On Health Production and Demand: And Why an Effective Health Industry is Vital for China (and the Rest of the World)

1.1 Introduction

Health goods and services can be seen as inputs in a production function that has people’s health as the only output. While this is an intuitive and reasonable statement, it is also clear that in our societies the production of health goods and services have some other important additional “outputs”. Bearing this in mind, in this introductory chapter we aim to exploring other relevant rationales, referring to a multi-product production function, in which people’s health and “other outputs” are jointly produced and demanded. Given the general purpose of this book, we will in particular consider how, in the Chinese case, these “additional outputs” might be considered relevant (Di Tommaso et al. 2017, 2020; Rubini et al. 2017).
1.2 Health, Economic Productivity and Growth

Increases in population’s health status have often been considered to have a central and positive impact on countries’ economic performance (Barro 1996; Well 2007; De Bloom et al. 2004, only to cite some). “The-healthier-the-richer” model further implies that investing in population’s health would improve productivity, with the positive effect of boosting economic growth, income and economic wealth. The very intuitive assumption here is that improvements in health status of the nation’s population lead to a more productive workforce. The so-called “Preston curve” (Preston 1975), first elaborated by Samuel Preston in 1975, reveals a strong positive correlation between health and GDP (Preston 2003; Deaton 2004; World Bank 2007; Marmot 2006): countries with higher health status in general have higher incomes than countries with worse health status and this holds over time, as Fig. 1.1 shows for 2017.

In the case of China, population’s life expectancy, the most common proxy of a nation’s health status, has grown clearly in the last decades of accelerated industrialization and development. The growth has been

![The Preston curve, 2017. (Source: Authors’ elaboration on World Bank data)](image-url)
particularly rapid between the 1960s and 1970s, but life expectancy has gradually continued to grow at a pace which is comparable to that of advanced economies (Fig. 1.2).

Life expectancy at birth reflects the overall mortality level of a population. It summarizes the mortality pattern that prevails across all age groups—children and adolescents, adults and the elderly. At the world level, life expectancy continues to climb and it is projected to increase from 73.5 years in 2018 to 74.4 in 2022, “bringing the number of people aged over 65 globally to more than 668 million, or 11.6% of the total global population” (Deloitte 2019, p. 4). Similar growth trends are foreseen for China, as illustrated in Fig. 1.3.

In the light of these data, considering the trends in life expectancy and per capita GDP that is reasonable to expect for China, it is more than likely that, in the future, the country will converge to the pathos of richest western countries, even considering a world trend of gradual increase in life expectancy at world level (Fig. 1.4).

The nature of the relationship between health and economic growth is quite ambiguous, however, given that bidirectional causality is a very reasonable hypothesis. This hypothesis seems to hold also for the Chinese
case. On the one hand, it is clear that improvements in people’s health have contributed to the acceleration of economic growth, similar to what has also happened in many other national experiences (Pritchett and Summers 1996; Bloom and Canning 2000; Bloom et al. 2003, 2014). On
the other hand, it is indisputable that economic growth has determined a
general increase in people’s health status, as it has been again demonstrated
to have happened in the experience of many other countries (Cutler et al. 2006; Hall and Jones 2007; WHO 2002; Lange and Vollmer 2017).

Disentangling this causal relationship is very complex. Intuitive con-
siderations might be strong enough to suggest the validity of the bidirec-
tional causality hypothesis for China in the so-called “post-reform years”.
However, it is possible to shed more light on this causality by discussing
some specific features connected to China’s history of political, social and
economic structural change. This discussion might benefit from two spe-
cific groups on analyses. On the one hand, it is possible to find specific
contributions focusing on the relatively high level of people’s health sta-
tus at the beginning of Deng Xiaoping’s reform era (Rifkin 1972, 1973;
Wilenski 1976, 1977; Maru 1977; Blendon 1979; Sidel and Sidel 1982). On
the other hand, there are additional studies providing important
details about the nature of the relation between the successful economic
growth of the last post-reform decades and its impact on people’s health
(Yang et al. 1991; Smith 1993; Henderson et al. 1994; Bumgarner 1992;
Chen and Zhang 1996).

As regards the impact of health enhancements on growth, after 1949,
the health of the Chinese people has improved very rapidly over the past
three decades. This impressive trend has also been acknowledged by inter-
national observers: the World Bank called it “the first Chinese Health
Care revolution” (Jamison 1984). Life expectancy rose from 35 years old
in the early 1950s to almost 70 years at the very beginning of the Deng
Xiaoping era. Between 1950 and 1980, the infant mortality also fell dra-
matically, from 250 to 50 (per 1000 live births). This was the during
the era of the great fights against the epidemic diseases (smallpox, cholera,
venereal diseases) and the parasitic diseases (schistosomiasis, malaria),
which were still a serious issue in the China of the 1950s. In these decades,
China also went through an overall healthcare reorganization, which
assigned to community doctors and prevention a very important role.

Of course, these evident successes in managing health challenges
were not only the result of the “healthcare revolution”, but they were
also clearly connected to other general improvements and changes in
Chinese society: better education, nutrition and food availability and
distribution, water supply and sanitation (Jamison 1984). Thus, in this general scenario it might be properly argued that the growth experienced at the beginning of the Deng Xiaoping era might have also benefited in its initial stages from an evident improvement in people’s health status, which had been promoted in the previous decades.

To study the second relation, i.e. the impact of growth on health, we can instead focus on the post-reforms/opening-up years, at the beginning of the period of China’s impressive economic and social structural changes (see Chap. 2). In these years, the gap between China and more advanced countries has been almost entirely filled not only in terms of infant mortality (Fig. 1.5), but also according to other health status indicators.

For example, the improvements in the Chinese healthcare system and the effectiveness of the supply of healthcare services appear clearly considering the “Tuberculosis effective treatment coverage”. This indicator combines two more common indicators—treatment coverage and the treatment success rate—to estimate the proportion of tuberculosis (TB) cases that are both detected and successfully treated. It provides, therefore, an indication of the effectiveness of national tuberculosis programmes in finding, diagnosing and treating people with TB.

As Table 1.1 shows, in the international context, over the past two decades China has significantly improved both the level of coverage as well as the effectiveness of its TB coverage.

![Fig. 1.5 Infant mortality rates (per 1,000 live births). (Source: Authors’ elaboration on World Bank data)](image-url)
Another field where China has been progressing steadily, also as the result of a better healthcare system, is the maternal mortality ratio (Fig. 1.6). The ration shows the annual number of female deaths from any cause related to or aggravated by pregnancy or its management (excluding accidental or incidental causes) during pregnancy and childbirth or within 42 days of termination of pregnancy, irrespective of the duration and site of the pregnancy, per 100,000 live births, for a specified year. Even if the indicator is still high in comparison to the developed countries, it has been decreasing rapidly.

Over a timespan of just 15 years, China has been able to reduce the indicator by 53% between 2000 and 2015, and by a remarkable 72% between 1990 and 2015.

Another important indicator is the “Coverage of essential health services”, defined as the average coverage of essential services based on tracer interventions (including reproductive, maternal, newborn and child health, infectious diseases, noncommunicable diseases and service capacity and access, among the general and the most disadvantaged population) (Table 1.2).

|        | TT coverage (%) | TT effective coverage (%) |
|--------|-----------------|---------------------------|
|         | 2001            | 2010                      | 2016                      |
| Canada  | 87              | 37                        | 87                        | 68                        | 87                        |
| China   | 35              | 33                        | 87                        | 83                        | 87                        |
| France  | 83              | 83                        |                           |                           |                           |
| India   | 35              | 19                        | 44                        | 39                        | 63                        |
| Italy   | 87              | 35                        | 87                        |                           | 87                        |
| Japan   | 87              | 50                        | 87                        | 49                        | 87                        |
| UK      | 89              | 60                        | 89                        | 72                        | 89                        |
| USA     | 87              | 72                        |                           |                           |                           |

Source: Author’s elaboration on WHO data (http://apps.who.int/gho/data/node.main)
Table 1.2 Coverage of essential health services (2015)

| Country                        | UHC index of essential service coverage (%) |
|--------------------------------|---------------------------------------------|
| Canada                         | 80                                          |
| China                          | 76                                          |
| France                         | 80                                          |
| Germany                        | 79                                          |
| India                          | 56                                          |
| Italy                          | 80                                          |
| Japan                          | 80                                          |
| United Kingdom of Great Britain and Northern Ireland | 80 |
| United States of America       | 80                                          |

Source: Authors’ elaboration on WHO data
As can be seen from the above, in 2015, China is getting closer to the standards of the western countries, as a result of massive changes in national policies and funding for the sector (see Chap. 3).

Fullman et al. (2018) have designed a Healthcare Access and Quality (HAQ) Index, including “32 causes from which death should not occur in the presence of effective care to approximate personal health care access and quality by location and over time” (p. 2236). If we look at the results for China (Fig. 1.7), the overall improvements experienced by the country over the years stand out clearly, with a statistically significant 2.3% average annual improvement for the period 1990–2000 and 2.4% between 2000 and 2016.

However, the improvements have not been uniform across the country. As we will see in Chaps. 2 and 3, economic growth in China, which has been mainly concentrated in urban and coastal areas like Guangdong and Zhejiang, has not implied equally improved access to healthcare or better health status. Despite a rapid increase in total health expenditure in the first decade of the Deng Xiaoping era (10.9 percent per year between 1978 to 1993 (Bloom and Williamson 1997)), access to healthcare has not improved for the great majority of the Chinese people.

![Fig. 1.7 Healthcare access and quality (HAQ) index for China, various years. (Source: Authors’ elaborations on Fullman et al. (2018))](image-url)
Market reforms brought new opportunities of access to health goods and services for some population segments, but these new opportunities were mainly limited to people located in the coastal urban areas and in the capital, Beijing. For example, in the same period the percentage of the population without any kind of health insurance increased dramatically: from 29% in 1981 to 79% in 1993 (World Bank 1996). And these were mainly people living in rural areas.

Several other similar data might be analysed to highlight what has happened in those years of accelerated growth; taken together, however, they would all show that the economic growth plans designed by the government required for their implementation investment in health especially in specific urban areas, where the Chinese government decided to experiment and promote the gradual opening of the economy.

However, even if analysis focuses only on the experience of the coastal urban and industrializing areas to study the assumed positive relationship between growth and health status, some further specifications should be introduced. Market reforms have not only promoted rapid structural changes in the economy, but also caused a structural change in society, which, in turn, has had a negative impact on the health status of the population. People’s social behaviours have changed and new chronic diseases such as cancer, heart diseases and stroke have replaced other traditional infectious and endemic diseases as leading causes of deaths (Jamison 1984; Bumgarner 1992; Chen and Zhang 1996). China is now the country with the highest number of obese people in the world, with approximately 46% of adults and 15% of children being either overweight or obese (Wang et al. 2019; Feng et al. 2017).

In synthesis, with reference to the Chinese case, the economic growth–health relationship is probably more complex than is normally argued using macro or short-run data. It seems reasonable to suggest that the health status improvement of the Mao’s era has had a role in the forthcoming economic growth successes initiated in the Deng Xiaoping era. Furthermore, there is no doubt that in the following years economic growth successfully promoted with the opening of the economy to the rest of the world has gradually produced more income and wealth, with an intuitive positive impact also on the national level of health status. However, the peculiarities of the (unbalanced) experience of growth,
industrialization and economic development with *Chinese characteristics* began in the late 1970s have had an ambiguous impact on the health of the Chinese people. It is, in fact, realistic to suggest that the nature of the growth processes launched at the beginning of Deng Xiaoping’s reforms has, over the course of the following decades, sustained, and often exacerbated, social and territorial disparities, with a clear effect also on how different segments of the Chinese population access healthcare.

This differentiated access to healthcare services will result, of course, in a growing but equally differentiated domestic demand for health. On the one hand, a demand for quality expressed by the upper and middle classes, educated and highly-educated people living in the richest parts of the country, mainly in the main metropolitan areas. On the other, a less sophisticated demand for health, albeit one that is still huge in terms of quantity, has been expressed by those segments of the society who have so far remained excluded by many of the benefits associated with national economic growth and the general increases in income. We refer here not only to the millions of inhabitants of rural areas, but also to the millions of migrants who have moved from rural to urban areas living with limited access to health, education and other public goods or services.

1.3 Health, Development and Structural Change Sustainability

A second important relationship to consider when studying the health industry is that which exists between people’s health and the sustainability of economic change and development dynamics. Economic development can be described as a process of structural change of economies that unquestionably drives structural transformations in societies (Barandini and Scazzieri 1990; Deutsch and Syrquin 1989; Kuznets 1971; Machlup 1963; North 1981; Syrquin 1988, 2008). In this perspective, promoting economic development means encouraging the structural change of economies governing the interrelated structural change of societies. It is undeniable that processes of industrialization or servitization radically change the structure of an economy, but it is equally undeniable that they
also modify the shape of the underlying society. These kinds of transformations change the life of individuals, communities, cities and regions, and nations. They produce radical modifications in individual and social behaviours, life conditions and expectations, and, clearly, they also drive fundamental alterations in people’s needs and demand for goods, services and rights.

In this scenario, people’s demand for a better healthcare system and better health status is a crucial issue. Structural changes in the economy connected to processes of industrialization or servitization pull changes in the quantity and quality of health demanded by people that have changed their conditions of living. The emergence of new demands for health and, more than this, the possibility for people to find satisfactory responses to such new demands are central issues in all those process of economies’ structural transformations that always push parallel structural changes in societies. The suitability of the economic structural change is connected to the sustainability of structural change in society and in these dynamics health production capacity might play an important role. In other words, producing health has a central function in responding to the need of steering the structural changes of the society, which are, in turn, driven by processes of economic transformation and development.

In the case of China, as we recall in the previous paragraph and as we will further discuss in Chap. 2, in recent decades the economic achievements of the country have been possible thanks to the gradual and radical structural changes in the economy (Chen et al. 2011; Chu-yuan Cheng 2018; Di Tommaso et al. 2013; Guthrie 2012). In one decade, the country has moved from a rural-based and closed economy to an export-led industrialized country specializing in low value-added manufactured goods. Then, year after year and decade after decade, China has continued its incessant structural transformation, changing its specialization, entering in increasingly sophisticated production of goods and services, which are currently being sold both in the huge domestic market and all around the world. If today we look back at what China was four decades ago, the great transformation is astonishing: the structure of the economy has changed enormously, as has its geography and the composition of the labour market. China has successfully entered into new industries and new markets. New towns, cities and immense metropolitan areas have
emerged, fuelled by colossal flows of internal migration. Modern infrastructures have been built, revolutionizing the internal mobility of resources, goods and people and allowing the progressive integration of China to the rest of the world.

This immense process of the structural change of the Chinese economy and society have radically modified individual and community demands for goods, services and rights. Returning to the core of this book, it has produced a growing demand for more and better health status. The one-child policy, along with the improvements in people’s health conditions and life expectancy, is translating into a slow but steady increase in the old age dependency ratio, which is the number of people older than 65 in a population divided by the number of working age people. A lower ratio could allow for better pensions and better healthcare for citizens, while a higher ratio indicates a heavier financial burden on working people. As shown in Fig. 1.8, Japan, Europe and the US already have a high dependency ratio, which is supposedly indicative of the dependency burden on the working population (Ingham et al. 2009). China can still count on a

![Fig. 1.8 Old-age dependency ratio (ratio of population aged 65+ per 100 population 15–64). (Source: Authors’ elaboration on UN-WPP data)](image-url)
relatively low-dependency ration, especially if compared to the situation characterizing some western countries. However, the situation is rapidly changing and the economically active proportion of the population will soon be in need to provide for the health, education, pension and social security benefits of the non-working population. In fact, based on current estimates, the China’s elderly dependency ratio will keep rising, from 2010 to 2050, by an average of 0.8% per year and will reach 43.93% in 2050, as a combined effect of rapid fertility decline (since the 1970) and an increase in life expectancy (Hu et al. 2011, 2012). In general, the ageing population is a key characteristic of China, where “the size of the elderly population in China will grow steadily and rapidly in the next forty years and is expected to peak in 2050–2055. Even if the speed of population aging slows down afterwards, the aged will continue to comprise around 34 percent of the total Chinese population by the year of 2100” (Hu et al. 2011, p. 108).

The growth of income, but also the great transformations in people’s social conditions and behaviours, have gradually involved wider parts of population. This means that millions of people that have started to think about and demand for a better quality of life for themselves, for their children, relatives and families. A new multitude of ordinary consumers and a rapidly expanding middle class have started to express a demand for complex goods and services able to substantially improve the quality of their present and future life: better education, elderly and children care, improved working conditions, culture, entertainment and leisure time and attention for the environment. In this transformed setting, the demand for health has also, of course, grown rapidly in terms of quantity and quality.

The impressive economic structural change has driven a corresponding extraordinary social structural transformation, where Chinese people have progressively formulated new demands and expectations in terms of health status. It goes without saying that the sustainability of the economic change is strongly connected to the sustainability of social change (Barbieri et al. 2020; Di Tommaso et al. 2013). The latter is, in turn, limited by the capacity of offering to Chinese people a better quality of life that goes beyond higher income and consumption opportunities and that, by definition, includes access to an adequate quantity and quality of
health. This explains why, also in this perspective, the development of a competitive, efficient and innovative Chinese health industry able to respond to Chinese people’s expectations has to be considered a national strategic priority.

### 1.4 Health, People’s Satisfaction and Political Consensus

Following the lines of reasoning introduced in the previous paragraph, it is evident that the production and consumption of health are central subjects in the social and political arena of any country. People’s health status—and, even more importantly, people’s perception of their health status—has a clear impact on people’s life satisfaction (Helliwell et al. 2017, 2019). Countries, regions, metropolitan and rural areas where population are (or feel) healthier are also places where people tend to express more satisfaction with their lives. It is well known, in fact, that people’s health is one of the most valued aspects of life: everywhere and in every culture, people put health status at the top of what they believe to have the greatest impact on their quality of life, living standards and well-being (OECD 2011; Gerdtham and Johannesson 2001; Musschenga 1997; Smith et al. 1999). Those nations or regions where people have high life expectancy are also the places where people tend to feel more satisfied with their lives. It is for this reason that people are very interested in health system functioning and access: again, people are more satisfied in those places where, for example, first aid, emergency treatment and hospitals work better (Fig. 1.9).

As regards China more specifically, the data show that over the years, the increase in per capita GDP has generally corresponded to an increase in self-reported life satisfaction (Fig. 1.10). A quite evident counterrtrend is registered in the most recent years, when a further growth in GDP has corresponded to a decrease in life satisfaction. This might be due to the fact that, once a certain GDP threshold had been reached, the degree of life satisfaction of people is less related to wealth-related factors, thereby indirectly confirming the social structural change mentioned earlier.
In this setting, people that consider themselves to have access to “the desired” quantity and quality of health goods and services are probably more satisfied than others and they might be expected to translate this positive feeling into political consensus. Thus, it is reasonable to argue that, everywhere, the capacity of producing what people consider “the desirable quantity and quality of health” is one of the main pillars of the relationship between political power and citizenship. This is true in the European public systems but also in more market-oriented cases such as the US, where people’s happiness and satisfaction are still connected to their health status and to a well-functioning healthcare system. Wherever people live—both in market-based private health systems and in government-managed public systems—it is undeniable that health production capacity and access to healthcare play a relevant role when people express their support for the existing political system (Immergut 1992; Jacobs and Skocpol 2016; Rice et al. 2018; Jones et al. 2014; Cutler et al. 2010; Mitchell 2011; Saltzman and Eibner 2016; McKee et al. 2017). In this setting, people that consider themselves to have access to “the desired” quantity and quality of health goods and services are probably more satisfied than others and they might be expected to translate this positive feeling into political consensus. Thus, it is reasonable to argue that, everywhere, the capacity of producing what people consider “the desirable quantity and quality of health” is one of the main pillars of the relationship between political power and citizenship. This is true in the European public systems but also in more market-oriented cases such as the US, where people’s happiness and satisfaction are still connected to their health status and to a well-functioning healthcare system. Wherever people live—both in market-based private health systems and in government-managed public systems—it is undeniable that health production capacity and access to healthcare play a relevant role when people express their support for the existing political system (Immergut 1992; Jacobs and Skocpol 2016; Rice et al. 2018; Jones et al. 2014; Cutler et al. 2010; Mitchell 2011; Saltzman and Eibner 2016; McKee et al. 2017).
health systems supply and functioning is normally considered a priority. Returning to the first sentences of this chapter, producing people's desired quantity and quality of health has an additional outcome: people's satisfaction about the conditions of their living and about the place where they live. It is this kind of feeling which, in turn, has a central role in shaping people's political consensus or discontent.

These last considerations explain why, also from this perspective, the development of a competitive, efficient and innovative Chinese health industry is a strategic priority for the maintenance of China's status quo. Given that the Chinese government needs to gain and maintain political consensus, the growth of a strong national health industry able to satisfy the new demand for health is highly expected, since producing more and better healthcare is clearly functional to gain political continuity and sustainability.

This perspective is explicitly embraced by President Xi Jinping: “The all-round moderately prosperous society could not be achieved without people's all-round health,” (…) “China is facing health problems that occur in developing countries as well as developed countries,” (…) “If these problems are not
effectively addressed, people’s health may be seriously undermined and economic development and social stability will also be compromised,” (...) “Efforts should be made to boost the salary and treatment, development space, professional environment and social status of health workers so as to make them more active” (Xi Jinping’s Speech to the National Meeting on Health, 19 August 2016, Beijing).

1.5 On the Desirable and Acceptable Level of Health

In the previous paragraphs, we referred to people’s demand for health and their satisfaction in this field as crucial issue from many perspectives. In synthesis, we argued that satisfying people about the quantity and the quality of health to which they have access is important for structural change dynamics and for political consensus. Before moving further, it is worth spending a few words on this theme, adding some specifications on what could be defined as a desirable and acceptable level of health.

National health systems are in charge of transforming health (knowledge, goods and services) inputs in people’s health. With reference to what we discussed so far, the objective of any national or regional health systems is therefore to produce a “desirable level of health” for the population. Or, even better, to produce what population perceive as being “the desirable quantity and quality of health”.

However, what precisely constitutes an “acceptable quantity and quality” of health is an open question. This “acceptable” amount cannot be univocally quantified without reference to a long list of variables and dimensions, such as level of income, education, technology, but also people’s culture, history, civic traditions, rights, life expectations or participation in political life. Countries, regions, cities, rural and metropolitan areas might express radically different references on what should be “acceptable” (or not). And everywhere what is defined as “acceptable” is one of the possible outcomes in a process of negotiation between actors that normally have different bargaining powers, capacity of organizing their interests, ability of expressing their voices, knowledge and education.
However, given that societies cannot be considered homogeneous realities, the picture is even more complex than the one described above. Something should be said in terms of health distribution, or better, in terms of how “the acceptable amount of health” is distributed. Given that one regional or national health system is supposed to produce an amount of “acceptable health”, different population segments might show different capabilities to access some of what is produced: social, geographical, generational and gender disparities are only among the most common issues that remain to be discussed. Of course, these disparities in terms of accessing health have an impact on what is “acceptable” (or not) and on what different individuals perceive as acceptable (or not).

Going back to the specificity of our Chinese case, there is no doubt that the “acceptable” and “desirable” amount of health has to be discussed in thinking about the heterogeneity of conditions in which Chinese people live. One of the distinctive features of the consolidation of the “Capitalism with Chinese characteristics” has been the coexistence of several parallel processes of structural transformation that have involved, in diverse moments and with diverse velocity, different territories and different social segments. The Chinese “long march” of the last four decades has been orchestrated by Chinese leaders governing a process of structural change with first-runner actors leading the way and latecomers destined to follow the same path only in subsequent moments: a multi-velocity model that has implied the coexistence of a variety of different economic, social and institutional settings. Different kinds of Chinese people, cities and territories have all been involved in this titanic and continuous process of change in different years and decades, making heterogeneity one of the most astonishing distinctive features of contemporary China. Heterogeneity in terms of a long list of dimensions: great differences between people and territories in terms of income and wealth, education and knowledge, life expectations, culture, social behaviours, cosmopolitanism and exposure to foreign way of living vs local closure and isolation, formal and informal rights, political and social participation vs exclusion.

The disparities in China are to be found, first of all, between urban and rural areas, but also between the different parts of the country. Figure 1.11 captures both, illustrating how the disposable income is dramatically
lower in rural areas than in the cities, but also how the whole of the Eastern region, both urban and rural areas, benefits from higher levels of wealth than are to be found in the other macro-regions of the country.

Territories in China widely differ according to the education levels of the population (Fig. 1.12), with territories reaching illiteracy rates higher than 10% (with a peak of 43% for Tibet), alongside with provinces where the percentage of illiterate people is lower than 3%, such as Shanxi (2.77%), Liaoning (2.23%) or Beijing (1.95%).

Similar intra-country disparities among provinces also remain considering higher education levels. Figure 1.13 shows the number of graduates on total population by province. The best-performing areas show figures that are almost four times higher than the worst ones.

Such a great variety of conditions in China makes the notion of what can be considered the acceptable level of health highly variable and, by definition, debatable. To simplify, it is clear that a middle-class highly educated man in his fifties who lives in Shanghai and a working-class young lady in her twenties living in the rural area of Hubei will have very different expectations about what is the “acceptable level of health”.

In this scenario, how is it possible to define what is the acceptable level of health in the Chinese case? The quantity and the quality of what can
be considered acceptable is basically what the Chinese government decides to define as acceptable. In the above described multi-velocity model of structural change, the Chinese government has to date defined “differentiated levels of acceptability” thinking to different territories and to different kinds of people. Of course, in terms of the sustainability of structural change, in this field disparities have to be carefully governed. This kind of differences, in fact, makes the existing dynamic equilibrium—and the continuous structural change of the economy and of the society—vulnerable to potential collapses and fractures. One way of making socially sustainable a system that maintains very different rights
in the access to fundamental goods such as those related to healthcare is working in order to hide these disparities. Making mobility and communication between provinces problematic and controlled can be useful to maintain a status quo characterized by inequalities. Hindering the connections between suburbs of large metropolitan areas can also be functional to the persistent sustainability of disparities. Controlling information, media and news remains a very powerful tool in a setting characterized by uneven conditions of life. These are all expedients that can be used to defend a system that offers very different levels of health to different kinds of people living in very different conditions in different cities, metropolitan areas or regions. Propaganda, nationalism and populism are other potent instruments able to distract people from their real living conditions and from macroscopic disparities in terms of rights of access to fundamentals goods and services such as those related to healthcare.

These tools have been used by the Chinese government in the name of economic growth and with the promise of raising millions of people to a high level of income and consumption. A promise that has been maintained for at least 400 million of what today can be defined the Chinese middle class. However, discussing about possible future trajectories, this
kind of intervention supporting a multi-velocity model of change based on the persistence of inequality might make the existing equilibria very unstable. In particular, the potential of such a big middle class sharing similar conditions of life and expectations is immense. To date it has been quite fragmented, spatially dispersed and for these reasons still too weak to be able to self-organize its own common interests and translate them into demands to the government. However, the capacity of the Chinese middle class to self-organize is just a matter of time and, sooner or later, the above-mentioned traditional tools—in synthesis mobility and information control—are destined to make the contrast potentially explosive.

In this setting, today’s Chinese government has different options, ranged between two extremes. On the one hand, continuing to work following the consolidated path and attitude, lowering universal expectations and demands for health, accepting a model that offers different the quantity and quality of health to people and thus defending the status quo of disparities through employing the traditional tools of controlling mobility and information. On the other side, working on the redistribution among territories and social segments of the benefits associated to economic growth. This means investing in health production and therefore bridging the country towards a path of convergence in terms of universal access to healthcare.

Currently, what is evaluated as acceptable in terms of quantity and quality of healthcare is still decided by the Chinese government. A political central choice that might be supported by different goals and perspectives.

The first choice to be made is related to how the Chinese government wants today to promote its “Capitalism with Chinese characteristics”. In this model, is health for people a human right, available to all? Or, being more realistic, is health a right at least for the majority of the Chinese population? Has everyone (or at least a great majority of the Chinese people) the right to the best attainable standards of physical and mental health, which includes access to all medical services, sanitation, adequate food security, decent housing conditions, healthy working conditions and a clean environment? This big question is connected to an even bigger question on the future evolution of Chinese state-led capitalism. How will the benefits of the achieved economic wealth be translated into
people’s prosperity for the majority of the Chinese population? Is distributed and diffused people’s prosperity the final goal of “Capitalism with Chinese characteristics”?

Second, recalling again the relationship between health and growth, the Chinese government is strongly interested in providing that amount of health that can maximize workers’ productivity and economic growth. Up to now accelerated and uninterrupted high rates of economic growth have been the main goal for Chinese policymakers. Political continuity has so far required incessant economic growth and growth needs health. These considerations lead directly to the important role that health plays in favouring the (economic and social) sustainability of structural change. Also in this perspective, the Chinese government will continue to carefully evaluate the proper quantity and quality of health to be offered (differentiating among regions, social classes, generations, gender, etc.). The challenge is meeting (and shaping) the expectations about what is an acceptable level of health expressed by the different segments of the Chinese society.

Third, the decision of moving towards a system where high levels of good health are accessible to larger portions of population is a prerequisite for the continuity of the political system and of its leadership that, of course, needs consensus even in a country which does not hold democratic elections. In this field, the immense Chinese middle class, so far fragmented and heterogeneous by genesis and nature, might find unprecedented unity. This kind of consideration can become very complex, opening a discussion on why so far the Chinese middle class has not demanded and obtained democracy, and especially on what we might expect in the future (Fukuyama 2014). What seems quite clear is that economic growth and the rise in income and consumption are no longer enough. This is probably more than evident to the Chinese leadership, especially in the aftermath of the new 2020 coronavirus epidemic: the supply of a better health to a larger number of people is one of the main challenges to meet in order to maintain and defend the continuity of the existing political status quo.
1.6 Health is Not Like Other Simple (Private) Goods

Health per se is not a public good. The health status of each person is a private good in the sense that, in general, one individual is the primary beneficiary of his/her own good or bad health condition. In terms of the goods and services that are necessary to provide and sustain health, such as food, shelter and use of treatments, “health” is often rival and excludable among individuals.

However, it is important to recall that there may be some (positive or negative) externalities resulting from one individual’s health status, such as exposure to communicable diseases. Preventing one person from catching a communicable disease (or treating it successfully) benefits the individual concerned and also reduces the risks of transferring the infection to others. In other words, preventing one person from getting communicable diseases (or treating them successfully) produces a significant positive externality to the entire community by reducing their risk of contracting the infection. Both the 2002 SARS and the 2020 coronavirus epidemics have shown that such externalities have impacts not only in the country where they originate, but can easily cross national boundaries and become international emergencies.

In other words, in all of the instances of communicable diseases, “producing health” for one person has a positive effect on the entire community, starting from where this person lives, works, travels, spends his/her leisure time. Any healthy person living in a community, thanks to his/her good health status, produces positive externalities beneficial to others. Vice versa, any unhealthy person in a community, because of his/her bad health conditions, produces negative externalities that are harmful to others. In these positive and negative effects to the others we can find one of the rationales for public intervention. In fact, decisions about treatments or prevention measures cannot be left only to individuals, who might be disincentivized to act properly, given that the main benefits would accrue to others. In these cases the individual health status is strongly connected to the community health status.
Moreover, it is important to underline that even if communicable disease prevention and control policies are non-rival in their effects (one person’s lower risk of contracting a disease does not limit the benefits of that lower risk to others), their implementation practices require excludable inputs (i.e. vaccination, condoms) and non-excludable inputs (i.e. knowledge, know-how in treatment).

Now, how are these issues relevant to China?

Many of the recent new epidemic diseases (SARS, avian influenza, novel coronavirus) have had their origins in China. There are several interpretations of the reasons why this is the case. Such interpretations include food tradition and culture, way of living influenced by high population density, massive rural–urban migrations with increasing health challenges and the need to share space in close proximity (Wang et al. 2008). Live poultry markets have been indicated for instance as a major source of infection for some subgroups of avian influenza (Zhang et al. 2014; Wang et al. 2014), calling in general for new regulations and quality standards for live animal markets.

In this scenario, whatever the mix of reasons that has made China particularly vulnerable to explosions of communicable diseases, it is clear that China authorities cannot underestimate this topic.

1.7 The Value of Producing Health: Big Data

Producing and offering health today—doing research, administering drugs, treating patients, experimenting new cures, monitoring citizens to prevent diseases, etc.—has the effect of producing (big) data.

The health-related Big Data sector is a new and fast-growing strategic industry. Exploiting the opportunities offered by data collection and processing depends on many factors—technology, computerization diffusion, organization, education quality, research expertise, knowledge in managing data consistency, standardization, and reliability—and it is revolutionizing the entire sector.

The great change has arrived from health professionals that today, in the most advanced realities, have become capable of recording, collecting and using massive amounts of data and looking for the best strategies to
use these numbers. Big Data in healthcare refers to the immense quantities of digitalized information related to people (individuals, families, communities and the entire population) useful to foster the capacity to learn and to understand illnesses, to cure diseases, to improve diagnosis and treatments, to prevent epidemics, to cut down costs, and so on.

A prodigious transformation has also arrived from patients, who are themselves potential source of priceless Big Data. Think, for example, to the potential capacity that today people have in collecting data on their own thanks to wearable equipment and devices. This is a revolutionary practice not only for research, but also for medicine. Few sporadic minutes per year in front of family doctors is nothing in comparison with people’s capacity of collecting data thanks to user-friendly wearable devices. New generations of portable devices can longitudinally monitor one person’s health status to provide a much more accurate view, which in turn may help predict a disease state or sliding into a disease state with the advantage of being be able to intervene sooner to prevent it. Many examples confirm that this revolution has already started in many fields. Blood pressure portable equipment or glucose monitors that people can today wear in connection with digital apps are common, cheap, light but powerful data collectors.

Moving back to the Chinese case, it is clear that China might exploit enormous advantages in this field. Given the convergence in terms of social behaviours and conditions of millions of Chinese people with a western lifestyle, in China it is possible to collect data related to the most diffused diseases of our global present. It is evident that as China’s population has radically transformed its way of living, new (for China) serious and chronic diseases (such as diabetes, respiratory illness and cancers) have become increasingly common. In this new and fast-growing big data industry, China can be sure to compete at the global level because of the size of its population. Given that for many diseases China has now become home to a large proportion of the worldwide cases, treating such a high number of patients is, per se, a source of immense value, because of the capacity of collecting and processing Big Data. With this structural competitive advantage, China might emerge as one of the giants of contemporary health industry and medicine.
In this scenario, the big challenge is, first, building an adequate digital infrastructure to facilitate the integration of the main actors of the healthcare filière: patients, physicians, hospitals, laboratories, universities, research centres, laboratories, etc. Digitalization and connectivity are the main policy goals. And in the field of infrastructure China has already shown to the world its catching-up capacity (motorways, internet, etc.). Hospitals in China are switching quite rapidly from paper records to electronic health records and the challenge now is to connect the system at the national level with laboratory, universities, research centres, physicians and, of course, patients. Another challenge is related to Big Data processing techniques, but also in this case there are no reasons to think that China cannot be able to lead the way at the global level. Processing this data to improve research-based healthcare has the potential to have a direct effect on the lives of millions of people (in China and abroad).

In this perspective, Big-Data advantages are not just connected to production and collection. The use of Big Data is a complex learning process that implies huge investments in people’s education. On the one hand, investing in doctors, nurses, researchers and other healthcare actors’ capacity to reading and elaborating on the huge quantity of data generated and “harvested”. And, on the other hand, encouraging the population to work on knowledge-based self-prevention, self-checking, self-testing, self-exams to be always shared with healthcare competent actors.

Needless to say, of course, this process of support to the growth of the health-related Big Data industry has a great impact on the evolution of the national law system. Information on health are very sensitive personal and community data. Making these Big Data a public good for public health purposes has very complex implications in terms of people’s rights and legal protection. In the future, China might follow different trajectories in this field, but it is clear that health-related Big Data production, collection and utilization is about technology, digitalization, methodological data processing capacity and also about building a new infrastructure of legal rules and procedures.
1.8 The Health Industry Perspective

According to what has been discussed so far, the development of an efficient, effective and innovative health industry should be considered very important in general, and a strategic priority with reference to the Chinese case.

Even if the overall goal of the health system, i.e. producing what a specific society considers an “acceptable level of health”, is the undetermined outcome of a continuous process of negotiation among different social actors, it is still very important to have an efficient system, so that the “acceptable level of health” is produced with the minimum level of expenditure. At the same time, it is also central to claim effectiveness in the health system, such that the minimum level of costs is also associated with the maximum quality of health produced.

In other words, what is an “acceptable amount of health” to be produced should be discussed thinking about other intuitive, but important considerations. It is desirable to understand not only what people demand, but also what could be offered to the population. Recalling technology limitations, resource scarcity or opportunity costs, suggests rephrasing our “core sentence” again as follows: the objective of national or regional health systems is to produce an “acceptable level of health” at the minimum cost possible, given the existing resource and technology constraints (see, for example, Cochrane 1972).

In this perspective, one country has the goal of promoting its national health industry being efficient and effective first of all in its capacity of producing what is considered “the acceptable quantity and quality of health” at the lowest possible costs. In this sense the health industry is seen as a sector that includes all of the different actors—companies, institutions, hospitals, ambulatories, labs, universities, insurances, etc.—that together offer goods and services to respond to people’s demand of health (Di Tommaso and Schweitzer 2005).
1.8.1 The Main Actors in the Health Industry

The health industry comprises a large number of interconnected actors that produce both health services and manufactured goods. It is possible to divide them into three main groups: healthcare providers, financiers and manufacturers.

Healthcare providers consist of both institutional and community-based organizations. Institutional organizations are hospitals, nursing homes, mental hospitals, and so forth, while community-based organizations include ambulatory care clinics, community-based medical practices, home-based care programmes such as visiting nursing and home-based hospice services.

The ownership of such institutions varies from country to country. In some countries, such as those in Europe, most hospitals are government-owned, while in the US most hospitals are private, though some are owned by state or local governments. In most countries, community-based physicians are independent entrepreneurs, but in some other nations they are civil servants, employed by the government. In recent years, there has been a substantial shift in the locus of care from institutional providers, such as hospitals, to home-based care programmes.

As far as China is concerned, there have been massive changes in the supply of healthcare services in the country in recent years.

Figure 1.14 shows that the number of hospital beds available per 10,000 inhabitants has been constantly increasing over the past decade. China has already surpassed several western countries in this domain (according to WHO data, in 2012 the number of hospital beds per inhabitant in China was higher than Italy, the UK or the USA) and the situation is likely to improve further in the future. In 2017, the Chinese hospitals had approximately 6.12 million beds, with an increase of 0.43 million beds with respect to the previous year (NBS 2018). The number of private hospitals in China has also increased, doubling to a total of 18,759 in six years, from 2011–2017 and which now account for 60.4% of Chinese hospitals.²

One key problem remains the “substantial inequities in the geographical distribution of healthcare resources” measured by hospital bed density
in different Chinese provinces, reflecting different local economic development and public sector investment (Pan and Shallcross 2016). As Fig. 1.15 illustrates, there are provinces, such as Xianjiang, Liaoning or Sichuan, where the number of available beds is more than 50% higher than in other provinces, such as Tianjin.

The second category of health industry actors includes healthcare financiers.

The current health expenditure (CHE) as a share of GDP is an indicator on the level of resources channelled to health relative to other uses. The ratio shows the importance of the health sector in the whole economy. It indicates the societal priority assigned to health, measured in monetary terms. As shown by Fig. 1.16, India and China still lag behind the industrialized countries, but progress made by China in the recent years are remarkable.

What distinguishes the different approaches in countries is the way in which the CHE is financed. The national healthcare financial systems, in fact, can be private, public or quasi-public. The United States is
Fig. 1.15  Number of beds in medical institutions, per 1,000 population, by province, 2017. (Source: Authors’ elaborations on NBS (2019))

Fig. 1.16  Current health expenditure (CHE) as percentage of gross domestic product (%). (Source: Authors’ elaboration on WHO data)
remarkable for funding over half of national health expenditures through private health insurance firms. According to the US Census Bureau, in 2018 8.5% of population were uninsured. Among the insured citizens, the private health insurance plans accounted for 67%, while the remaining 33% were covered by public plans (Berchick et al. 2019), mainly the Medicare programme for the elderly and the 50 state Medicaid programmes for the indigent. In other countries, although the public financing of healthcare predominates, private insurance coverage is expanding and the share of privately financed healthcare is increasing. Therefore, even if the relative proportions of public and private financing differs between the US, European countries, and Japan, most financing programmes in industrialized countries are, in fact, mixed, with both public and private funding coexisting. In some cases, as the US or Canada, total expenditure is mostly based on private efforts (see Fig. 1.17).

The share of domestic private expenditures on health of the level of total current health expenditures indicates how much of the health system is funded domestically by the private sector. Private sector funds stem from households to corporations and non-profit organizations. This kind of expenditure can be either pre-paid, by means of voluntary health insurance, or paid directly to healthcare providers. The indicator describes

Fig. 1.17 Domestic private health expenditure (PVT-D) as percentage of current health expenditure (CHE) (%). (Source: Authors’ elaboration on WHO data)
the role of the private sector in funding healthcare relative to public or external sources.

As far as China is concerned, the role played by public spending has increased significantly, while private expenditure dropped from nearly 80% in 2000 to less than 40% in 2015. This is a clear sign of the efforts made by the government to introduce a public and universalistic system (as described in Chap. 3).

The third group of actors operating in the healthcare industry is comprised of health product manufacturers. These firms are well known for manufacturing pharmaceuticals and diagnostic and therapeutic medical equipment, such as radiology and dialysis machines, and laboratory testing equipment.

Even if the rate of globalization of the three main groups is different, the manufacturing filière is clearly globalized. As with other sectors of the economy, in the case of health-related industries, low value added and highly polluting productions traditionally locate in less developed countries. Nevertheless, in more recent years this picture has been gradually changing, and countries such as China and India are establishing themselves as global players, increasingly able to climb the value added ladder and to provide national and international markets with high-tech products and advanced services. In the case of China, this shift has been possible also thanks to a massive effort of the government on the strengthening of the domestic innovation capacity (see Chap. 5 for a deeper focus on this aspect). Behind this choice lies the awareness of the intertwined relation between health and knowledge.

First, health systems are major generators of scientific knowledge, innovation and technological advancements that typically go beyond health-related sectors. Health system actors—thanks to highly sophisticated R&D activities and to unique learning processes occurring during practices carried out in hospitals and specialized labs—produce relevant positive economic externalities and cross-fertilizer spill-overs to other sectors, clusters and filière. Health industries might therefore lead the way to countries’ and regions’ innovation paths offering a quite unique contribution to growth, economic development, competitiveness and employment (see Chap. 3).
Second, in a similar perspective, health industries are R&D-intensive sectors, which can provide goods and services for global demand and hence produce valuable export earnings. In this sense, the health industry might favour the development of export-oriented paths of growth, innovation, job creation (see Chap. 2).

In the specific case of China, the health industry can play a pivotal role in promoting the technological upgrading of the country, supporting economic growth and increasing the population’s well-being. As highlighted in the previous paragraphs, an increase in population health has both economic and socio-political impacts. In the case of China, the government considers the improvement in health and living conditions of Chinese people to be a fundamental step to be achieved in the march towards a fully developed and harmonious country.

As Chaps. 2 and 3 illustrate, the government has been supporting a complete restructuring of the healthcare system promoting a universal model for all citizens along with an efficient and effective industry. Indeed, the modernization of China and the growth of the domestic industry might significantly affect the patterns of the global industry, thanks to the rush to innovation and request for modern products and services (as analysed in Chap. 3), the international exposure of Chinese firms (as described in Chap. 4) as well as the growing attention of the government towards knowledge production and international scientific collaborations (as highlighted in Chap. 5).

Notes

1. The case of the US is emblematic from it has become a main banner for the opposition as well as for the subsequent victory and mandate of Trump’s administration.
2. http://www.nhfpc.gov.cn/yzygj/s3585/201804/aeafaa4fab304bd-d88a651dab5a4553d.shtml
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