (2017). The primary health-care system in China. *The Lancet.* 390. 2584-2594. 10.1016/S0140-6736(17)33109-4.
Liu, G.G., Z. Zhao, R. Cai, T. Yamada, and T. Yamada. 2002. Equity in Health Care Access To: Assessing the Urban Health Insurance Reform. *China, Social Science and Medicine* 55 (10): 1779–1794. https://doi.org/10.1016/S0277-9536(01)00306-9.

Lu, Yonglong, Shuai Song, Ruoshi Wang, Zhaoyang Liu, Jing Meng, Andrew J. Sweetman, Alan Jenkins, et al. 2018. Impacts of Soil and Water Pollution on Food Safety and Health Risks in China. *Environmental International* 77: 5.

Lv, Qing, Yuton Jiang, Jun Qi, Yanli Zhang, Xi Zhang, Linkai Fang, Liudan Tu, et al. 2019. Using Mobile Apps for Health Management: A New Health Care Mode in China. *JMIR Mhealth Uhealth* 7 (6): e10299.

Majumder, Sumit, Tapas Mondal, and M. Deen. 2017. Wearable Sensors for Remote Health Monitoring. *Sensors* 17 (1): 130.

Meng, Qingyue, Daoxin Yin, Anne Mills, and Kamran Abbasi. 2019. China’s Encouraging Commitment to Health. China’s Health System Reforms: Review of 10 Years of Progress. Accessed July 10, 2019. www.bmj.com/china-health-reform.

Newmarker, Chris. 2019. The US–China Trade War: Here’s What it Means for Medical Device Industry Suppliers. *Medical Design and Outsourcing*. https://www.medicaldesignandoutsourcing.com/the-u-s-china-trade-war-heres-what-it-means-for-medical-device-industry-suppliers/

Otsuka, Kenji. 2016. Developing Environment and Health Policy in China. *Journal of Contemporary East Asia Studies* 5 (1): 27–41. https://doi.org/10.1080/24761028.2016.11869090.

Palmer, J. 2020. Has the Coronavirus Reached Its Peak in China? *Foreign Policy*, February 12. Accessed February 17, 2020. https://foreignpolicy.com/2020/02/12/coronavirus-peak-new-cases-china-quarantine-containment-wuhan-hubei-xi-jinping/

Poon, Carmen C.Y., Qing Liu, Hui Gao, Wan-Hua Lin, and Yuan-Ting Zhang. 2011. Wearable Intelligent Systems for E-health. *Journal of Computing Science and Engineering* 5 (3): 246–256.

Qi, Zhang, Zhu Liming, and Wim van Lerberghe. 2011. The Importance of Traditional Chinese Medicine Services in Health Care Provision in China. *Universitar Forum* 2 (2), available at: http://universitasforum.org/index.php/ojs/article/view/63/242

Radu, S. 2019. US, China Compete for Medical Research Leadership, *US News and World Reports*, September 27. Accessed February 20, 2020. https://www.usnews.com/news/best-countries/articles/2019-09-27/china-threatens-the-us-leadership-position-in-medical-research.
Rees, Victoria. 2019. US–China Trade War Leaves Gap for Indian Pharma to Grow. *European Pharmaceutical Review*, June 18. https://www.europeanpharmaceuticalreview.com/news/89905/us-china-trade-war-leaves-gap-for-indian-pharma-to-grow/

Shawn, Y. 2020. ‘Utter Chaos’: Coronavirus Exposes China Healthcare Weaknesses. *Aljazeera News*, January 29. Accessed February 17, 2020. https://www.aljazeera.com/news/2020/01/chaos-coronavirus-exposes-china-healthcare-weaknesses-200129050408104.html

Spigarelli, Francesca, Curran Louise, and Arteconi Alessia. 2016. Europe–China Cooperation And Competition In the Green Industries. *International Journal of Ambient Energy* 38: 1, ISSN: 0143-0750. https://doi.org/10.1080/01430750.2017.1333712

Stanford Medicine. 2018. The Democratization of Health Care. *Health Trends Reports*. Accessed July 10, 2019. http://med.stanford.edu/content/dam/sm/school/documents/Health-Trends-Report/Stanford_Medicine_Health_Trends_Report_2018_FINAL.pdf.

Sun, Jing, Yutao Guo, Xiaoning Wang, and Zeng Qiang. 2016. Health For Aging China: Opportunities and Challenges. *Ageing and Disease* 7 (1): 53–67.

Taylor, Nick Paul. 2019. Medical Equipment Hit by Escalation of US–China Trade War. *Medtech Dive*. https://www.medtechdive.com/news/medical-equipment-hit-by-escalation-of-us-china-trade-war/554823/

Vedom, J., and Huhua Cao. 2011a. Health Care Access and Regional Disparities in China. *Risques de santé en sociétés* 1: 63–78. https://journals.openedition.org/eps/4345?lang=en.

———. 2011b. Health Care Access and Regional Disparities in China. *Espace populations sociétés* 1: 63–78.

Wang, Qing, and Zhiming Yang. 2016. Industrial Water Pollution, Water Environment Treatment, and Health Risks in China. *Environmental Pollution* 218: 358–365.

Weeks, John. 2017. Chinese TCM Renaissance and the Global Movement for Integrative Health and Medicine. *The Journal of Alternative and Complementary Medicine* 23 (2): 79–81.

Wharton University Pennsylvania. 2020. ‘Ticking Time Bombs’: China’s Health Care System Faces Issues of Access, Quality and Cost, Wharton University Pennsylvania. Accessed February 17, 2020. https://knowledge.wharton.upenn.edu/article/ticking-time-bombs-chinas-health-care-system-faces-issues-of-access-quality-and-cost/
WHO (2018), The Change We Bring, Progress Report 2016–2017, https://iris.wpro.who.int/bitstream/handle/10665.1/14164/WPR-2018-CHN-002-eng.pdf?ua=1

Wong, Dorcas. 2019. Investing in China’s Healthtech Industry. China Briefing, July 25. https://www.china-briefing.com/news/investing-chinas-healthtech-industry/

Wu, Shaolong. 2019. Effect of the Escalating China–US Trade War on Health Care. The Lancet, September 9.

Yakobovitch, D. 2020. How to Fight the Coronavirus with AI and Data Science. Towards Data Science, February 15. Accessed February 20, 2020. https://towardsdatascience.com/how-to-fight-the-coronavirus-with-ai-and-data-science-b3b701f8a08a.

Yao, Shujie, and Zhongyi Zhang. 2001. On Regional Inequality and Diverging Clubs: A Case Study of Contemporary China. Journal of Comparative Economics 29 (3): 466–484.

Zhang, J.J., and K.R. Smith. 2007. Household Air Pollution from Coal and Biomass Fuels in China: Measurements, Health Impacts, and Interventions. Environmental Health Perspectives 115: 848–855.

Zhao, Zhongwei. 2006. Income Inequality, Unequal Health Care Access, and Mortality in China. Population and Development Review 32 (3): 461–483.

Zhao, Xiao Bin, and S.P. Tong. 2000. Unequal Economic Development in China: Spatial Disparities and Regional Policy Reconsideration, 1985–1995. Regional Studies 34 (6): 549–561.

Zhou, Maigeng, Guojun He, Junning Liu, Peng Yin, Yichong Li, Haidong Kan, Maorong Fan, An Xue, and Maoyong Fan. 2015. The Associations between Ambient Air Pollution and Adult Respiratory Mortality in 32 Major CHINESE Cities, 2006–10. Environmental Research 137: 278–286.

Zhu, Jiangping. 2018. Through a Century: Traditional Chinese Medicine since 1912. Chinese Medical Culture 1 (1): 5–10.

Zhu, Dawei, Guo Na, Wang Jiang, Nicholas Stephen, and Chen Li. 2017. Socioeconomic Inequalities of Outpatient and Inpatient Service Utilization in China: Personal and Regional Perspective. International Journal for Equity in Health 16 (1): 210.